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Need-Based Justice and Distribution Procedures

Need, Equity, and Accountability

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Evidence on Third-Party Distributive Decisions from an Online Experiment

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Abstract: We report the results of a vignette experiment with a quota sample of the German population in which we analyze the interplay between need, equity, and accountability in third-party distributive decisions. We asked subjects to divide firewood between two hypothetical persons who either differ in their need for heat or in their productivity in terms of their ability to chop wood. The experiment systematically varies the persons' accountability for their neediness as well as for their productivity. We find that subjects distribute significantly fewer logs of wood to persons who are held accountable for their disadvantage. Independently of being held accountable or not, the needier person is always compensated with a share of logs that exceeds her contribution, while the person who contributes less is punished in terms of receiving a share of logs smaller than her need share. Moreover, there is a domain effect in terms of subjects being more sensitive to lower contributions than to greater need.

Keywords: Need, Equity, Accountability, Justice, Vignette Experiment

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1. Introduction

This paper contributes to the growing experimental social choice literature which was initiated by the investigations of subjects' individual and group distributive choices by Yaari and Bar-Hillel (1984) and Frohlich et al. (1987) (for overviews see, for example, Konow 2003, Traub et al. 2005, Konow 2009, and Gaertner and Schokkaert 2012). This literature shows that subjects' distributive preferences are pluralistic and context-dependent (Konow and Schwettmann 2016). Distributive preferences are pluralistic if they consist of multiple fairness criteria. They are context-dependent if the weight that is given to each criterion depends on institutional factors and personal traits. Apart from the two most important criteria equality and equity, *need* has also been identified as relevant in pluralistic justice theories (Konow 2001, 2003). Moreover, several studies (see, for example, Konow 2001 and Schwettmann 2009) have found that people's support for need-based fairness is balanced against accountability.

However, apart from these stylized facts, not much is known about the quantitative relationship between distributive principles like need and equity, on the one hand, and moderating factors like accountability, on the other hand. In this paper, we will contribute to filling this gap by reporting the results of a vignette experiment with a quota sample of the German population in which we analyze the interplay between need, equity, and accountability in third-party distributive decisions. Subjects, who were recruited by an online platform, were asked to divide firewood needed for heating in winter between two hypothetical persons who differed in their need for heat and their productivity in terms of their ability to chop wood (and thus to contribute to the total stock of firewood available). The experiment systematically varied the hypothetical persons' accountability for their neediness as well as for their lower productivity.

Our main results are as follows. Subjects distributed significantly fewer logs of wood to persons who were held accountable for their disadvantage in terms of exhibiting greater need or lower productivity. Independently of being held accountable or not, the needier person was always compensated with a share of logs that exceeded her[1] contribution, while the person who contributed less was punished in terms of receiving a share of logs smaller than her need share.

Regression analysis additionally revealed that the isolated impact of being accountable for greater need on the compensation granted was—in absolute terms—smaller than the impact of being accountable for lower productivity on the punishment received (the difference between the respective coefficients was insignificant, however). Moreover, we found significant interaction terms between the relative degree of a person's disadvantage and her accountability with respect to her compensation and punishment, respectively. In the setting where a person's disadvantage was due to greater need, her compensation increased (decreased) with increasing need if she was (not) held accountable. In the setting where a person's disadvantage was due to lower productivity, her punishment increased with decreasing contribution even if she was not held accountable, but the

1 Gender was not specified in our vignettes. We used a set of common German surnames to identify the protagonists.

marginal punishment (in terms of the differential slope of being held accountable) was much more severe. Hence, there is a clear domain effect in terms of subjects being more sensitive to lower contributions than to greater need.

The paper is organized as follows: Section 2 reviews the theoretical background of this study and introduces previous empirical research on the matter. In Section 3, we outline the research design before presenting the data analysis and results in Section 4. Section 5 concludes the paper.

2. Literature Review

Needs play an important role in political theory (Doyal and Gough 1984,Weale 1984, Nussbaum 1992, Dean 2013), as a policy goal (Esping-Andersen 1990, Boarini and d'Ercole 2006), and are deeply linked with conceptions of the welfare state (Dean 2002, Plant et al. 2009). Because of their fundamental nature—they refer to the basic conditions for human existence— needs have also been proposed by many as the principal normative grounding for human rights (see, for example, Brock 2005, Gasper 2005, and Renzo 2015). As a distributional criterion, need also features prominently in positive justice research (see, for example, Frohlich and Oppenheimer 1990, Scott et al. 2001, Konow 2003, Michelbach et al. 2003, Scott and Bornstein 2009, Liebig and Sauer 2016), suggesting that voters, too, care about needs.

A need can be understood as an amount of some good that a member of society requires in order to *avoid harm* (Miller 1999).[2] Some needs are biological (for example, the amount of calories a person should consume every day), while many others are social in nature (for example, the amount of money necessary to participate in social life). What separates needs from mere wants is, among other things, that the former are based on a socially shared understanding (Miller 1999). That is, for someone's want to become a need, others must *acknowledge* that it is necessary for her in order not to be harmed. As an inter-subjectively acknowledged threshold, needs provide a fundamentally different basis of social justice than other criteria, such as equality, equity, and the Rawlsian maximin principle.

In line with Konow (1996, p. 28), equity is understood here as a variant of Aristotle's proportionality principle, which relates a person's entitlement to her *contribution*: "[. . .] the output [. . .] should be allocated in proportion to the discretionary component of the participant's input, for example, in proportion to productive work effort". Hence, in equity theory (Homans 1958, Adams 1965), this principle is often called the "contribution principle" (compare Diederich 2020).

Our understanding of accountability is based on Konow's "principle of accountability". He states that this principle "calls for allocations to be in proportion to volitional contributions" (Konow 2001, p. 138) and that "individuals are only held accountable for factors they may reasonably control" (Konow 2001, p. 142).

2 For an overview on philosophical approaches to need-based justice, see Siebel and Schramme (2020) as well as Miller (2020).

In the context of distributive justice, one might also think of luck egalitarianism, which argues that someone being worse-off than others can only be justified if she is not accountable for her situation. The effects of "brute luck", therefore, should be compensated, while those resulting from "option luck" do not qualify for compensation (see, for example, Temkin 1993, Knight 2009, Cohen 2011, and Tan 2012; an experimental investigation on attitudes towards compensation and risk-taking can be found in Cappelen et al. 2013a). Theoretical considerations in economics are also relevant. For example, Cappelen and Norheim (2005, 2006), Cappelen and Tungodden (2006), and Cappelen et al. (2010) investigated the possible relevance of accountability for liberal egalitarian theories of justice.

From an empirical point of view, Konow (2009) highlighted that many empirical and experimental studies have found preferences for unequal distributions, giving room for principles other than equality (for some examples that also include the principle of need, see Deutsch 1975, Leventhal 1976, Lerner 1977, Lamm and Schwinger 1980, Deutsch 1985, Scott et al. 2001, and Cappelen et al. 2008).

Concerning need, subjects have been found to prefer distributions that grant a minimum income to everyone. For example, Ahlert et al. (2012) have reported great support for the need principle in terms of "truncated utilitarianism" or a "truncated split" in a modified dictator game. Frohlich and Oppenheimer (1992) have demonstrated that maximizing the average income with a floor constraint is the overwhelmingly preferred distributive principle by groups (also see Frohlich et al. 1987).

Concerning accountability, Weiner (1993) has found that it leads to greater reward or punishment. Weiner and Kukla (1970) have also demonstrated that lack of effort is punished more severely than lack of ability. Skitka and Tetlock (1993a,b) have shown that personal ideological orientation influences whether it has an impact on distributive decisions. Conservatives are in favor of withholding public assistance to people who are accountable for their predicament while liberals tend to help everyone. Konow (1996) has found support for the assumption that persons are only held accountable for variables they can control (for example a person's work effort).

Moreover, there are some studies that explore need and accountability in combination. Lamm and Schwinger (1980) investigated the influence of social proximity and accountability, calling it "the perceived causal locus of the needs" (p. 426). However, they did not find a significant influence of accountability on distributive choices. Gaertner and Schwettmann (2007) used questionnaire-experimental studies to assess subjects' justice evaluations for scenarios that involved trade-offs between basic needs on the one hand and efficiency or accountability on the other hand. Incorporating a more efficient choice alternative often led to decisions against the needy person. Introducing personal accountability (in terms of having an innate or acquired handicap) had, if at all, a rather weak impact on justice evaluations. Using a charity game, Buitrago et al. (2009) explored whether it makes a difference if the causes of neediness were known or not, including cases in which neediness was self-inflicted by low effort. They did not find a significant effect, concluding that "help attitudes may result from idiosyncratic preferences, which are unaffected by the causes of neediness" (p. 83).

