Social Norm Perceptions in Third-Party Punishment

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Abstract

Costly punishment from an unaffected third party can play an important role in sustaining cooperation and deterring selfish behavior. It has been proposed that individuals engage in third-party punishment because they want to enforce social norms. In this paper, we study whether and which norm-related beliefs motivate third-party punishment. We run an experiment and explicitly measure personal norms of appropriateness, normative expectations, and empirical expectations alongside associated punishment decisions in a modified dictator game. We find that each of the three norm perceptions has a causal positive impact on punishment on its own. For their joint correlations with punishment, we find that higher personal norms and empirical expectations are associated with higher punishment decisions, whereas normative expectations are negatively correlated. Normative expectation seem to matter in combination with personal norms, as we find a positive correlation between their difference with punishment. Additionally, we find that the relative importance of each norm-related belief depends on gender or on the role that individuals are assigned to. We conclude that the desire to enforce own beliefs of appropriateness or typical behavior motivates punishment decisions rather than perceived societal appropriateness views. Moreover, we show the importance of considering all three norm-related beliefs because otherwise, the effect of one of them could be wrongly attributed to another.

Keywords: Third-Party Punishment, Social Norms, Empirical Expectations, Normative Expectations, Personal Norms

JEL: C72, C91, D63, D84, D91

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1 Introduction

In third-party punishment, an unaffected individual punishes another person for an act of wrongdoing. It is seen as a tool for the enforcement of social norms (Carpenter & Matthews 2012, 2009, Henrich et al. 2006, Fehr & Fischbacher 2004) and it can serve to sustain cooperation by deterring selfish behavior (Lergetporer et al. 2014, Carpenter & Matthews 2012, Mathew & Boyd 2011, Charness et al. 2008, Carpenter et al. 2004, Fehr & Fischbacher 2004), to promote more egalitarian allocations (Martin et al. 2021), and more generally to sustain different norms of behavior across societies (Kamei et al. 2023, Henrich et al. 2006). In many cases, this punishment comes at a personal cost to the punisher. Hence, the existence of third-party punishment shows that humans care about how others behave in a specific situation, even when they are not affected by it.

Whatever constitutes wrongdoing, however, is not always clear, is subjective, and may depend on the punisher's perceptions of the relevant social norms. First, punishers may have their own personal beliefs about what should be done in a specific situation – their *personal norms of appropriateness*[1] – and punish those who deviate from it. In this way, they want to enforce their own preferences about how to behave in a specific situation. Second, because humans are a part of society, they potentially base their punishment decisions not only on their personal opinions of appropriateness but also on what others deem appropriate. *Normative expectations*[2] are individuals' beliefs about what others think is appropriate behavior and can serve to guide punishment decisions to enforce behavior that individuals believe everyone prefers. Third, in addition to thinking about what others think is appropriate, punishers may also rely on their *empirical expectations*[2], their beliefs about what constitutes common behavior. Punishers may take their empirical expectations to guide their punishment decisions, as how humans typically behave may result from what they think others (and themselves) think is appropriate (Tremewan & Vostroknutov 2021).

It is often argued that the existence of third-party punishment is evidence by itself that humans care about the enforcement of social norms (Carpenter & Matthews 2012, 2009, Henrich et al. 2006, Fehr & Fischbacher 2004). However, to the best of our knowledge, no study specifically elicits

[1] We follow Bicchieri (2016) to classify the beliefs that matter for norm compliance. For the text to be more concise, we refer to personal norms as a social norm perception.

[2] Cialdini et al. (1990) defines the injunctive norm as what people believe ought to be and the descriptive norm as what usually is (common behavior). The classification that we follow by Bicchieri (2016) can be viewed as the individual's belief of the injunctive norm (normative expectation) and the belief of the descriptive norm (empirical expectation).

personal norms, normative expectations, and empirical expectations together and addresses their roles as the underlying motives for third-party punishment. Furthermore, no other study explicitly identifies the causal impact of the three types of social norm perceptions on third-party punishment decisions. In this paper, we close this research gap and identify whether and to what extent personal norms of appropriateness, empirical expectations, and normative expectations trigger third-party punishment and study their relative importance.

Previous studies indicate that social norms and beliefs about social norms matter for third-party punishment. Carpenter & Matthews (2009) test a broad set of different average behavior specifications in public goods game[3] and find that deviations from the average contribution of the session best explain larger third-party punishment decisions. Carpenter & Matthews (2012) confirm this result and observe furthermore that deviations from the punisher's beliefs about the expected contribution, as well as from the punisher's own contribution, are associated with larger punishment decisions. Therefore, empirical expectations seem to matter for third-party punishment decisions. Moreover, normative expectations seem to matter as well. House et al. (2020) find that injunctive norm nudges that consist of messages about 'what is wrong and bad behavior' increase third-party punishment decisions for children. Zong et al. (2021) show that punishers react to norm-relevant information, i.e., providing a player's expectations about the behavior in the game. Dimant & Gesche (2023) show that injunctive and descriptive norm nudges increase third-party punishment decisions. They further show in a subsequent experiment that both nudges increase personal appropriateness ratings of the situation. However, in this subsequent experiment, they do not elicit punishment decisions and hence do not show how they are associated with punishment decisions. Finally, personal norms also seem to matter. Bašić & Verrina (2023) show that both normative expectations and personal norms about third-party punishment decisions are positively correlated with own third-party punishment decisions.

Other studies also investigate norms of third-party punishment. Kamei (2020), Fabbri & Carbonara (2017) and Lois & Wessa (2019) find that information and beliefs about others' punishment decisions influence subjects' own punishment decisions. Furthermore, Kamei (2018) shows that being observed by another punisher increases punishment, indicating that subjects care about

[3]Such as the average contribution of the session, of the ingroup, or of the outgroup, the own contribution, or the set of all possible (exogenously set) contributions.

conforming to a punishment norm. Literature on second-party punishment also identifies the importance of the descriptive and injunctive norms of cooperation for punishment (Li et al. 2021, Reuben & Riedl 2013), as well as the punishment norm itself Li et al. (2021).

In summary, the literature demonstrates that beliefs about social norms matter for third-party punishment decisions. Yet, unlike our paper, none of the above-mentioned studies explicitly elicits all three social norm perceptions, i.e., personal norms, empirical expectations, and normative expectations, as well as punishment decisions together and, therefore, cannot clearly identify the channels for punishment decisions. In principle, all of the three mentioned norm perceptions inform each other and hence are correlated (Tremewan & Vostroknutov 2021). At the same time, these three norm-related beliefs can differ because of asymmetries in the availability and processing of information and because of heterogeneous preferences. Therefore, it is important to consider all of these norm-related beliefs because otherwise the effect of one of them could be wrongly attributed to another one. Furthermore, none of the papers provide causal effects of social norm perceptions on punishment.

We run an online experiment that consists of two sections. We measure personal norms, empirical expectations, normative expectations, and emotions before the first section and after the second section. We control for negative emotions, as they are an important driver of third-party punishment (Jordan, McAuliffe & Rand 2016, Carpenter & Matthews 2012, Nelissen & Zeelenberg 2009). In the first section, punishers go through a modified dictator game in different roles, depending on the treatments. In this dictator game, the dictator starts with an endowment of 100 CZK and can decide to transfer either 0, 10, 40, or 50 CZK to the receiver.[4] In the punishment section, subjects choose whether and how much to punish *another* dictator, drawn from a different group of people, for their behavior in the same type of game via the strategy method. The to-be-punished dictator does not interact with the punishers in any other way.

We employ four treatments with an exogenous variation of the first section to create additional heterogeneities in social norm perceptions. Participants are randomly assigned either to the role of the dictator (*Dictator treatment*), the role of the receiver (*Receiver treatment*), the role of the observer (*Observer treatment*), or to the *Baseline*. In the Dictator and Receiver treatment, partici-

[4]We omit the choices of 20 and 30 to force more extreme transfers and hence to have a higher potential of shifting norm perceptions after a transfer.

pants played one round of the modified dictator game. In the Observer treatment, they observed a transfer from a dictator from an earlier session, and in the Baseline, they did not do anything in the first section. While in the Observer treatment we provide a signal about typical behavior without affecting participants' payoff, the Receiver treatment potentially changes how this information (the transfer) is perceived. Additionally, being assigned to the role of a dictator or receiver may make subjects (motivatedly) form different initial perceptions about social norms.

We find that the treatment assignment leads to substantial heterogeneities in the distribution of the three social norm perceptions and in the within-subject differences of the three norm perceptions. This allows us to identify their relative impact. Additionally, we speak to their causal influence by first showing that potential reverse causality plays only a marginal role – if any – by comparing the correlations of social norm perceptions with punishment between the first and second elicitation and by comparing social norm perceptions between the roles. Second, we also employ an IV regression, where we exploit the caused variation in the norm perceptions by the treatments.

Our main findings are the following: We find significant positive effects of each of the three norm perceptions on punishment individually. However, when studying their joint correlations, we find that the correlation of normative expectations with punishment reverses to a significant negative correlation, while the positive correlation of personal norms and empirical expectations with punishment prevails. This shows that subjects who believe higher transfers are more appropriate, and those who think that dictators typically transfer more, punish more. At the same time, if they believe others deem higher transfers more appropriate, they punish less. We find that the difference between personal norms and normative expectations can explain this negative relationship. Punishers use their normative expectations to determine whether they can free-ride on others' punishment decisions or whether their punishment decisions become more crucial.

Moreover, an exploratory heterogeneity analysis reveals that the relative importance of the three norm-related beliefs depends on gender and the assigned role. The positive relationship between personal norms and punishment is stronger for males, whereas the relationship between empirical expectations and punishment is stronger for females. Moreover, receivers seem to rely more on their empirical expectations compared to the rest of the sample and dictators seem to motivatedly downwards bias their personal norms, which results in overall lower punishment choices.

The contribution of this paper is two-fold. First, we contribute to the literature about social norms and third-party punishment (Bašić & Verrina 2023, Dimant & Gesche 2023, Zong et al. 2021, House et al. 2020, Lois & Wessa 2019, Kamei 2018, Fabbri & Carbonara 2017, Carpenter & Matthews 2012, 2009, Henrich et al. 2006, Fehr & Fischbacher 2004) by finding a causal influence of each norm perception on its own and thus by providing evidence that third-party punishment is indeed used for the enforcement of social norms. Importantly, we also show the importance of considering all three norm-related beliefs, as the positive correlation of normative expectations reverses to a negative when considering them jointly with personal norms and empirical expectations. Consequently, we show that third-party punishment is used – at least partially – to enforce one's own view of appropriateness and typical behavior, but not society's appropriateness views. Moreover, we show that the importance of personal norms or empirical expectations is heterogeneous and depends, for example, on gender or the specific exogenously assigned role. These results provide policy implications for those aiming to alter third-party punishment. Policies should focus on shifting empirical expectations (and, if possible personal norms) to influence punishment most efficiently. In addition, policymakers should carefully evaluate who the target population is, as there is heterogeneity in the relevance of the social norm perceptions.

Second, we also contribute to the literature about social norms more broadly (e.g. Bicchieri, Dimant, Gelfand & Sonderegger 2023, Abeler et al. 2019, Danilov & Sliwka 2017, Kessler & Leider 2012, Andreoni & Bernheim 2009, Bénabou & Tirole 2006), by showing the importance of considering all three-norm related beliefs. As they are correlated but also different from each other, the effect of one of them may be wrongly attributed to another one. This has important implications for our understanding of norm-driven economic behavior because individuals might care less about societal appropriateness views and more about their own appropriateness views and typical behavior.

The paper is structured as follows: In section 2, we provide a theoretical discussion, in section 3, we describe the experimental design, and section 4 presents the results. Lastly, section 5 provides a discussion and concludes.

2 Theoretical Considerations

In this section, we discuss how social norm perceptions relate to each other and under which circumstances they may diverge. Based on this analysis, we derive the potential influence of social norm perceptions on third-party punishment decisions.

As Tremewan & Vostroknutov (2021) argue, individuals form social norm perceptions based on the information available to them and based on their perceptions of the availability of information to others. In the case of the personal opinion of appropriateness, individuals also take into account their own preferences about the expected outcomes that are associated with specific actions. Consequently, personal norms can differ among individuals due to differences in the information they rely on, different information processing, or heterogeneous preferences.

When forming normative expectations, i.e., beliefs about others' personal views of appropriateness, individuals could compare others to themselves. If they believe others to be exactly alike, normative expectations coincide with their own personal norm of appropriateness. However, if individuals believe there are differences – either in the availability of information, information processing, or in preferences – they may think that others hold a different personal norm of appropriateness. Consequently, normative expectations can differ from one's own personal norm of appropriateness.[5]

Lastly, individuals' behavior does not necessarily align with their own or societal perception of appropriate behavior. Merguei et al. (2022) find that when there are several norms in a situation, subjects opportunistically follow the norm that maximizes their own payoffs – a phenomenon termed moral opportunism. Additionally, Bicchieri, Dimant & Sonderegger (2023) show that individuals can also motivatedly distort their social norm perceptions in a self-serving manner. They find that subjects update their empirical – but not normative – expectations about lying when presented with an upcoming opportunity to lie. Thus, individuals may choose to exploit these selfish opportunities, or, crucially, expect others to do so. In addition, Kölle & Quercia (2021) show that when there is strategic uncertainty about others' behavior, normative and empirical expectations of participants differ substantially. Consequently, the perception of common behavior can differ substantially from normative views.

[5]See Bašić & Verrina (2023) for specific examples, where personal norms and normative expectations may differ.

To sum up, the three norm-related beliefs can differ due to heterogeneities in preferences, due to differences in the availability and processing of information, and due to moral opportunism. Given that they differ, the question arises, which among them is most important for individual's third-party punishment decisions. As third-party punishment is costly and does not come with a direct personal monetary benefit, individuals need to have another, potentially non-monetary, motivation to engage in such punitive behavior.

One such motivation could be the desire for others to align their behavior with one's own appropriateness view. Punishing those, who deviate from this view can help to change future behavior towards own appropriateness views in order to implement an outcome that one believes is better for everyone – or at least for individuals with the same type as themselves. This could also be done to change future outcomes where one is directly involved. The reliance on personal norms goes in line with (Bašić & Verrina 2023), who demonstrate the importance of personal norms for economic decision-making, including third-party punishment.[6]

If own personal norms of appropriateness coincide with normative expectations, the latter can matter for the same reasons. Additionally, punishers may want to contribute to enforcing an outcome, that society prefers. If normative expectations and own personal norms diverge, individuals believe to hold a different view of appropriateness than others. Punishers then face a trade-off between enforcing an outcome that they deem appropriate, or an outcome that they believe society deems appropriate. Whether the one or the other dominates punishment decisions may depend on individual factors. Bašić & Verrina (2023) find an overall stronger correlations of personal norms with economic behavior compared to normative expectations. This indicates that subjects might rely more on their personal norms than normative expectations when deciding on punishment.[7]

Lastly, previous literature emphasizes that empirical expectations are more important for economic behavior than normative expectations (Bicchieri et al. 2022, Kölle & Quercia 2021, Chen et al. 2020, Schmidt 2019, Agerström et al. 2016, Bose et al. 2016, Bicchieri & Xiao 2009) including for punishment decisions (Dimant & Gesche 2023). Beliefs about common behavior may be used

[6]Unlike this study, (Bašić & Verrina 2023) focus on appropriateness views about punishment decisions and not about behavior in the game itself.

[7]There might be cases when individuals engage in costly punitive behavior to enforce an outcome that they believe others would prefer, even if that goes against their own appropriateness views. Pluralistic ignorance – i.e., a difference between the perceived societal norm and all personal norms – is a prominent phenomenon that might be enforced in those cases (Andre et al. 2024, Bursztyn et al. 2020).

for punishment, if one wants to reinforce typical behavior by punishing those who behave atypically. In this case, subjects might actively decide to base punishment on empirical expectations instead of normative expectations because they want to justify and reinforce deviations from higher normative standards. In addition, such a reliance on empirical expectations can also be used in a self-serving way to avoid costly punishment, if one wants to behave opportunistically. This opportunity to decrease punishment may be especially exploited, because empirical expectations are more prone to motivated self-serving distortions compared to normative beliefs (Bicchieri, Dimant & Sonderegger 2023).

To identify the effect of each of these three norm-related beliefs, we attempt to create an environment with heterogeneity in the appropriateness views, and an additional mismatch between beliefs of common behavior and those appropriateness views. We use a (modified) dictator game, which is known to create substantial heterogeneities in behavior (Engel 2011). As any allocation in the dictator game is Pareto-efficient, there is not one socially optimal solution, and hence (potentially heterogeneous) fairness views and social preferences shape appropriateness views. Additionally, we employ four treatments to shift the three norm-related beliefs to a different extent.

One way to shift the beliefs is through receiving or observing a transfer in this dictator game, as it gives a noisy signal of common behavior. Thus, participants may update their empirical expectations downwards or upwards around this reference point (Bicchieri et al. 2022, Hoeft et al. 2019, Gino et al. 2009, Keizer et al. 2008). At the same time, this signal may also inform normative expectations and change personal norms as they are related and inform each other.[8]

Another way to shift norm-related beliefs is by assigning subjects to different roles, such as receiver, dictator, or observer, additionally to their roles as third-party punishers. Depending on the role, subjects may motivatedly distort their beliefs in self-serving ways (e.g. Bicchieri, Dimant & Sonderegger 2023, Zimmermann 2020, Epley & Gilovich 2016). For instance, dictators may motivatedly believe that smaller transfers are appropriate, whereas receivers may believe that higher transfers are more appropriate.

Finally, we test whether social norm perceptions affect punishment *causally*. For this we tackle a potential reverse causality problem in the following way: First, we elicit norm perceptions at the beginning and the end of the experiment and compare their associations with punishment. Second,

[8]See Tremewan & Vostroknutov (2021) for how social norm perceptions inform each other.

we compare norm perceptions of subjects with and without the punishment opportunity. Third, we examine how punishment changes norm perceptions in the treatment without information. And lastly, we employ an instrumental variable regression, exploiting the exogenous variation in social norm perceptions depending on the treatment. To further address a potential source of endogeneity, we control for negative emotions, as the literature finds that they affect third-party punishment decisions (Jordan, Hoffman, Bloom & Rand 2016, Carpenter & Matthews 2012, Nelissen & Zeelenberg 2009).

