

Winter is Coming

How Laypeople Think About Different Kinds of Needs

Alexander Max Bauer,^{a*} Jan Romann,^b
Mark Siebel,^a and Stefan Traub^c

^a*Department of Philosophy, University of Oldenburg, Oldenburg, Germany*

^b*Faculty of Technology, University of Applied Sciences Emden/Leer, Emden, Germany*

^c*Department of Economics, Helmut-Schmidt-University, Hamburg, Germany*

Abstract: Needs play a key role in many fields of social sciences and humanities, ranging from normative theories of distributive justice to conceptions of the welfare state. Over time, different conceptions of what counts as a need (i.e., what is considered a normatively relevant need) have been proposed. Many of them include (in one way or the other) needs for survival, decency, belonging, and autonomy. Little work has been done on how these kinds of needs are evaluated in terms of their significance for distributive justice. To begin closing this gap, we investigate the role of the four aforementioned kinds of needs for impartial observers. We do so in two empirical studies. The first study asks participants to evaluate the importance of each of the four kinds of needs separately. We find that different levels of importance are attributed to the kinds of needs, which places them in a hierarchy. The second study asks participants to make distributive decisions. Results further support the hierarchy found in the first study and, additionally, reveal that participants tend to make coherent allocation decisions.

Keywords: Basic Needs, Coherence, Distributive Justice, Equality, Equity, Rationality

* Corresponding author. Department of Philosophy, University of Oldenburg, Ammerländer Heerstraße 114–118, 26129 Oldenburg, Germany, alexander.max.bauer@uni-oldenburg.de. Telephone: +49 (0)441 798 2034. The authors were members of the research group “Need-Based Justice and Distributive Procedures” (FOR 2104) funded by the German Research Foundation (DFG Grants SI 1731/2 – 2, TR 458/6 – 2). We are indebted to the support and input throughout all project phases by participants of FOR 2104 meetings.

1. Introduction

Imagine that you were living in a cottage that you heated exclusively with firewood. Spring has given way to summer, summer has given way to autumn – and temperatures are starting to fall. Winter is coming, and, unfortunately, you are short on firewood. And now imagine that without additional firewood it would get so cold in your hut that you would probably become life-threateningly ill.

In this case, your physical integrity—something that pretty much all authors can agree counts as a basic need—is seriously threatened. Such needs have played a role in philosophy since antiquity (see, e.g., Pötzler 2021, who interprets Aristotle’s reflections on ἀναγκαῖον in his *Metaphysics* as related to basic needs; Aristotle 1933–1935, 1015a20–1015b15), they feature in the *Acts of Luke*, when the Christian community is described (see Bauer 2019a, p. 302f.; Luke 2016, p. 141f.), and they have repeatedly been emphasized in the history of thought (e.g., Marx 1969). In the last century, then, psychology (e.g., Maslow 1943, Alderfer 1972) and philosophy (e.g., Thomson 1987, Miller 1999, Hamilton 2003; for overviews see Brock and Miller 2019, Miller 2020, Siebel and Schramme 2020, as well as Pötzler 2021), among some other fields,¹ found new interest in the topic, and needs have gained new weight as a cornerstone of the welfare state (see, e.g., Esping-Andersen 1990).

Authors have developed countless theories of what counts as a basic need. Few things obtain such an unanimous approval as—the above sketched—physical integrity. In the course of this paper, we identify a *hierarchy* of four kinds of needs that are recurring in the literature: survival, decency, belonging, and autonomy. We ask whether these needs are perceived as having different degrees of importance (first indications that this might indeed be the case are provided by the studies of Pötzler and Hannikainen 2022 as well as Bauer and Romann forthcoming). To test this, we designed and conducted two empirical studies.

The first study elicits absolute need evaluations. Here, participants were first given short vignettes presenting our four types of needs in a hypothetical context. Each vignette was introduced with an illustration of the hypothetical situation.² Then, for each of them, participants had to indicate how important they consider the need in question to be. We find that different levels of importance are attributed to the kinds of needs, effectively placing them in a clear hierarchy.

The second study sheds light on relative need evaluations. Here, too, participants were first familiarized with vignettes of the four kinds of needs and the corresponding illustrations. Then they were presented with cases showing two people. Cases varied as to what kind of need the two people experience. The participants’ task was to distribute a scarce good between these two hypothetical people as impartial decision-makers. As an additional within-participants variation, we altered whether both persons contributed equally or unequally to the amount available for distribution. This way, we investigate

1 For perspectives from philosophy, psychology, sociology, political science, and economics, see Kittel and Traub (2020).

2 The illustrations were drawn by artist Douwe Dijkstra.

whether productivity has an effect on the decisions. Our findings further support the hierarchy we found in the first study. Moreover, productivity has an effect on participants' decisions. In addition, we are able to observe that our participants' need evaluations are coherent in terms of being additive.

The rest of this paper is structured as follows. Section 2 gives a review of the relevant literature. Section 3 reports our first and Section 4 our second study. Section 5 concludes the paper.

2. Literature Review

As has been pointed out recently, e.g., by Kittel et al. (2020) and Bauer et al. (2022), needs are not only relevant for normative reflections, but have also been the subject of numerous empirical studies. Think, for example, of early empirical social choice (e.g., Yaari and Bar-Hillel 1984) and what followed from it (for a review, see Gaertner and Schokkaert 2012). At least since the beginnings of motivational psychology (e.g., Williams and Page 1989) they are also to be found in the field of psychology (for a review, see Diederich 2020). Population surveys have also revealed that basic needs play a role in people's ideas of justice (e.g., Reeskens and van Oorschot 2013, Hülle et al. 2018). Incentivized economic experiments have shown that needs influence subjects' decisions (e.g., Brañas-Garza 2006, Cappelen et al. 2013). There were also attempts to bring real needs into the laboratory (e.g., Kause et al. 2018). Hence, our studies and their implications regarding the concept of need potentially touch on many different fields of research.

The concept of need has been defined in different ways. Generally, needs may be attributed by the locution " S needs x in order to Φ ". In the context of justice, the expression at S typically refers to persons, but we may equally think of households, companies, and so forth. The term at x designates the object of a need, viz., the thing needed. This can be a material resource, but also other goods, such as personal relationships. The expression at Φ stands for the goal to be achieved with the object of the need, which may be an action, a status, an opportunity, and so forth. In any case, by claiming that S needs x in order to Φ , it is stated that x is *necessary* for S to achieve Φ .

A need claim can be *purely instrumental*, such as "She needs a hammer in order to knock in the nail". Such a claim is morally neutral in itself; its moral relevance depends, among other things, on the moral relevance of the goal involved. Many authors tell such instrumental needs from *categorical* (absolute or intrinsic) ones. Categorical needs are distinguished from mere wants, wishes, or desires—either through some objective criterion (Brock 2005, Thomson 2005, Weale and Craig 1998, Wringe 2005) or through some inter-subjective process (Kelsen 2016, Hamilton 2003, Miller 1999). Furthermore, they are assumed to bear a normative force since what they aim at is regarded as something that ought to be realized. In other words, they are taken to be "necessary, indispensable, or inescapable, at least with respect to some important goals" (Brock and Miller 2019, par. 37). The overarching goal most commonly used to characterize categorical needs is avoidance of harm, or in positive terms, living a decent life (see, i. a., Frankfurt 1984,

Miller 1976, 1999, Thomson 1987, 2005, Wiggins 1987, 1998).

There are quite a few distinctions between categorical needs to be found in the literature.³ Frequently, they are categorized in form of a hierarchy that is based on the priority of satisfying these needs. The most noted hierarchy is, arguably, the one of Maslow (1943), which is part of his psychological Motivation Theory. It is usually represented as a pyramid constituted of, from the bottom up, *physiological* needs, *safety* needs, *social* needs, *esteem* needs, and *self-actualisation* needs. Alderfer (1969, 1972) modified Maslow's account by differentiating between *existence* needs, *relatedness* needs, and *growth* needs,⁴ developing the "Existence, Relatedness, and Growth Need Questionnaire" that was used, e.g., by Rauschenberger et al. (1980). Roughly, existence needs combine Maslow's physiological and safety needs, relatedness needs combine social and esteem needs, and growth needs can be identified with self-actualisation needs.⁵ Alderfer's hierarchy thus resembles the distinction between *vital* needs, *social* needs, and *agency* needs by Hamilton (2003, 2009).

Assigning top priority to needs directed at very existence, such as food, shelter and sleep, is at the heart of the Basic Needs Approach (Jolly 1976, Ghai 1978). Moreover, it is a common thread in philosophical accounts (e.g., Braybrooke 1987, Wiggins 1987, 1998), probably because such needs promise the highest objectivity and, due to their vital importance, the greatest moral significance. Nonetheless, only a minority remains with them (Daniels 1985). It is much more common to hold that there are basic needs beyond the biological minimum not to be ignored just because existence comes first. Such needs are often derived by asking what is necessary for functioning in social groups (Braybrooke 1987, Thomson 1987, Wiggins 1998) or our ability to function as human agents (Copp 1998, Gewirth 1978, O'Neill 1998, Shue 1996), as Brock and Miller (2019) summarize. Along these lines, Miller (2007, 3) argues that "[h]uman beings are social as well as biological creatures" and takes "basic needs" to be the "conditions for a decent human life in any society" while "societal needs" are the additional "requirements for a decent life in the particular society to which the person belongs".

Regardless of whether those needs are aptly named basic or not, we want to integrate them into our study. Following Alderfer's distinction between relatedness needs and growth needs, we divide them into needs for social belonging and needs for autonomy, such as the need for self-actualization by creative work. The latter echoes Hamilton's agency needs, which include autonomy, recognition, and creative expression. In line with most of the literature, we assume that social belonging and autonomy needs possess lower

3 Note that, in the course of history, a variety of lists of such needs have been suggested, specifying what does count as a basic need (e.g., Doyal and Gough 1991, Braybrooke 1987, Nussbaum 1990). Others have opposed these attempts to draw up concrete lists and have instead made *categorizations* of basic needs (e.g., Hamilton 2003).

4 Note also Williams and Page (1989), who consider safety, belonging, and esteem.

5 Moreover, the idea of multidimensional poverty indices can be interpreted as representing different kinds of needs (on the relationship between poverty and need, see Mac Cáirtheach 2014, for multidimensional measurement of need-based justice, see Bauer 2018, 2022). In medical and care contexts there is also use of differentiations between needs, see, e.g., Hörnquist (1982), Cleary et al. (2006), Vlachantoni et al. (2011), Glorney et al. (2010).

priority than needs for mere survival. Furthermore, under the general heading of needs for a decent life, we interpose the need for not feeling cold. In decreasing priority, we thus distinguish four kinds of needs:

- needs for mere survival,
- needs for a decent life,
- needs for social belonging, and
- needs for autonomy.

Those kinds are not to be understood as mutually exclusive. As Hamilton (2003) has already put it (regarding his own typology): “the boundaries between the [...] categories are necessarily porous” (p. 23).

While there are no studies explicitly testing the philosophical considerations outlined above, empirical tests of Maslow’s theory emerged quickly. A large extend of these originated before the 1980s in the field of organisational psychology. Most of these studies only find marginal support for his theory (see, e.g., Hall and Nougaim 1968, Payne 1970, Roberts et al. 1971, Lawler and Suttle 1972, Herman and Hulin 1973, Waters and Roach 1973, see Wahba and Bridwell 1976, as well as Mitchell and Moudgill 1976, for overviews).