In contrast to this, Konow (2001) found that telephone and questionnaire survey par-

ticipants' support for need-based justice was balanced against both accountability and efficiency. Schwettmann (2012), using a questionnaire study, presented respondents with distribution problems that required them to distribute a resource between two groups, providing them with information on benefit, need, efficiency, and accountability. He found strong support for need-oriented distributive choices that were not influenced by concerns for efficiency. Accountability, though, had a significant impact on distributive decisions. When a group was accountable for a shortage of supplies, fewer respondents decided to lift its members up to the need threshold. Furthermore, Cappelen et al. (2013b) has found evidence for the influence of need (represented by subjects from low-income countries) and accountability (represented by "entitlement" through real-effort tasks) in a dictator game.

Skitka and Tetlock (1992) have investigated the influence of the causes of neediness on subjects' readiness to help others. They concluded that subjects "are least likely to help victims whose need is attributed to internal-controllable causes—such as carelessness, laziness, greed, and self indulgence" (pp. 496f.). This conclusion is supported by other studies, which all find that performance and accountability have an influence on the support for need as a distributive criterion (see Wagstaff 1994, Farwell and Weiner 1996, and Scott and Bornstein 2009).

A considerable literature deals with medical interventions that can obviously be considered as situations of (basic) need satisfaction. Ubel et al. (2001) investigated the influence of accountability on hypothetical decisions for the allocation of transplant livers (also see Neuberger et al. 1998). Those who were accountable for their illness received the transplant less often. Diederich and Schreier (2010) have confirmed the relevance of accountability for prioritization in health care using a mixed-methods design (also see Diederich et al. 2014). Similar results have been obtained by Betancourt (1990), Karasawa (1991), Murphy-Berman et al. (1984), Turner DePalma et al. (1999), and Yamauchi and Lee (1999). Annas (1985) and Stanton (1999) have shown the relevance of accountability for the allocation of scarce life-saving technology. Finally, Fowler et al. (1994) have shown that clinical services directed at patients that can be held accountable for their illness were considered a lower priority.

In summary, apart from a small number of exceptions, the literature finds—in a wide range of different scenarios—a significant negative impact of a person's accountability for her neediness on other persons' willingness to distribute resources to her. This paper contributes to this literature by reporting the results of a vignette experiment with a quota sample of the German population that analyzes the interplay between need, equity, and accountability in third-party distributive decisions.

In the following section, we introduce the design of our vignette experiment. As noted by Konow (2003), vignette experiments provide a flexible and easily controllable way to present relevant contextual information to subjects. In particular, the empirical social choice literature, pioneered by Yaari and Bar-Hillel (1984), relies on such designs to study preferences for distributions in hypothetical scenarios (overviews are given by Schokkaert 1999, Schwettmann 2009, and Gaertner and Schokkaert 2012). As suggested by Konow (2003, 2005), subjects acted as impartial decision-makers in order to avoid self-serving bias. Like Schwettmann (2012), we used heating in winter as a background story. The

accountability framing followed Diederich and Schreier (2010), who also used smoking and hereditary factors as causes for a disease, as well as Skitka and Tetlock (1992), who also named the disregard of a doctor's warning and a gene defect as causes for low and high accountability.

However, most of the above mentioned experimental social choice studies (for example, Gaertner and Schwettmann 2007, Schwettmann 2012, and Ahlert et al. 2012) are based on sets of predefined choice alternatives in terms of distributions of resources among two or more persons that correspond to certain *normative* distributive principles (such as egalitarianism, Rawls' maximin criterion, and truncated utilitarianism). That is, in these settings, subjects or groups make choices between standards of behavior that were devised by experts. Like in a beauty contest, the standard of behavior that is met with the greatest approval from subjects is declared the winner.

A distinct advantage of this expert driven approach is its ability to provide direct tests of certain axioms and normative theories of distributive justice (see Frohlich et al. 1987 for a prototypical experiment; see Bauer and Meyerhuber 2019, 2020 for considerations on the interplay of empirical research and normative theory). A drawback of this approach is that such preselections may involve a researcher's bias (Ahlert et al. 2012). Related to the previous argument, people's opinions about distributive justice frequently are in conflict with these traditional norms and assumptions (see Schokkaert 1999; also see Amiel and Cowell 1999 and Traub et al. 2005). Moreover, as noted by Ahlert et al. (2012, p. 980), rankings of *monistic* distributive principles according to their approval by subjects in choice experiments do not adequately reflect the fact that "pluralism of distribution principles is the predominant outcome of many empirical investigations" (also see Konow 2003).

Consequently, although this study has been heavily inspired by the aforementioned literature, we took a different path by letting subjects freely choose how much of a given resource they want to distribute among two persons who differ in their need, productivity, and accountability (this procedure is similar to Question 3 in Konow 2009). Hence, whether or not these endogenously determined distributions meet certain distribution principles is an outcome of the experiment. The main goal of this paper is to quantitatively measure the impact of giving information on accountability on subjects' distributive decisions while systematically varying recipients' need and productivity.

3. Experimental Design

In the vignettes, we asked subjects to imagine two persons, denoted "Person A" and "Person B", who do not know each other (for the instructions and the exact wording of the vignette see Appendix A). Subjects were told that these two persons heat their homes exclusively with firewood and that both have enough logs in stock to survive the upcoming winter. Nonetheless, they need additional firewood so that they will not feel cold. With this in mind, the community allows them to chop wood in the community forest for a certain period of time. Both A and B have little money and, therefore, they have no other means of getting firewood or heating material.

The subjects' task was to distribute an exogenously given number of logs among A and B. In order to justify unequal distributions of logs, we introduced heterogeneity between A and B with respect to their *need* for logs, their *productivity* in terms of the number of logs contributed, and their *accountability* for their situation. In the following, we call the framing of the vignette with respect to need and productivity *scenario* and the framing with respect to accountability *treatment*.

The experiment consisted of two treatments (accountability framings). In the High Accountability Treatment, subjects were told that Person A had continued to smoke heavily against the advice of her doctor, which caused a metabolic disease. This is the reason why she needs a higher room temperature (being accountable for greater need in the Need Scenario) or has chopped less wood (being accountable for lower productivity in the Productivity Scenario). In the Low Accountability Treatment, Person A suffers from a *congenital* metabolic disease, which is why she needs a higher room temperature (hence not accountable for greater need in the Need Scenario) or has chopped less wood (hence not accountable for lower productivity in the Productivity Scenario).

Subjects were randomly assigned to one of the two treatments in the beginning of the experiment. That is, the treatment effect of the *source of heterogeneity*—high or low accountability—on subjects' distributive decisions were measured at the between-subjects level. In both treatments, all subjects were presented both scenarios in randomized order. Hence, the impact of the *type of heterogeneity*—need or productivity differences—on subjects' distributive decisions were measured at the within-subjects level.

Each scenario consisted of five different *cases* that were presented separately to each subject. The cases varied the amount and distribution of needs and contributed logs. Subjects were shown the number of logs contributed by Person A and Person B (productivity), the number of logs needed by A and B (need), and the total number of logs. Subjects were then asked to distribute the logs between the two persons according to what they thought to be most just. We let subjects distribute the logs freely, without providing predefined or default options. However, subjects always had to allocate all available resources to A and B.

Table 1 shows the parametrization of the vignette by scenario and case.[3] As shown in the table, the Need Scenario provided both persons with 1000 logs (equal constant productivity), but different needs. For example, in case 2, A's (B's) need of 1400 (800) logs was greater (smaller) than her productivity of 1000 logs, and their joint need of 2200 logs was greater than their total productivity of 2000 logs. Likewise, the Productivity Scenario attached an equal constant need of 1000 logs to both persons, but varied their productivity. For example, in case 2, A's (B's) productivity of 800 (1400) logs was insufficient (more than sufficient) to meet her need of 1000 logs, and their joint productivity of 2200 logs was sufficient to meet their total need of 2000. Note that in both scenarios, Person A was always in the *disadvantaged position*, that is, she was more needy or less productive than Person B.