3 Experiment

We ran an online experiment[9] in March and April of 2021 with subjects from the subject pool of the Masaryk University Experimental Economics Laboratory (MUEEL). The experiment was programmed in z-Tree (Fischbacher 2007), and we used z-Tree unleashed (Duch et al. 2020) to implement running sessions on the internet. Each session consisted of 14 participants and took an average of around 40 minutes, with average earnings of 118 CZK (approximately 4.79 EUR, which corresponded to a student wage of one hour of unqualified work). The experiment received ethical approval from the GfeW.[10] We analyze the punishment behavior of 296 participants (punishers).[11] Furthermore, we included 120 punishees,[12] who were dictators in the dictator game and were subject to potential sanctions from the punishers. Punishees did not interact in any other way with the punishers. Hence, we ensured impartial third-party punishment decisions and removed any indirect counter-punishment considerations.

3.1 Experimental Design

The experiment consisted of two parts, A and B, where part A was payoff-relevant with an 80% probability and part B with 20% probability. Part A was the main part of the experiment. In part B, we elicited distributive preferences and demographics. In part A, we implemented four treatments, namely the *Dictator treatment (N=80)*, the *Receiver treatment (N=77)*, the *Observer*

[9] Arechar et al. (2018), for example, find that an interactive public goods game with and without punishment can be conducted very reliably online and produces similar behavioral patterns as in the laboratory.

[10] German Association of Experimental Economics

[11] We excluded four participants from the analysis because they remained inactive for several minutes, and we had to forward them to the next pages.

[12] We had to exclude one punishee from the analysis because of inattention.

treatment (N=79), and the *Baseline (N=60)*. These treatments differed in what preceded the punishment phase.

Figure 1: Experimental design part A

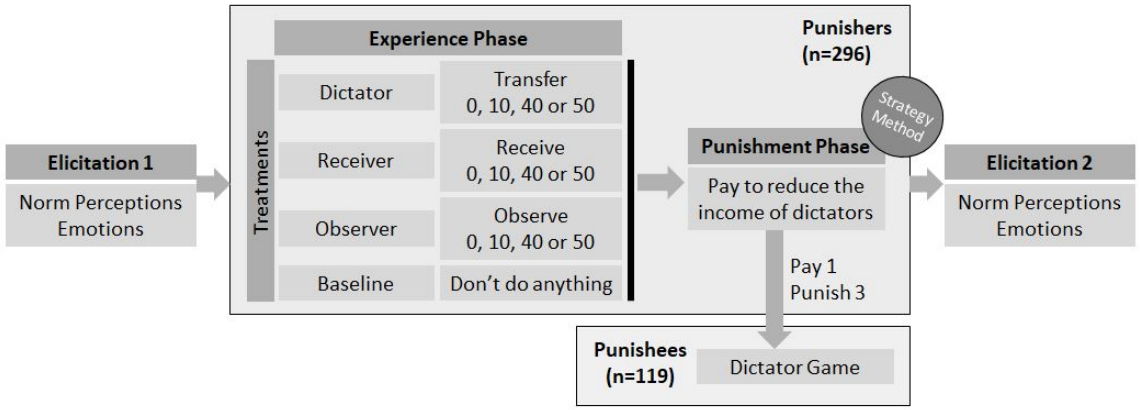


Figure 1 depicts part A of the experimental design. In part A, we elicited norm perceptions at the beginning and at the end.[13] We will explain our elicitation method after we explain the modified dictator game and the subsequent punishment phase.

After the first elicitation of norm perceptions and emotions, punishers went through the experience phase. In the Dictator and Receiver treatment, subjects were randomly assigned to either the role of dictator or the role of receiver. Dictators then made a decision about how much to transfer to a randomly matched receiver. In the Observer treatment, subjects observed the transfer of a randomly matched dictator of the Dictator treatment from a previous experimental session.[14] In the Baseline, the experience phase was simply omitted.[15]

We focus on a dictator game for the experience phase because there is no unique socially optimal allocation. Because of this, social norm perceptions may be more dispersed because subjects may deem different allocations as the appropriate allocation. In our modified version of the dictator game, the dictator receives an endowment of 100 CZK, while the receiver starts with zero. The dictator decides to transfer either 0, 10, 40, or 50 CZK to the receiver. By excluding intermediate choices like 20 or 30, we allow for a clearer taxonomy of high (equal split) and low (unequal split)

[13] In principle, eliciting beliefs also at the beginning could overestimate the link between punishment and norm perceptions. However, d'Adda et al. (2016) do not find evidence that the order of norm elicitation affects behavior.

[14] Each dictator was used for one subject from the Observer treatment, who saw the specific decision. Dictators in the Dictator treatment did not know that their choices were used to be shown to other players in a later session.

[15] The Dictator and Receiver treatment took place in the same session, whereas the Observer treatment and Baseline each took place in separate sessions.

transfers. At the same time, we enforce more extreme transfers that have a larger impact on shifting social norm perceptions.[16] The further advantage of this modified version is that participants are not familiar with what describes common behavior and what ought to be done in this version. To avoid a systematic influence of income effects on punishment across treatments, we equalized payoffs by different show-up fees before the experience phase. Receiver subjects were paid a show-up fee of 50 CZK. In the treatments Observer and Baseline, everyone received an individual show-up fee that consisted of 50 CZK plus a randomly chosen payoff from the set of payoffs that Receiver subjects had obtained in earlier sessions. Each payoff from this set was used exactly once for the Observer treatment and in the Baseline, the distribution of them was replicated.[17] By this, we established the same wealth level before the punishment phase across all treatments except in the Dictator, where subjects were wealthier by design.[18]

Right after the experience phase, subjects were given the opportunity to punish a dictator in the same version of the dictator game. This group of dictators (*punishees*, see figure 1) was unrelated to the group of dictators that set the transfer in the experience phase and only existed to get punished for their behavior and hence for the punishment decisions of the punishers to have real consequences. The punishment phase was the same for all treatments. All punishers had the opportunity to reduce the earnings of a punishee dictator. Punishers received an endowment of 50 CZK and could use that endowment to punish. We elicited the willingness to punish via the strategy method, where the punisher expressed how many deduction points to assign to the punishee for every possible transfer.[19] We applied the typically used punishment ratio of 1:3, where the punisher pays one unit of her endowment to deduct the income from the punishee by three units (e.g. Fehr & Fischbacher 2004).[20] We made punishers aware that they themselves would not be punished at any stage of the experiment.

[16] In the pilot session, most of the norm perceptions were between 10 an 40 CZK. Thus, we assume that receiving a signal of a higher or lower transfer has the potential to change them. In addition, being assigned to the role of a dictator has the potential to change norm perceptions through motivated beliefs.

[17] We could not use the exact same number of payoffs because of a smaller number of subjects in the Baseline.

[18] In principle, a higher wealth should result in higher punishment. However, we find that dictators punish significantly less and that wealth before the punishment decisions did not play an important role.

[19] Jordan, McAuliffe & Rand (2016) find that third-party punishment decisions are not influenced by the strategy method.

[20] It was possible to reduce the punishees' income by up to 150 CZK, which would result in a negative payment of the punishee. However, punishees played multiple rounds of the same dictator game, therefore, negative payments in one round could be compensated by positive payments in another round, as well as by the elicitation stage and the show-up fee.

Before the experience phase and after the punishment phase, we elicited subjects' emotions, personal norms, and empirical and normative expectations. To measure personal norms and norm perceptions, we follow Bicchieri et al. (2022). First, we asked subjects what they believed *should* be transferred in the dictator game (personal norm). They could choose from the same set of transfers that we used throughout the whole experiment: 0, 10, 40, or 50 CZK. Second, we asked them what they thought was the *average response* to this question by the other participants of the experimental session (normative expectation). Finally, we asked subjects *what they believed was the average choice* of the dictators in the ongoing (Dictator and Receiver treatment) or a previous (Observer treatment and Baseline) experimental session (empirical expectation). For both normative and empirical expectations, we used a continuous scale. In this way, we can capture even small changes in individual norm perceptions.[21] The first norm elicitation took place after punishers knew their role in the experience phase. We incentivized the elicitation of normative and empirical expectations. We paid an additional 15 CZK whenever participants were within a range of 6 CZK around the true average. We incentivized this decision-making to obtain a higher accuracy of the responses (Gächter & Renner 2010).

We measured self-reported emotions following the elicitation of Bosman & Van Winden (2002) and Cubitt et al. (2011). We included both positive and negative emotions to prevent experimenter demand effects towards what emotions participants should feel. Specifically, we asked participants about the current intensity of anger, gratitude, guilt, happiness, irritation, compassion, surprise, and envy. We measured the intensity of each emotion by self-reports on a 7-point Likert scale, from not feeling the emotion at all to feeling it very much. We measured the intensity of emotions both before the experience phase and after the punishment decisions.[22]

Next, we describe the procedure for punishees. Punishees started with the same elicitation of emotions and norms as the punishers. Then they played four rounds of the same version of the modified dictator game, only with the addition that dictators could get punished for their choices. In each round, it was determined whether a punishee acted in the role of a punishee dictator or a punishee recipient. To be more economical, we matched 10 punishers to 4 punishees, and punishees

[21] We elicited them with a slider, with an initial position at 25 which constitutes half of the highest possible transfer. In the second elicitation, which took part right after the punishment, subjects were shown their choices from the first elicitation. We asked them to consider whether their expectations had changed.

[22] At the second elicitation, choices from the first elicitation were prefilled. We asked subjects to consider whether the intensity of their emotions had changed.

played the game multiple rounds. In each round, we matched one punisher with one punishee dictator and implemented the punishment decision. In that way, every punishment decision of a punisher was implemented once if part A was chosen to be payoff relevant for that punisher. The punishees knew that different punishers punished them in different rounds. However, we did not disclose this information to the punishers. We told punishers that punishees were in the same experimental session playing the same version of the dictator game and that punishers could reduce the income of a punishee dictator.[23]

Lastly, in part B, all punishers played the same dictator game as in part A without the possibility of getting punished. All subjects made decisions as a dictator. Afterward, the computer decided randomly whether their role was a dictator or receiver and who they were matched with. Afterwards, subjects answered a questionnaire with demographic information, for which they received 30 CZK, in case part B was payoff relevant (additional to a 50 CZK show-up fee). This part served as a control for differences in redistributive preferences, which we use as an additional control in a robustness check.

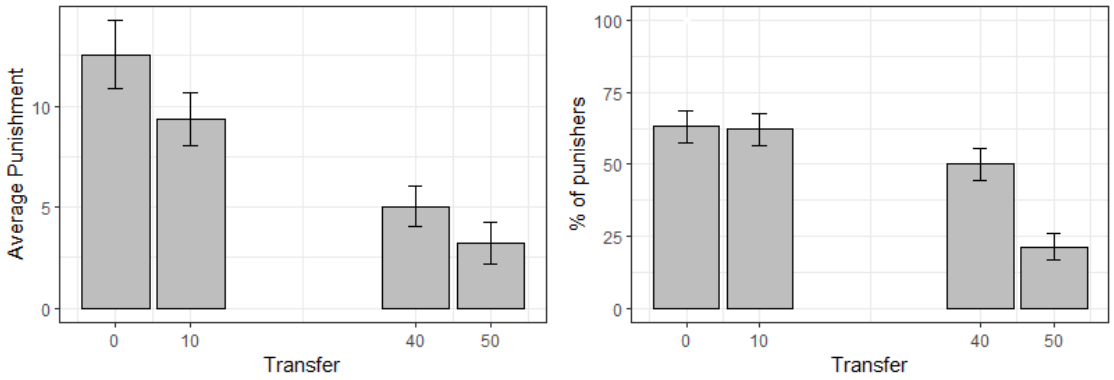
4 Results

In this section, we present the results of our experiment. Figure 2 depicts the overall punishment and propensity to punish all possible transfers of the dictator game elicited via the strategy method. Subjects mainly punish dictators, who transfer 0, 10, and 40 CZK. The amount of punishment decreases with the more equal splits, indicating that subjects want to enforce more equal splits. In our analysis, we focus on prosocial punishment and treat the transfers of 0, 10, and also of 40 as such. Approximately 60% of all subjects punished a dictator for low transfers of 0 and 10, and around 50% for a transfer of 40. Thus, we consider the punishment of 40 as prosocial as well, as any deviation from the equal split of 50 may be perceived as selfish and less social behavior.[24]

[23]Because part A was paid in 80% of cases, the punishment decisions of 8 punishers were implemented in the experiment. In each session, the computer created two groups of each two punishees, who played the dictator game four times. In each of the four rounds, the role of the dictator was assigned randomly. We imposed the condition that each punishee would be twice in the role of dictator and twice in the role of receiver, to provide more equal payoffs for punishee participants. Neither punishers nor punishees were informed about the matching procedure, and all interactions remained anonymous.

[24]Around 20% of subjects also punished a dictator for a transfer of 50. This punishment can be considered as antisocial, which follows a different motivation. Therefore, we focus only on the transfers of 0, 10, and 40.

Figure 2: Average punishment decisions and frequency of punishment for different transfers of the dictator elicited via the strategy method.



Note: The left figure shows the average amount of deduction points and 95% confidence intervals for every transfer that dictators could choose. The right figure depicts how many percent of subjects decided to punish a particular transfer at all and 95% binomial confidence interval by the normal approximation method.

4.1 Social Norm Perceptions and Punishment

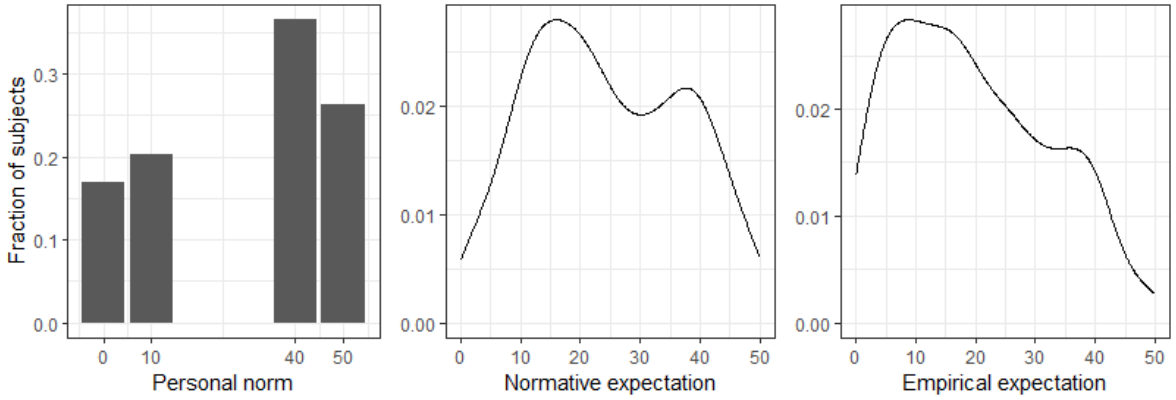
We use the treatment manipulation to increase heterogeneity among social norm perceptions by 1) assigning subjects to different roles and 2) receiving or observing different transfers. Figure 3 shows the distribution of norm perceptions that subjects hold at the end of part A, i.e., after the punishment phase. Pooling over all treatments, average personal norms (mean = 29.80, sd = 19.40) are significantly ($p < 0.001$) higher than normative expectations (mean = 24.44, sd = 12.89), which are significantly ($p < 0.001$) higher than empirical expectations (mean = 19.57, sd = 12.77).[25] This means that individuals believe that the appropriate transfer according to themselves is higher than what they think others, on average, think is appropriate. The expectation of what is usually done is even lower.[26] Additionally, the figure also reveals that there is no consensus about what subjects believe should be done and what they believe constitutes the injunctive and descriptive norm.

We also find substantial differences in the three norm-related beliefs within subjects. Figure 4 depicts the individual level differences between all pairwise combinations of the three social

[25] All significance tests are paired non-parametric Wilcoxon signed-rank tests.

[26] Note that there is no significant difference ($p = 0.8012$) between how accurate subjects were in predicting what others on average believe is appropriate and in what is usually done. The mean absolute difference between normative expectations and the true mean of everyone's personal norms of appropriateness of the specific session is 12.74 (sd=8.35). The mean absolute difference of empirical expectations and the true mean of the behavior of a session is 13.08 (sd=8.78).

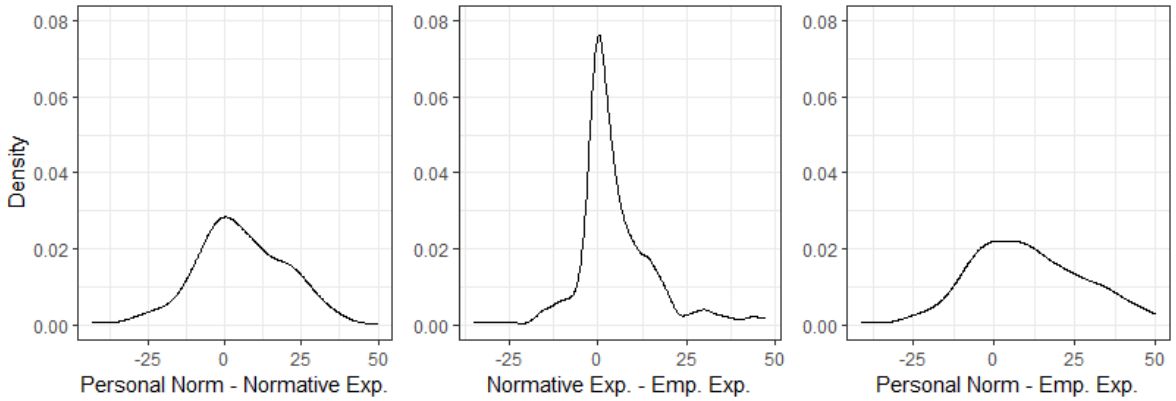
Figure 3: Densities of second elicitations of norm perceptions



Note: The first plot shows the fractions of subjects that hold a particular personal norm. The plot in the middle and on the right show the distribution of normative and empirical expectations via Kernel densities.

norm perceptions. While a difference of 0 is the most frequent for all three combinations, most of the density mass is not at 0.[27] Consequently, also at the individual level, the three norm-related beliefs differ with most subjects holding higher personal norms than normative expectations, higher normative expectations than empirical expectations, and thus also higher personal norms than empirical expectations.