Methodologically, those studies often assess satisfaction scores or need strength scores of participants in a working environment, many making use of the “Porter Need Satisfaction Questionnaire” (Porter 1961). In retrospect, it is astonishing that a large part of research on something as fundamental as basic human needs was primarily conducted not in a general setting but restricted to the workspace. We chose another path by utilizing hypothetical vignettes to analyze the importance ascribed to different kinds of needs. This happens, in part, in the wake of the growing experimental social choice literature which goes back to the investigations of distributive choices by Yaari and Bar-Hillel (1984) and Frohlich et al. (1987).⁶

In this strand of literature, there are only very few to no experiments on distributive decisions implementing different kinds of needs. Some vary contexts that might in turn be interpreted as representing different spheres of need. These variations are rather extreme, though, so that comparability amongst them is at risk: For example, Scott and Bornstein (2009) use food and medicine in a catastrophe and non-catastrophe variation, Gaertner and Schwettmann (2007, p. 630) use trade-offs between “helping a handicapped person or teaching intelligent children”, giving “financial aid to starving people in Subsaharan Africa versus an environmental programme in the home country” of a participant,

6 For overviews see, e.g., Konow (2003), Traub et al. (2005), Konow (2009), as well as Gaertner and Schokkaert (2012). Vignettes have been used famously, e.g., by Dahl and Ransom (1999), Kahneman and Tversky (1979), or recently in experimental philosophy, e.g., by Knobe (2003a,b). For use in justice research see, i.a., Kahneman et al. (1986), Blinder and Choi (1990), or Levine (1993); for use in need contexts, see, e.g., Bauer (2019b). Insightful reflections on using empirical studies to investigate justice evaluations are to be found in Miller (1992), Elster (1995), as well as Levitt and List (2007). Also see Bauer and Meyerhuber (2019, 2020).

or “a set of measures for rapid economic reconstruction at the expense of some basic human rights and a slower economic recovery going hand in hand with a full restoration of these human rights” (see also Konow 2001, 2003, Gaertner and Schwettmann 2007, Schwettmann 2009). Here, the differences between contexts are that large that it is not possible to tell whether differences found between them are due to the different kinds of needs or due to other factors that are varied between the contexts. An exception is Bauer and Romann (forthcoming), who systematically varied the kinds of needs, but did not find any influence of the different kinds in a hypothetical distribution task.⁷

In summary, despite the relatively large research inspired by Motivation Theory, there seems to be little to no systematic research on different kinds of needs in the context of distributive justice. Those few that touch upon this topic vary kinds of needs rather unsystematically. We therefore want to study the impact of different kinds of needs on distributive decisions made by impartial observers.

In the further course of this paper, we will also investigate how coherent the hypothetical decisions of our participants are. Our understanding of coherence is derived from the coherence theory of justification. According to this theory, a system of beliefs is the more justified the more its elements cohere, where coherence does not only mean consistency but also hanging or fitting together (cf. BonJour 1985, Lehrer 1990, Thagard 2000). When it comes to beliefs about magnitudes, an important aspect of coherence in this sense is *additivity*. Consider a person who thinks that Anne is 2 inches taller than Ben, and Ben 3 inches taller than Clare, but also thinks that Anne is 4 inches taller than Clare. Then her beliefs fit together less than the beliefs of a person who agrees with the first two assumptions but additionally believes that Anne is 5 inches taller than Clare. In this spirit, we will examine whether the differences in priority assigned to our four kinds of needs are additive.

3. Study 1

3.1. Design

In our first study, participants are asked to evaluate the importance of our four kinds of needs in absolute terms. That is, they evaluate each kind separately and on a scale that relates directly to the kinds’ importance. To this end, they are first given an overview of the different kinds of needs. We ask them to imagine four people with different names (that are randomly drawn from a pool of common German surnames). All four are in need for firewood, each of them needing it for a different reason. In all four instances, the need is not merely instrumental, but is regarded as having normative weight, as has been shown in Section 2. Below each other, and in randomized order, the four people and their respective needs are introduced with an illustration (see Figure 1) and a short vignette (see Appendix A for wording).

⁷ Prior to this, Bauer (2018, 2022) argued for the importance of differentiating kinds of need, originally in the context of measuring need-based distributive justice, but also—on a sidenote—extending to empirical research on need-based distributive justice.

In accordance with Section 2, participants are told that a person can need the wood either for survival, decency, belonging, or autonomy. We present four short vignette texts,⁸ each exemplifying one of those kinds of needs: A person can need the wood to

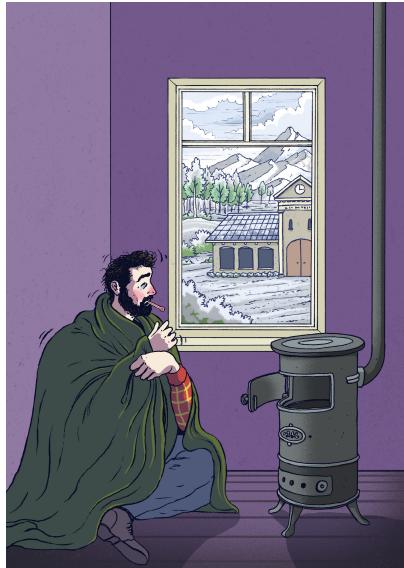
- survive the upcoming winter. This means that if they receive less wood than they need, it will be so cold in the hut they live in that they are very likely to fall life-threateningly ill.
- avoid freezing in the upcoming winter. The members of their community agree that one cannot live in dignity if one has to freeze. If they receive less wood than they need, it becomes unacceptably cold in their hut.
- be able to participate regularly in the social life of their community in the upcoming winter since it is common practice to meet in the community center and everyone is expected to bring wood to heat it. If they receive less than they need, they will not be able to participate regularly.
- be able to plan the leisure time autonomously, since they usually use their spare time to create art in their studio, which is heated with wood. If they receive less than they need, they won't be able to use their studio regularly.

Following this introduction, the kinds of needs are presented to participants on four separate screens. Here, they are shown the full-sized illustration with a single caption beneath it describing the kind of need once again as follows:

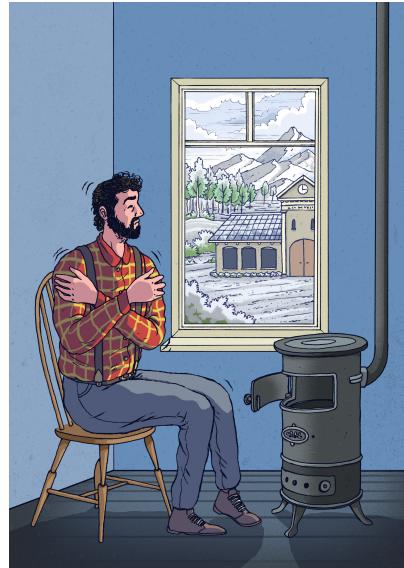
- **Survival:** “*A* needs the wood to make sure to survive the upcoming winter.”
- **Decency:** “*B* needs the wood in order not to freeze in the upcoming winter.”
- **Belonging:** “*C* needs the wood to be able to participate regularly in the social life of his community in the upcoming winter.”
- **Autonomy:** “*D* needs the wood to be able to use his studio regularly in the upcoming winter”.

On top of each screen, they are told that they will have to indicate how important they deem the kind of need shown on the page. On the bottom, they are asked how much the person needs the wood in the present case. They have to give their answer on a Likert scale from 1 (“doesn't need the wood at all”) to 7 (“absolutely needs the wood”) (see Appendix A for the instructions of Study 1). That is, participants indicate how important they consider the satisfaction of the abstract need through a concrete material good. Their evaluation is thus conditional on the situation and the material good.

⁸ The vignette's scenario is adapted from Bauer et al. (2022).



(a) Survival



(b) Decency



(c) Belonging



(d) Autonomy

Figure 1: Illustrations presented to participants. Figure 1a shows the Survival Need, Figure 1b the Decency Need, Figure 1c the Belonging Need, and Figure 1d the Autonomy Need.

3.2. Procedure

The study was programmed in oTree (Chen et al. 2016) and ran online in February 2021 with a sample size of $n = 100$. Participants were recruited by the professional market research institute respondi for a fee, where they were randomly sampled from respondi's

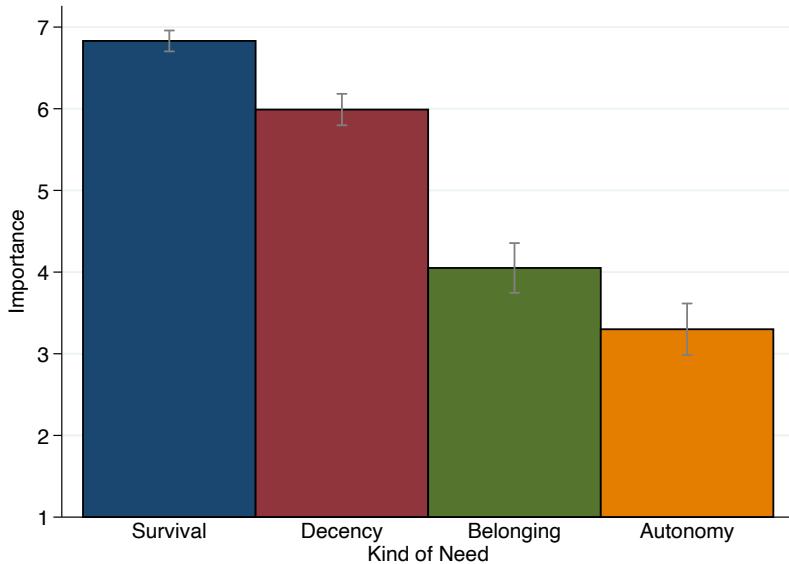
online access panel, stratified by the three characteristics gender, age, and equivalent household net income (see Table 4 in Appendix G). The data provider has subjected itself to strict ethical guidelines and is certified according to ISO 20252. Participants must actively opt into the panel and then take part in specific surveys voluntarily. Since our study is an anonymous standard survey that only uses hypothetical vignettes and assesses uncritical opinions, no additional approval was sought from the ethics commission. As suggested, e.g., by the United States' *Federal Policy for the Protection of Human Subjects*, to ensure informed consent, participants were told at the beginning of each study that the survey at hand is part of a research project, that taking part is voluntary, and that they can drop out at any time. They were notified how long the survey would approximately take and that its purpose is to assess personal opinions and judgments. They were also informed that their answers will be analyzed and that all data will be stored in an anonymous format so that no participant can be identified (see Appendix A and D). They were informed beforehand about their compensation by the panel provider.

At the beginning of the study, they were greeted with a welcome message (see Appendix A). Thereafter, participants had to evaluate the four kinds of needs as described in Section 3.1 (within-participants design). After this task, three control questions were asked to ensure that participants read the vignettes and instructions carefully (see Appendix B). As has been announced beforehand, only those participants who passed at least two of our control questions were compensated and included in our analysis. Failing more than one questions led to an immediate termination of the survey. Those participants did not receive any further questions. The 100 participants who answered two or three questions correctly were given a sociodemographic questionnaire asking for their age, gender, household net income, political orientation, and sensitivity to cold (see Appendix C). They were paid a flat fee of 4.15 euros for approximately 15 minutes of their time. Another 31 participants were excluded from the study after failing to pass control questions.⁹

3.3. Working Hypothesis

In light of the theoretical literature reviewed in Section 2, we suspect that participants ascribe some importance to all four kinds of needs. We also suspect that the importance of those kinds of needs that are more basic in theory is evaluated higher on average than the importance of those kinds of needs that are less basic in theory. More specifically, in line with psychological Motivation Theory (Maslow 1943, Alderfer 1969) and philosophical considerations (Braybrooke 1987, Wiggins 1987, 1998), we hypothesize that physiological needs (survival, decency) receive higher importance ratings than social needs (belonging) and individual needs (autonomy). If we look at the means (M) of importance ratings,

⁹ Failure rates indicate that our first question was failed more often than the second and third question (Question 1: 41 of 131 (31.30%), Question 2: 36 of 131 (27.48%), Question 3: 27 of 131 (20.61%). Using χ^2 tests, we found that the excluded participants did not diverge from the remaining participants with regard to age and income at a significance level of 5%. There is, however, a significant difference (at the 1% level) between men and women when it comes to failure rates (Age: $\chi^2 = 3.787, p = 0.436$, Income: $\chi^2 = 8.511, p = 0.075$, Gender: $\chi^2 = 7.238, p = 0.007$).