First and foremost, we are interested in how the accountability treatment influences

3 A sixth case per scenario, which we dropped from the analysis, was used only as a consistency check.

Table 1: Parametrization of the Vignette by Scenario and Case

Case	1	2	3	4	5
Need Scenario					
Need A	1800	1400	1000	700	600
Need B	1200	800	400	200	100
Total	3000	2200	1400	900	700
A's Need Share	60%	64%	71%	78%	86%
Productivity Scenario					
Productivity A	1200	800	400	200	100
Productivity B	1800	1400	1000	700	600
Total	3000	2200	1400	900	700
A's Prod. Share	40%	36%	29%	22%	14%

Need Scenario: Number of logs needed by Person A, B, and overall while keeping productivity constant ($A = B = 1000$ logs). Productivity Scenario: Number of logs contributed by Person A, B, and overall while keeping need constant ($A = B = 1000$ logs). Subjects were presented both scenarios in randomized order and all five cases of each scenario also in a randomized order.

the share of logs that is (re)distributed to Person A, given her need and contribution in relation to B's need and contribution. We expect subjects to punish Person A with a lower share of logs if she is more accountable for her disadvantage. Second, we are interested in what happens when relative need increases or relative productivity decreases. We hypothesize that subjects compensate A's increasing need relative to B (A's need share) when moving from case 1 to 5 of the Need Scenario by distributing a higher share of logs to her. Analogously, we hypothesize that subjects punish A's decreasing contribution relative to B (A's productivity share) when moving from case 1 to 5 of the Productivity Scenario by distributing a lower share of logs to her. Finally, taking into account interactions between accountability treatment and scenario, we hypothesize that subjects' sensitivity towards A's increasing need share (decreasing productivity share) is positively correlated with her accountability.

Since subjects received only a flat payment, we promoted internal validity by asking three control questions after the distribution task in order to make sure that the subjects read the instructions carefully and actually understood the task.[4] Only those who passed at least two out of three checks were included in the final analysis.

In order to control for subjects' heterogeneity with regard to their socio-demographics and justice attitudes, we asked them, in a post-experimental questionnaire, for their age, gender, and equivalent household net income;[5] and to state their support for three differ-

4 For the wording of the control questions, see Appendix B.

5 Several authors demonstrated that individual attitudes and socio-demographic characteristics, such as gender, matter for justice evaluations (compare, for example, Schokkaert and Capéau 1991, **?**,

ent distributive principles—need, equity, and equality (compare, for example, Skitka and Tetlock 1992 and Mitchell et al. 1993) as well as their evaluation of Person A's accountability for her situation on a 7-point Likert scale. We also assessed subjects' perceived locus of control in a similar way[6] and collected information on subjects' health status (dummy variables for being a smoker and suffering from a cardiovascular or metabolic disease)[7] and their political orientation (using a 7-point Likert scale ranging from 1 (most left-wing) to 7 (most right-wing), see Appendix B for wordings).[8]

The experiment was programmed in oTree (Chen et al. 2016) and conducted online in September 2019. Respondents were recruited via the private market research institute *respondi*, which enabled us to draw our sample from a database representative of the German population. For reasons of external validity,[9] we chose to run our study with a quota sample based on three characteristics: gender, age, and equivalent household net income, with a sample-size of $n = 200$.[10]

The 200 subjects who passed the control questions were paid a flat fee of 4.90 euro, equal to 9.80 euro per hour. A further 203 subjects who failed to pass the control questions did not receive any payment and were excluded from further analysis (it was announced by *respondi* in the beginning of the experiment that failure to answer the control questions correctly would lead to exclusion from the study without payment). The enormous amount of dropouts shows that general population samples without performance-related incentives can potentially generate a lot of noise in the data. Hence, relatively strict exclusion criteria should be applied.

Before conducting the main experiment, we tested the efficacy of the vignette with respect to the accountability framing. In the pretest, subjects were simply asked to rate Person A's accountability for her situation on a scale from 1 to 10.[11] The pretest was conducted with paper and pencil and involved 82 students at Helmut Schmidt University Hamburg in January 2019. 53 subjects were randomly assigned to the Need Scenario, 29 to the Productivity Scenario, and all of them were treated with both the Low and High Accountability framings (that is, in contrast to the main experiment, we used a within-subjects treatment for the accountability framing and a between-subjects treatment for

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Davidson et al. 1995, Scott et al. 2001, Amiel and Cowell 2002, Michelbach et al. 2003, and Jungeilges and Theisen 2005).

6 Fong (2001) found a correlation between subjects' support for income redistribution and their belief that success is determined by factors outside of our control (also see Phares and Lamiell 1975).

7 Ubel et al. (2001) found that smokers tend to punish unhealthy behavior regarding the need for transplant organs less often than subjects who never smoked (also see Diederich and Schreier 2010).

8 Skitka and Tetlock (1992) found conservatives to be less likely to help people whose needs result from internal and controllable factors. Wagstaff (1994) reported that left-wing oriented individuals make more egalitarian distributive choices (also see Mitchell et al. 1993).

9 On the importance of a sample being representative if empirical research is considered as relevant for normative theory, see Schwettmann (2020).

10 For a breakdown of the sample by gender, age, and income, see Table 3 in Appendix D.

11 For the pretests' wording and instructions, see Appendix C. The results are displayed in Figure 5 in the Appendix.

the scenario).[12] In both scenarios, the mean difference of subjects' accountability judgment was significantly greater for the High than for the Low Accountability Treatment.[13] Hence, the pretest clearly confirmed that subjects attribute higher accountability to persons who disregard their doctor's warning.

4. Results

We begin the presentation of the results with subjects' responses to the accountability question posed in the post-experimental questionnaire. In order to interpret the results of this study in terms of Person A's accountability for her disadvantage, it is necessary to establish that the accountability framing actually worked. As noted in the previous section, the vignette design had already been successfully tested in a pretest, though with a student sample. Next, we turn to our main research question, whether and how the accountability treatment influences the share that is distributed to Person A. Third, we analyze how the scenario, that is, the source of Person A's and Person B's heterogeneity, influences subjects' distributive decisions. Finally, we report the results of a regression analysis that quantifies the treatment effects as well as their interactions and additionally controls for subjects' socio-demographics and attitudes. Figure 1 shows subjects' mean judgment of Person A's accountability for her greater need and her lower productivity on a 7-point Likert scale. A two-tailed t-test confirms that, in both scenarios, the bar representing the High Accountability Treatment is significantly larger than the one representing the Low Accountability Treatment.[14] Hence, as already suggested by the pretest, the vignette was effective for inducing a low and a high accountability frame in subjects with respect to Person A's disadvantage. Moreover, Figure 1 indicates that there is no significant difference in subjects' mean judgment of Person A's accountability between Need and Productivity Scenario. A pairwise two-tailed t-test cannot reject the null hypothesis of equality of the mean accountability judgment.[15] Hence, we conclude

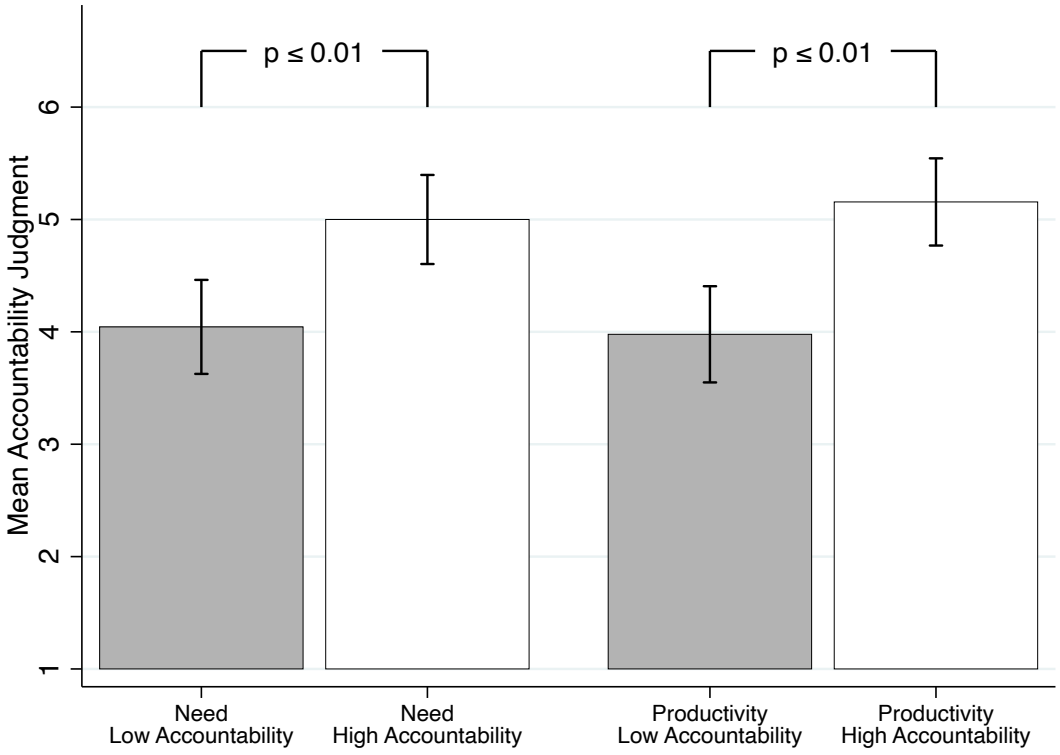
12 Although the two different versions of the questionnaire were evenly distributed in a large classroom before students entered the classroom in order to attend a lecture, the case numbers of the pretest are not balanced due to group formation in the classroom.