Figure 4: Densities of within-subjects differences in norm perceptions



Note: The figures show the Kernel densities of the within-subject differences in the three norm-related beliefs.

Additionally, we find that the treatment assignment created substantially different distributions of the three norm perceptions and their individual differences between the treatments (see Figure

[27]The high peek at 0 for the gap between normative and empirical expectations is mostly driven by the dictator treatment.

6 and Figure 7 in Appendix A.1.1 for the distributions conditional on the treatments). As we find substantial differences between the three norm perceptions both agreggated and on individual level, we are able to distinguish their relative correlations with punishment. Thus, we continue with studying the correlations between subjects' punishment decisions and their norm perceptions. In particular, we examine whether the decisions are driven by what subjects believe should be done, what they believe others believe should be done, or what they think is usually done. For this, we run regressions with all three norm perceptions and all subsets of combinations of the three as independent variables. Table 1 shows the results of these Tobit regressions (see table 3 of Appendix A.1 for the combinations of two social norm perceptions).[28] In all models, we control for the dummy variables Transfer10 and Transfer40, which indicate the transfer of the to-be punished dictator in the strategy method. In addition, to tackle potential endogeneity problems caused by omitted variables, we control for negative emotions in all models, since third-party punishment is known to correlate with negative emotions (Jordan, McAuliffe & Rand 2016, Carpenter & Matthews 2012, Nelissen & Zeelenberg 2009). The results do not substantially change (and remain statistically significant) if we exclude negative emotions.[29]

In models (1), (2), and (3), we regress punishment decisions on each norm perception individually. In model (4), we include all three norm perceptions simultaneously, as they are highly correlated with each other (personal norms and empirical expectations: $\rho = 0.448$, personal norms and normative expectations: $\rho = 0.642$, and normative expectations and empirical expectations: $\rho = 0.626$, Spearman correlation, $p < 0.001$ all). This is important because the correlation between one of the norm perceptions and punishment without controlling for the other two would pick up the explanatory power of the others. By including all three simultaneously, we can study their relative importance.

In the first three models, we find a positive and significant correlation between punishment and each of the norm perceptions individually. This changes when we include all three norm perceptions simultaneously. In model (4), we observe that the correlation of personal norms and empirical expectations with punishment decisions remains positive and significant. In contrast, the

[28] About 42% of all punishment decisions were 0, thus we use a Tobit model to account for such corner solutions

[29] We declare a variable 'negative emotions' that consists of the average of anger, irritation, surprise, and envy (Cronbach's α of 0.69 ($CI_{95\%} = [0.66, 0.72]$) means the variable is internally consistent). We also include the differences in negative emotions of the second and first elicitation to capture emotion changes on the individual levelcaused by the experience phase.

Table 1: Tobit regression of relationship between norm perceptions and punishment

TransferSM10	-4.23^{***}	-4.19^{***}	-4.24^{***}	-4.26^{***}
	(0.84)	(0.83)	(0.83)	(0.84)
TransferSM40	-11.52^{***}	-11.45^{***}	-11.50^{***}	-11.56^{***}
	(1.29)	(1.28)	(1.28)	(1.29)
Personal Norm	0.24^{***}			0.23^{**}
	(0.06)			(0.07)
Normative Expect.		0.19^{*}		-0.25^{*}
		(0.08)		(0.12)
Empirical Expect.			0.37^{***}	0.36^{**}
			(0.08)	(0.11)
Neg. Emotions	0.02	0.43	0.50	0.05
	(0.97)	(0.97)	(0.93)	(0.94)
Δ Neg. Emotions	2.11^{+}	2.06	2.46^{+}	2.45^{+}
	(1.26)	(1.35)	(1.36)	(1.26)
Constant	0.97	2.47	-0.32	0.29
	(3.28)	(3.72)	(3.51)	(3.59)
Observations	888	888	888	888
Log Likelihood	$-2{,}433.93$	$-2{,}450.44$	$-2{,}432.51$	$-2{,}419.70$
Wald Test	96.45^{***}	65.38^{***}	100.35^{***}	123.80^{***}
	(df = 5)	(df = 5)	(df = 5)	(df = 7)

Note: SE clustered at individual level $+\ p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

significant positive relationship between normative expectations and punishment decisions reverses to a significant negative relationship. As normative expectations change the sign of the association, we explore the possibility that the effect of normative expectations depends on their relative position with the two other norm-related beliefs. Thus, in the next section, we compute the differences of normative expectations and the other two norm perceptions and study their relationship with punishment.

These dynamics remain similar, when regressing combinations of only two of the three social norm perceptions in Appendix A.1 (table 3). The coefficient of negative expectations, however, becomes close to zero and insignificant, when including only either personal norms and empirical expectations.

The magnitude of the positive correlations between personal norms and empirical expectations with punishment stays very similar across the models. This indicates that both matter for punishment decisions, and explain a different part of the variation of punishment.[30]

We replicate our findings in all of the following robustness checks (see Appendix A.1). First, we estimate the relationship between the first elicitation of norm perceptions and punishment decisions. Second, we estimate the relationship between both elicitations of norms with the propensity to punish. Third, we focus on deviations from the respective norms, i.e., the difference between the respective norm and the chosen transfer of the to-be-punished dictator. Forth, we include the subject's choices of part B of the experiment, where they themselves made a transfer decision as a dictator.[31] In all robustness checks, we can replicate the positive association of personal norms and empirical expectations with punishment, and the negative association of normative expectations with punishment.

Lastly, we check whether our results are biased by the use of the strategy method. In particular, the relationship of empirical expectations with punishment could be biased because subjects might over-report punishment choices for transfers that they believe unlikely to occur.[32] To check

[30]Note that we elicit personal norms on a discrete scale (0, 10, 40, 50) and empirical expectations on a continuous scale (0-50). This leads to a measurement error for personal norms. With a positive correlation between personal norms and empirical expectations, this measurement error leads to an underestimation of the correlation between personal norms and punishment and an overestimation of the importance of empirical expectations.

[31]We do not find any significant association between this transfer and their punishment decisions.

[32]With the strategy method, we elicit punishment decisions conditional on all possible transfers, but punishers only have to pay for the punishment of the actual transfer of the matched dictator. As a consequence, subjects with high empirical expectations might over-punish low transfers, as they do not expect to pay for this decision (and vice versa). This would lead to a stronger positive correlation of empirical expectations and third-party punishment.

whether this is an issue, we run a robustness check (see appendix A.2), where we declare a dummy that is one if the to-be punished transfer is within a predefined neighborhood of an individual's empirical expectations. We find that empirical expectations are still significantly and positively related to punishment decisions after controlling for any of the neighborhood dummies. Hence, our results remain robust and the strategy method does not seem to substantially affect our results. Summarizing we find that:

Result 1 *Personal norms of appropriateness and empirical expectations are positively associated with punishment decisions.*

Result 2 *After controlling for personal norms and/ or empirical expectations, normative expectations are negatively associated with punishment decisions.*

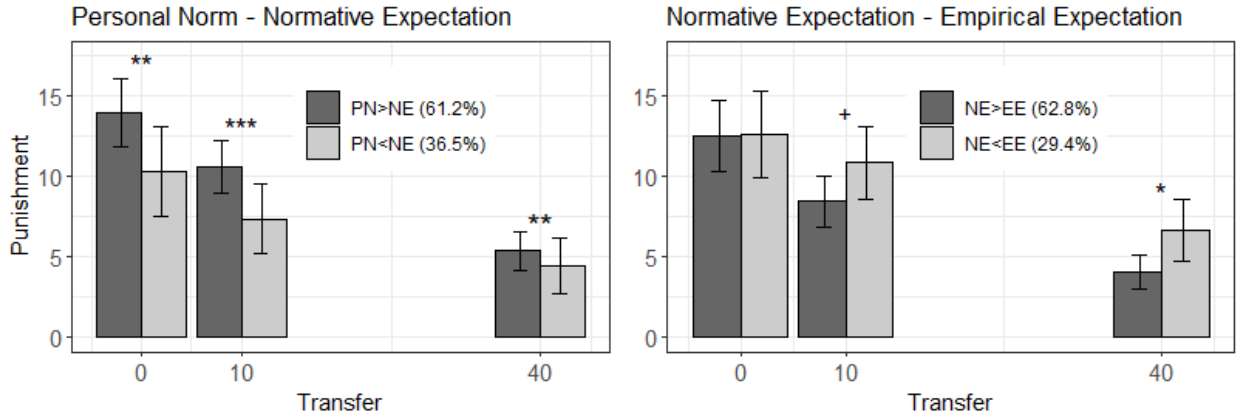
4.2 Normative Expectations Gaps and Punishment

So far, we discovered that, surprisingly, normative expectations (beliefs about what others deem appropriate) are not associated with higher punishment decisions. On the contrary, they are associated with even smaller punishment decisions after controlling for personal norms and empirical expectations. One explanation is that an individual considers normative expectations in relation to the two other norm-related beliefs. In this section, we analyze how differences between normative expectations and the two other norm perceptions relate to third-party punishment decisions.

We find a significant positive association between punishment and the difference between personal norms and normative expectations ($Gap_{PN-NE} = PN - NE$) and a significant negative association between punishment and the difference between normative and empirical expectations ($Gap_{NE-EE} = NE - EE$), see appendix A.3 for the regression table 8. Figure 5 illustrates punishment differences conditional on the sign of these gaps, i.e., conditional on whether participants hold higher or lower normative expectations compared to either their personal norms (upper graph) or empirical expectations (lower graph).

First, we describe the positive relationship between punishment and the gap of personal norm and normative expectations (what one deems appropriate in relation to what one thinks others deem appropriate). As seen in figure 5, subjects with a higher personal norm than normative expectations punish more than those who hold higher normative expectations than personal norm.

Figure 5: Gaps related to normative expectations and punishment



*Note: The left panel shows punishment decisions conditional on the transfer of the to-be-punished dictator (TransferSM) for subjects with either higher (PN > NE) or lower (PN < NE) personal norms than normative expectations. The right panel shows these punishment decisions for subjects with either higher (NE > EE) or lower (NE < EE) normative than empirical expectations. The figure omits individuals with equal norm perceptions (PN=NE, 2.4%; NE=EE, 7.8%). Error bars show 95% confidence intervals. + $p < 0.1$; *$p < 0.5$; ** $p < 0.01$; *** $p < 0.001$ based on Wilcoxon rank sum tests.*

If personal norms are high and normative expectations low, subjects may perceive their role in punishment as crucial and punish more. On the other hand, if normative expectations are higher than personal norms, subjects may anticipate others to punish more, and can free-ride on other's punishment decisions.

Second, we describe the negative relationship between punishment and the gap of normative expectations and empirical expectations (what one thinks others deem appropriate in relation to what one thinks is usually done). If normative expectations differ from empirical expectations (92.2% of subjects), an individual believes others do not behave according to the (beliefs) about the social norm of appropriateness. Most of the participants (approximately 63%[33]) hold higher normative expectations than empirical expectations. They believe that the transfer, which is considered socially appropriate, is higher than the transfer that is actually sent. They suppose that even though others hold high standards of behavior, they actually do not act like that, and this belief of disconformity leads to lower punishment. For almost 30% of the participants, normative expectations were lower than empirical expectations[34]. These individuals expect others to give

[33]The respective averages of norm perceptions (for those with norm. exp > emp.exp.) are: pers. norm: 31.24, norm. exp.: 27.11, emp. exp.: 17.21

[34]The respective averages of norm perceptions (for those with norm. exp < emp.exp.) are: pers. norm: 28.28,

more than what they believe is socially appropriate and punish more than the rest. This could be driven by the fact that those individuals, on average, hold a personal norm that is even higher than their empirical expectations. The exact reasons behind such a combination of beliefs and why it leads to higher punishment, however, can only be speculated upon.

To conclude, normative expectations affect third-party punishment indirectly through its relative position to the other two norm perceptions. We find a strong and stable positive association between the gap of personal norm (what one approves of) and normative expectations (what one beliefs others approve of) with punishment. The association between punishment and the difference of normative and empirical expectations (what society approves of vs. what one beliefs is typically done) is less pronounced, and seems to matter only for punishment of high transfers (see Figure 5). Therefore, we conclude that the gap between personal norm and normative expectations matters for third-party punishment.

Result 3 *The gap between personal norm and normative expectations is associated positively with punishment decisions.*

4.3 Heterogeneity in Norm-driven Punishment

In addition, we find that the relative importance of the three norm perceptions for punishment decisions differs between subjects based on the role (treatment) they were assigned to and on gender. For instance, subjects in the role of receivers in the experience phase, seem to rely more on their empirical expectations when deciding on punishment compared to the rest of the sample. Subjects in the roles of dictators, observers, and subjects in the baseline hold qualitatively the same relative importance of the norms as discussed in the main part (for more details, see appendix A.5.1). As subjects being assigned to the role of a dictator in the experience phase hold (possibly motivatedly) the lowest personal norms – and through their reliance also on personal norms – their overall punishment decisions are significantly lower compared to those subjects in the baseline treatment. Furthermore, we find substantial differences in the relative importance of the particular social norm perception for punishment between males and females. Males base their punishment decisions on their personal norms, whereas females, rely on their empirical expectations (for the

norm. exp.: 19.58, emp. exp.: 24.17

regression results, see appendix A.5.2). Hence, it seems that males do not care about enforcing a social norm but rather what they personally deem appropriate, in contrast to females, who seem to care about the enforcement of typical behavior.

4.4 The Causal Effect of Norm Perceptions

In this section, we explore whether social norm perceptions *causally* affect punishment. In principle, the punishment decision itself could shape social norm perceptions, and thus create the challenge of reverse causality. For instance, punishers may want to provide a reason for the way they punish and thus report their social norm perceptions in line with their punishment choices.

We show that reverse causality does not play a major role in our analysis. For this, we compare social norm perceptions an their relationship with punishment between the first and second elicitation and the different roles that subjects were assigned to. Additionally, we run an IV analysis.

First, we compare the first and second elicitation of norm perceptions in the Baseline treatment, where subjects engage only in punishment between the two elicitations. Hence, any changes in the norm perceptions can be attributed to the punishment section. We do not find significant differences for empirical expectations (from 22.22 to 23.25), but we do find statistically significant ($p < 0.05$) increases in personal norms (from 31.50 to 34.83) and normative expectations (from 25.99 to 28.03) between the two elicitations. Therefore, the punishment phase itself seems to influence normative views (personal norms and normative expectations), i.e., it increases how much subjects think should be sent and how much they believe others think should be sent. However, it does not affect subjects' beliefs about typical behavior, i.e., empirical expectations. In the following paragraphs, we will show that reverse causality does not play a major role, as the effect of social norm perceptions on third-party punishment outweighs any effect from punishment on personal norms and normative expectations.

For that, we compare the correlations of norm perceptions with punishment between the norm elicitation before the punishment opportunity (first elicitation) and the norm elicitation after the punishment opportunity (second elicitation). We find that the relationships are in the same direction, similar in size, and at the same significance level for all norm perceptions with punishment between the first and second elicitation (all models reported in Appendix A.1, table 4).[35]

[35]The same holds true for the associations between the first and second elicitation with a punishment dummy (if

Furthermore, we compare social norm perceptions of punishers and punishees to study whether the knowledge of the upcoming punishment opportunity changes social norm perceptions before the punishment opportunity. Punishees do not have this punishment opportunity and thus their norm perceptions are not influenced by this.[36] We find no significant differences between punishers and punishees norm perceptions, indicating that the knowledge about the upcoming punishment opportunity does not change norm perceptions (see table 10 in Appendix A.4). This fact, together with the same correlations of the first and second norm elicitations with punishment demonstrates that reverse causality likely does not play a major role.

In addition, we employ an instrumental variable approach. Here, we exploit the changes in norm perceptions caused by the experience phase and the treatment manipulation. We use the treatment assignment to the roles of dictator, receiver, and observer and the received or observed transfers as instruments for all three norm perceptions. We find that the treatment manipulation (observing/ receiving a specific transfer, or being assigned to the role of the dictator) significantly shifts norm perceptions compared to the baseline (see table 11 in Appendix A.4.2). We find the most prominent changes in empirical expectations, followed by normative expectations and personal norms. For a more formal description and discussion of the IV approach, see Appendix A.4.2. Table 2 shows the results of the second stage of the Tobit IV for all three norm perceptions. In model (1), we use personal norms as an instrumented regressor, in model (2), normative expectations, and in model (3), we instrument for empirical expectations. In model (4), we instrument for all three norm perceptions simultaneously. In all models, we additionally instrument for negative emotions and the change in negative emotions. We replicate all results with models without negative emotions and the change in negative emotions (see table 12 in Appendix A.4.2).

Models (1), (2), and (3) show a statistically significant positive effect of each norm perception individually on punishment (weakly significant in the case of personal norm). We take this as evidence of a causal positive influence of the three norm perceptions individually on punishment. As we show in section 4.1, it is important to control for all three norm perceptions when estimating their relative effect. In model (4), however, we do not find a statistically significant impact of any of the three norm perceptions, when instrumenting for all of them simultaneously. One reason for

the punisher decided to deduct points at all).

[36] Punishees act one half of the time as dictators and the other half as receivers. Therefore, their norm perceptions should be the least biased of all subjects.