The figure shows the mean importance ascribed to the four kinds of needs on a scale from 1 (“does not need the wood at all”) to 7 (“absolutely needs the wood”). $n = 100$.

Figure 2: Mean importance ascribed to the four kinds of needs

we can state as **Hypothesis 1 (Hierarchy in M):**

$$M_{\text{Survival}} > M_{\text{Decency}} > M_{\text{Belonging}} > M_{\text{Autonomy}}. \quad (1)$$

3.4. Results

As hypothesized, the importance of the four kinds of needs was rated quite different, as can be seen Figure 2. The Survival Need scored highest with a mean rating of 6.830 ($\sigma = 0.065$, 95% CI [6.701, 6.959]), followed by the Decency Need with a mean rating of 5.990 ($\sigma = 0.098$, 95% CI [5.796, 6.184]). Third in line, after a notable drop, is the Belonging Need with a mean rating of 4.051 ($\sigma = 0.155$, 95% CI [3.743, 4.358]), followed by the Autonomy Need with a mean rating of 3.300 ($\sigma = 0.160$, 95% CI [2.982, 3.618]).¹⁰

As a one-way analysis of variance further shows, pairwise comparisons of all kinds of needs are significant at the $p \leq 0.001$ level (see Table 1). In addition, a pooled OLS regression showed that none of our control variables (age, gender, household net income, political orientation, sensitivity to cold) had a significant effect on our partici-

¹⁰ Note that the scale is limited to the interval [1,7]. One could assume that many participants choose the maximum value for Survival, and rightfully so, as 92 of 100 participants did. For Decency, only 31 did so. This in mind, we performed a number of Wilcoxon signed-rank tests to test for differences between the kinds of needs (Survival vs. Decency: $z = 7.348$, $p \leq 0.001$; Decency vs. Belonging: $z = 8.242$, $p \leq 0.001$; Belonging vs. Autonomy: $z = 4.379$, $p \leq 0.001$).

pants' assessments (see Table 5 in Appendix G). Here, we clearly see that participants do differentiate when it comes to the importance they ascribe to the different kinds of needs. Additionally, Table 6 in Appendix G reports contrasts of predictive margins. Since we used a within-participants design, the individual importance ratings for the four kinds of needs are not independent. Furthermore, the importance ratings are censored from below (1) and above (7). Hence, as additional robustness checks, Table 5 also includes random-effects panel regressions and Tobit panel regressions. These lead to qualitatively identical results.

Table 1: Mean importance ascribed to kinds of needs and differences between them

	Survival	Decency	Belonging	Autonomy
Mean	6.830	5.990	4.051	3.300
Std. Dev.	0.065	0.098	0.155	0.160
Decency	-0.840***			
Belonging	-2.779***	-1.939***		
Autonomy	-3.530***	-2.690***	-0.751***	

Upper panel: Mean of the ascribed importance and Standard Deviation.

Lower panel: Mean differences. $n = 100$. Significance levels: * $p \leq 0.1$, ** $p \leq 0.05$, *** $p \leq 0.001$, Bonferroni adjusted.

4. Study 2

4.1. Design

For our second study, we join the vignette of Study 1 with a vignette by Bauer et al. (2022). In Bauer et al. (2022), participants are asked to imagine two hypothetical persons. Their names are drawn randomly from a list of common German surnames. In the following, we simply refer to them as "Person A" and "Person B". Person A and Person B are both in need for firewood. Their community allows them to chop wood in the community's forest for a certain period of time, which is the only way for Person A and Person B to get firewood, since both have little money.

In the fashion of Study 1, we alter the vignette by adding the four different kinds of needs that Person A and Person B can experience (see Section 3.1). Participants are introduced to those four kinds at the study's beginning. As in Study 1, each vignette (see Appendix D for wordings) is presented next to a picture that illustrates the kind of need in question (see Figure 1 again).

Subsequent to this introduction, participants are introduced to their task, which is to distribute an endogenously given number of logs—described as the total amount of wood both have chopped—among Person A and Person B in a way participants think to be most just. They are made aware that in doing so they will have to make trade-offs between Person A and Person B; the more wood they give to one person, the less they

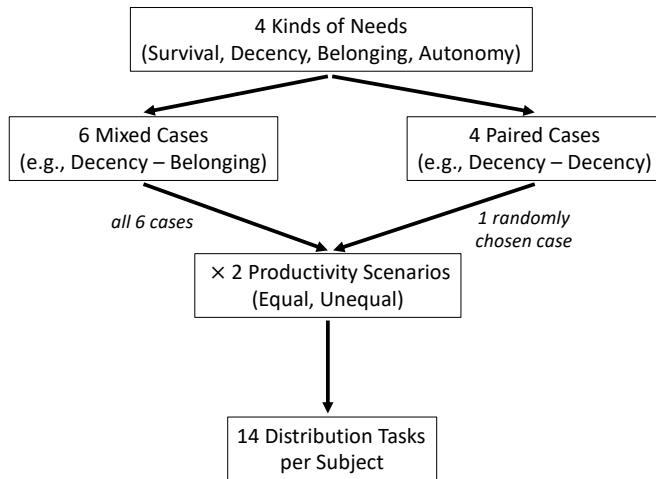


Figure 3: Within-participants variations of Study 2

can give to the other. Still more, we revealed that it would not be possible to completely meet the needs of both persons at the same time, as the available amount of wood was just about enough to completely cover the needs of one of the two persons; the other person would then end up empty-handed. In case a person receives less wood than they need, the person will suffer certain consequences, depending on the kind of need they experience. Participants were further informed that they would distribute the wood in advance without knowing exactly how cold the winter actually will be. This is why we describe the possible effects of the upcoming winter on the respective person as “more or less likely”.

The design of Study 2 is schematized in Figure 3. As can be seen there, each participant had to make a total of 14 different allocation decisions, denoted as *Cases* in the following. For each case, they had to decide how much wood to give to Person A and Person B. Those 14 cases were split into two different *Scenarios* with 7 cases each. This within-participants variation altered whether Person A and B have chopped the same amount or different amounts of wood. In the *Equal Productivity Scenario*, Person A and Person B have chopped 500 logs each, in the *Unequal Productivity Scenario*, Person A has only chopped 200 logs, while Person B has chopped 800 logs. Note that the total amount of logs is constant over every case and over both scenarios. We randomized whether participants started with the Equal Productivity Scenario or the Unequal Productivity

Scenario. Within each Scenario, we further randomized the order of appearance of the seven cases.

The seven cases themselves vary what Person A and Person B need the wood for (i.e., which kind of need they experience). Here, we distinguish between *Mixed Cases* and *Paired Cases*. In Mixed Cases Person A and Person B experience two different kinds of needs, whereas in Paired Cases they experience the same kind of need. While Paired Cases give us a baseline and a consistency check, mixed cases provide us with the differences between the kinds of needs that are in our focus. Six of the seven cases a participant sees per scenario are *Mixed Cases*, containing the possible combinations that can be obtained from the four different kinds of needs without creating pairs, as depicted in Table 2. One additional case a participant sees per scenario is—randomly drawn—one of the four possible *Paired Cases*, which shows the same pair in both scenarios.

Table 2: Combinations made from Kinds of Needs for each Case of a Scenario

Person	Case					
	1	2	3	4	5	6
A	Survival	Survival	Survival	Decency	Decency	Belonging
B	Decency	Belonging	Autonomy	Belonging	Autonomy	Autonomy

The combinations made from the four Kinds of Needs for the six Mixed Cases of each Scenario.

Between-participants, we implement two different *Formulations* in which we present those descriptions of the different kinds of needs and their consequences either as the avoidance of negative consequences (*Avoidance Formulation*) or as the enablement of good outcomes (*Enablement Formulation*) to check whether possible effects are influenced by the way we present the kinds of needs.

Each case is presented on a separate screen (see the exemplary task in Appendix D for an example). On every screen, we randomize the position of Person A and Person B. Participants are informed how much wood Person A and Person B have chopped each and in total on each screen. In the center of every screen, two illustrations are displayed side by side to highlight the kind of need Person A and Person B exhibit in the displayed case. Below each picture, a single sentence additionally makes clear what Person A and Person B need the wood for:

- **Survival:** “A [B] needs the wood to avoid life-threatening illness [stay healthy] in the upcoming winter.”
- **Decency:** “A [B] needs the wood to avoid freezing [have it warm] in the upcoming winter.”
- **Belonging:** “A [B] needs the wood in order not to be excluded from [to participate in] social life in the upcoming winter.”
- **Autonomy:** “A [B] needs the wood so that their studio does not become unusable [so that they can use their studio] in the upcoming winter.”

Participants are asked to enter the amount Person A and Person B should receive on a blank line in a sentence below each picture that stated “A [B] should receive ___ logs of wood”. Here, all available logs have to be distributed by them.

Mixed Cases, Paired Cases, and Productivity Scenarios are varied within-participants because otherwise only the treatment mean differences and not the mean values of the individual differences could be analyzed. Formulations are varied between-participants to keep the number of cases that are presented to participants manageable, hence to avoid fatigue effects, and to prevent contrast effects, which would make it difficult to find out if the wording actually makes a difference.

4.2. Procedure

Our study, programmed in oTree (Chen et al., 2016), was conducted online in April 2021. The total sample size was $n = 200$. Participants were recruited via the private market research institute respondi, being randomly sampled from respondi’s online access panel, stratified by the characteristics gender, age, and household net income to promote external validity (see Table 7 in Appendix G). Sampling rates of these characteristics have been taken from the “Best for Planning” study of Germany’s *Society for Integrated Communication Research* as representative for the adult German population (Gesellschaft für integrierte Kommunikationsforschung 2019, p. 284, 291).

To control for the heterogeneity of our participants with regard to their sociodemographic backgrounds and justice attitudes, we implemented a questionnaire, where we asked participants for their age, gender, and household net income. Furthermore, they had to state their support for the three different distributive principles of need, equity, and equality, as well as their political orientation, all on 7-point Likert scales. Lastly, they were asked how they perceive their own sensitivity to cold (see Appendix F for wordings).

To facilitate internal validity and to ensure that our vignettes and instructions were read thoroughly, participants had to answer three control questions after they completed the distribution task (see Appendix E for wordings). The final analysis was restricted to those participants who passed at least two of the three questions. Those 200 participants were paid a flat fee of 5.40 euros, being equivalent to an hourly wage of 10.80 euros. 64 participants were excluded since they failed to pass at least two of our three control questions. For them, the survey was terminated after giving two wrong answers and they were asked no further questions.¹¹

¹¹ Failure rates indicate that our second question was failed more often than the first and third question (Question 1: 83 of 264 (31.44%), Question 2: 119 of 264 (45.08%), Question 3: 68 of 264 (25.76%), see Appendix E for the questions’ wording). Excluded participants did not diverge from the remaining participants in age, income, or gender at a significance level of 5% (Age: $\chi^2 = 2.049$, $p = 0.727$, Income: $\chi^2 = 1.657$, $p = 0.799$, Gender: $\chi^2 = 0.047$, $p = 0.828$).

4.3. Working Hypotheses

A little notation first. Let $\mathcal{I} = \{1, 2, \dots, n\}$ denote the set of participants i and $\mathcal{N} = \{1 (\text{Survival}), 2 (\text{Decency}), 3 (\text{Belonging}), 4 (\text{Autonomy})\}$ the ordered set of the kinds of needs α, β . Needs are ordered in terms of decreasing priority as elicited in Study 1, i.e., $\alpha < \beta$. In the relative evaluation task, participant i is endowed with $\ell^i = 1000$ logs of wood. They assign $0 > \ell_\alpha^i \leq 1000$ logs to Person A with need α and $\ell_\beta^i = 1000 - \ell_\alpha^i$ logs to Person B with need β . The relative evaluation of Person A's need α by participant i is hence given by $\Delta_{\alpha,\beta}^i = \ell_\alpha^i - \ell_\beta^i = 2\ell_\alpha^i - 1000$.