13 Need Scenario, High Accountability Treatment: mean = 8.53 (90% CI = $[8.14, 8.92]$), Low Accountability Treatment: mean = 2.85 (90% CI = $[2.25, 3.45]$), mean difference = 5.68 (90% CI = $[5.07, 6.29]$), $p \leq 0.01$; Productivity Scenario, High Accountability Treatment: mean = 8.90 (90% CI = $[8.30, 9.50]$), Low Accountability Treatment: mean = 3.90 (90% CI = $[2.92, 4.88]$), mean difference = 5.00 (90% CI = $[3.78, 6.22]$), $p \leq 0.01$; pairwise two-tailed t-test (within-subjects treatment).

14 Need Scenario, High Accountability Treatment: mean = 5.00 (90% CI = $[4.72, 5.28]$), Low Accountability Treatment: mean = 4.04 (90% CI = $[3.75, 4.34]$), mean difference = 0.96 (90% CI = $[0.55, 1.36]$), $p \leq 0.01$; Productivity Scenario, High Accountability Treatment: mean = 5.16 (90% CI = $[4.88, 5.43]$), Low Accountability Treatment: mean = 3.98 (90% CI = $[3.68, 4.28]$), mean difference = 1.18 (90% CI = $[0.78, 1.58]$), $p \leq 0.01$; two-sample two-tailed t-test (between-subjects treatment).

15 High Accountability Treatment, Need Scenario vs. Productivity Scenario: mean difference = -0.16 (90% CI = $[-0.31, 0.02]$), $p = 0.104$; Low Accountability Treatment, Need Scenario vs. Productivity Scenario: mean difference = 0.07 (90% CI = $[-0.18, 0.31]$), $p = 0.659$; paired-sample two-tailed t-test

that it did not matter to the subjects whether A's disadvantage was caused by need or productivity differences.



The figure shows subjects' mean judgment of Person A's accountability for her greater need (lower productivity) in the Low (High) Accountability Treatment using a 7-point Likert scale. Larger numbers mean greater accountability. The grey (white) bars represent $n = 91$ ($n = 109$) observations each. Error bars represent 90% confidence intervals for the mean. p value of a two-tailed two-sample t-test (between-subjects).

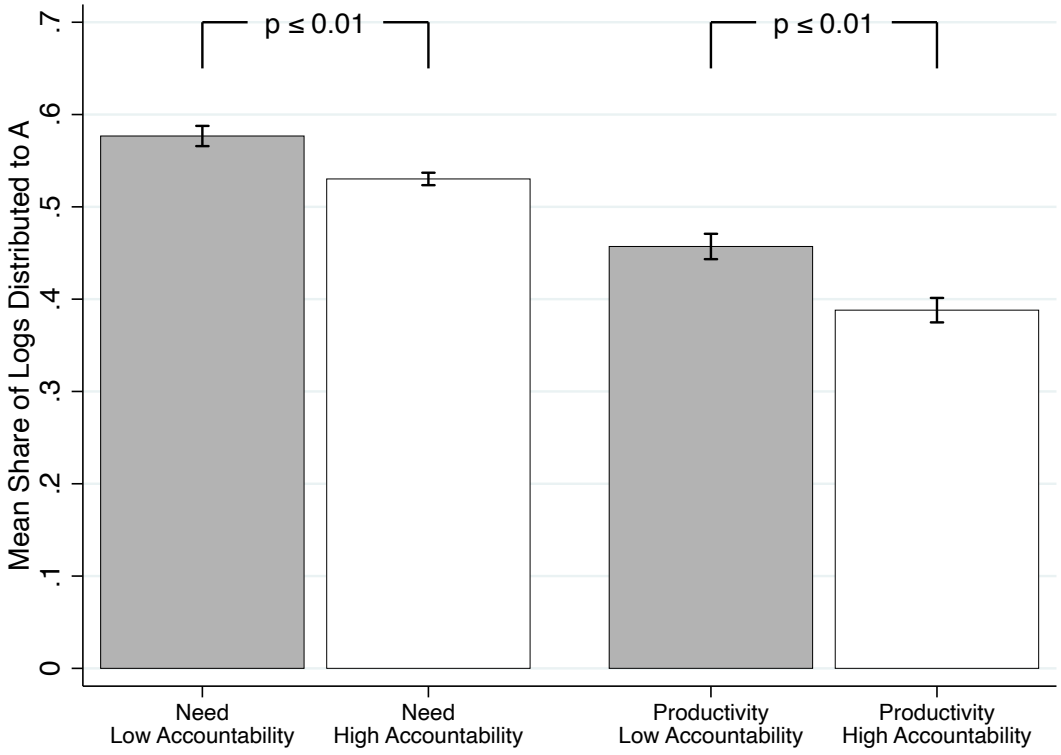
Figure 1: Mean Accountability Judgment by Treatment and Scenario

In Figure 2, we turn to our main interest, namely, the impact of the accountability treatment on the share of logs distributed to Person A. As expected, the bar chart reveals that subjects were willing to distribute significantly more logs to Person A under the Low Accountability Treatment.[16] Moreover, we see a difference between both scenarios. In the Need Scenario, subjects distributed—irrespective of the accountability treatment—*more*

(between-subjects treatment).

16 Need Scenario, High Accountability Treatment: mean = 0.53 (90% CI = $[0.53, 0.54]$), Low Accountability Treatment: mean = 0.58 (90% CI = $[0.57, 0.59]$), mean difference = $-.05$ (90% CI = $[-0.06, 0.04]$), $p \leq 0.01$; Productivity Scenario, High Accountability Treatment: mean = .39 (90% CI = $[0.38, 0.40]$), Low Accountability Treatment: mean = 0.46 (90% CI = $[0.45, 0.47]$), mean difference = -0.07 (90% CI = $[-0.08, -0.06]$), $p \leq 0.01$; two-sample two-tailed t-test (between-subjects treatment).

than 50% of the available logs to Person A.[17] That is, Person A received more than she contributed and, thus, she was compensated for her disadvantage. In the Productivity Scenario, in which both persons had the same need and Person A's disadvantage was due to her lower productivity, subjects distributed significantly *less* than 50% of the available logs to her.[18] That is, Person A's lower productivity was punished irrespective of the accountability treatment.



The figure shows the mean share of logs distributed to Person A by treatment (Low vs. High Accountability) and scenario (Need vs. Productivity). Each bar represents $n = 500$ observations. Error bars represent 90% confidence intervals for the mean. p value of a two-tailed t-t-testtest (between-subjects).