Table 2: Tobit IV regression punishment on norm perceptions and neg. emotions, second stage

	Dependent variable: punishment			
	(1)	(2)	(3)	(4)
Personal Norms	0.62^{+} (0.36)			−0.14 (0.70)
Normative exp.		0.75^{*} (0.37)		0.01 (0.87)
Empirical exp.			0.80^{**} (0.30)	0.93 (0.59)
Negative Emotions	−3.93 (5.98)	−2.26 (5.76)	−3.53 (4.45)	−3.40 (5.20)
Δ Neg. Emotions	2.05 (9.20)	3.63 (8.59)	13.03^{+} (7.51)	14.70 (11.01)
Transfer10	-4.26^{***} (0.84)	-4.21^{***} (0.83)	-4.25^{***} (0.83)	-4.27^{***} (0.84)
Transfer40	-11.56^{***} (1.29)	-11.5^{***} (1.29)	-11.51^{***} (1.28)	-11.57^{***} (1.29)
Constant	0.21 (19.46)	−4.04 (18.943)	1.10 (12.56)	1.98 (16.36)
Observations	888	888	888	888
Log Likelihood	−8474.89	−8116.57	−8059.94	−14938
Wald χ^2 (df = 5)	88.33^{***}	90.29^{***}	90.04^{***}	90.76^{***}

Note: SE clustered at individual level. $+\ p < 0.1$; $*\ p < 0.05$; $**\ p < 0.01$; $***\ p < 0.001$
Treatments conditional on transfer as instruments for empirical expectations, negative emotions, and Δ negative emotions

the failure of identifying their relative causal impact is that all norm perceptions are shifted in the same direction in each of the treatments (see regression 11 in Appendix A.4.2).There seems to be not enough induced variability between the three norm perceptions to disentangle the influence of each of them simultaneously in a instrumental variable regression.[37]

To conclude, given our analyses, we believe it to be very unlikely that reverse causality plays a major role in our experiment. Hence, we provide evidence that social norm perceptions *causally* affect third-party punishment.

5 Conclusion

In this paper, we show that punishers' perceptions of social norms matter for third-party punishment decisions. We explicitly measure three social norm perceptions about the behavior in a specific situation alongside punishment decisions, in contrast to the existing literature on social norms and punishment (e.g. Bašić & Verrina 2023, Dimant & Gesche 2023, Li et al. 2021, House et al. 2020,

[37]It proves challenging to isolate the specific causal effects of each social norm perception in this IV framework (controlling for all), as information provision leads to an update of all of them into the same direction. Future research should come up with instruments that move only targeted norm perception while keeping the others constant.

Reuben & Riedl 2013, Carpenter & Matthews 2012, 2009, Fehr & Fischbacher 2004). We employ four treatments that manipulate subjects' perception of social norms to create differences among them. This allows us to speak to their relative importance and identify their causal effects on third-party punishment through the exogenous shift.

We find that all three norm perceptions individually have a positive causal influence on third-party punishment. When studying the correlation of all norm perceptions with punishment simultaneously, we find that both the personal belief about what should be done – personal norms – and the belief about what is usually done – empirical expectations – remain positively correlated with third-party punishment decisions. However, beliefs about what others believe should be done – normative expectations – reverse to a negative correlation with punishment after the conclusion of personal norms and/ or empirical expectations. These findings extend Carpenter & Matthews (2012) who find a positive correlation between the belief about average behavior (empirical expectations) with third-party punishment and Carpenter & Matthews (2009) who find that the session's averages best explain punishment compared to own group's averages, in- or out-group averages, own contributions, or the respective medians, minima, or maxima. Our finding that third-party punishment is not driven by the belief of the injunctive norms – normative expectations – is seemingly surprising, given that Bašić & Verrina (2023) show that normative expectations, together with personal norms, about punishment itself are positively correlated with punishment and that House et al. (2020) and Dimant & Gesche (2023) show that injunctive norm nudges increase punishment decisions. Instead, we even find a negative correlation, when controlling for personal norms or empirical expectations. On the other hand, it goes in line with literature, who finds that empirical expectations are more important for economic behavior than normative expectations (Bicchieri et al. 2022, Chen et al. 2020, Schmidt 2019, Agerström et al. 2016, Bose et al. 2016, Bicchieri & Xiao 2009).

Further, we explore explanations for the negative correlation of normative expectation with punishment after controlling for other norm perceptions. We compute the difference between personal norms with normative expectations, and normative epxectations with empirical expectations, to explore how normative expectations matter in combination with the other norm-related beliefs. We find that the difference between personal norms and normative expectations is positively correlated with punishment and explains best why normative expectations are negatively correlated

when controlling for all norm perceptions. Subjects whose normative expectations are higher than their personal beliefs may anticipate others to punish more. Then they free-ride on their peers' punishment decisions and punish less. Conversely, subjects whose personal norms are higher than their normative expectations may perceive their own punishment as more crucial and punish more. This argumentation is in line with Kamei et al. (2023) who find that in the presence of other punishers, subjects free-ride on others' punishment decisions. In addition, we also find that the difference between normative expectations and empirical expectations matter for punishment. Subjects who believe that others typically do not behave in accordance with their beliefs of appropriateness, but rather exploit selfish opportunities, punish less.

Overall, our results indicate that both own beliefs of appropriateness and typical behavior motivate third-party punishment on their own. Beliefs about social appropriateness views, however, seem to matter only in combination with personal norms. These findings extend and align well with previous literature on third-party punishment and social norms. Unlike existing studies, we provide a more complete picture of how all three norm-related beliefs motivate punishment choices.

Our paper also adds to the literature about how normative and empirical information nudges affect third-party punishment. We find that our treatments shift social norm perceptions. For instance, we find that receiver and observers update their beliefs about common behavior depending on the dictator's transfer. Since appropriateness views are correlated with those beliefs, we also find an effect of the experienced transfers on normative expectations and personal norms of appropriateness. This fact can explain the results of House et al. (2020), Dimant & Gesche (2023), and Zong et al. (2021), who find that descriptive and injunctive norm nudges increase punishment decisions. Based on our results, the provided information either about the descriptive or injunctive norm can change not only normative expectations but, crucially, also empirical expectations and personal norms. Consequently, they impact third-party punishment decisions.

Our results also extend and may explain the results of Bašić & Verrina (2023), Kamei (2020), Lois & Wessa (2019), Fabbri & Carbonara (2017) who show that punishment decisions are correlated with beliefs and information about others' punishment decisions. Others' punishment decisions may also inform the injunctive and descriptive norm of the situation itself, and not only create own norms of punishment. Hence, punishers' beliefs about others' punishment decisions may correlate with their empirical expectations of the situation itself and through them correlate with punishment

decisions.

Moreover, we find that the reliance on a specific norm-related belief depends on gender. Males punish primarily based on what they personally believe constitutes appropriate behavior, while females, on the other hand, primarily punish according to what they believe constitutes common behavior. The stronger reliance on empirical expectations for females contrasts Croson et al. (2010) who find that males rely more on their empirical expectations compared to females when donating money. On the other hand, Fišar et al. (2016) do not find any gender differences in the relationship between empirical expectations and third-party punishment decisions in their study of bribing.

Furthermore, we show that the importance of a specific norm perception and punishment also depends on the mere assignment to a role. For example, being assigned to the role of receiver leads to a higher reliance on empirical expectations compared to the rest of the sample. Additionally, being assigned to the role of dictator leads to significantly lower social norm perceptions and consequently lower punishment levels. This motivated downwards update of social norm beliefs is in accordance with the literature on motivated beliefs (e.g. Bicchieri, Dimant & Sonderegger 2023, Zimmermann 2020, Epley & Gilovich 2016). By lowering their norm perceptions, dictators reduce their need to give a higher transfer and, consequently, their need to punish other dictators.

We can draw policy recommendations from our results. Policies that are aimed at changing empirical expectations rather than normative expectations have a higher potential to change third-party punishment decisions. For instance, providing information about common behavior instead of providing information about what others deem appropriate may influence empirical expectations more than normative expectations and hence have a higher potential to shift punishment behavior. This would align with Dimant & Gesche (2023), who show that empirical information changes behavior more than normative information (although non-significantly). Additionally, as the reliance on either personal norms or empirical expectations depends on gender and the role that subjects are assigned to, specific information policies should be tailored to the needs of the specific audience in order to increase it's effectiveness.

To conclude, we show that social norm perceptions motivate third-party punishment. Specifically, we show that personal norms of appropriateness and empirical expectations are positively associated with higher punishment decisions. In addition, we find a positive correlation between normative expectations and punishment, but this relationship reverses when controlling for either

of the other two norm perceptions. This has important consequences for the overall social norm literature. We show that it is important to consider all norm-related beliefs because otherwise, the effect of one of them might be wrongly attributed to another.

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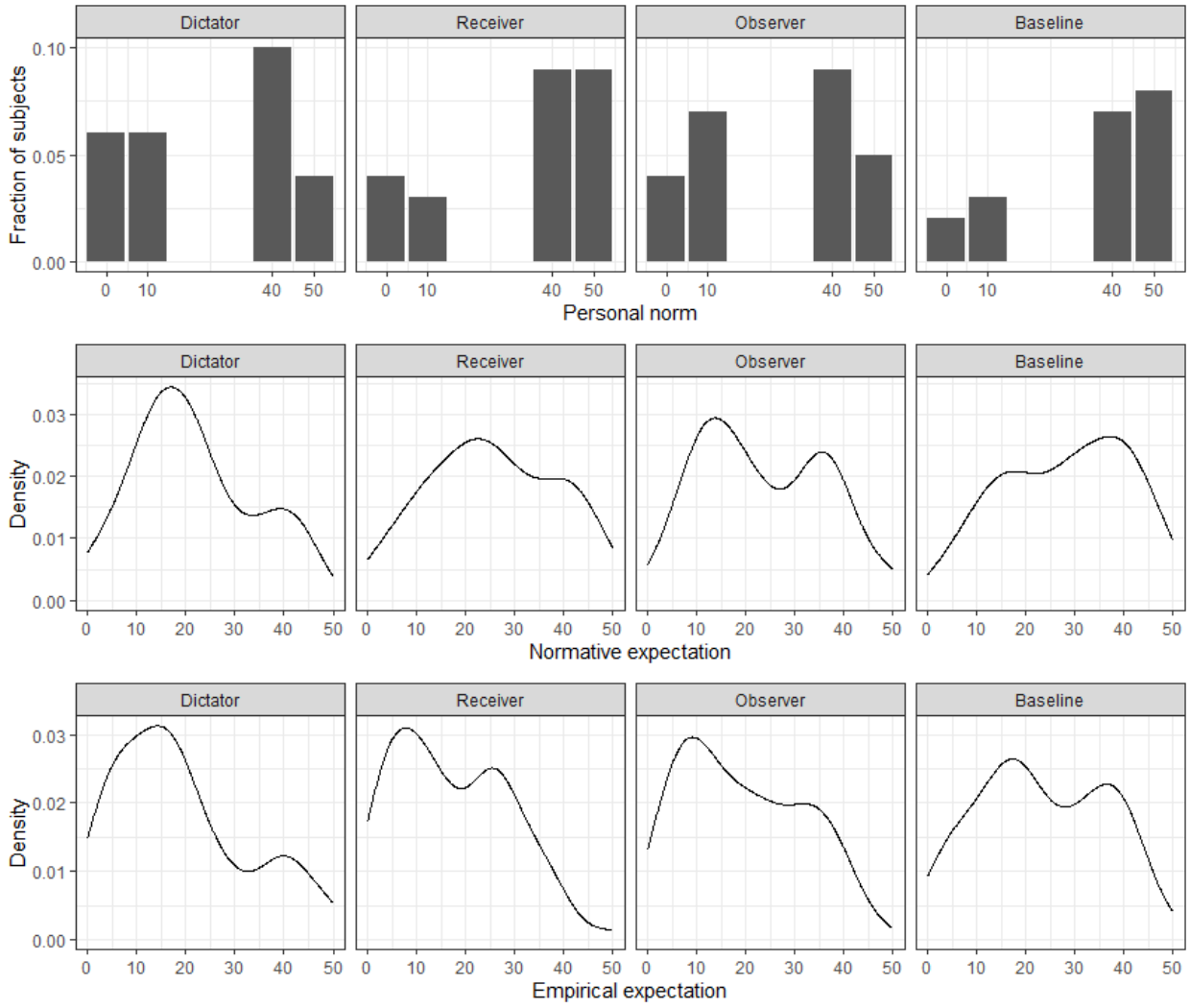
Appendix

A Additional Models and Robustness Checks

A.1 Social Norm Perceptions and Punishment

A.1.1 Distribution of Norm Perceptions per Treatment

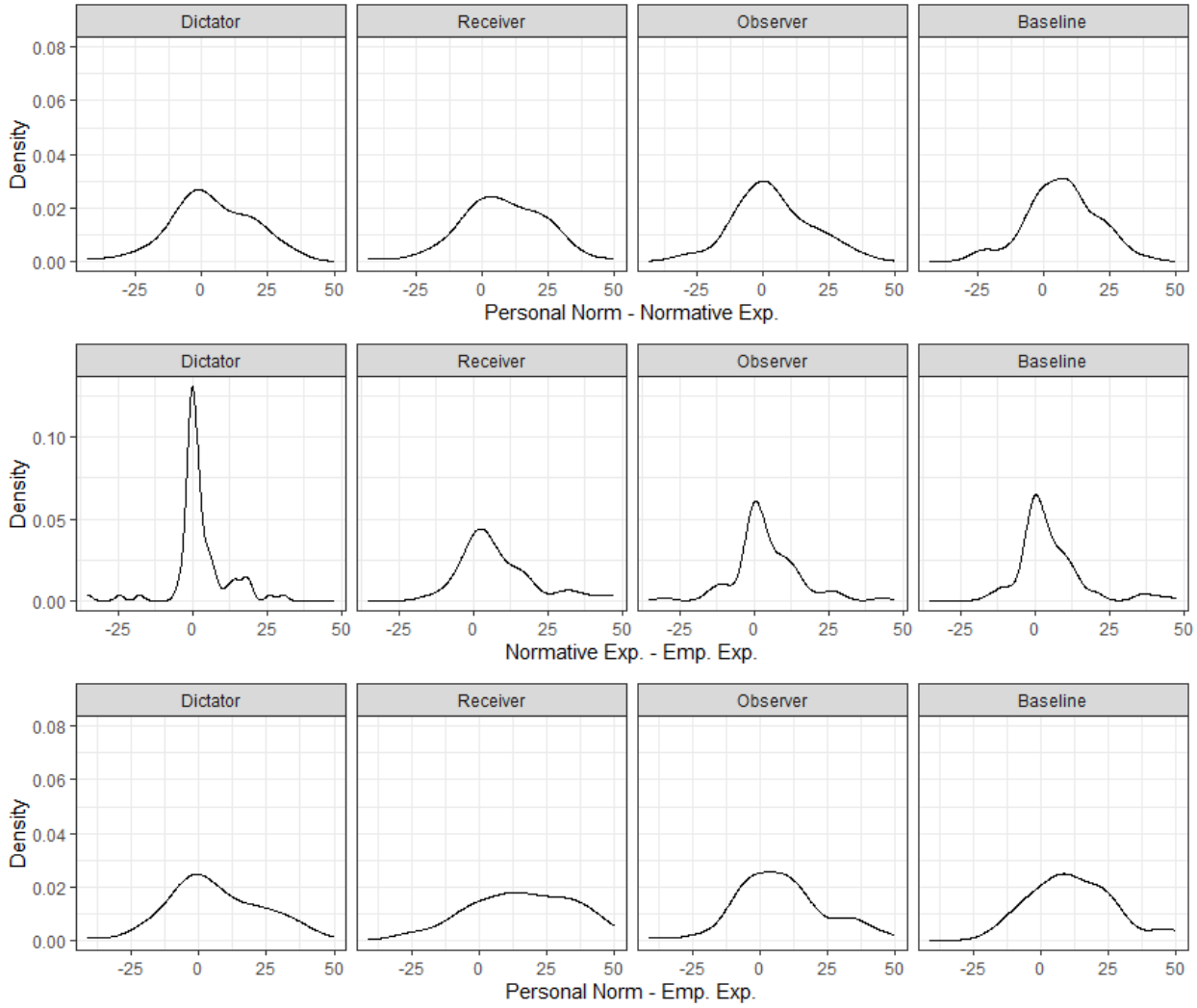
Figure 6: Distribution of Social Norm Perceptions per Treatment



A.1.2 Combinations of Norm Perceptions and Punishment

First, we regress punishment on combinations of social norm perceptions and punishment, where we take only two out of the three social norm perceptions. We replicate the results from the main

Figure 7: Distribution of Social Norm Differences per Treatment



text, namely, that empirical expectations are significantly positively correlated with punishment, that personal norms are significantly positively correlated, and that normative expectations are (however non-significantly) correlated when controlling for any combination of personal norms and empirical expectations.

A.1.3 Robustness Norm Perceptions and Punishment

Next, we replicate the overall association between norm perceptions and punishment decisions. In table 4, in model (1), we regress punishment on the first elicitation of norm perceptions. In models (2) and (3), we regress a punishment dummy on the first and second elicitation of norm perceptions to study the extensive margin of punishment. Both models replicate the results from

Table 3: Tobit regression punishment on social norm perceptions combinations

	Dependent variable:		
	punishment		
	(1)	(2)	(3)
Personal Norm	0.27^{***}	0.16^{*}	
	(0.07)	(0.07)	
Normative Expect.	-0.06		-0.07
	(0.10)		(0.11)
Empirical Expect.		0.26^{**}	0.41^{***}
		(0.10)	(0.11)
Constant	1.89	-2.18	0.56
	(3.63)	(3.50)	(3.65)
Transfer	✓	✓	✓
Neg. Emotions	✓	✓	✓
Δ Neg. Emotions	✓	✓	✓
Observations	888	888	888
Log Likelihood	$-2{,}433.54$	$-2{,}424.92$	$-2{,}432.03$
Wald Test (df = 6)	97.09^{***}	114.17^{***}	101.17^{***}
Note: SE clustered at ind. level	$^{*}p < 0.05$;$^{**}p < 0.01$;$^{***}p < 0.001$		

the main section: Personal norms and empirical expectations are significantly positively associated with punishment decisions. We further find that normative expectations are negatively associated with punishment decisions at the 10% and 0.1% significance levels.

Table 4: Tobit and Logit regression punishment on norm perceptions

	Dependent variable:			
	punishment		punishment_dummy	
	Tobit		*logistic*	
	(1)	(2)	(3)	(4)
	1st elicitation	2nd elicitation	1st elicitation	2nd elicitation
Personal Norm	0.18*	0.23**	0.02*	0.03**
	(0.08)	(0.07)	(0.08)	(0.07)
Normative Expect.	−0.36*	−0.25*	−0.04*	−0.04*
	(0.14)	(0.12)	(0.14)	(0.12)
Empirical Expect.	0.44***	0.36**	0.05***	0.04**
	(0.13)	(0.11)	(0.13)	(0.11)
Constant	2.07	0.29	−0.22	−0.24
	(3.76)	(3.59)	(3.76)	(3.59)
TransferSM	✓	✓	✓	✓
Neg. Emotions	✓	✓	✓	✓
Δ Neg. Emotions	✓	✓	✓	✓
Observations	888	888	888	888
Log Likelihood	−2,425.14	−2,419.70	−558.21	−545.02
Akaike Inf. Crit.			1,132.41	1,106.03
Wald Test (df = 7)	113.88***	123.80***		

Note: SE clustered at ind. level * $p < 0.05$;** $p < 0.01$;*** $p < 0.001$

Additionally, we regress punishment on the deviations of the transfer to the norm perceptions. For this, we take the difference of each of the three norm perceptions to the transfer separately. Table 5 reveals that the results remain robust to this model specification.