We start with the Equal Productivity Scenario (EPS). For *paired* need evaluations $\alpha = \beta$, we expect the mean relative need evaluation to be zero: $\bar{\Delta}_{\alpha,\alpha}^{\text{EPS}} = 0$. For *mixed* need evaluations $\alpha < \beta$, we expect the mean relative need evaluation to increase in the distance between absolute need evaluations. Hence, **Hypothesis 2 (Hierarchy in Δ)** reads as follows:

$$\bar{\Delta}_{\alpha,\beta}^{\text{EPS}} > \bar{\Delta}_{\alpha,\beta'}^{\text{EPS}}, \quad \beta > \beta'. \quad (2)$$

We further assume that participants make coherent distributive decisions. A decision is coherent if the differences we observe in mean allocations are additive. In other words, it is coherent if the difference of two kinds of needs, being not next to each other in the hierarchy, equals the sum of the differences of the kinds of needs that are spanned by the original difference. Hence, **Hypothesis 3 (Coherence)** states:

$$\bar{\Delta}_{\alpha,\beta}^{\text{EPS}} = \bar{\Delta}_{\alpha,\beta'}^{\text{EPS}} + \bar{\Delta}_{\beta',\beta''}^{\text{EPS}} + \bar{\Delta}_{\beta'',\beta}^{\text{EPS}}, \quad \alpha \leq \beta' \leq \beta'' \leq \beta. \quad (3)$$

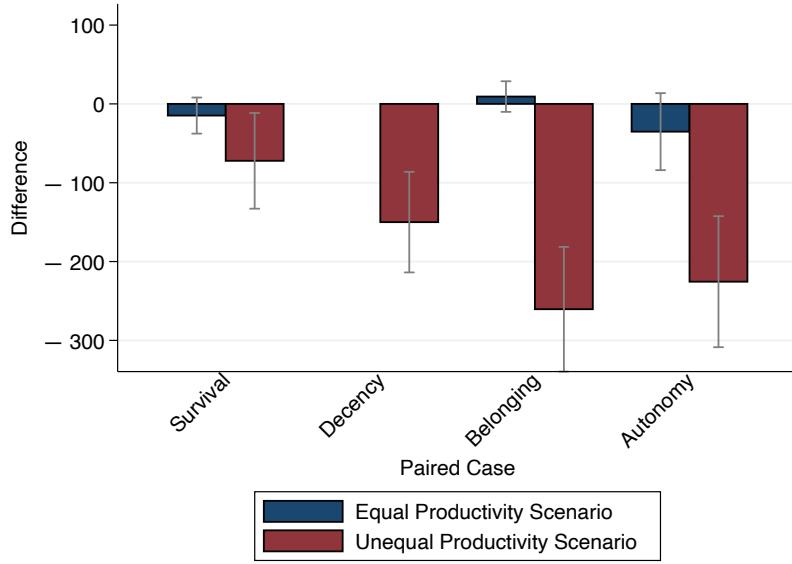
In the Unequal Productivity Scenario (UPS), the relative need evaluation for pairs $\alpha = \beta$ does not need to be zero if productivity matters. In fact, we expect the need evaluation to be lower for the less productive Person A: $\bar{\Delta}_{\alpha,\alpha}^{\text{UPS}} < 0$. However, we expect the impact of lower productivity on relative need evaluations to decrease with the importance of need: $\bar{\Delta}_{\alpha,\alpha}^{\text{UPS}} - \bar{\Delta}_{\alpha',\alpha'}^{\text{UPS}} > 0$ for $\alpha < \alpha'$. For mixed need evaluations, as in EPS, we expect mean relative need evaluations to increase with the distance between absolute need evaluations. Hence, **Hypothesis 4 (Productivity)** ready as follows:

$$\bar{\Delta}_{\alpha,\beta}^{\text{UPS}} > \bar{\Delta}_{\alpha,\beta'}^{\text{UPS}}, \quad \beta > \beta'. \quad (4)$$

Here, we also expect relative need evaluations to be coherent $\bar{\Delta}_{\alpha,\beta}^{\text{UPS}} = \bar{\Delta}_{\alpha,\beta'}^{\text{UPS}} + \bar{\Delta}_{\beta',\beta''}^{\text{UPS}} + \bar{\Delta}_{\beta'',\beta}^{\text{UPS}}$, where $\alpha \leq \beta' \leq \beta'' \leq \beta$.

4.4. Results

We start with taking a look at the Paired Cases (Section 4.4.1) before moving on to the Mixed Cases (Section 4.4.2). After looking at the mean differences, we examine the coherence of our participants' decisions (Section 4.4.3) and, finally, we present a number of regressions (Section 4.4.4).



The figure shows the mean differences in allocations to Person A and Person B, experiencing the same kind of need, by Productivity Scenario. n = 200.

Figure 4: Mean differences for the 4 Paired Cases by Productivity Scenario

4.4.1. Mean Differences in Allocations for Paired Cases

First, we take a look at the relative evaluations, i. e., the way participants allocated the logs of firewood between the two persons presented to them. Since Paired Cases give us a baseline and a consistency check, we start with having a look at them. To do so, we calculate the mean of the individual differences (represented by Δ) of the number of logs participants gave to Person A and Person B in those four cases (see Table 9 in Appendix G).

Figure 4 shows the mean differences for the four Paired Cases. The bars are differentiated by the two Productivity Scenarios that were presented within-participants. We see that in the Equal Productivity Scenario participants by and large distribute equally between Person A and Person B, resulting in a mean difference of (roughly) around 0. Since both persons have contributed the same amount of wood and exhibit the same kind of need, this is, arguably, the only reasonable default, which is a strong indicator that our participants understood the vignette and task and took it seriously.

However, in the Unequal Productivity Scenario, where Person A has cut 200 logs and Person B 800 logs, Person A gets less than Person B. Interestingly, this depends on the kind of need as hypothesized above. If both need the wood for survival, the lower productivity of Person A has hardly any effect, that is, she gets only a little less than Person B although she has cut much less. The difference is a bit more pronounced for the second kind of need, Decency, and is largest for Belonging and Autonomy. But even there, Person A still gets significantly more than she has initially contributed. See also Table 8 in the Appendix, reporting means of absolute percentage deviations of the share

that Person A receives from the share that Person A contributed.

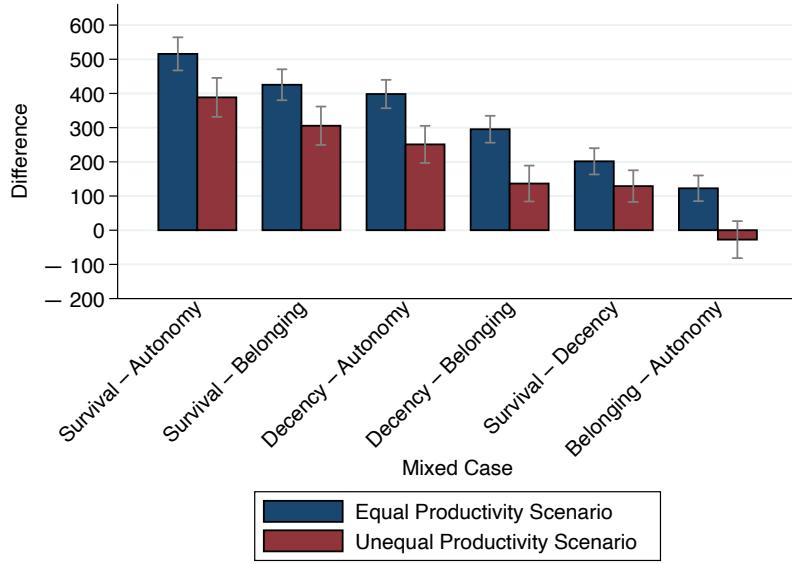
Table 8 additionally shows by how many percent the share that the needier Person A receives differs from the share of their contribution (normalized to 0 – 100%). This deviation can be interpreted as a kind of elasticity of need satisfaction for productivity; the larger this deviation, the more important needs are considered. In the Equal Productivity Scenario, as would be expected, this rambles around roughly 1%. In the Unequal Productivity Scenario, on the other hand, we get a benchmark for the marginal effect of productivity for the same kinds of needs. This is a first measure of the importance of the different kinds of needs, because the more productivity matters, the less the equality of needs matters. The difference is highest for survival (10.556%), followed by decency (9%), autonomy (7.486%) and belonging (6.791%).

4.4.2. Mean Differences in Allocations for Mixed Cases

Next, we consider the Mixed Cases. Again, we calculate the mean of the individual differences of the number of logs participants gave to Person A, experiencing one kind of need, and Person B, this time experiencing another, less basic, kind of need (see Table 9 in Appendix G).

Figure 5 presents the mean differences for the six possible combinations that can be made with Person A and Person B experiencing different kinds of needs, again by Productivity Scenario. It becomes apparent that in the Unequal Productivity Scenario the mean differences are smaller than in the Equal Productivity Scenario for every combination. In Table 9, we additionally report two-tailed Welch's t-tests for the difference between the Productivity Scenarios showing that mean differences for all cases are significantly lower in the Unequal Productivity Scenario. Differences between Cases are tested in a series of regressions, see Section 4.4.4.

Furthermore, if we assume that there is an order of the four kinds of needs, as proposed in Section 2, we can see that the differences are larger for those combinations that represent kinds of needs that are not located “next to each other” in the hierarchy. Spanning all four kinds of needs, the difference for the case *Survival – Decency* is largest, followed by those two cases that span three kinds of needs, namely *Survival – Belonging* and *Decency – Autonomy*. Lastly, those combinations representing kinds of needs that are adjacent to each other, the cases *Survival – Decency*, *Decency – Belonging*, and *Belonging – Autonomy*, show the smallest differences. These observations can be seen as a hierarchy in the perception of the different kinds of needs that is in line with the theoretical predictions. The difference for the case *Survival – Autonomy* is largest, just as those kinds of needs are furthest from each other in theory. For the cases *Survival – Belonging* and *Decency – Autonomy*, the difference is clearly smaller. Even more so for the cases *Survival – Decency* and *Belonging – Autonomy*. This lends support to our Hierarchy Hypothesis.



The figure shows the mean differences in allocations to Person A and Person B, experiencing different kinds of needs, by Productivity Scenario. $n = 200$.

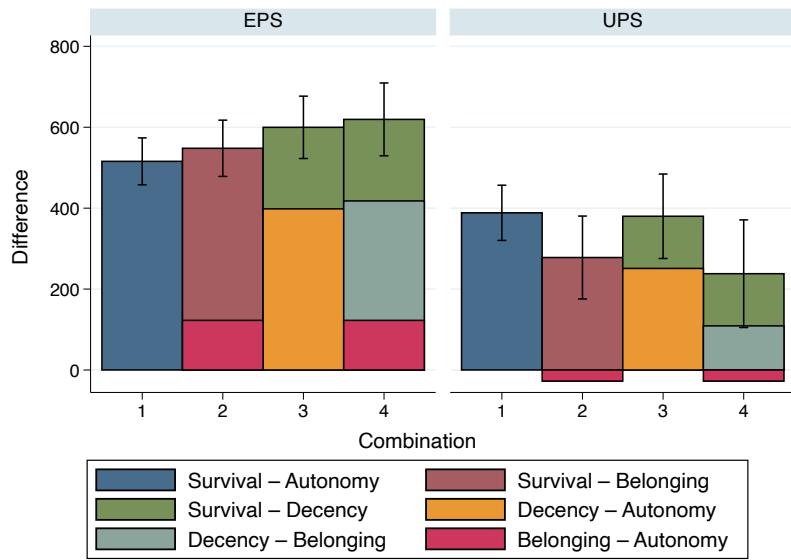
Figure 5: Mean differences for the 6 Mixed Cases by Productivity Scenario

4.4.3. Additivity of Allocations

In addition to the hierarchy observed above, we assume that rational people make coherent differentiations when distributing resources among people who experience different kinds of needs. As has been noted in connection with our Coherence Hypothesis, we speak of coherent differentiations when they are additive. Additivity is given if the Δ of two kinds of needs, being not next to each other in the hierarchy, equals the sum of the differences of the kinds of needs that are spanned by the original Δ .