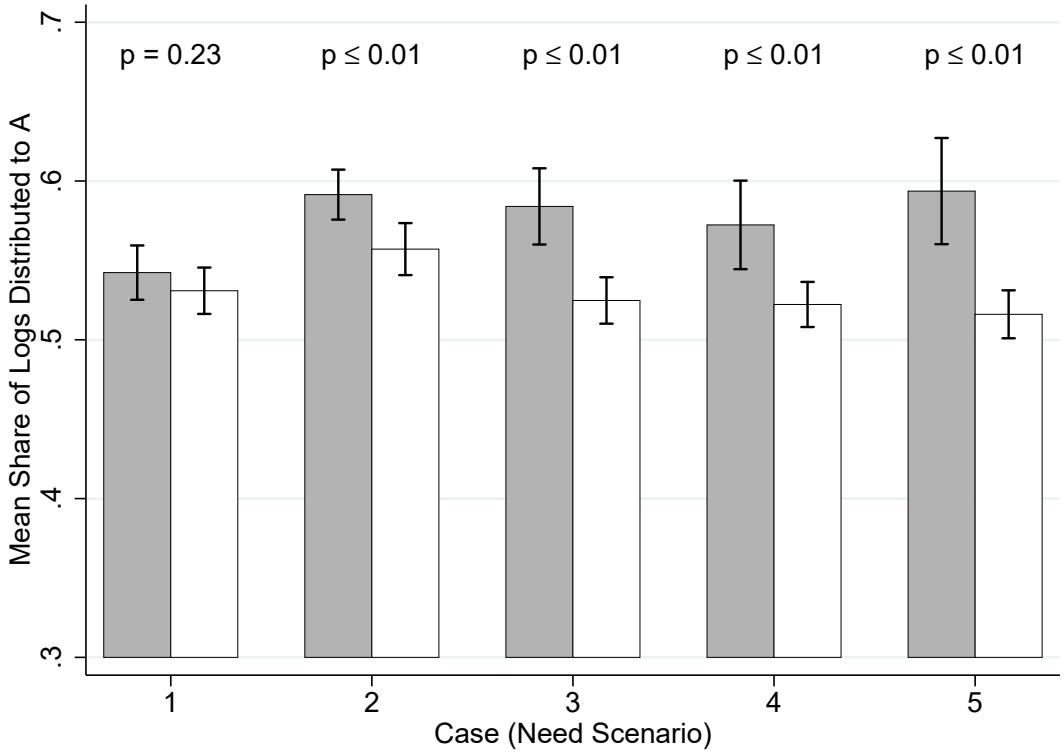
Figure 2: Mean Share of Logs Distributed to Person A by Treatment and Scenario

Figures 3 and 4 additionally provide a breakdown of subjects' distribution of logs to Person A by case. Apart from case 1 of the Need Scenario, all treatment effects of accountability are significant, which supports our preceding conclusion regarding the

17 Need Scenario, Low Accountability Treatment: mean = 0.58 (90% CI = $[0.57, 0.59]$), $p \leq 0.01$; High Accountability Treatment: mean = 0.53 (90% CI = $[0.53, 0.54]$), $p \leq 0.01$; one-sample t-test, mean tested against 0.5.

18 Productivity Scenario, Low Accountability Treatment: mean = 0.46 (90% CI = $[0.45, 0.47]$), $p \leq 0.01$; High Accountability Treatment: mean = 0.39 (90% CI = $[0.38, 0.4]$), $p \leq 0.01$; one-sample t-test, mean tested against 0.5.

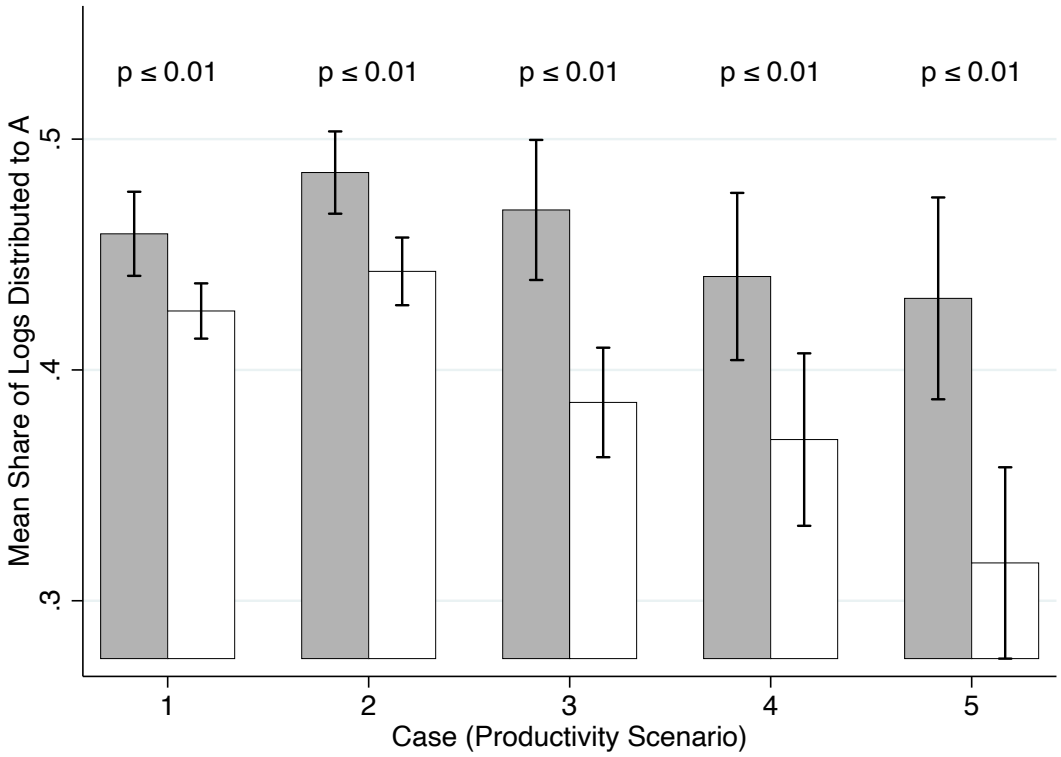
impact of accountability. As to the impact of A's need share on the share of logs she received (cases 1 to 5 of the Need Scenario), Figure 3 shows a positive slope for the Low Accountability Treatment, but a negative slope for the High Accountability Treatment. As to the impact of A's productivity on the share of logs she received (cases 1 to 5 of the Productivity scenario), Figure 4 shows that the decreasing productivity share of Person A induced subjects to distribute a lower share of logs to her. Here, high accountability led to a stronger decline of logs distributed to A than low accountability. On the whole, the data seems to support our expectations.



The figure shows the mean share of logs distributed to Person A by treatment (High vs. Low Accountability) and case (1–5) in the Need Scenario. The grey (white) bars represent $n = 91$ ($n = 109$) observations in the Low (High) Accountability Treatment. Error bars represent 90% confidence intervals for the mean. p value of a two-tailed t-test (between-subjects).

Figure 3: Mean Share of Logs Distributed to Person A by Treatment and Case in the Need scenario.

In order to quantify the impact of the source (accountability treatment), type (scenario), and extent (need or productivity share) of A's disadvantage on the share of logs she received, we performed a regression analysis, the results of which are displayed in Table 2. We report the results of an OLS panel regression with robust standard errors using the share of logs distributed to Person A (the number of logs she received normalized



The figure shows the mean share of logs distributed to Person A by treatment (High vs. Low Accountability) and case (1–5) in the Productivity Scenario. The grey (white) bars represent $n = 91$ ($n = 109$) observations in the Low (High) Accountability Treatment. Error bars represent 90% confidence intervals for the mean. p value of a two-tailed t-test (between-subjects).

Figure 4: Mean Share of Logs Distributed to Person A by Treatment and Case in the Productivity scenario.

by the total number of logs available) as the endogenous variable.[19] Regressions were performed separately for the Need Scenario (upper panel) and the Productivity Scenario (lower panel).

We performed 4 regressions per scenario. Model (1) only includes a dummy variable for the Accountability Treatment with "low" as the benchmark category $\{0 = low, 1 = high\}$. Model (2) separately estimates the impact of Person A's need and productivity share. Model (3) interacts the Accountability Treatment with A's need and productivity share. Finally, Model (4) includes a number of control variables. Estimates for the control variables can be seen in Table 4 in Appendix D.

19 As there was only a single right-censored observation in the Need Scenario and none in the Productivity Scenario, the use of tobit instead of OLS regression would not change the results reported below. The tobit regression tables are available from the authors on request.