Table 5: Tobit regression punishment on deviations of norm perceptions with transfer

	Dependent variable:			
	punishment			
	(1)	(2)	(3)	(4)
Dev Personal Norms	0.26^{***}			0.23^{**}
	(0.04)			(0.07)
Dev Normative Expect.		0.25^{***}		-0.27^{*}
		(0.04)		(0.11)
Dev Empirical Expect.			0.31^{***}	0.34^{**}
			(0.04)	(0.11)
Constant	-0.46	-0.12	0.91	0.97
	(2.81)	(2.87)	(2.76)	(2.70)
Neg. Emotions	✓	✓	✓	✓
Δ Neg. Emotions	✓	✓	✓	✓
Observations	888	888	888	888
Log Likelihood	$-2{,}434.61$	$-2{,}451.65$	$-2{,}433.95$	$-2{,}420.52$
Wald Test	94.68^{***}	62.68^{***}	97.52^{***}	122.10^{***}
	(df = 3)	(df = 3)	(df = 3)	(df = 5)

Note: SE clustered at individual level $+ \; p < 0.1$; $^{*} \; p < 0.05$; $^{**} \; p < 0.01$; $^{***} \; p < 0.001$

Finally, we include the subjects' own transfer decisions as a dictator in part B of the experiment. Model (1) in table 6 reveals that the transfer in part B is not at all correlated with punishment decisions. Model (2) adds norm perceptions and shows that even after controlling for the transfers in part B, the results from the main text still hold. The correlations between the norm perceptions and punishment do not substantially change after including the own transfer.

Table 6: Tobit regression punishment on own transfer in part B and norm perceptions

	Dependent variable:	
	punishment	
	(1)	(2)
Transfer Part B	−0.04	−0.04
	(0.05)	(0.05)
Personal Norm		0.23**
		(0.07)
Normative Expect.		−0.24*
		(0.12)
Empirical Expect.		0.36**
		(0.11)
Constant	7.74**	0.32
	(2.94)	(3.57)
Transfer	✓	✓
Neg. Emotions	✓	✓
Δ Neg. Emotions	✓	✓
Observations	888	888
Log Likelihood	−2,456.35	−2,418.92
Wald Test	53.52***	125.08***
	(df = 5)	(df = 8)
Note: SE clustered at individual level	+ $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$	

A.2 Interaction Empirical Expectations and Strategy Method

In this section, we check whether subjects decrease their punishment for a transfer in the strategy method, which they believe is more likely to occur. We declare the dummy variables Neighborhood5, Neighborhood15, and Neighborhood25 that take the value 1 if the to-be punished transfer in the

strategy method is within the distance of 5 CZK, 15 CZK, or 25 CZK from a subject's empirical expectations, respectively. Table 7 shows a Tobit regression, which includes norm perceptions and neighborhood dummies. Models (4) and (5) include an interaction of the neighborhood variable and the Transfer dummies. We allow for such interaction because the effect of the neighborhood variable likely differs depending on the to-be-punished transfer. Specifically, the decrease in punishment may be less pronounced for a to-be-punished transfer of 40 because the initial punishment level is lower already compared to 0 or 10.

All models show a negative association between neighborhood variables and punishment decisions. However, only in model (2) is the relationship statistically significant, giving some indication that subjects decrease their punishment in the proximity of their empirical expectations. However, the neighborhood variable may just capture higher punishment of a transfer of 0, 10, especially when not including the interaction with the Transfer dummies. Additionally, using of the strategy method is also evaluated by Jordan, McAuliffe & Rand (2016), who find that it does not bias third-party punishment decisions.

Most importantly, the positive significant association between personal norms and empirical expectations and punishment and the negative association with normative expectations (the results from the main text) remains robust and significant for all models. Hence, even though subjects might punish less severely in close proximity to their empirical expectations, empirical expectations still significantly explain punishment behavior.

Table 7: Tobit regression punishment on norm perceptions and neighborhood dummy

	Dependent variable:				
	punishment				
	(1)	(2)	(3)	(4)	(5)
Neighborhood5	−1.92			−2.33	
	(1.40)			(3.78)	
Neighborhood15		−2.25*			−0.42
		(1.05)			(3.04)
Neighborhood25			−1.48		
			(1.02)		
Personal Norms	0.23**	0.23**	0.24**	0.23**	0.23**
	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)
Normative Expect.	−0.25*	−0.25*	−0.25*	−0.23+	−0.23+
	(0.12)	(0.12)	(0.12)	(0.12)	(0.12)
Empirical Expect.	0.33**	0.31**	0.32**	0.37**	0.43**
	(0.11)	(0.11)	(0.11)	(0.12)	(0.14)
Constant	1.29	2.25	1.96	0.24	−1.01
	(2.39)	(2.39)	(2.39)	(2.61)	(3.59)
Transfer	✓	✓	✓	✓	✓
Transfer:Neighborhood5	×	×	×	✓	×
Transfer:Neighborhood15	×	×	×	×	✓
Observations	888	888	888	888	888
Log Likelihood	−2,423.00	−2,422.38	−2,423.07	−2,420.82	−2,420.64
Wald Test	118.11***	119.65***	118.20***	122.85***	123.05***
	(df = 6)	(df = 6)	(df = 6)	(df = 8)	(df = 8)

Note: SE clustered at individual level. + $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

A.3 Normative expectations gaps and punishment

In this section, we report the results of regression estimating correlations between third-party punishment and differences between each pair of norm perceptions. All models estimate a Tobit regression with standard errors clustered at the individual level, control for dummy TransferSM, and both Negative emotions and change in them. Model (1) - (3) show particular correlations of each gap separately, model (4) includes two gaps that were significantly associated with punishment.

Table 8: Tobit regression punishment on normative expectations gaps

	Dependent variable:			
	punishment			
	(1)	(2)	(3)	(4)
Gap PN-NE	0.26^{***}			0.24^{**}
	(0.07)			(0.07)
Gap NE-EE		-0.24^{*}		-0.19^{+}
		(0.11)		(0.11)
Gap PN-EE			0.10	
			(0.07)	
Constant	7.41^{*}	8.86^{**}	7.02^{*}	8.42^{**}
	(2.90)	(2.91)	(2.96)	(2.85)
Transfer	✓	✓	✓	✓
Neg. Emotions	✓	✓	✓	✓
Δ Neg. Emotions	✓	✓	✓	✓
Observations	888	888	888	888
Log Likelihood	−2,441.13	−2,449.52	−2,454.08	−2,436.64
Wald Test	82.48^{***}	66.68^{***}	57.87^{***}	91.11^{***}
Note:				SE clustered at individual level
				$+p < 0.1; *p < 0.05; **p < 0.01; ***p < 0.001$

In model (1), we find a significant positive association between the punishment and the difference between personal norm and normative expectations. The higher the difference between the punisher's belief of what is right and what she thinks others approve of, the more she punishes. If the participant has a higher personal norm than normative expectations (61.2% of participants), she perceives her punishment as more crucial. On the other hand, those who hold lower personal

norm than normative expectations (36.5% of participants) punish less, potentially free-riding on others' punishment decisions. In model (2), we find a negative association between punishment and the difference between normative and empirical expectations. When an individual believes there is a discrepancy between what is approved by society and what is usually done, the punishment is significantly different. In the case of a positive difference (higher normative than empirical expectations, 62.8%), participants punish less. If the difference is negative (29.4%), the individual punishes more. The first case describes a situation where societal expectations for appropriateness surpass common practices, the latter case shows perceptions of people that are more "optimistic" when it comes to what is done. They believe that what is usually done is more altruistic than what is approved by society. Model (3) shows the association of difference between personal norm and empirical expectations, however, this association is not significant. Finally, in the model (4), we include both gaps PN-NE and NE-EE to analyze which relationship is more prevalent and if the effects we found in models (1) and (2) are stable. We find that while there is still a significant positive association between punishment and the difference of personal norm and normative expectations, the effect of gap NE-EE dminishes.

A.4 The Causal Effect of Norm Perceptions

In this section, we provide details of our attempt to map the causality of social norm perceptions on third-party punishment. We first provide details on the first three approaches mentioned in the main text, then disclose how we proceed in IV analysis.

A.4.1 Reverse causality

First, table 9 shows differences between the first and second elicitation of norm perceptions in the Baseline. It reveals statistically significant higher personal norms and normative expectations in the second elicitation than in the first. Similarly, empirical expectations are higher in the second elicitation however not at a statistically significant level. We conclude that the punishment phase increases personal norms and normative expectations but does not significantly change empirical expectations. In the text above (section 4.4, we discuss the implications of the change in personal norm and normative expectations due to punishment for our paper.

Second, we compare the coefficients of the correlations between first and second norm percep-

Table 9: Comparisons of first and second norm perceptions elicitations in the Baseline

Means (SE)	1st Elicitation	2nd Elicitation	p-value
Personal Norms	31.50 (2.36)	34.83 (2.33)	0.034
Normative expectations	25.99 (1.59)	28.03 (1.66)	0.034
Empirical expectations	22.22 (1.60)	23.25 (1.66)	0.915

Note: Wilcoxon signed rank test with continuity correction; N=60

tions elicitation. Table 4 (section A.1.3) replicates the findings of the main text. We find the same and significant relationships between all norm perceptions with punishment when looking at the first elicitation, i.e., the elicitations before the punishment (and experience) phase with a slightly larger negative coefficient for normative expectations and a lower positive coefficient for personal norms, but similar coefficients for empirical expectations. In addition, the coefficients and significance in the estimation of whether the punisher decided to punish (*punishment dummy*) are again very similar between first and second elicitation.

Third, we compare the first elicitation of norm perceptions between punishers and punishees. Table 10 shows no significant differences. Hence, the knowledge about the upcoming punishment opportunity does not change norm perceptions.

Table 10: Comparisons of first norm perceptions elicitation between punishers and punishees

Means (SE)	Punishers *(N=296)*	Punishees *(N=119)*	p-value
Personal Norms	27.74 (1.15)	28.74 (1.85)	0.585
Normative expectations	23.97 (0.70)	24.34 (1.19)	0.724
Empirical expectations	19.53 (0.70)	20.66 (1.15)	0.492

Note: Wilcoxon rank sum test with continuity correction

A.4.2 Instrumental Variable approach

Lastly, we use a Tobit IV regression to estimate the causal influence of norm perceptions on punishment decisions. We use the Receiver and Observer treatments conditional on the transfers (Receive 0, ..., Receive 50, Observe 0, ..., Observe 50), as well as the assignment to the role of dictator (Dictator) as instruments for the second elicitation of each norm perception separately as well as for negative emotions. Specifically, we use the following model specifications:

First stage:

$$y_i = treatments_i \Pi_1 + transfer_i \Pi_2 + \nu_i \tag{1}$$

Second stage:

$$punishment_i^* = y_i \beta + transfer_i \delta + \epsilon_i \tag{2}$$

As punishment is restricted in between 0 and 50, we do not observe *punishment*, but only:

$$punishment_i^* = \begin{cases} 0 & \text{if } punishment_i < 0 \\ punishment_i^* & \text{if } 0 \leq punishment_i \leq 50 \\ 50 & \text{if } punishment_i > 50 \end{cases} \tag{3}$$

Note that $punishment_i^*$ denotes one single punishment decision for a transfer of either 0, 10, or 40 of one subject. We cluster standard errors on the individual level to account for within-individual dependencies. $transfer_i$ is a vector of dummies for the (exogenous) transfers of 10, and 40. $treatments_i$ are the instruments (Receive 0, ..., Receive 50, Observe 0, ..., Observe 50, Dictator). y_i is a vector of the endogenous variables, i.e., personal norms, empirical expectations, normative expectations, negative emotions, and the difference in negative emotions between the first and the second elicitation.[38] Further note that (ν_i, ϵ_i) are assumed to be distributed multivariate normal. Therefore, the first and second stages are estimated together by Maximum Likelihood.[39]

The treatments and transfers are exogenous to the punisher by design and thus fulfill the requirement of instrument exogeneity. To evaluate instrument relevance, we analyze how the instruments shift subjects' norm perceptions. For this, we compare the second elicitation of norm perceptions in the treatments to the Baseline. We show this change by regressing the norm perceptions on the instruments (see the linear regression in table 11). Note that the first stage in the Tobit IV is estimated simultaneously with the second stage via Maximum Likelihood. We show this linear regression for illustrative purposes only.

In line with the literature on the erosion of social norms (Bicchieri et al. 2022, Keizer et al. 2008,

[38] While the first measure shows the emotions of subjects after the punishment, the second variable captures whether emotions were triggered in the experience and punishment part. Hence, the difference accounts for individual changes that are produced by the experience (and punishment) phase.

[39] See `https://www.stata.com/manuals/rivtobit.pdf` for more information on the estimation procedure.

Table 11: Linear regression experience on norm perceptions and emotions

	Dependent variable:				
	Pers. Norm	Norm. Exp.	Emp. Exp.	Neg. Em.	Δ neg. Em.
	(1)	(2)	(3)	(4)	(5)
Dictator	-9.46^{**}	-6.47^{**}	-4.19^{+}	-0.11	-0.22^{*}
	(3.22)	(2.17)	(2.28)	(0.18)	(0.11)
Receive 0	-2.61	-5.85^{+}	-14.40^{***}	1.05^{***}	0.83^{***}
	(4.61)	(3.21)	(2.28)	(0.29)	(0.20)
Receive 10	-6.20	-6.37^{*}	-6.84^{**}	0.89^{**}	0.21
	(5.08)	(3.03)	(2.55)	(0.28)	(0.17)
Receive 40	3.99	3.58	7.18^{**}	0.82^{**}	0.06
	(4.03)	(2.83)	(2.73)	(0.30)	(0.15)
Receive 50	1.53	4.61	-3.12	-0.08	0.07
	(5.92)	(4.19)	(3.23)	(0.29)	(0.16)
Observe 0	-8.54^{+}	-7.51^{*}	-6.94^{*}	0.27	0.01
	(4.51)	(2.99)	(2.78)	(0.26)	(0.12)
Observe 10	-9.42^{*}	-5.12^{+}	-3.27	-0.01	0.19
	(4.50)	(3.01)	(2.92)	(0.25)	(0.16)
Observe 40	-2.48	-0.52	2.00	-0.49^{+}	-0.10
	(4.95)	(3.57)	(3.53)	(0.27)	(0.12)
Observe 50	-10.29	-2.09	-6.57	0.12	0.02
	(6.62)	(3.92)	(4.16)	(0.39)	(0.13)
Constant	34.83^{***}	28.03^{***}	23.25^{***}	2.47^{***}	0.02
	(2.36)	(1.67)	(1.68)	(0.14)	(0.07)
Observations	296	296	296	296	296
R^2	0.06	0.08	0.15	0.14	0.16
Adjusted R^2	0.03	0.05	0.12	0.12	0.13
Residual Std. Error (df = 286)	19.13	12.54	11.97	1.08	0.67
F Statistic (df = 9; 286)	1.93^{*}	2.84^{**}	5.50^{***}	5.37^{***}	5.85^{***}

Note: SE clustered at individual level $+p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Gino et al. 2009), we find that a norm violation, i.e., a transfer of 0 and 10, has a stronger effect on shifting social norm perceptions compared to high transfers: A low transfer (0, 10) decreases all three types of norm perceptions compared to the Baseline. The effect of a high (40, 50) transfer on norm perceptions is ambiguous and depends on receiving or observing a transfer. Even though the Observer and Receiver treatments give a signal of what is typically done, the instruments do not only significantly shift empirical expectations but also normative expectations - however, to a smaller extent. Personal norms also get shifted, yet mostly not significantly. Being assigned to the role of the dictator significantly shifts personal norms, normative expectations, and empirical expectations. We conclude that the instruments significantly shift all three norm perceptions and hence are relevant.

Finally, a valid instrument has to fulfill the exclusion restriction property. The instruments should exclusively influence punishment through the instrumented variables. To ensure this, we include the channel of negative emotions, as they are known to correlate with punishment (Jordan, McAuliffe & Rand 2016, Carpenter & Matthews 2012, Nelissen & Zeelenberg 2009). We confirm this by finding a (marginally) significant correlation between the difference of negative emotions and punishment (see table 1). Additionally, we observe that the instruments influence negative emotions and the difference of negative emotions in the case of receiving a transfer or being assigned to the role of a dictator. Hence, we include both negative emotions and the difference of negative emotions in the IV regression in the main text (table 2.[40]

Table 12 replicates the results reported in the main text without instrumenting for negative emotions and the change in negative emotions. We find a positive influence of each of the norm perceptions individually.

A.5 Heterogeneity in Norm-driven Punishment

In this section, we study how punishment and the relative importance of the three norm perceptions may differ between subjects. For this, we first explore the impact of the exogenous assignment to the different roles (treatments) in the Experience phase. Additionally, to illustrate subject-specific

[40]The second elicitations incorporate the total change of negative emotions compared to the Baseline, however only on an aggregate level. The differences between the first and second elicitations incorporate individual changes. This is particularly important for the self-report of negative emotions because subjects may interpret the 7-Likert scale differently from each other. By focusing on the change of negative emotions, those individual differences in the absolute interpretation of the scale get less pronounced.