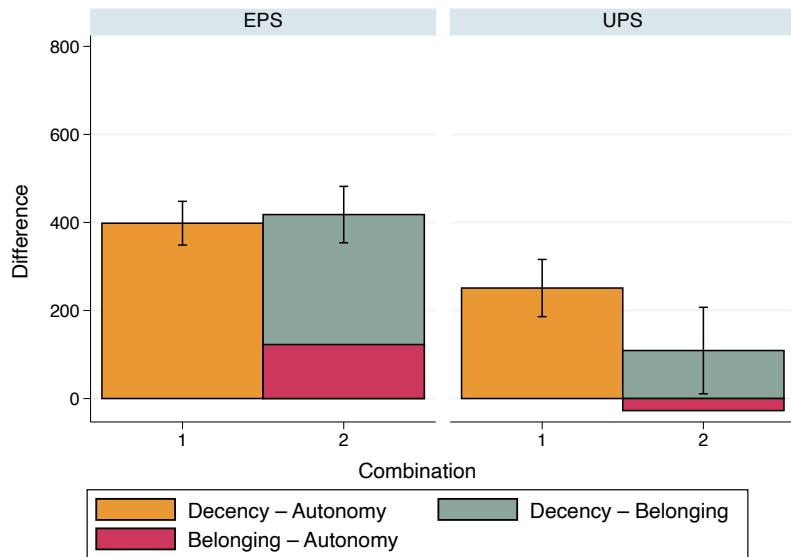
Figure 6 to 8 indicate that this, indeed, seems to be the case. In Figure 6, the first bar shows the difference of the case *Survival – Autonomy* as reference, both in the Equal and the Unequal Productivity Scenario. The following three bars then show the three possible additions, as introduced in Equation (6), above. In Figure 7, the first bar shows the case *Decency – Autonomy* as reference, again both for the Equal and the Unequal Productivity Scenario, followed by the analogous addition of *Belonging – Autonomy* and *Decency – Belonging* in the next bar. In Figure 8, the first bar shows the case of *Survival – Belonging*, once more for both the Equal and the Unequal Productivity Scenario, followed by the analogous addition of *Decency – Belonging* and *Survival – Decency* in the second bar.

To assess whether the references and the additions do not differ significantly from each other in their accumulated difference (i.e., the sum of the individual differences), we ran a number of one-way ANOVAs with Bonferroni correction; one for every Productivity Scenario regarding the combinations shown in Figure 6 (Equal Productivity Scenario: $F(3, 796) = 2.24, p = 0.083$; Unequal Productivity Scenario: $F(3, 796) = 2.82, p =$



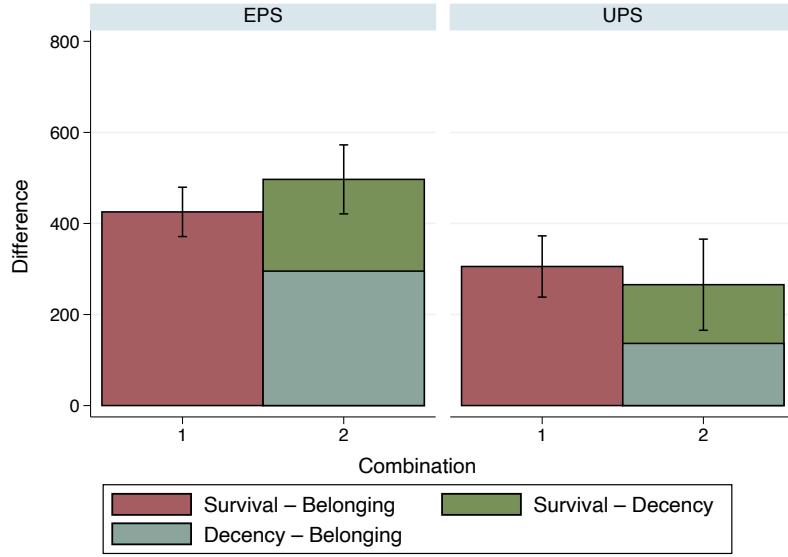
The figure shows a comparison between the reference case “Survival – Autonomy” and the possible additions by Productivity Scenario. $n = 200$.

Figure 6: Additivity of importance ratings: Survival – Autonomy



The figure shows a comparison between the reference case “Decency – Autonomy” and the possible addition by Productivity Scenario. $n = 200$.

Figure 7: Additivity of importance ratings: Decency – Autonomy



The figure shows a comparison between the reference case “Survival – Belonging” and the possible addition by Productivity Scenario. $n = 200$.

Figure 8: Additivity of importance ratings: Survival – Belonging

0.038) as well as regarding the combinations shown in Figure 7 (Equal Productivity Scenario: $F(1, 398) = 0.320, p = 0.571$; Unequal Productivity Scenario: $F(1, 398) = 8.010, p = 0.005$) and 8 (Equal Productivity Scenario: $F(1, 398) = 3.240, p = 0.073$; Unequal Productivity Scenario: $F(1, 398) = 0.610, p = 0.437$). The ANOVAs indicate that the additions have total values that do not differ significantly from the reference values, except for the combination of *Decency – Belonging* and *Belonging – Autonomy* compared to the reference of *Decency – Autonomy* in the Unequal Productivity Scenario (with $p = 0.005$, see Figure 7).

Although most of the differences between the combinations of need comparisons are insignificant and, therefore, additivity cannot be rejected, a certain response pattern seems to emerge. In the Equal Productivity Scenario, a slight superadditivity can be seen, which increases with the number of comparisons combined (see, in particular, the left panel of Figure 6). Analogously, there is a slight tendency towards subadditivity in the Unequal Productivity Scenario, which also seems to increase when multiple comparisons are combined (see, in particular, the right panel of Figure 6). It could thus be that the participants, in the scenario where Persons A and B exhibit the same productivity but different needs, basically grant the needier person a kind of “bonus” that *accumulates* when several comparisons are combined. The Unequal Productivity Scenario creates a situation where (too much) distribution towards the needier person is itself perceived as unjust in terms of equity and, therefore, the needier person receives a “malus” that also accumulates when several comparisons are combined. An obvious explanation for this decision pattern would be a gain-loss domain effect (for further occurrences of a gain-loss

domain effect in the context of need-based justice, see Weiß et al. 2017).

4.4.4. Regressions

Finally, we turn to a number of Tobit panel regressions, reported in Table 3 using the participants ID as the panel variable and the case number as the time variable. We chose to use Tobit models since our dependent variable—the difference between the logs distributed to Persons A and B—contains two left censored and 80 right censored observations. Here, the largest difference ($\Delta_{Sur-Aut}$) serves as our reference category. Model 1 shows that all other cases are highly significant, as is the overall model. The constant is 465.076, thus in the base case *Survival – Autonomy* Person A receives on average 465 logs more than Person B. There is a clear order of the cases, whereby the difference to the case *Belonging – Autonomy* is, as expected, the strongest with a regression coefficient amounting to -416.201. Therefore, the average number of logs allotted to Person B is lower than the amount allotted to Person A in every case.

In Model 2, we added the Productivity variable and let it interact with the Case variable. This shows that Productivity has a highly significant effect insofar as low productivity leads to a lower distribution to Person A (the difference between Person A and Person B decreases by 135 logs). This effect, as can be seen from the non-significant interaction terms, is not limited to individual cases, but rather related to the entire productivity block in each case.

Additionally, a pairwise comparison of margins was estimated for all combinations of differences that can be made with our four kinds of needs (see Table 10 in Appendix G). All but two comparisons are highly significant.

Model 3, then, shows that the two formulations—one of them in terms of avoidance of harm, the other one in terms of enablement of something good—make no overall difference. It has to be noted, though, that the interaction of Productivity Scenario and Formulation is weakly significant, amounting to a regression coefficient of 39.876.

In Model 4, we add household net income, gender, and age, as well as political attitude and the importance of productivity, equality, and need, for the participants' decisions as control variables (these covariates are reported in Table 11 in Appendix G). Of the covariates, only the questions for the importance of need, productivity, and equality as decision criteria are significant. Here, stronger emphasis on the importance of productivity leads to a smaller difference between the logs distributed to Persons A and B with a regression coefficient of -78.682, so does—to a lesser extent—an emphasis on the importance of equality with a coefficient of -16.959. Importance of need, then, works in the opposite direction, leading to a larger difference with a coefficient of 21.637.

5. Conclusion

In this paper, we presented the results of two vignette studies with online samples of the German adult population, investigating how laypeople evaluate four different kinds of needs, namely, survival, decency, belonging, and autonomy. Participants of both studies

Table 3: Allocation difference between Person A and B: Regression Results

	(1)	(2)	(3)	(4)
Survival – Belonging	−92.993*** (19.569)	−99.337*** (26.790)	−92.927*** (18.920)	−98.491*** (20.198)
Decency – Autonomy	−134.304*** (19.563)	−127.306*** (26.776)	−134.295*** (18.914)	−138.839*** (20.190)
Decency – Belonging	−246.405*** (19.540)	−233.661*** (26.742)	−246.254*** (18.892)	−261.238*** (20.165)
Survival – Decency	−298.108*** (19.534)	−329.228*** (26.728)	−297.954*** (18.886)	−301.307*** (20.159)
Belonging – Autonomy	−416.201*** (19.530)	−408.574*** (26.719)	−416.059*** (18.882)	−415.070*** (20.154)
Productivity $\{0 = Equal, 1 = Unequal\}$		−134.817*** (26.799)	−151.202*** (15.384)	−142.311*** (11.614)
Formulation $\{0 = Avoidance, 1 = Enablement\}$			−39.546 (37.168)	−25.407 (31.091)
Constant	465.076*** (21.856)	532.282*** (25.458)	550.268*** (29.003)	758.614*** (155.900)
Control variables	No	No	No	Yes
Interaction between Productivity and Need Combination	No	Yes	No	No
Interaction between Productivity and Formulation	No	No	Yes	No
σ_u	238.797*** (13.334)	239.374*** (13.266)	239.152*** (13.259)	188.017*** (11.626)
σ_e	274.654*** (4.238)	265.281*** (4.094)	265.513*** (4.097)	270.947*** (4.377)
χ^2	600.020***	794.280***	789.480***	817.420***

The table reports the results of a Tobit random-effects panel regression. Endogenous variable: Allocation difference between A and B (Δ_A). First row: coefficients, second row: standard errors in parentheses. Control variables include Age, Gender, and Household Net Income (see Table 11 in the Appendix). $n = 2400$ (200 participants). 2 (80) left-censored (right-censored) observations. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

were recruited via the online platform respondi. Samples were stratified by gender, age, and income.

In the first study, participants ($n = 100$) had to evaluate the importance of the different

kinds of needs in absolute terms on a 7-point Likert scale. To this end, they were first presented with vignettes in which hypothetical persons experienced the different kinds of needs. Each vignette was accompanied by an illustration. We hypothesized that the four kinds of needs would not be perceived as equally important, but that there would be a hierarchy. This hypothesis receives very clear support from the data; survival is rated highest, decency comes second, followed by belonging and autonomy.