Table 2: Share of Logs Distributed to Person A: Regression Results

	(1)	(2)	(3)	(4)
			Need Scenario	
Accountability	-0.047***	—	0.112***	0.126***
$\{0 = low, 1 = high\}$	(0.009)		(0.036)	(0.038)
A's Need Share	—	-0.007	0.113**	0.113**
$\{[0.60, 0.86]\}$		(0.028)	(0.050)	(0.050)
Accountability	—	—	-0.221***	-0.221***
× A's Need Share			(0.056)	(0.056)
Constant	0.577***	0.557***	0.496***	0.483***
	(0.008)	(0.018)	(0.031)	(0.046)
Control Variables	No	No	No	Yes
χ^2	27.6***	0.1	45.5***	152.0***
R^2	0.071	0.000	0.085	0.187
			Productivity Scenario	
Accountability	-0.069***	—	-0.152***	-0.125***
$\{0 = low, 1 = high\}$	(0.015)		(0.038)	(0.034)
A's Productivity Share	—	0.325***	0.166***	0.166***
$\{[0.14, 0.40]\}$		(0.046)	(0.060)	(0.060)
Accountability	—	—	0.292***	0.292***
× A's Prod. Share			(0.089)	(0.089)
Intercept	0.457***	0.328***	0.410***	0.320***
	(0.011)	(0.020)	(0.026)	(0.054)
Control Variables	No	No	No	Yes
χ^2	22.6***	50.1***	74.3***	320.5***
R^2	0.066	0.052	0.128	0.375

*The table reports the results of an OLS panel regression with robust standard errors. Endogenous variable: Share of logs distributed to Person A. First row: coefficients, second row: standard errors in parentheses. Control variables include Age, Gender, Equivalent Household Net Income, Smoker, Cardiovascular Disease, Metabolic Disease, Importance of Need, Importance of Equity, Importance of Equality, Locus of Control, Political Attitude (see Table 4 in the Appendix). Significance levels: * $p \leq 0.1$, ** $p \leq 0.05$, *** $p \leq 0.01$.*

Model (1) shows that the accountability dummy is highly significant in both scenarios. When Person A's health disadvantage is self-inflicted, the share of logs that is distributed to her is 4.7 (90% CI = $[3.2, 6.1]$) percentage points smaller in the Need Scenario and 6.9 (90% CI = $[4.5, 9.3]$) percentage points smaller in the Productivity Scenario. We see that subjects' punishment of Person A for continuing smoking against her doctor's advice exhibits a tendency to be more severe in the Productivity Scenario than in the Need Scenario. However, the mean difference (2.2 percentage points) is not significant (90% CI = $[-0.3, 4.8]$, $p = 0.149$, two-tailed t-test). As shown in Figure 1, such a difference could not be driven by different accountability judgments on the part of the subjects. Also note that the fact that the mean share distributed to Person A is about 12 percentage points greater in the Need Scenario than in the Productivity Scenario (mean difference = 12.0, 90% CI = $[10.0, 14.0]$, $p \leq 0.01$, two-tailed t-test) is simply due to productivity differences, as Person A always contributes 50% in the Need Scenario and, on average, only 28.3% in the 5 cases of the Productivity Scenario.

At first glance, Model (2), upper panel, indicates that there is almost no impact of Person A's need share on the share of logs she receives (estimated slope coefficient = -0.007, 90% CI = $[-0.053, 0.038]$, $p = 0.791$). However, this is compatible with Figure 3, which suggests that the positive and negative impact of A's greater need share in the Low and High Accountability Treatments cancel each other out. In contrast to this, the lower panel of the table shows that A's productivity share is positively related to the share of logs she receives. Each percentage point contributed by A to the total stock of logs is rewarded with an additional share of 0.325 percentage points (90% CI = $[0.249, 0.401]$, $p \leq 0.01$) distributed to her. To give a simple example, the point estimate for case 1, where A contributes 40% to total log endowment, is 45.8% (90% CI = $[45.0, 46.5]$). In case 5, where she contributes only 14%, it drops to 37.3% (90% CI = $[35.1, 39.5]$).

Introducing an interaction term between the accountability treatment and Person A's need share in Model (3) confirms our conjecture that A's need share has a positive impact in the Low Accountability Treatment and a negative impact in the High Accountability Treatment: When A's need share increases by 1 percentage point, the share of logs distributed to her increases (decreases) by 0.113 (90% CI = $[0.031, 0.195]$) ($0.113 - 0.221 = -0.108$, 90% CI = $[-0.151, -0.065]$) percentage points in the Low (High) Accountability Treatment. In fact, the point estimate for the share of logs distributed to A increases from 56.3% in case 1 (60% need share) to 59.3% in case 5 (86% need share) when Person A's disadvantage is due to a congenital disease; it decreases from 54.3% in case 1 to 51.5% in case 5 when her disadvantage is due to her unreasonable behavior with respect to smoking.

The lower panel of Table 2, Model (3), confirms the positive impact of Person A's productivity share reported in Model (2). However, the significant interaction term indicates that the relationship between A's productivity share and the share of logs she receives is much steeper in the High Accountability Treatment (where she is generally given fewer logs). The respective marginal effects are 0.166 (90% CI = $[0.067, 0.264]$) without and 0.458 (90% CI = $[0.351, 0.565]$) with interaction term. For instance, when A contributes only 14% to the total number of logs (case 5), the treatment effect of accountability is 11.1 percentage points; when she contributes 40% (case 1), the treatments effect of

accountability is only 3.5 percentage points. Putting it differently, the stronger the consequences of A's unreasonable behavior for her (relative) productivity, the stronger the subjects' punishment in terms of distributing fewer logs to her.

Comparing the interaction terms Accountability × A's Need Share (-0.221, 90% CI $= [-0.313, -0.129]$) and Accountability × A's Productivity Share (0.292, 90 % CI $= [0.147, 0.438]$) in Model (3) shows that, in absolute terms, high accountability has a slightly bigger impact on subjects' sensitivity to productivity and need changes in the Productivity Scenario than in the Need Scenario. However, the absolute difference of the marginal effects (0.071, 90% CI $= [-0.060, 0.202]$) is insignificant ($p = 0.374$, Welch test).

Model (4) shows that all treatment effects and interactions remain significant when control variables are included. As can be seen in Table 4 in the Appendix, age and equivalent household net income have a slight positive effect on the share of logs distributed to Person A in the Productivity Scenario. Gender is insignificant. Among the health-related control variables, only the smoker dummy exhibits a significant positive effect in the Productivity Scenario. In separate regressions, we also checked for interactions between smoker and accountability as well as smoker and A's Productivity Share, but the respective interaction terms are insignificant.[20] Hence, smokers' (53 of 200 subjects) willingness to distribute more logs to A than non-smokers is not related to A's accountability or her contribution.

Locus of control does not significantly affect subjects' distributive decisions. According to the political attitude variable, right oriented subjects distribute less to the disadvantaged Person A, but only in the Productivity Scenario. With regard to subjects' justice attitudes, we see, as expected, that support for the need principle leads to more distribution and support for equity leads to less distribution in both scenarios. Support for equality also has a positive impact on distributive decisions in the Productivity Scenario.

5. Conclusion

In this paper, we have reported the results of a vignette experiment with a quota sample of the German population in which we analyzed the interplay between need, equity, and accountability in third-party distributive decisions. Subjects, who were recruited via an online platform, were asked to divide firewood needed for heating in winter between two hypothetical persons who differed in their need for heat and their productivity in terms of their ability to chop wood (and thus their ability to contribute to the total stock of firewood available). The experiment systematically varied the disadvantaged person's accountability for her neediness as well as for her lower productivity.

The findings presented in the previous section support our main hypothesis that the disadvantaged Person A's accountability impacts subjects' willingness to compensate her for her greater need and her lower productivity. Subjects distributed significantly fewer

20 These regressions are not reported here to save space, but they are available from the authors on request.

logs of wood to Person A if she was held accountable for her disadvantage. Independently of being held accountable or not, the needier person was always compensated with a share of logs that exceeded her contribution, while the person who contributed less was punished in terms of receiving a share of logs smaller than her need share.

This result is in line with the vast majority of the experimental social choice literature briefly reviewed in Section 2 of this paper. For example, Schwettmann (2012), who also used a "heating-in-winter" scenario, found that when the disadvantage of the worse-off individuals was caused by their "careless behaviour" (p. 368), subjects chose significantly less often the options ("splits") that lifted the disadvantaged individual to the poverty line. He therefore concluded that "[a]lthough support for people in need continued to be high, a conflict between the principles of needs and responsibility clearly existed" (p. 372).