Table 12: Tobit IV regression punishment on norm perceptions, second stage

	Dependent variable: punishment			
	(1)	(2)	(3)	(4)
Personal Norms	0.58^{+} (0.34)			0.15 (1.00)
Normative Exp.		0.76^{*} (0.36)		0.35 (1.45)
Empirical Exp.			0.50^{*} (0.24)	0.26 (0.45)
Transfer10	-4.24^{***} (0.84)	-4.20^{***} (0.83)	-4.23^{***} (0.83)	-4.27^{***} (0.84)
Transfer40	-11.50^{***} (1.3)	-11.45^{***} (1.29)	-11.45^{***} (1.28)	-11.55^{***} (1.28)
Constant	−8.78 (10.18)	−10.12 (8.83)	−1.41 (4.85)	−9.67 (8.35)
Observations	888	888	888	888
Log Likelihood	−6299.94	−5939.23	−5885.93	−12771.59
Wald χ^2 (df = 3)	84.89^{***}	87.38^{***}	86.58^{***}	89.3^{***}

Note: SE clustered at individual level. $+\ p < 0.1$; $*\ p < 0.05$; $**\ p < 0.01$; $***\ p < 0.001$
Treatments conditional on transfer as instruments for each social norm perception separately.

heterogeneities, we study how norm-driven punishment decisions change with gender.

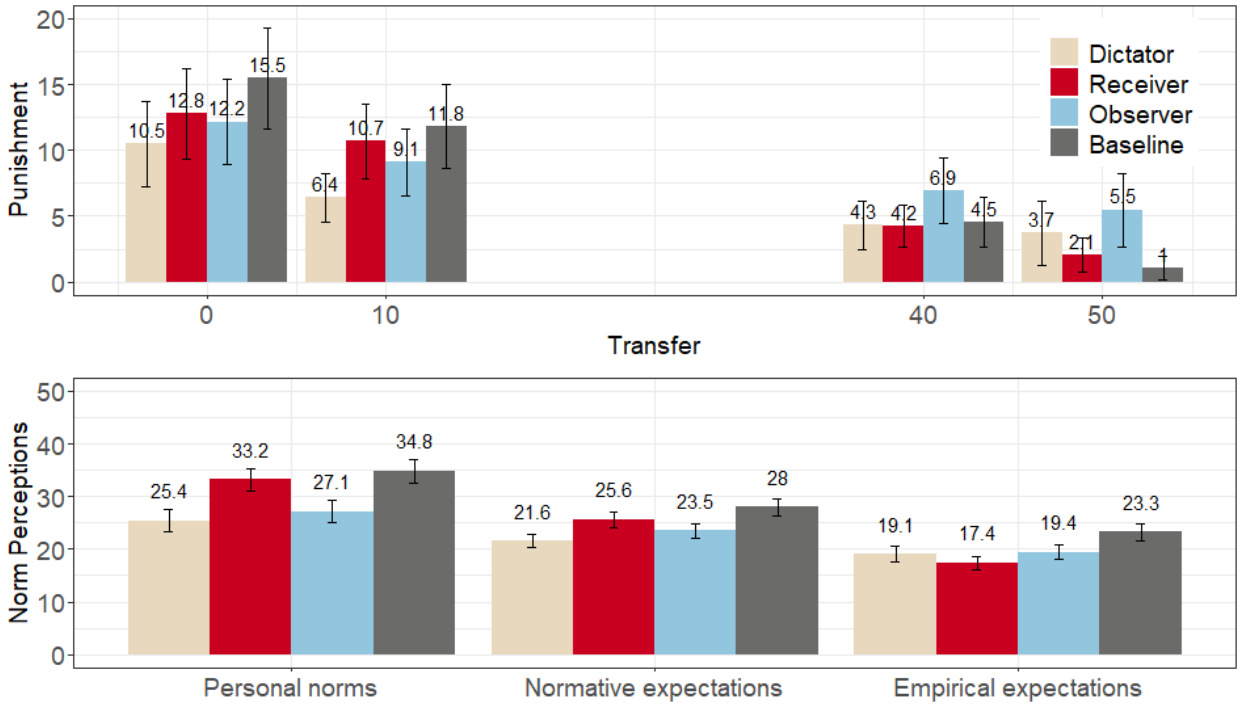
A.5.1 Role and the Importance of Social Norm Perceptions for Punishment

Figure 8 shows punishment decisions conditional on the role in the Experience phase and their respective norm perception averages. Non-parametric Wilcoxon rank sum tests reveal that the mere assignment to the role as dictators in the experience phase significantly (at least $p < 0.05$) reduces punishment for a transfer of 0 and 10 compared to the Baseline. Additionally, being in the Observer treatment significantly (at least $p < 0.05$) increases the punishment of a transfer of 50 compared to the Baseline and the Receiver treatment. This increase in antisocial punishment is mostly driven by subjects in the Observer treatment, who hold low personal norms and observe a high transfer.

More importantly, the figure indicates that the changes in punishment decisions (for a transfer of 0 and 10) closely follow the changes in the norm perceptions induced by the treatments. For instance, in the Baseline, both punishment decisions and norm perceptions are the highest of all treatments. Similarly, in the Dictator treatment, both punishment decisions and personal norms and normative expectations are the lowest. This illustrates the importance of norm perceptions for punishment decisions, also if the differences are induced by the exogenous assignment to a specific

treatment.

Figure 8: Roles, norm perceptions, and punishment



Note: The upper panel shows punishment decisions conditional on the transfer of the to-be-punished dictator (Transfer) and on the specific role in the Experience phase. The lower panel shows norm perception averages conditional on the specific role. Error bars show 95% confidence intervals and are based on standard errors that are clustered on individual level.

Next, we explore whether the difference in the norm-driven punishment is entirely due to the treatment assignment or whether the same norm-driven correlations also exist within each treatment. For this, we regress punishment decisions on all norm perceptions for each of the treatments separately. Table 13 shows the results of such Tobit regression. First of all, model (1) reveals that being assigned to the role of a dictator significantly decreases punishment decisions compared to the Baseline. All other roles also lead to smaller, yet non-significant punishment decisions compared to being in the Baseline. Models (2) to (5) split the data set into the respective treatments. They reveal that the direction of the correlation remains the same for all treatments. Only the effect sizes and the standard errors differ between the treatments. It is noteworthy that in the Receiver treatment, the correlation between empirical expectations and punishment decisions is the strongest.

Table 13: Tobit regression punishment on the role and norm perceptions

	Dependent variable:				
	punishment				
	(1)	(2)	(3)	(4)	(5)
Dictator	-6.73^{*}				
	(2.93)				
Receiver	-3.28				
	(3.03)				
Observer	-2.43				
	(2.95)				
Personal Norm		0.27^{*}	0.29^{*}	0.23	0.10
		(0.12)	(0.12)	(0.17)	(0.18)
Normative Expect.		-0.58^{*}	-0.33^{+}	-0.14	-0.001
		(0.26)	(0.20)	(0.24)	(0.27)
Empirical Expect.		0.45^{+}	0.72^{***}	0.26	0.10
		(0.23)	(0.20)	(0.20)	(0.30)
Constant	11.79^{***}	-5.89	-2.73	1.10	9.50
	(2.34)	(6.87)	(7.42)	(6.39)	(8.02)
Treatment	All	Dictator	Receiver	Observer	Baseline
Transfer	✓	✓	✓	✓	✓
Neg. Emotions	✓	✓	✓	✓	✓
Δ Neg. Emotions	✓	✓	✓	✓	✓
Observations	888	240	231	237	180
Log Likelihood	$-2{,}453.59$	-589.12	-594.70	-669.42	-542.13
Wald Test	59.10^{***}	34.34^{***}	75.74^{***}	25.14^{***}	23.92^{**}
	(df = 5)	(df = 7)	(df = 7)	(df = 7)	(df = 7)

Note: SE clustered at individual level $+ p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Furthermore, the lower panel of figure 8 reveals that the between-treatment differences in empirical expectations do not follow the same pattern as the differences in personal norms and more importantly, punishment decisions. This indicates that the importance of the three norm perceptions may differ depending on the role. To study whether this is the case, we regress punishment on the norm perceptions and interact them with the treatments (see appendix A.5.1). We find that being in the Receiver treatment (marginally) significantly ($p < 0.1$) increases the importance of empirical expectations for punishment compared to all other treatments. Apart from this, there is no other significant interaction between the treatment assignment and one of the norm perceptions. We conclude that the exogenous assignment into a specific role may change the importance of empirical expectations, however, the relative importance seems to be rather stable for the different roles.

Table 14: Tobit regression punishment on the role and interaction with norm perceptions

	Dependent variable:			
	punishment			
	(1)	(2)	(3)	(4)
Personal Norm	0.20*	0.22*	0.24**	0.25**
	(0.09)	(0.09)	(0.08)	(0.08)
Normative Expect.	−0.19	−0.18	−0.28*	−0.31*
	(0.14)	(0.15)	(0.14)	(0.13)
Empirical Expect.	0.39**	0.22	0.38**	0.41***
	(0.13)	(0.14)	(0.14)	(0.12)
Dictator	3.06			
	(5.20)			
Receiver		−8.22		
		(5.50)		
Observer			0.95	
			(5.36)	
Baseline				5.62
				(7.25)
Personal Norm:Treatment	0.08	0.06	−0.01	−0.16
	(0.15)	(0.14)	(0.18)	(0.21)
Normative Expect.:Treatment	−0.37	−0.14	0.15	0.34
	(0.29)	(0.25)	(0.27)	(0.31)
Empirical Expect.:Treatment	−0.002	0.46+	−0.12	−0.30
	(0.25)	(0.25)	(0.25)	(0.32)
Constant	0.14	1.86	−0.23	−0.64
	(4.06)	(3.68)	(3.82)	(3.94)
Interaction:Treatment	Dictator	Receiver	Observer	Baseline
Transfer	✓	✓	✓	✓
Neg. Emotions	✓	✓	✓	✓
Δ Neg. Emotions	✓	✓	✓	✓
Observations	888	888	888	888
Log Likelihood	−2,414.39	−2,413.75	−2,418.54	−2,415.53
Wald Test (df = 11)	134.16***	135.12***	125.97***	131.48***

Note: SE clustered at individual level + $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

A.5.2 Gender

In this section, we look closer at gender differences in the importance of norm perceptions for punishment decisions. The existing literature remains ambiguous as to the effect of gender on punishment. Kromer & Bahçekapili (2010) find that males punish selfish behavior more often than females, and McAuliffe et al. (2015) confirm this results among children. In contrast, Carpenter & Matthews (2012) find that females punish more than males, and Leibbrandt & López-Pérez (2012) show that females engage in more antisocial punishment. Piardini et al. (2017) study different gender compositions of punisher and punishee, and find that males punish females significantly more than females punish males and that same-sex groups do not differ in punishment. Moreover, there is only little evidence on how norm perceptions are related to economic behavior with respect to gender. Croson et al. (2010) find that males rely more on their empirical expectations when deciding about their own donations. Krysowski & Tremewan (2021) find that females find giving unfair amounts in a dictator game less acceptable compared to males when the dictator is unidentified. Fišar et al. (2016) study gender differences in bribing behavior and do not find a gender difference in the positive association between accepting bribes and beliefs about how often others accept bribes.

In our experiment, we do not find significant differences in third-party punishment decisions between males and females. However, we find differences in the relative importance of norm perceptions for punishment decisions across gender. For this, we first split the sample into males and females. Table 15 shows the results of a Tobit model, where we regress punishment on norm perceptions for females in the model (1), males in the model (2), and on the full sample in the model (3), with a dummy indicating female, and the interaction of female with all norm perceptions. The interaction effect then shows the importance of norm perceptions for punishment for females, whereas the baseline effect shows this relationship for males. In model (1), we find a positive relationship between empirical expectations and punishment for females, and a negative relationship with normative expectations, whereas personal norms seem not to matter. In model (2), we find the opposite for males; we find a statistically significant positive association between personal norms and punishment for females, whereas empirical and normative expectations seem not to matter for their punishment decisions. Model (3) confirms this pattern.

The difference in the importance of the norms for punishment decisions is not driven by different

Table 15: Tobit regression punishment on interaction norm perceptions conditional on gender

	Dependent variable:		
	punishment		
	(1)	(2)	(3)
Personal Norm	0.08	0.48^{***}	0.45^{***}
	(0.09)	(0.13)	(0.12)
Normative Expect.	-0.29^{*}	-0.22	-0.21
	(0.15)	(0.19)	(0.17)
Empirical Expect.	0.55^{***}	0.05	0.06
	(0.14)	(0.18)	(0.18)
Female			2.95
			(4.76)
Female:Personal Norm			-0.36^{*}
			(0.15)
Female:Normative Expect.			-0.09
			(0.23)
Female:Empirical Expect.			0.49^{*}
			(0.22)
Neg. Emotions	-0.32	0.24	0.04
	(1.14)	(1.70)	(0.94)
Δ Neg. Emotions	4.39^{*}	0.73	2.33^{+}
	(2.00)	(1.44)	(1.20)
Constant	1.67	-0.75	-1.03
	(4.46)	(5.73)	(4.32)
Gender	Female	Male	Both
Transfer	✓	✓	✓
Observations	489	399	888
Log Likelihood	$-1{,}337.91$	$-1{,}063.89$	$-2{,}406.57$
Wald Test	72.39^{***} (df = 7)	77.82^{***} (df = 7)	147.31^{***} (df = 11)

Note: SE clustered at individual level. $+\ p < 0.1$; $^{*}\ p < 0.05$; $^{**}\ p < 0.01$; $^{***}\ p < 0.001$

Table 16: Differences first elicitation norm perceptions between gender

Means (SE)	Males *(N=163)*	Females *(N=133)*	p-value
Personal Norms	30 (1.7)	29.63 (1.51)	0.922
Normative Expectations	24.85 (1.17)	24.11 (0.97)	0.668
Empirical Expectations	20.79 (1.14)	18.57 (0.97)	0.145

Note: Non-parametric Wilcoxon rank sum test

initial (first elicitation) levels of the norm perceptions between females and males. Table 16 shows average norm perceptions for females and males. The only substantive difference in norm perceptions is between empirical expectations (20.79 for males vs. 18.57 for females), yet the difference is not statistically significant.

We conclude that females punish according to their beliefs of the descriptive norm, whereas males do so according to what they personally believe is appropriate, without taking their beliefs about the injunctive and descriptive norm into account. This result illustrates that there exist heterogeneities in the importance of each of the norms.

B Experimental Instructions

The experiment took place online with the subject pool of the Masaryk University Experimental Economics Laboratory (MUEEL). We enclose the experimental protocol and instructions with experimental screens for punishers and punishees. The subjects went through pages independently, and the experimenter was present at the Zoom meeting, communicating with participants through the Zoom chat. If some participants did not show any activity for more than 2 minutes (apart from the planned waiting time within instructions), the experimenter contacted them through the chat or called them on the phone in case they did not respond.

Protocol and Verbal Instructions for Online Sessions for EXPERIMENTER

Main Experimenter - checks in participants, gives all verbal instructions + number, runs ZTU from VM, sends them the individual links to participants, solves ZTU issues if they come up, handles private chat if necessary.

20 - 30 MINUTES BEFORE SESSION BEGINS:

<Host/ Experimenter 1 checks in participants one by one, once their audio connects, says>

*EXPERIMENTER 1: "Can you hear me? If you can, please unmute yourself and let me know. < if full name is not clear from zoom name, ask for it – Can you tell me your full name? – thank you>. N**ow I will assign you the number, which we will use at the beginning of the experiment. Your number is X.** I will now direct you to a breakout room where you should wait for the experiment to begin. You don't have to be at computer now, just be fully prepared at least 5 minutes before the beginning of the experiment. Once you see join, please click on it, and you can mute yourself and turn the camera off now.*

<Direct participant to breakroom where on second computer shares screen (see Experiment_Lobby_Screen), >

Welcome to the experiment lobby! The experiment will begin shortly…

- The random number you got assigned is your participant label. We will use it in case we have more participants than we need in this experiment. If that is the case, we will randomly draw a number – if your number will be drawn, you won't participate in today's experiment, but we will pay you 50 CZK for your show up.
- Please turn off your video and put yourself on mute. It is not allowed to communicate with other participants for the whole duration of the experiment.
- Please keep **your unique ID (or code)** ready as we will ask you to enter it during this session. (You can find this in the email you received with the zoom link for this session).
- Make sure you are in a calm, quiet area without any distractions or people around. While the experiment is running, please stay focused. Please make sure to close all applications on your computer and any websites that are open.
- If you have any questions at any point, please type them into the private chat feature on Zoom and one of the experimenters will respond.
- You have to be fully prepared at least 5 minutes before the beginning of the experiment.

Thank you for your cooperation.

At the beginning - ASKING RESERVES TO LEAVE:

<Experimenter enters breakout room and inform participants, that it will be closed and they will get instructions in main meeting >

MAIN EXPERIMENTER: "Hello again and thanks for coming. For this experiment, we require 14 people. All of you have been assigned a number between 1 and X. I will now share my screen with random number generator. If your number is randomly generated, I will ask you to leave this zoom meeting. If you have entered your bank details in hroot then you will receive CZK 50 for this experiment, and you can register for another session of this experiment. Thanks for coming"

<repeat for all numbers, afterward makes sure that the reserves have left the zoom meeting room->

STARTING THE SESSION:

MAIN EXPERIMENTER: "I will now be sending you your individual links to the experiment. I need to do this one by one so please keep an eye on the chat and you should receive your link in a few minutes. After receiving the link, please paste it in your browser. The experiment will begin shortly after that. If you have any questions during the experiment, please use the chat feature on zoom to ask the question and we will respond to it there.>

<send individual links to all via private chat>

MAIN EXPERIMENTER: "You have now all received the link to the online experiment, so we can start soon. You should see grey screen with small green leaf on side, if you do not, please write to me through chat. If you have not done so already, please now minimize this zoom meeting (without closing it) and move it away from your screen. Since this is an interactive experiment, you might have to wait while other participants make decisions but it is important that you do not engage in any other activity during this time. Please do not open up any tabs on your browser. We will begin shortly."

<Experimenters go on mute, we make sure background is set to number of links that were sent out, press F5 in the VM and start >

ENDING THE SESSION

MAIN EXPERIMENTER: "Now you see payment screen. This is the last screen of this experiment. If you have any question or feedback, please, write to us. Thank you for participating in this experiment. Your full payment will be transferred to your accounts until the end of two working days. After you click on proceed, you can close the tab and leave the zoom meeting room. Thanks again and goodbye."