In the second study, participants ($n = 200$) had to make distributive decisions. They were presented with a series of cases in which two hypothetical persons experienced (mostly) different kinds of needs. They then had to decide how to divide a scarce amount of a good between the two. That is, they had to trade-off the satisfaction of one kind of need with another kind of need. Within-participants, we have also varied whether the two persons contributed equally or differently to the amount available for (re)distribution. Between-participants, we have further varied whether the kinds of needs were presented in an avoidance or enablement formulation. The results lend further support to the hierarchy found in Study 1. Additionally, we can see that the productivity of the two hypothetical persons has an influence on how participants distribute. If one person has contributed less to the available amount, they tend to receive less of it. In addition, we were able to verify that the distribution decisions of our participants are internally coherent insofar as they are additive. Moreover, the type of formulation had no influence on the distribution of our participants, which shows that the effects found do not depend on minor differences in the wording.

Our results fit well with the hierarchizations from the psychological and philosophical literature. There are, of course, differences in the details, but the general orientation is quite similar. When Alderfer proposes the triptych of existence needs, relatedness needs, and growth needs, or when Maslow suggests physiological needs, safety needs, social needs, esteem needs, and self-actualization needs, this comes fairly close to the ordering we found for our survival needs, decency needs, belonging needs, and autonomy needs. Moreover, this ordering echoes the widespread idea from the philosophical literature that there are basic needs beyond the physiological minimum that must not be ignored just because survival comes first. These needs are taken to be directed at social participation and human development. Lastly, our results have interesting implications for the role of both needs and different justice principles in the context of distributive and social policy. Our results show that, even in the case of the most basic needs, productivity still plays a role in distributive decisions, indicating that participants prefer social policies that are not unconditional but require a certain contribution. Differentiating both with regard to the kinds of needs and to the contribution (and further factors of accountability, see Bauer et al. 2022) might be worthwhile in researching the relation of perceived deservingness and policy support (see, e.g., Gielens et al. 2019, Heuer and Zimmermann 2020).

References

- Alderfer, C.P., 1969. An empirical test of a new theory of human needs. *Organizational Behavior and Human Performance* 4, 142–175.
- Alderfer, C.P., 1972. Existence, relatedness, and growth. *Human needs in organizational settings*. Free Press, New York.
- Aristotle, 1933–1935. *Metaphysics*. 2 vols. Harvard University Press, Cambridge.
- Bauer, A.M., 2018. Sated but thirsty. Towards a multidimensional measure of need-based justice. *FOR 2104 Working Paper 2018-03*. Hamburg.
- Bauer, A.M., 2019a. Gerechtigkeit und Bedürfnis. Perspektiven auf den Begriff des “Bedürfnisses” vor dem Hintergrund der Bedarfsgerechtigkeit, in: Bauer, A.M., Baratella, N. (Eds.), *Oldenburger Jahrbuch für Philosophie*. BIS-Verlag, Oldenburg, pp. 285–327.
- Bauer, A.M., 2019b. Zur Grundlegung empirisch informierter Maße der Bedarfsgerechtigkeit. Zwei Desiderata zwischen normativer Theorie, formaler Modellierung und empirischer Sozialforschung, in: Bauer, A.M., Meyerhuber, M.I. (Eds.), *Philosophie zwischen Sein und Sollen. Normative Theorie und empirische Forschung im Spannungsfeld*. Walter de Gruyter, Berlin and Boston, pp. 179–220.
- Bauer, A.M., 2022. Sated but thirsty. A prolegomenon to multidimensional measures of need-based justice. *Axiomathes* 32, 529–538.
- Bauer, A.M., Meyer, F., Romann, J., Siebel, M., Traub, S., 2022. Need, equity, and accountability. Evidence on third-party distribution decisions from a vignette study. *Social Choice and Welfare* 59, 769–814.
- Bauer, A.M., Meyerhuber, M.I. (Eds.), 2019. *Philosophie zwischen Sein und Sollen. Normative Theorie und empirische Forschung im Spannungsfeld*. Walter de Gruyter, Berlin and Boston.
- Bauer, A.M., Meyerhuber, M.I. (Eds.), 2020. *Empirical research and normative theory. Transdisciplinary perspectives on two methodical traditions between separation and interdependence*. Walter de Gruyter, Berlin and Boston.
- Bauer, A.M., Romann, J., forthcoming. Equal deeds, different needs. Need, accountability, and ressource availability in third-party distribution decisions, in: Knobe, J., Nichols, S. (Eds.), *Oxford studies in experimental philosophy*. Oxford University Press, Oxford. volume 5.
- Blinder, A., Choi, D., 1990. A shred of evidence on theories of wage stickiness. *The Quarterly Journal of Economics* 105, 1003–1015.
- BonJour, L., 1985. *The structure of empirical knowledge*. Harvard University Press, Cambridge.

- Braybrooke, D., 1987. Meeting needs. Princeton University Press, Princeton.
- Brañas-Garza, P., 2006. Poverty in dictator games. Awakening solidarity. *Journal of Economic Behavior & Organization* 60, 306–320.
- Brock, G., 2005. Needs and global justice. *Royal Institute of Philosophy Supplements* 57, 51–72.
- Brock, G., Miller, D., 2019. Needs in moral and political philosophy, in: Zalta, E.N. (Ed.), *The Stanford encyclopedia of philosophy*. summer 2019 ed.. Metaphysics Research Lab, Stanford University, Stanford. URL: <https://plato.stanford.edu/archives/sum2019/entries/needs/>.
- Cappelen, A., Moene, K., Sørensen, E., Tungodden, B., 2013. Needs versus entitlements. An international fairness experiment. *Journal of the European Economic Association* 11, 574–598.
- Chen, D., Schonger, M., Wickens, C., 2016. otree. An open-source platform for laboratory, online, and field experiments. *Journal of Behavioral and Experimental Finance* 9, 88–97.
- Cleary, M., Freeman, A., Hunt, G., Walter, G., 2006. Patient and carer perceptions of need and associations with care-giving burden in an integrated adult mental health service. *Social Psychiatry and Psychiatric Epidemiology* 41, 208–214.
- Copp, D., 1998. Equality, justice, and the basic needs, in: Brock, G. (Ed.), *Necessary goods. Our responsibilities to meet others' needs*. Rowman & Littlefield, Lanham, pp. 113–133.
- Dahl, G., Ransom, M., 1999. Does where you stand depend on where you sit? Tithe donations and self-serving beliefs. *American Economic Review* 89, 703–727.
- Daniels, N., 1985. Just health care. Cambridge University Press, Cambridge.
- Diederich, A., 2020. Identifying needs. The psychological perspective, in: Traub, S., Kittel, B. (Eds.), *Need-based distributive justice. An interdisciplinary perspective*. Springer, Cham, pp. 59–89.
- Doyal, L., Gough, I., 1991. A theory of human need. Palgrave Macmillan, Basingstoke.
- Elster, J., 1995. The empirical study of justice, in: Miller, D., Walzer, M. (Eds.), *Pluralism, justice, and equality*. Oxford University Press, Oxford, pp. 81–98.
- Esping-Andersen, G., 1990. The three worlds of welfare capitalism. Princeton University Press, Princeton.
- Frankfurt, H., 1984. Necessity and desire. *Philosophy and Phenomenological Research* 45, 1–13.

- Frohlich, N., Oppenheimer, J., Eavey, C., 1987. Choices of principles of distributive justice in experimental groups. *American Journal of Political Science* 31, 606–636.
- Gaertner, W., Schokkaert, E., 2012. Empirical social choice. Questionnaire-experimental studies on distributive justice. Cambridge University Press, New York.
- Gaertner, W., Schwettmann, L., 2007. Equity, responsibility and the cultural dimension. *Economica* 74, 627–649.
- Gesellschaft für integrierte Kommunikationsforschung, 2019. Best for planning. Interlink data in a meaningful way.
- Gewirth, A., 1978. Reason and morality. University of Chicago Press, Chicago.
- Ghai, D., 1978. Basic needs and its critics. *The IDS Bulletin* 9, 16–18.
- Gielens, E., Roosma, F., Achterberg, P., 2019. Deservingness in the eye of the beholder. A vignette study on the moderating role of cultural profiles in supporting activation policies. *International Journal of Social Welfare* 28, 442–453.
- Glorney, E., Perkins, D., Adshead, G., McGauley, G., Murray, K., Noak, J., Sichau, G., 2010. Domains of need in a high secure hospital setting. A model for streamlining care and reducing length of stay. *International Journal of Forensic Mental Health* 9, 138–148.
- Hall, D., Nougaim, K., 1968. An examination of Maslow's need hierarchy in an organizational setting. *Organizational Behavior and Human Performance* 3, 12–35.
- Hamilton, L., 2003. The political philosophy of needs. Cambridge University Press, Cambridge.
- Hamilton, L., 2009. Human needs and political judgment, in: de Bruin, B., Zurn, C. (Eds.), *New waves in political philosophy*. Palgrave Macmillan, London, pp. 40–62.
- Herman, J., Hulin, C., 1973. Managerial satisfactions and organizational roles. An investigation of Porter's need deficiency scales. *Journal of Applied Psychology* 57, 118–124.
- Heuer, J.O., Zimmermann, K., 2020. Unravelling deservingness. Which criteria do people use to judge the relative deservingness of welfare target groups? A vignette-based focus group study. *Journal of European Social Policy* 30, 389–403.
- Hörnquist, J.O., 1982. The concept of quality of life. *Scandinavian Journal of Social Medicine* 10, 57–61.
- Hülle, S., Liebig, S., May, M.J., 2018. Measuring attitudes toward distributive justice. The basic social justice orientations scale. *Social Indicators Research* 136, 663–692.
- Jolly, R., 1976. The World Employment Conference. The enthronement of basic needs. *Development Policy Review* A9, 31–44.

- Kahneman, D., Knetsch, J., Thaler, R., 1986. Fairness as a constraint on profit seeking. Entitlements in the market. *The American Economic Review* 76, 728–741.
- Kahneman, D., Tversky, A., 1979. Prospect theory. An analysis of decision under risk. *Econometrica* 47, 263–292.
- Kause, A., Vitouch, O., Glück, J., 2018. How selfish is a thirsty man? A pilot study on comparing sharing behavior with primary and secondary rewards. *PLOS ONE* 13, e0201358.
- Kelsen, H., 2016. Was ist Gerechtigkeit? Reclam, Stuttgart.
- Kittel, B., Neuhofer, S., Schwaninger, M., 2020. The impact of need on distributive decisions. Experimental evidence on anchor effects of exogenous thresholds in the laboratory. *PLOS ONE* 15, e0228753.
- Kittel, B., Traub, S. (Eds.), 2020. Need-based distributive justice. An interdisciplinary perspective. Springer, Cham.
- Knobe, J., 2003a. Intentional action and side effects in ordinary language. *Analysis* 63, 190–194.
- Knobe, J., 2003b. Intentional action in folk psychology. An experimental investigation. *Philosophical Psychology* 16, 309–324.
- Konow, J., 2001. Fair and square. The four sides of distributive justice. *Journal of Economic Behavior & Organization* 46, 137–164.
- Konow, J., 2003. Which is the fairest one of all? A positive analysis of justice theories. *Journal of Economic Literature* 41, 1188–1239.
- Konow, J., 2009. Is fairness in the eye of the beholder? An impartial spectator analysis of justice. *Social Choice and Welfare* 33, 101–127.
- Lawler, E., Suttle, L., 1972. A causal correlational test of the need hierarchy concept. *Organizational Behavior and Human Performance* 7, 265–287.
- Lehrer, K., 1990. Theory of knowledge. Westview, Boulder.
- Levine, D., 1993. Fairness, markets, and ability to pay. Evidence from compensation executives. *The American Economic Review* 83, 1241–1259.
- Levitt, S., List, J., 2007. What do laboratory experiments measuring social preferences reveal about the real world? *Journal of Economic Perspectives* 21, 153–174.
- Luke, 2016. Die Apostelgeschichte des Lukas, in: Evangelische Kirche in Deutschland (Ed.), Die Bibel. Lutherübersetzung. Deutsche Bibelgesellschaft, Stuttgart, pp. 137–174.