Schwettmann (2012) and related studies usually present subjects with an exogenously given choice set of distributions that correspond to specific distributive principles such as egalitarianism, Rawls' maximin principle, or truncated utilitarianism. Like in a beauty contest, the distributive principle that meets with the most approval from subjects is declared the winner. In our study, we took a different approach by letting subjects freely choose how many logs of wood they wanted to distribute to Persons A and B, who differed in their need and productivity. Eliminating the fixed choice set avoids a possible drawback of the expert approach, namely, researcher's bias (Ahlert et al. 2012), and leads to behavior more in line with subjects' rather pluralistic opinions about distributive justice (see Schokkaert 1999, Amiel and Cowell 1999, Konow 2003, Traub et al. 2005, Ahlert et al. 2012).

Apart from the main treatment effect of accountability, a regression analysis additionally revealed interesting differences between the two scenarios presented to the subjects. Notably, the isolated impact of being accountable for greater need (in the Need Scenario where productivity was equal and constant) on the compensation granted to Person A was—in absolute terms—smaller than the impact of being accountable for lower productivity (in the Productivity Scenario where need was equal and constant) on the punishment imposed on her. Assuming that equality of need and productivity are perceived as reference points, this result points to a gain-loss domain effect (Tversky and Kahneman 1991, also see Weiß et al. 2017) and an increased perceptual sensitivity (Trueblood 2015) to Person A's lower contribution (negative domain) than to her greater need (positive domain). Admittedly, the comparison of both regression coefficients was insignificant. Hence, further research is necessary to clarify the framing effect.

Our quota sample is representative of the German population with respect to gender, age, and income distribution. Regression analysis showed that smokers were willing to distribute more logs to the disadvantaged person in the scenario where she was less productive. Subjects who supported need as a distributive criterion generally distributed more resources to the disadvantaged person while subjects who supported equity distributed fewer to her.

This quantitative analysis of individual distributive preferences clearly shows that subjects trade off distributive principles like equity (contribution) and need against each other and take into account a person's accountability for her disadvantage. Hence, the

evidence presented here supports earlier studies on accountability and need-based justice (see, for example, Konow 2001 and Schwettmann 2009). It also supports the experimental social choice literature (see Konow and Schwettmann 2016) that posits that subjects' distributive preferences are pluralistic (in terms of consisting of multiple fairness criteria) and context-dependent (the weight that is given to each fairness criterion depends on, for example, institutional factors and personal traits). Finally, our results also underline the (sometimes underestimated) importance of need as a distributive criterion.

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A. Instructions of the Main Experiment

Welcome Screen

In this survey, we are interested in your personal opinion and judgment. Therefore, there are no correct or incorrect answers in this study.

You will probably need about 30 minutes if you work intently. It is important that you complete the study without interruption and without closing your browser. If you cannot avoid closing your browser, you can continue the study by clicking on the link in the invitation e-mail again.

We will analyze your answers together with the answers of all other participants in this study. All data will be stored in an anonymous format so that no participant can be identified. The results of the study will be published. They may influence future research and may be used to inform policymakers.

If you are editing this study on a smartphone, it is likely that some of the tables displayed will extend beyond the right edge of the screen. Hence, it is best to use "landscape mode" or scroll through the tables to view them in their entirety.

Thank you for participating!

Introduction

Your task is to distribute logs of wood.

We will present you with a number of different scenarios and ask you to imagine that they are real. Please take the time to put yourself in the position of the scenarios and come to a personal judgment.

In these scenarios, when moving from screen to screen, text that differs from the previous page is highlighted in blue. Text that is similar to that in the previous page is not highlighted in blue. Moreover, the numbers reported in the tables change from page to page.

Vignette Text and Treatments

Note: The surnames of the two persons, denoted by A and B in the following, were randomly drawn from a set of typical German surnames: A,B∈{Bauer, Becker, Fischer, Hoffmann, Klein, Koch, Meyer, Müller, Neumann, Richter, Schäfer, Schmidt, Schneider, Schröder, Schulz, Schwarz, Wagner, Weber, Wolf, Zimmermann}. The presentation of the information in the table was randomized (more productive/more needy person in upper/lower row, information on need and wood chopped in left/right column).

Please imagine two persons, A and B, who do not know each other. Both heat their huts exclusively with firewood and have enough logs in stock to survive in winter. However, they need additional firewood in order not to feel cold in winter. The community allows the two persons to chop wood in the community forest for a certain period of time. A and B have little money and therefore have no other way to get firewood.

[High Responsibility Treatment, Need Scenario]
A needs r and B needs s logs. If they get less than they need, it will get unreasonably cold in their huts. The less firewood they get, the colder their huts will be. The persons can use more firewood than they need to heat their huts up to pleasant temperatures or store it for subsequent winters.

Both A and B have chopped o logs.

A continued to smoke heavily against the advice of her doctor. Therefore, A is suffering from a metabolic disease, which is why she needs a higher room temperature. Therefore, A needs more firewood than B.

[High Responsibility Treatment, Productivity Scenario]
A and B both need r logs. If they get less than they need, it will get unreasonably cold in their huts. The less firewood they get, the colder their huts will be. The persons can use more firewood than they need to heat their huts up to pleasant temperatures or store it for subsequent winters.

A has chopped o logs and B has chopped p logs.

A continued to smoke heavily against the advice of her doctor and is suffering from a cardiovascular disease. That is why A has chopped less wood than B.

[Low Responsibility Treatment, Need Scenario]
A needs r and B needs s logs. If they get less than they need, it will become unreasonably cold in their huts. The less firewood they get, the colder their huts will be. The persons can use more firewood than they need to heat their huts to pleasant temperatures or store it for subsequent winters.

Both A and B have chopped o logs.

A suffers from a congenital metabolic disease, which is why she needs a higher room temperature. Therefore, A needs more firewood than B.

[Low Responsibility Treatment, Productivity Scenario]
A and B both need r logs. If they get less than they need, it gets unreasonably cold in their huts. The less firewood they get, the colder their huts will be. The persons can use more firewood than they need to heat their huts up to pleasant temperatures or store it for subsequent winters.

A has chopped o logs and B has chopped p logs.

A suffers from a congenital cardiovascular disease. Therefore, A chopped less wood than B.

So, both persons have cut q logs together. In the table, you can see how much wood they have chopped and how much firewood in terms of logs they need. Please enter in the free spaces how you want to distribute the firewood between the two persons in the way that you think is most just. Please distribute all q logs, that is, 100% to A and B.

There are n logs left.

Person	Chopped	Need	Should Receive	Percentage
A	o	r	**u**	x
B	p	s	**v**	y
Total	q	t	w	z

Note: o, p, $q = o + p$, r, s, $t = r + s$ are parameters of the experiment (see Section 3); u and v had to be entered by the subjects; $n = q - w$, $w = u + v$, $x = 100u/w$, $y = 100v/w$, and $z = x + y$ were automatically calculated while typing.

B. Additional Questions

Control Questions

Note: Options for questions 2 and 3 were displayed in randomized order.

Question 1: Please describe how often you reflect on justice issues in your daily life and what this means to you.

We ask this question to ensure that the tasks are read carefully. If you are reading this, please enter the number 42 in the field below instead of an answer to the question itself.

Have you ever reflected on justice issues?

Question 2: Which statements apply to this study? Multiple answers are possible.

☐ Farmers work a rye field.

☐ Farmers work a sunflower field.

☐ Farmers work a wheat field.

☐ Wood is needed to build a house.

☐ Wood is needed to heat in winter.

☐ Water is needed to run a mill.

☐ Water is needed to drink.

Question 3: What was the largest quantity of logs to be distributed in the previous scenarios?

☐ 44

☐ 55

☐ 770

☐ 3000

☐ 9999

☐ 55505

☐ 70777

Support for Different Distribution Principles

Note: Items were displayed in a randomized order.

Please indicate on the following scale from 1 to 7 how important the considerations below were for your distributive decisions. *1* stands for *not important at all*. *7* stands for *very important*.

- Each person should receive as much wood as they need.
- Each person should receive the wood they have chopped.
- Each person should receive the same amount of wood.

Locus of Control

Some people think that they have complete freedom of choice in how they live their lives; others think that they have no choice in how they live their lives. What do you believe to be true for yourself? How much freedom of choice do you have in how you shape your life? Please give your answer on a scale from 1 to 7. *1* stands for *no free choice at all*. *7* stands for *completely free choice*.

Political Orientation

In politics, one speaks of left-wing and right-wing. How would you generally describe your own political position? On a scale from 1 to 7, where would you rate yourself? *1* stands for *left*. *7* stands for *right*.