----------DONE----------

Instructions – punishers

[screen 1]

Experimental instructions

You are now taking part in an economic experiment. You can earn a considerable amount of money depending on the decisions that you and other participants make. Therefore, it is very important that you read the instructions carefully. It is important to us that you stay concentrated and in front of your computer. Communication with any of the participants is strictly forbidden and can lead to withholding of the payment.

This experiment consists of a part A and a part B. Either part A or part B is going to be paid out to you. Part A will be paid with a probability of 80% and part B with a probability of 20%. You will receive your payoff on your bank account within two working days from the end of the experiment.

If you have questions or technical problems, please write to us through the chat in zoom.

[screen 2 – only experience]

Experimental instructions - Part A - Stage 1

We will now explain part A. After reading the instructions for the entire part A, you will start to make decisions. Therefore, carefully read the instructions and if you have any questions, please write to us through the chat in zoom. Instructions for part B will be shown after you have finished part A. < Part A consists of two stages.

In the first stage, you will be paired randomly and anonymously with another participant. One of you will be randomly assigned to be Player A and the other to be Player B.

Player A will receive 100 CZK and Player B will not receive anything. Player A can then decide to transfer either 0, 10, 40, or 50 CZK to Player B.

Your role will be Player A. [Your role will be Player B.]

[screen 3 – all]

Experimental instructions - Part A [- Stage 2 - experience]

[In stage 2, – experience] There are players C and D, who are like you real human participants of this experimental session. You will make decisions that will affect the payoff of Player C, therefore your choices have real consequences for your own payoff and for the payoff of Player C.

Player C receives 100 CZK and Player D does not receive anything. Player C can then decide to transfer either 0, 10, 40, or 50 CZK to Player D.

You can assign deduction points to participant C. Each deduction point you transfer to participant C diminishes your income by 1 CZK and participant C's income by 3 CZK. You can assign a number of deduction points between 0 and 50. You will decide how many deduction points to assign to Player C for any possible choice of him/her. Specifically, you will decide how many deduction points to assign if Player C transfers either 0, 10, 40, or 50 CZK.

You won't know how Players C have decided until the end of the experiment. Your choice will be implemented and the number of deduction points you chose will be assigned to Player C and his income will be reduced accordingly, depending on Player C's chosen transfer. Therefore, all your

choices potentially have a real impact on the payoff of Players C. Note that nobody has the opportunity to assign deduction points to you at any point in the experiment.

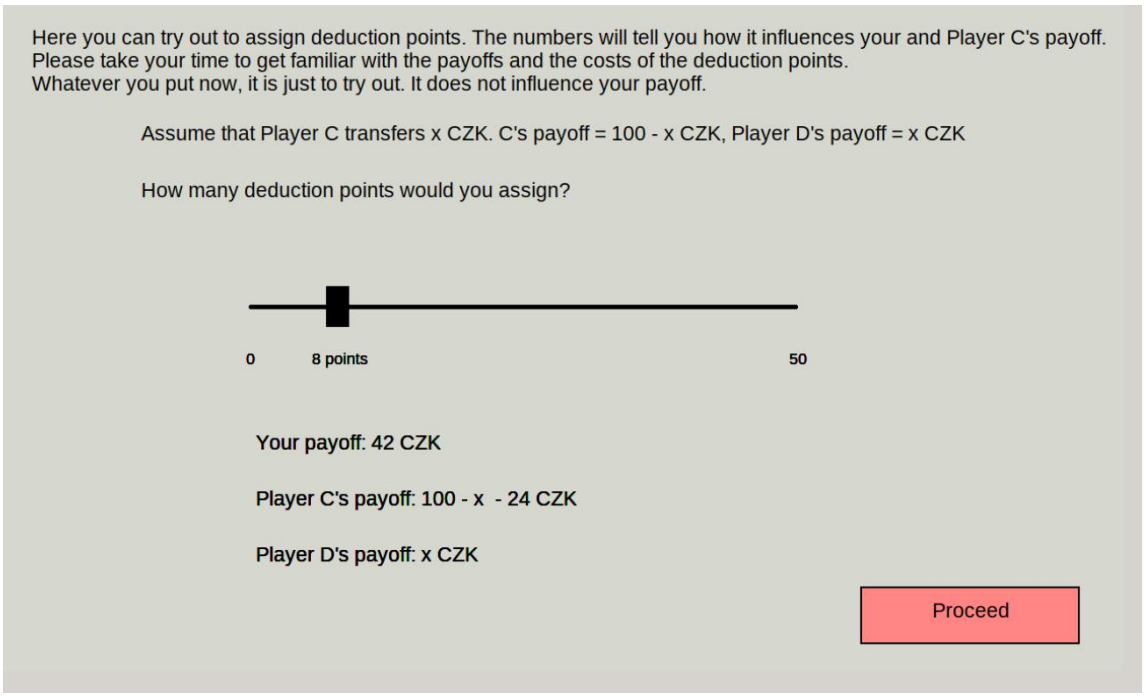
[screen 4 - tryout stage]

Here you can try out to assign deduction points. The numbers will tell you how it influences your and Player C's payoff. Please take your time to get familiar with the payoffs and the costs of the deduction points.

Whatever you put now, it is just to try out. It does not influence your payoff.

Assume that Player C transfers x CZK. C's payoff = 100 - x CZK, Player D's payoff = x CZK

How many deduction points would you assign?



[screen 5 – observers]

Before your decisions, we will give you an impression on how participants decided about the transfers. We will show you the decision and consequences of a randomly chosen participant, Player A, that participated in an earlier session of this experiment. That player is randomly chosen from all the players that participated in the earlier session and that were making a decision as Player A.

Player A received 100 CZK and Player B did not receive anything. Player A could then decide to transfer either 0, 10, 40, or 50 CZK to Player B. There was no opportunity to assign deduction points to Player A.

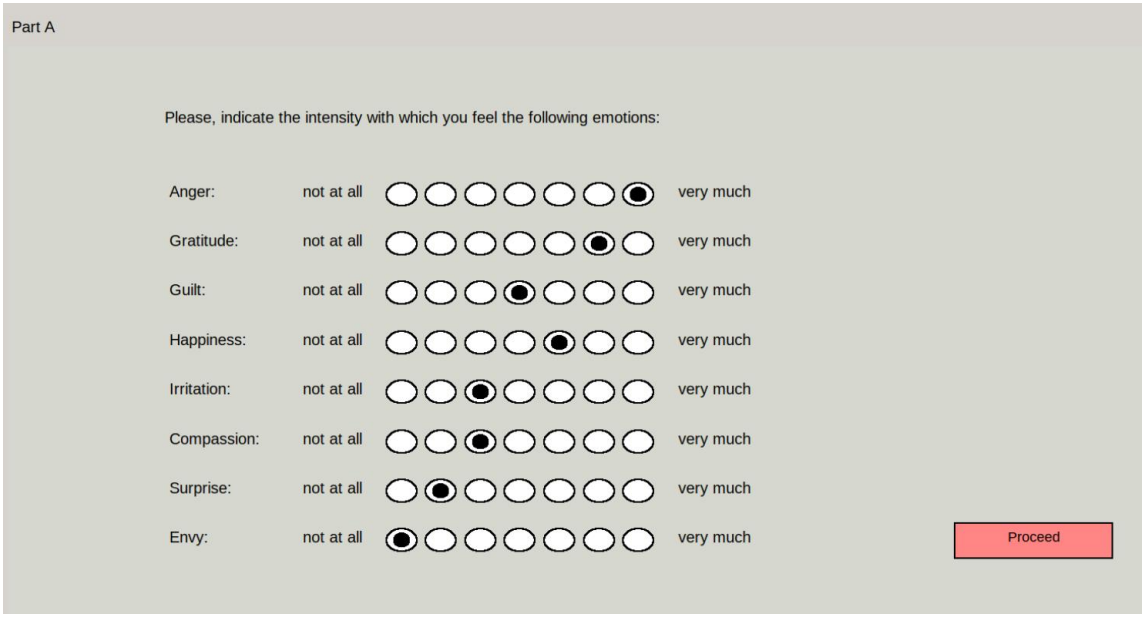
[screen 6 all]

Now we will start with part A. Remember that there is an 80% chance that this part is going to be payoff relevant for you. In this part A, you receive a base payment of 50 CZK [if observer or inactive 50 + X CZK; X randomly chosen payoff of subject from experience treatment in earlier session] that is independent of your future decisions and will be paid out for sure if part A is going to be picked for your payoff.

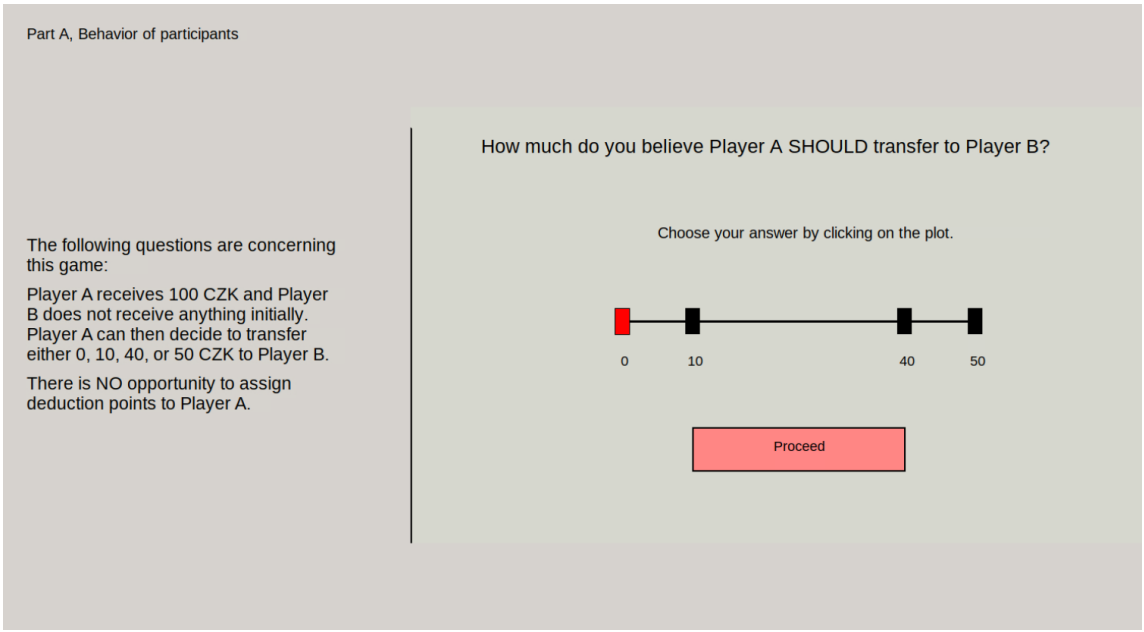
[Your role will be Player A [B] – experience]

Before we start with the first stage, we will ask you about your emotions and opinions on the behavior of participants in this [a previous – observe & inactive] experimental session.

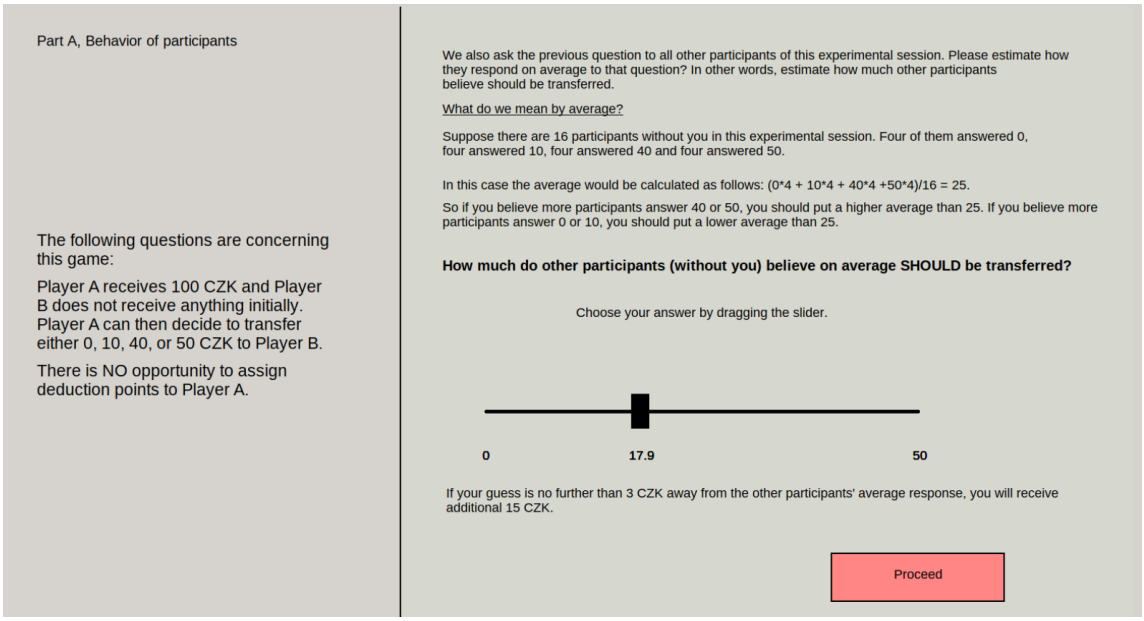
[screen 7 – 1st Emotions elicitation]



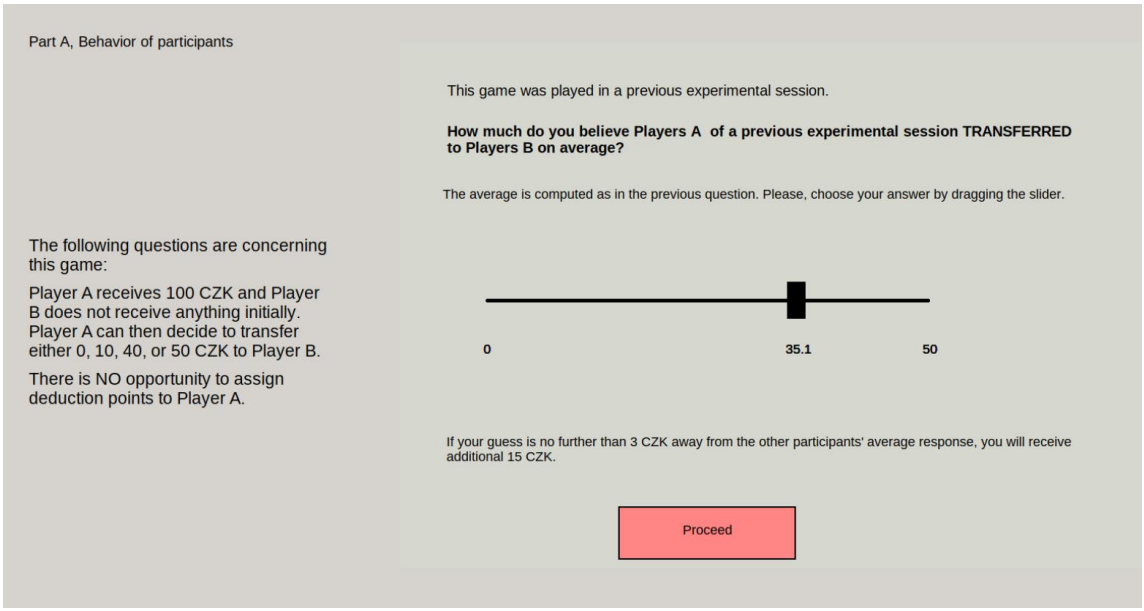
[screen 8 – 1st Norms elicitation – Personal norm]



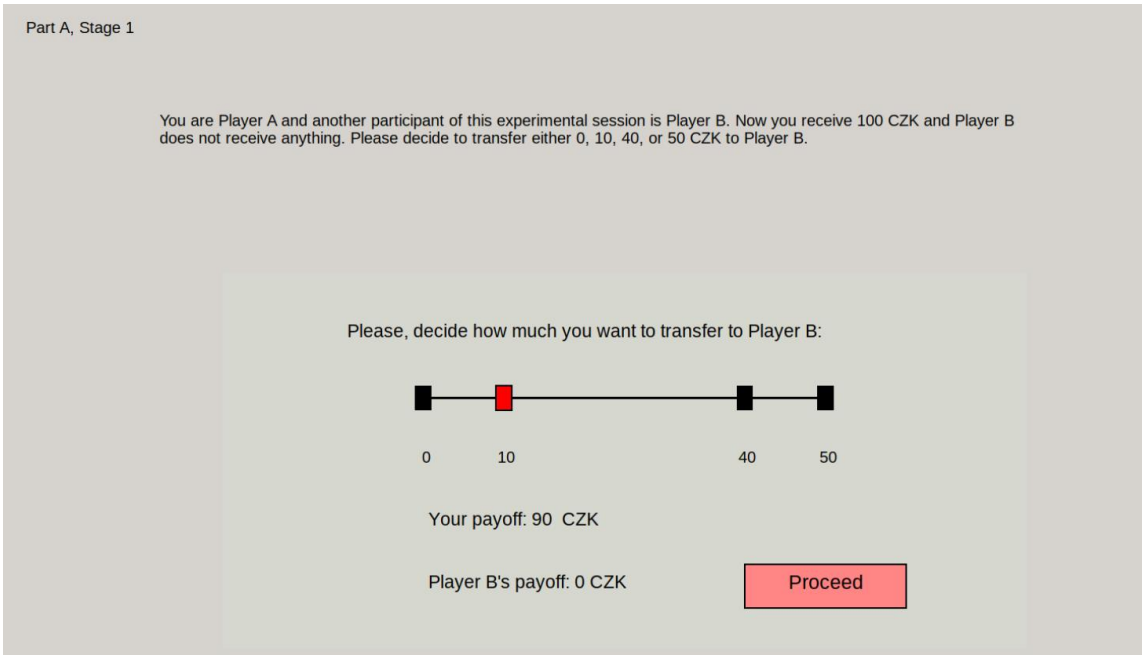
[screen 9 – 1st Norms elicitation – Normative expectations]