- Mac Cá尔thaigh, S., 2014. Need and poverty. *Policy & Politics* 42, 459–473.
- Marx, K., 1969. Kritik des Gothaer Programms, in: für Marxismus-Leninismus beim ZK der SED, I. (Ed.), Marx-Engels-Werke. Dietz, Frankfurt am Main. volume 19, pp. 11–32.
- Maslow, A., 1943. A theory of human motivation. *Psychological Review* 50, 370–396.
- Miller, D., 1976. Social justice. Oxford University Press, Oxford.
- Miller, D., 1992. Distributive justice. What the people think. *Ethics* 102, 555–593.
- Miller, D., 1999. Principles of social justice. Harvard University Press, Cambridge and London.
- Miller, D., 2007. National responsibility and global justice. Oxford University Press, Oxford.
- Miller, D., 2020. Needs-based justice. Theory and evidence, in: Bauer, A.M., Meyerhuber, M.I. (Eds.), Empirical research and normative theory. Transdisciplinary perspectives on two methodical traditions between separation and interdependence. Walter de Gruyter, Berlin and Boston, pp. 273–294.
- Mitchell, V., Moudgill, P., 1976. Measurement of Maslow's need hierarchy. *Organizational Behavior and Human Performance* 16, 334–349.
- Nussbaum, M., 1990. Aristotelian social democracy, in: Douglass, B., Mara, G., Richardson, H. (Eds.), Liberalism and the good. Routledge, New York and London, pp. 203–252.
- O'Neill, O., 1998. Rights, obligations, and needs, in: Brock, G. (Ed.), Necessary goods. Our responsibilities to meet others' needs. Rowman & Littlefield, Lanham, pp. 95–112.
- Payne, R., 1970. Factor analysis of a Maslow-type need satisfaction questionnaire. *Personnel Psychology* 23, 251–268.
- Porter, L., 1961. A study of perceived need satisfactions in bottom and middle management jobs. *Journal of Applied Psychology* 45, 1–10.
- Pötzler, T., 2021. Basic needs in normative contexts. *Philosophy Compass* 16, e12732.
- Pötzler, T., Hannikainen, I., 2022. The typicality effect in basic needs. *Synthese* 200, 382.
- Rauschenberger, J., Schmitt, N., Hunter, J., 1980. A test of the need hierarchy concept by a Markov model of change in need strength. *Administrative Science Quarterly* 25, 654–670.

- Reeskens, T., van Oorschot, W., 2013. Equity, equality, or need? A study of popular preferences for welfare redistribution principles across 24 European countries. *Journal of European Public Policy* 20, 1174–1195.
- Roberts, K., Walter, G., Miles, R., 1971. A factor analytic study of job satisfaction items designed to measure Maslow need categories. *Personnel Psychology* 24, 205–220.
- Schwettmann, L., 2009. Trading off competing allocation principles. Theoretical approaches and empirical investigations. Peter Lang, Frankfurt am Main.
- Scott, J., Bornstein, B., 2009. What's fair in foul weather and fair? Distributive justice across different allocation contexts and goods. *The Journal of Politics* 71, 831–846.
- Shue, H., 1996. Basic rights. Subsistence, affluence, and U.S. foreign policy. 2 ed., Princeton University Press, Princeton.
- Siebel, M., Schramme, T., 2020. Need-based justice from the perspective of philosophy, in: Traub, S., Kittel, B. (Eds.), *Need-based distributive justice. An interdisciplinary perspective*. Springer, Cham, pp. 21–58.
- Thagard, P., 2000. Coherence in thought and action. The MIT Press, Cambridge.
- Thomson, G., 1987. Need. Routledge & Kegan Paul, London and New York.
- Thomson, G., 2005. Fundamental needs, in: Reader, S. (Ed.), *The philosophy of need*. Cambridge University Press, Cambridge, pp. 175–186.
- Traub, S., Seidl, C., Schmidt, U., Levati, M., 2005. Friedman, Harsanyi, Rawls, Boulding—or somebody else? An experimental investigation of distributive justice. *Social Choice and Welfare* 24, 283–309.
- Vlachantoni, A., Shaw, R., Willis, R., Evandrou, M., Falkingham, J., Luff, R., 2011. Measuring unmet need for social care amongst older people. *Population Trends* 145, 60–76.
- Wahba, M., Bridwell, L., 1976. Maslow reconsidered. A review of research on the need hierarchy theory. *Organizational Behavior and Human Performance* 15, 212–240.
- Waters, L., Roach, D., 1973. A factor analysis of need-fulfillment items designed to measure Maslow need categories. *Personnel Psychology* 26, 185–190.
- Weale, A., Craig, E., 1998. Needs and interests, in: Routledge encyclopedia of philosophy. Routledge, London and New York, pp. 752–755.
- Weiß, A.R., Bauer, A.M., Traub, S., 2017. Needs as reference points. When marginal gains to the poor do not matter. FOR 2104 Working Paper 2017-13. Hamburg.
- Wiggins, D., 1987. Needs, need, needing. *Journal of Medical Ethics* 13, 62–68.

- Wiggins, D., 1998. What is the force of the claim that one needs something?, in: Brock, G. (Ed.), Necessary goods. Our responsibilities to meet others' needs. Rowman & Littlefield, Lanham, pp. 33–56.
- Williams, D., Page, M., 1989. A multi-dimensional measure of Maslow's hierarchy of needs. *Journal of Research in Personality* 23, 192–213.
- Wringe, B., 2005. Needs, rights, and collective obligations, in: Reader, S. (Ed.), The philosophy of need. Cambridge University Press, Cambridge, pp. 187–207.
- Yaari, M., Bar-Hillel, M., 1984. On dividing justly. *Social Choice and Welfare* 1, 1–24.

A. Instructions of Study 1

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. Taking part in this study is voluntary, and you can drop out at any time.

You will probably need about 15 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 at Mingle again.

In the course of the study, we will give you a total of three attention checks. With these questions we want to make sure that you read and understand the instructions correctly. If you answer more than one of these questions incorrectly, you will automatically be excluded from the study.

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.

Thank you for participation!

Vignette Text

Note: We randomized the names displayed, denoted as A, B, C, and D below (“Bauer”, “Becker”, “Fischer”, “Hoffmann”, “Klein”, “Koch”, “Meyer”, “Müller”, “Neumann”, “Richter”, “Schäfer”, “Schmidt”, “Schneider”, “Schröder”, “Schulz”, “Schwarz”, “Wagner”, “Weber”, “Wolf”, and “Zimmermann”, based on frequent German surnames), as well as the order the four kinds of needs appeared in. Next to each kind of need, a thumbnail of the picture illustrating this kind of need was displayed.

Please imagine four people with the names A, B, C, and D. All are in need for wood. They need the wood for different reasons. On this page, we present to you the different reasons for which A, B, C, and D need the wood. On the following pages, you will be asked how important it is that the respective person’s need is met.

A: A needs the wood to make sure to survive the coming winter. If A receives less than he needs, it will be so cold in his hut that he is very likely to become life-threateningly ill. The less wood he receives, the higher the probability that he will become life-threateningly ill.

B: B needs the wood in order not to freeze in the coming winter. The members of the community to which B belongs agree that one cannot live in dignity if one has to freeze. If B receives less than he needs, it becomes unacceptably cold in his hut. The less wood he receives, the more often he will freeze.

C: C needs the wood to be able to participate regularly in the social life of his community

in the coming winter. It is common practice to meet at the community center and everyone brings wood with which to heat it. If *C* receives less than he needs, he will not be able to participate regularly in the social life. The less wood he receives, the less often he will be able to come to meetings at the community center.

D: *D* needs the wood to be able to use his studio regularly in the coming winter. He creates art there in his spare time. If *D* receives less than he needs, he will not be able to use his studio regularly. The less wood he receives, the less often he will be able to create art in his studio.

Task

Note: The needs of Person A, B, C, and D were displayed on separate screens. Their names were identical to those from the instructions screen. The order of the four screens was randomized. On each screen, we displayed a picture illustrating the kind of need in question. Below each picture, a single sentence summed up the kind of need. Participants had to enter their rating on a scale from 1 to 7. An additional option for “no answer/I don’t know” was included.

Please indicate how important you think the following kind of need is that *A* (*B*, *C*, *D*) can meet by using firewood.

A: *A* needs the wood to avoid becoming life-threateningly ill.

B: *B* needs the wood to avoid freezing.

C: *C* needs the wood to participate in social life.

D: *D* needs the wood to use his studio.

How much does *A* [*B*, *C*, *D*] need the wood in this case? Please give your answer on the following scale from 1 (“Does not need the wood at all”) to 7 (“Does absolutely need the wood”).

B. Control Questions of Study 1

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: How many reasons to need wood have we presented to you?

- 3
- 4
- 5

Question 3: Which statements apply to this study? Multiple answers are possible.

- Wood is needed to renovate a building.
- Wood is needed to carve together.
- Wood is needed to heat.

C. Additional Questions of Study 1

Political Orientation

Note: An additional option for “no answer/I don’t know” was included.

In politics, one speaks of left-wing and right-wing. How would you describe your own political position in general? Where on a scale of 1 (left) to 7 (right) would you place yourself?

Sensitivity to Cold

Note: An additional option for “no answer/I don’t know” was included.

On a scale from 1 (not at all sensitive to cold) to 7 (very sensitive to cold), how sensitive are you to cold?

D. Instructions of Study 2

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. Taking part in this study is voluntary, and you can drop out at any time.

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 at Mingle again.

In the course of the study, we will give you a total of three attention checks. With these questions we want to make sure that you read and understand the instructions correctly. If you answer more than one of these questions incorrectly, you will automatically be excluded from the study.

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.

Thank you for participation!

Instructions

Your task will be to distribute firewood between two people. 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.

Vignette Text

Note: The four reasons were displayed to participants either in the Avoidance or in the Enablement Formulation. We randomized the names displayed, denoted as A and B below (“Bauer”, “Müller”, “Schmidt”, “Schneider”, “Fischer”, “Weber”, and “Meyer”, based on frequent German surnames), as well as the position of the two persons (randomizing whether the more productive or the more needy person appears on the left side of the screen).

Please imagine two people with the names *A* and *B*. *A* and *B* do not know each other. Both are in need of wood. The community of *A* and *B* allows them to chop wood in the community forest for a certain period of time. Both have little money and therefore have no other way to get wood.

On the coming pages, we will present you with a total of 14 cases where *A* and *B* need the wood for different reasons. On each page, we will tell you what *A* needs the wood for and what *B* needs the wood for. You will then be asked to divide the wood as fairly as possible between *A* and *B*.

Please note that you have to make the following trade-off: The more wood you give to one person, the less you can give to the other. It is not possible to completely meet the needs of both people at the same time. In each of the 14 cases, the available amount of wood will only be enough to completely cover the needs of one of the two people; the other person would then go away empty-handed.

We now present to you the four different reasons for which A and B may need the wood. These four reasons have to do with the coming winter. Since you need to distribute the wood in advance without knowing exactly how cold the winter will be, we describe the expected effects of the winter on the people as more or less likely.

Please read the descriptions of the four reasons carefully.

Reason 1 (Avoidance Formulation): The person needs the wood to avoid falling life-threateningly ill and dying from it in winter. They heat their hut exclusively with wood. The more logs the person gets, the less likely they are to fall life-threateningly ill. If the person gets no wood at all, they will certainly fall life-threateningly ill. If the person gets all the available wood, they will certainly not fall life-threateningly ill.

Reason 1 (Enablement Formulation): The person needs the wood to stay healthy and survive in winter. She heats her hut exclusively with wood. The more logs the person gets, the higher the probability that they will stay healthy. If the person gets no wood at all, they will certainly not stay healthy. If the person gets all the available wood, they will certainly stay healthy.

Reason 2 (Avoidance Formulation): The person needs the wood to not freeze in winter. They heat their hut exclusively with wood. The more logs the person gets, the less likely they will freeze. If the person gets no wood at all, they will certainly freeze. If the person gets all the wood available, they will certainly not freeze.