Person A's Accountability

How do you rate A's personal accountability for the smaller [higher] amount of wood she cut [needs]? Please give your answer on a scale from 1 to 7. *1* stands for *not responsible at all*. *7* stands for *completely responsible*.

Subjects' Health

- Do you currently smoke, for example, (e-)cigarettes, pipes, or cigars?
- Do you currently suffer from a cardiovascular disease or have you suffered from a cardiovascular disease in the past?
- Do you currently suffer from a metabolic disorder or have you suffered from a metabolic disorder in the past?

C. Pretest

Instructions of the Pretest

Please imagine two people, Schneider and Müller, who do not know each other. Both heat exclusively with firewood and have enough logs in stock to survive in winter. However, they need additional firewood in order not to feel cold during winter. Their community allows them to chop wood in the community forest for a certain period of time. Schneider and Müller have little money and therefore have no other way to get firewood.

[High Responsibility for Need Treatment]
Both Schneider and Müller chopped the same amount of wood. Schneider needs more firewood than Müller. If they get less than they need, it will become unreasonably cold in their huts. The less firewood they get, the colder their huts will be. They can use more firewood than they need to heat their huts to pleasant temperatures or store it for subsequent winters.

Schneider has continued to smoke heavily against the advice of her doctor. As a result, Schneider is suffering from a metabolic disease, which is why she needs a higher room temperature. Therefore, Schneider needs more firewood than Müller.

How do you assess Schneider's personal accountability for the higher amount of firewood she needs?

[High Responsibility for Productivity Treatment]
Both Schneider and Müller need the same amount of firewood. If they get less than they need, it will become unreasonably cold in their huts. The less firewood they get, the colder their huts will be. They can use more firewood than they need to heat their huts to pleasant temperatures or store it for subsequent winters.

Schneider has continued to smoke heavily against the advice of her doctor. As a result, Schneider is suffering from a cardiovascular disease. That is why Schneider has chopped less wood than Müller.

How do you assess Schneider's personal accountability for the smaller amount of wood she has chopped?

[Low Responsibility for Need Treatment]
Both Schneider and Müller have chopped the same amount of wood. Schneider needs more firewood than Müller. If they get less than they need, it will become unreasonably cold in their huts. The less firewood they get, the colder their huts will be. They can use more firewood than they need to heat their huts to pleasant temperatures or store it for subsequent winters.

Schneider suffers from a congenital metabolic disease, which is why she needs a higher room temperature. Therefore, Schneider needs more firewood than Müller.

How do you assess Schneider's personal accountability for the higher amount of firewood she needs?

[Low Responsibility for Productivity Treatment]
Both Schneider and Müller need the same amount of firewood. If they get less than they need, it will become unreasonably cold in their huts. The less firewood they get, the

colder their huts will be. They can use more firewood than they need to heat their huts to pleasant temperatures or store it for subsequent winters.

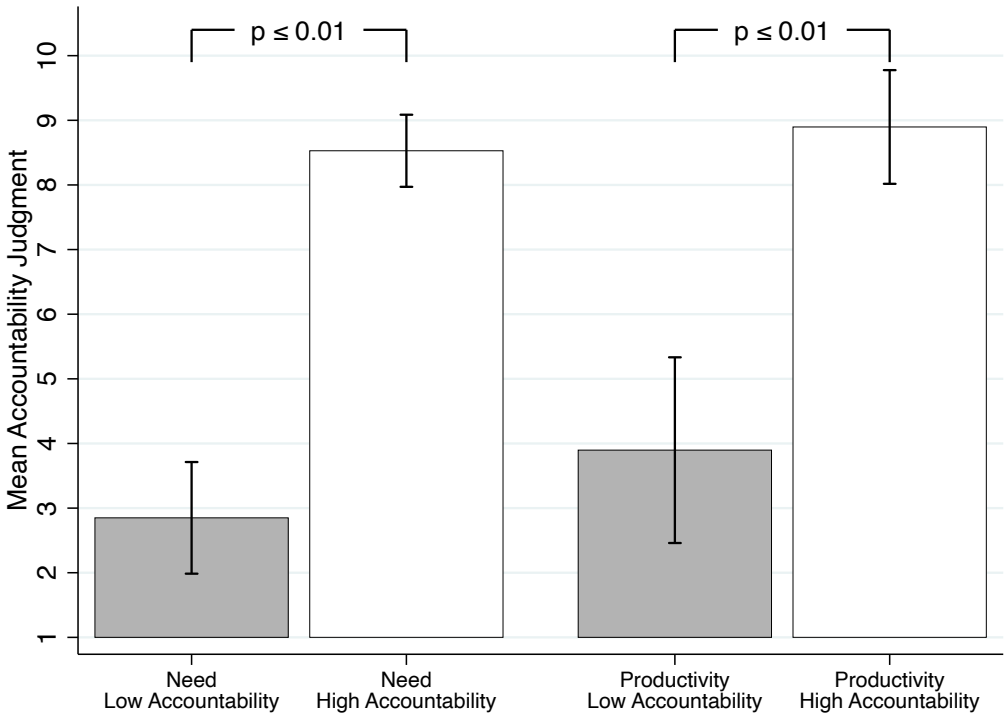
Schneider suffers from a congenital cardiovascular disease. Therefore, Schneider has chopped less wood than Müller.

How do you assess Schneider's personal accountability for the smaller amount of wood she has chopped?

Please give your answer on a scale from 1 to 10. *1* stands for *not at all accountable*. *10* stands for *fully accountable*.

not at all accountable									fully accountable
1	2	3	4	5	6	7	8	9	10
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Results of the Pretest



The figure shows subjects' mean judgments of Schneider's accountability for her greater need (lower productivity) in the low (high) accountability treatment using a $[1, 10]$ *scale. Larger numbers mean greater accountability. Bars represent* $n = 53$ *(*$n = 29$*) observations in the need (productivity) scenario. Error bars represent 90% confidence intervals for the mean. p value of a pairwise two-tailed t-test (within-subjects treatment).*

Figure 5: Pretest: Mean Accountability Judgment by Treatment and Scenario

D. Additional Tables

Table 3: Breakdown of Sample by Gender, Age, and Income

Gender		Age		Income Interval[a]	
Group	Share	Group	Share	Group	Share
Female	49.5	18–29	20.5	[0, 1100)	20.0
Male	50.5	30–39	18.5	[1100, 1500)	20.0
		40–49	19.0	[1500, 2000)	20.0
		50–59	24.0	[2000, 2600)	20.0
		60–69	18.0	[2600, ∞)	20.0

Share in percent. $n = 200$. [a] *Equivalent household net income.*

Table 4: Control Variables

	Need Scenario (4)	Productivity Scenario (8)
Age	0.0000493	0.000641*
$\{\sharp years\}$	(0.000267)	(0.000383)
Gender	-0.0113	-0.000814
$\{0 = female, 1 = male\}$	(0.00761)	(0.0116)
Equivalent HH Net Income	-0.000000370	0.00000264**
$\{euros\}$	(0.000000531)	(0.00000130)
Smoker	0.0103	0.0334**
$\{0 = no, 1 = yes\}$	(0.00944)	(0.0151)
Cardiovascular Disease	-0.00984	0.0177
$\{0 = no, 1 = yes\}$	(0.0112)	(0.0171)
Metabolic Disease	0.00354	-0.00164
$\{0 = no, 1 = yes\}$	(0.0146)	(0.0164)
Locus of Control	0.00225	0.000365
$\{1, \ldots, 7\}$	(0.00411)	(0.00627)
Political Attitude	0.00197	-0.0113**
$\{1, \ldots, 7\}$	(0.00327)	(0.00513)
Importance Need	0.0107***	0.00905**
$\{1, \ldots, 7\}$	(0.00241)	(0.00359)
Importance Equity	-0.0115***	-0.0134***
$\{1, \ldots, 7\}$	(0.00274)	(0.00422)
Importance Equality	-0.00350	0.0222***
$\{1, \ldots, 7\}$	(0.00240)	(0.00365)

*The table reports the results of an OLS panel regression with robust standard errors (control variables of models (4) and (8) in Table 2). Endogenous variable: Share of logs distributed to Person A. First row: coefficients, second row: standard errors in parentheses. Significance levels: * $p \leq 0.1$, ** $p \leq 0.05$, *** $p \leq 0.01$.*

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