Reason 2 (Enablement Formulation): The person needs the wood to be warm in winter. They heat their hut exclusively with wood. The more logs the person gets, the higher the probability that they will be warm. If the person does not get any wood at all, they will certainly not have it warm. If the person gets all the available wood, they will certainly have it warm.

Reason 3 (Avoidance Formulation): The person needs the wood in order not to be excluded from social life in winter, since it is common practice to meet in the community center and everyone brings wood with which to heat it. The more logs the person gets, the less likely they are to be excluded from social life. If the person gets no wood at all, they will certainly be excluded from social life. If the person gets all the available wood, they will certainly not be excluded from social life.

Reason 3 (Enablement Formulation): The person needs the wood to participate in social life in winter, since it is common practice to meet in the community center and everyone brings wood to heat it. The more logs the person gets, the more likely they are to participate in social life. If the person does not get any wood at all, they will certainly

not participate in social life. If the person gets all the available wood, they will certainly participate in social life.

Reason 4 (Avoidance Formulation): The person needs the wood so that their studio does not become unusable in winter. They heat their studio exclusively with wood. There, they create art in their free time. The more logs the person gets, the less likely it is that their studio will become unusable. If the person gets no wood at all, their studio will certainly be unusable. If the person gets all the available wood, their studio will certainly not be unusable.

Reason 4 (Enablement Formulation): The person needs the wood so that they can use their studio in the winter. They heat their studio exclusively with wood. There, they create art in their free time. The more logs the person gets, the more likely they are to use their studio. If the person gets no wood at all, they will certainly not use their studio. If the person gets all the available wood, they will certainly use their studio.

Scenario Introduction

Note: Before each scenario, a single sentence was displayed to introduce participants to the productivity of Person A and B in the next seven cases.

Equal Productivity Scenario: In the following 7 cases that we show you, A and B have each cut 500 logs of wood.

Unequal Productivity Scenario: In the following 7 cases that we show you, A has cut 200 and B 800 logs of wood.

Exemplary Task

A and *B* have cut 500 logs each [*A* has cut 200 and *B* has cut 800 logs]. So both persons have cut a total of 1,000 logs. In the empty spaces below, please make the distribution to both people that you think is most just.



A needs the wood so that their studio does not become unusable in the winter.

A should receive ____ logs of wood.



B needs the wood to avoid freezing in the winter.

B should receive ____ logs of wood.

E. Control Questions of Study 2

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: How much wood have *A* and *B* cut together in the previous displayed cases.

- 5000
- 3000
- 2500
- 1800
- 1200
- 1000
- 500

F. Additional Questions of Study 2

Support for Different Distribution Principles

Note: Items were displayed in a randomized order. An additional option for “no answer/I don’t know” was included.

How important were the following considerations for your distributions? Please give your answers on a scale from 1 (not at all important) to 7 (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.

Political Orientation

Note: An additional option for “no answer/I don’t know” was included.

In politics, one speaks of left-wing and right-wing. How would you describe your own political position in general? Where on a scale of 1 (left) to 7 (right) would you place yourself?

Sensitivity to Cold

Note: An additional option for “no answer/I don’t know” was included.

On a scale from 1 (not at all sensitive to cold) to 7 (very sensitive to cold), how sensitive are you to cold?

G. Additional Tables

Table 4: Sample of Study 1 by Gender, Age, and Income

Gender		Age		Income Interval ^a	
Group	Share	Group	Share	Group	Share
Female	50.0	18 – 29	21.0	[0, 1100)	16.0
Male	50.0	30 – 39	18.0	[1100, 1500)	23.0
		40 – 49	19.0	[1500, 2000)	23.0
		50 – 59	24.0	[2000, 2600)	19.0
		60 – 69	18.0	[2600, ∞)	19.0

Share in percent. n = 100. ^a Equivalent household net income.

Table 5: Control variables for Study 1

	(1)	(2)	(3)	(4)	(5)	(6)
Decency	-0.840*** (0.178)	-0.838*** (0.179)	-2.706*** (0.319)	-2.702*** (0.319)	-0.834*** (0.105)	-0.832*** (0.106)
Belonging	-2.779*** (0.178)	-2.780*** (0.179)	-5.028*** (0.323)	-5.024*** (0.322)	-2.781*** (0.160)	-2.782*** (0.161)
Autonomy	-3.530*** (0.178)	-3.530*** (0.178)	-5.851*** (0.325)	-5.847*** (0.324)	-3.530*** (0.175)	-3.530*** (0.176)
Age		-0.006 (0.004)		-0.008 (0.009)		-0.006 (0.006)
{years}						
Gender		-0.025 (0.136)		0.009 (0.281)		-0.021 (0.181)
{0 = female, 1 = male}						
Household Net Income		-1.14e ⁻⁶ (3.10e ⁻⁶)		-1.36e ⁻⁶ (6.34e ⁻⁶)		-1.14e ⁻⁶ (1.22e ⁻⁶)
{euros}						
Political Attitude		-0.004 (0.003)		-0.006 (0.006)		-0.004*** (0.002)
{1, ..., 7}						
Sensitivity to Cold		0.025 (0.046)		0.021 (0.095)		0.026 (0.062)
{1, ..., 7}						
Constant	6.830*** (0.126)	7.023*** (0.344)	9.082*** (0.305)	9.378*** (0.733)	6.830*** (0.065)	7.025*** (0.472)
F	170.680***	64.310***				
χ^2			440.56***	441.890***	453.470***	709.130***

The table reports the results of two pooled OLS regressions (Models (1) and (2)), two Tobit panel regressions (Models (3) and (4)), as well as two random-effects GLS panel regressions (Models (5) and (6); panel variable: *id*). Endogenous variable: *importance rating*. First row: coefficients, second row: standard errors in parentheses. n = 100. Significance levels: * p < 0.10, ** p < 0.05, *** p < 0.01.

Table 6: Contrasts of predictive margins for Study 1

	Contrast	Std. Err.	<i>t</i>
Dec. vs. Sur.	-0.838	0.179	-4.690***
Bel. vs. Sur.	-2.780	0.179	-15.570***
Aut. vs. Sur.	-3.530	0.178	-19.820***
Bel. vs. Dec.	-1.942	0.179	-10.850***
Aut. vs. Dec.	-2.692	0.179	-15.080***
Aut. vs. Bel.	-0.750	0.179	-4.200***

The table reports the contrasts of the predictive margins of the mean ratings of the four kinds of needs. $n = 100$. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 7: Sample of Study 2 by Gender, Age, and Income

Gender		Age		Income Interval ^a	
Group	Share	Group	Share	Group	Share
Female	50.0	18 – 29	21.0	[0, 1100)	16.0
Male	50.0	30 – 39	18.0	[1100, 1500)	23.0
		40 – 49	19.0	[1500, 2000)	23.0
		50 – 59	24.0	[2000, 2600)	19.0
		60 – 69	18.0	[2600, ∞)	19.0

Share in percent. $n = 200$. ^a Household net income.

Table 8: Percentage deviation of the share that Person A receives from the share that Person A contributed for Paired Cases by Productivity Scenario

Case	Productivity Scenario					
	EPS			UPS		
	Mean	%	Std. Dev.	Mean	%	Std. Dev.
Sur. – Sur.	0.741		4.279	10.556		4.538
Dec. – Dec.	0.000		0.000	9.000		4.678
Bel. – Bel.	0.698		3.196	6.791		5.276
Aut. – Aut.	1.765		8.867	7.489		6.037

The table reports means of absolute percentage deviations of the share that Person A receives from the share that Person A contributed for Paired Cases by Productivity Scenario.

Table 9: Mean differences for Cases by Productivity Scenario

Case	Productivity Scenario					
	EPS			UPS		
	Δ	95% CI	Δ	95% CI	Diff.	t
Sur. – Sur.	-14.8	[-37.709, 8.080]	-72.2	[-132.921, -11.523]	57.4	1.740*
Dec. – Dec.	0.0		-150.0	[-213.765, -86.235]	150.0	4.625***
Bel. – Bel.	9.3	[-10.120, 28.725]	-260.5	[-339.553, -181.378]	269.8	6.512***
Aut. – Aut.	-35.2	[-84.039, 13.608]	-225.5	[-308.627, -142.432]	190.3	3.882***
Sur. – Aut.	515.7	[467.261, 564.119]	388.5	[331.488, 445.472]	127.2	3.335***
Sur. – Bel.	425.4	[380.155, 470.625]	305.5	[249.298, 361.682]	119.9	3.259***
Dec. – Aut.	398.3	[356.770, 439.790]	251.0	[196.734, 305.267]	147.3	4.227***
Dec. – Bel.	295.3	[255.957, 334.663]	136.5	[84.059, 188.941]	158.8	4.750***
Sur. – Dec.	201.5	[163.081, 239.939]	129.0	[82.679, 175.321]	72.5	2.363***
Bel. – Aut.	122.6	[85.082, 160.099]	-27.5	[-81.641, 26.641]	150.1	4.469***

The table reports the differences (Δ) of Pairs Cases (upper part) and Mixed Cases (lower part) by Productivity Scenario as well as results of two-tailed Welch's t -tests. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 10: Pairwise comparisons of margins for all combinations of Mixed Cases

Combination	Contrast	Std. Err.	<i>z</i>
Sur. – Bel. vs. Sur. – Aut.	–98.491	20.198	–4.880***
Dec. – Aut. vs. Sur. – Aut.	–138.839	20.190	–6.880***
Dec. – Bel. vs. Sur. – Aut.	–261.238	20.165	–12.950***
Sur. – Dec. vs. Sur. – Aut.	–301.307	20.159	–14.950***
Bel. – Aut. vs. Sur. – Aut.	–415.070	20.154	–20.590***
Dec. – Aut. vs. Sur. – Bel.	–40.347	20.136	–2.000
Dec. – Bel. vs. Sur. – Bel.	–162.746	20.109	–8.090***
Sur. – Dec. vs. Sur. – Bel.	–202.816	20.102	–10.090***
Bel. – Aut. vs. Sur. – Bel.	–316.579	20.097	–15.750***
Dec. – Bel. vs. Dec. – Aut.	–122.399	20.101	–6.090***
Sur. – Dec. vs. Dec. – Aut.	–162.468	20.094	–8.090***
Bel. – Aut. vs. Dec. – Aut.	–276.232	20.089	–13.750***
Sur. – Dec. vs. Dec. – Bel.	–40.069	20.065	–2.000
Bel. – Aut. vs. Dec. – Bel.	–153.833	20.060	–7.670***
Bel. – Aut. vs. Sur. – Dec.	–113.763	20.052	–5.670***

*The table reports pairwise comparisons of predictive margins. Significance levels (Bonferroni corrected): * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.*

Table 11: Control Variables for Study 2

	(2)	(3)	(4)
Productivity \times Sur. – Bel.	12.767 (37.806)		
Productivity \times Dec. – Aut.	-13.981 (37.794)		
Productivity \times Dec. – Bel.	-25.193 (37.747)		
Productivity \times Sur. – Dec.	62.495* (37.732)		
Productivity \times Bel. – Aut.	-15.008 (37.723)		
Productivity \times Formulation		39.876* (21.767)	
Age			-1.236
{#years}			(1.081)
Gender			11.218
{0 = female, 1 = male}			(33.979)
Household Net Income			-0.001
{euros}			(0.001)
Importance Need			21.637*
{1, ..., 7}			(11.285)
Importance Productivity			-78.682***
{1, ..., 7}			(9.363)
Importance Equality			-16.959*
{1, ..., 7}			(9.067)
Political Attitude			8.981
{1, ..., 7}			(15.199)
Sensitivity to Cold			-2.785
{1, ..., 7}			(10.466)

The table reports the results of two Tobit random-effects panel regressions with robust standard errors (interaction terms and control variables of models (2) and (4) in Table 3). First row: coefficients, second row: standard errors in parentheses. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.