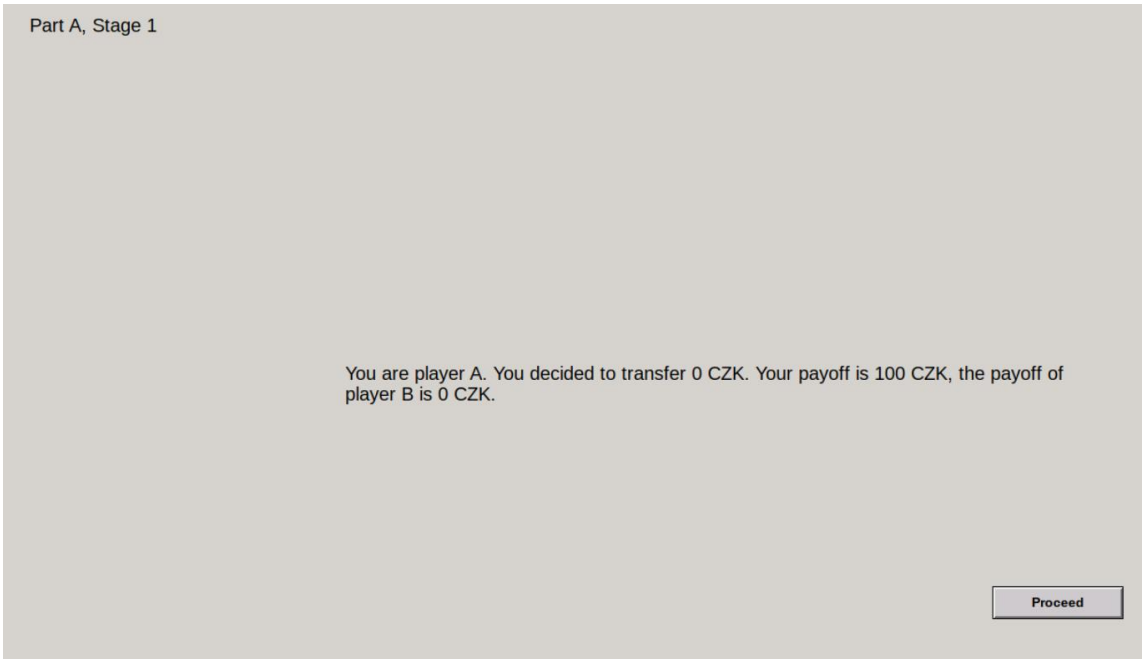


[screen 10 – 1st Norms elicitation - Empirical expectations]

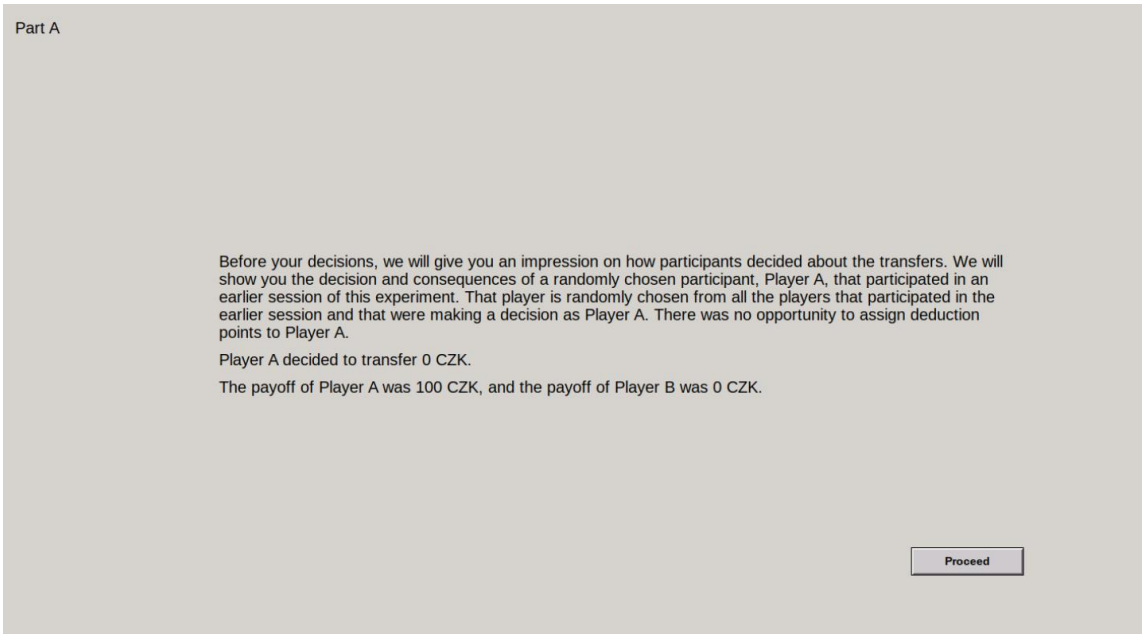


[screen 11 - Treatment Receive – DG game and results]

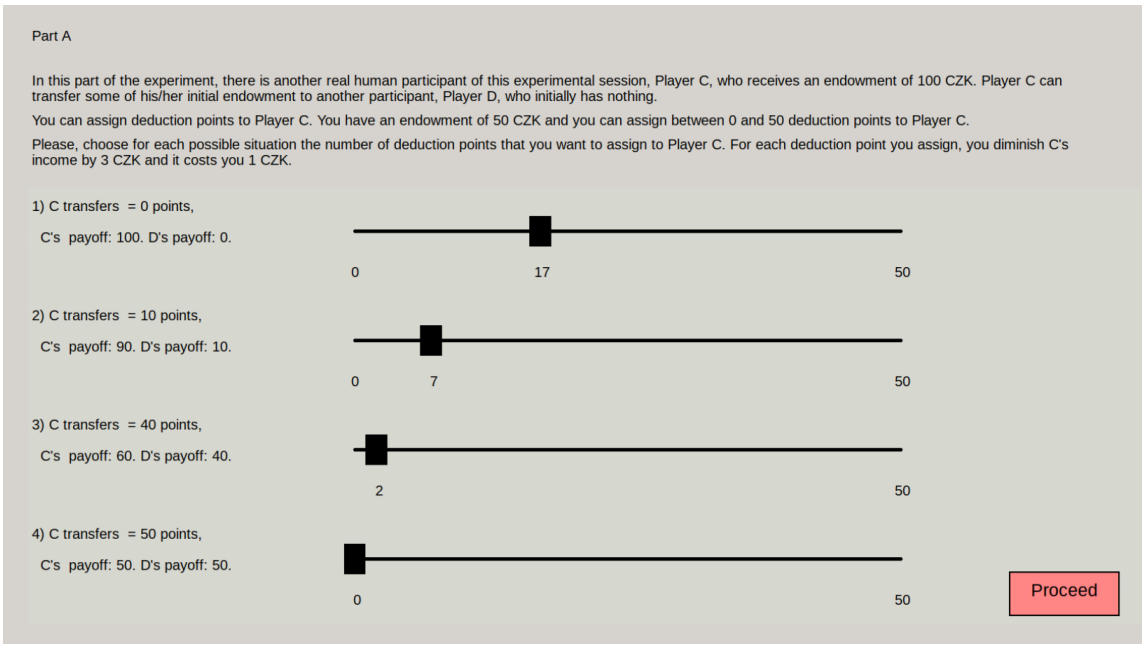




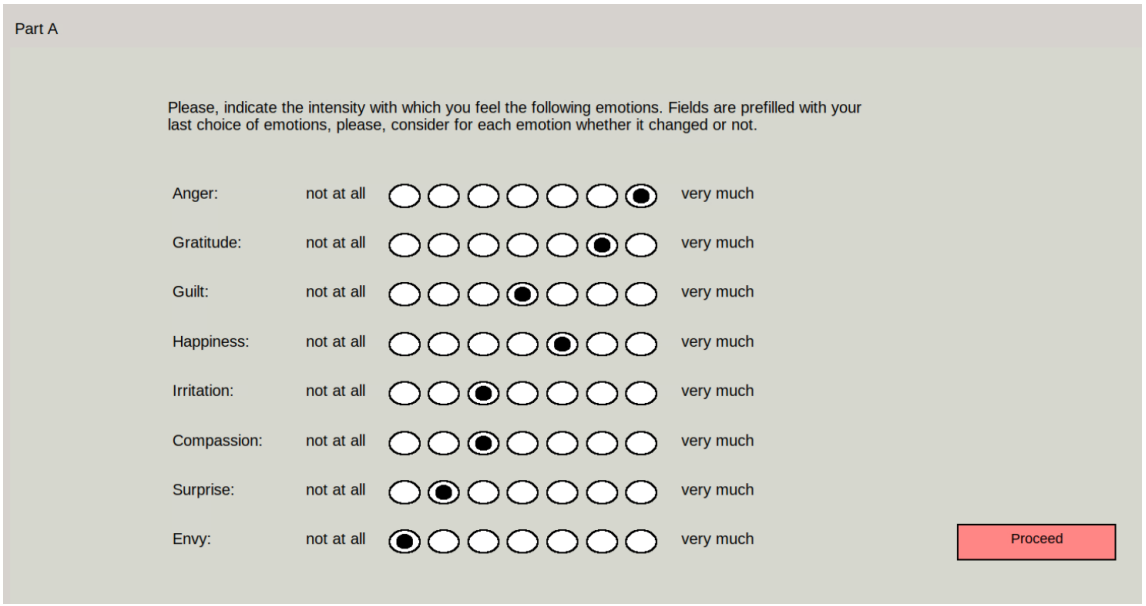
[screen 11 – Treatment Observe]



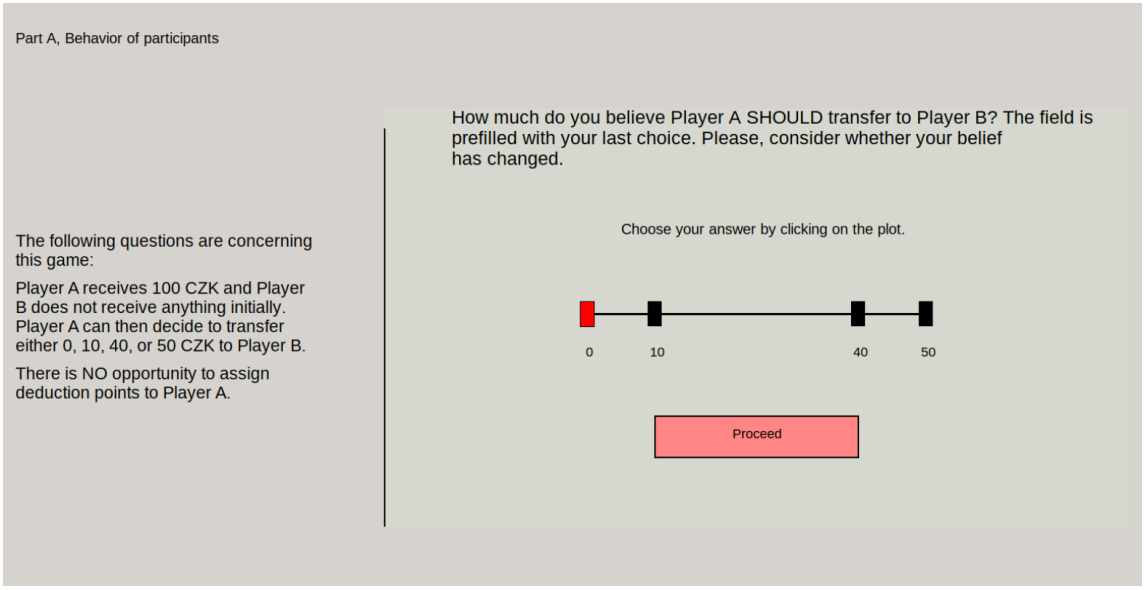
[screen 12 – Punishment phase]



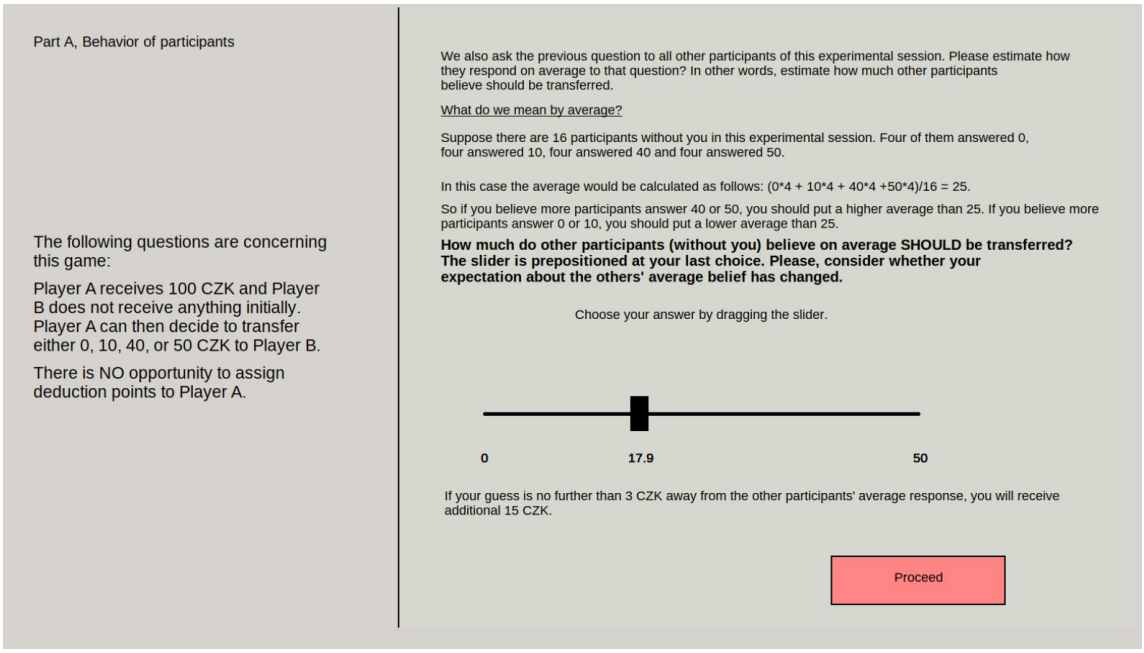
[screen 13 – 2nd Emotions elicitation]



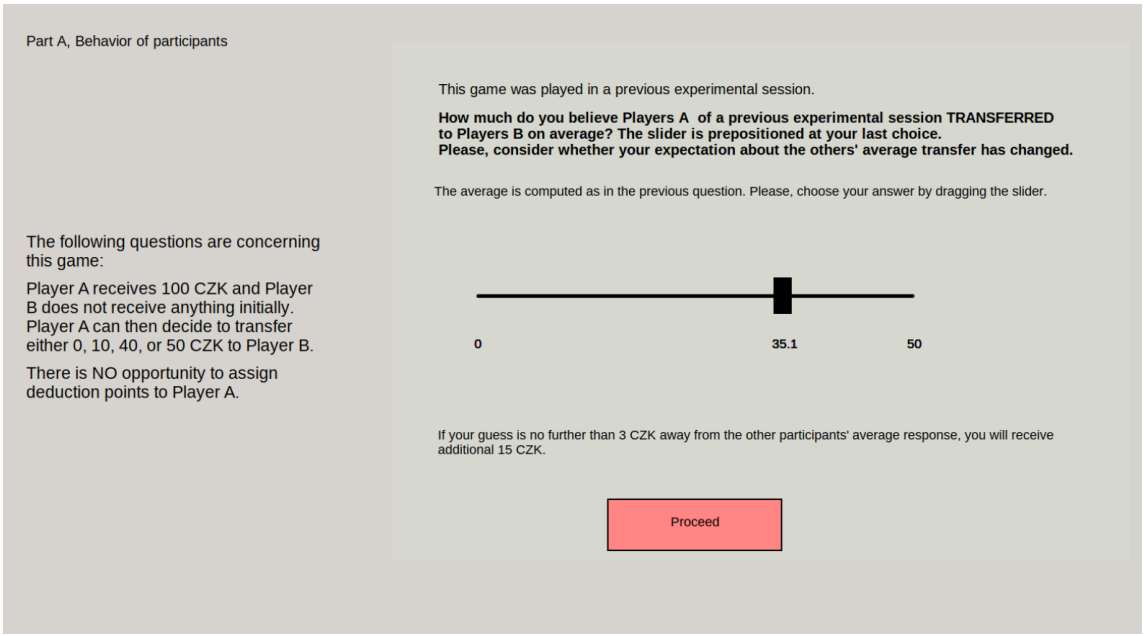
[screen 14- 2nd Norms elicitation – Personal norm]



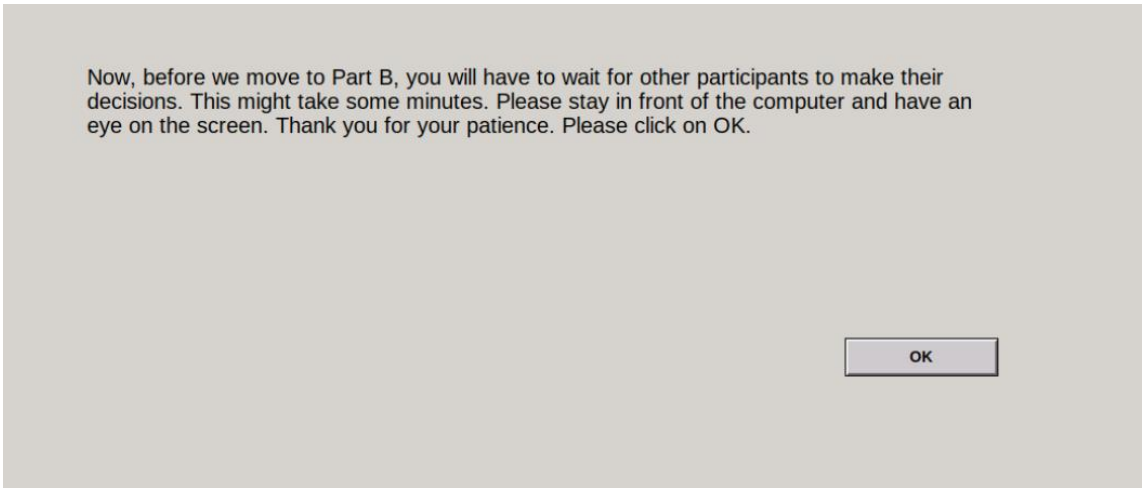
[screen 15- 2nd Norms elicitation – Normative expectations]



[screen 16 - 2nd Norms elicitation – Empirical expectations]



[screen 17 - waiting stage]



[screen 18 – Instructions part B]

Experimental instructions - Part B

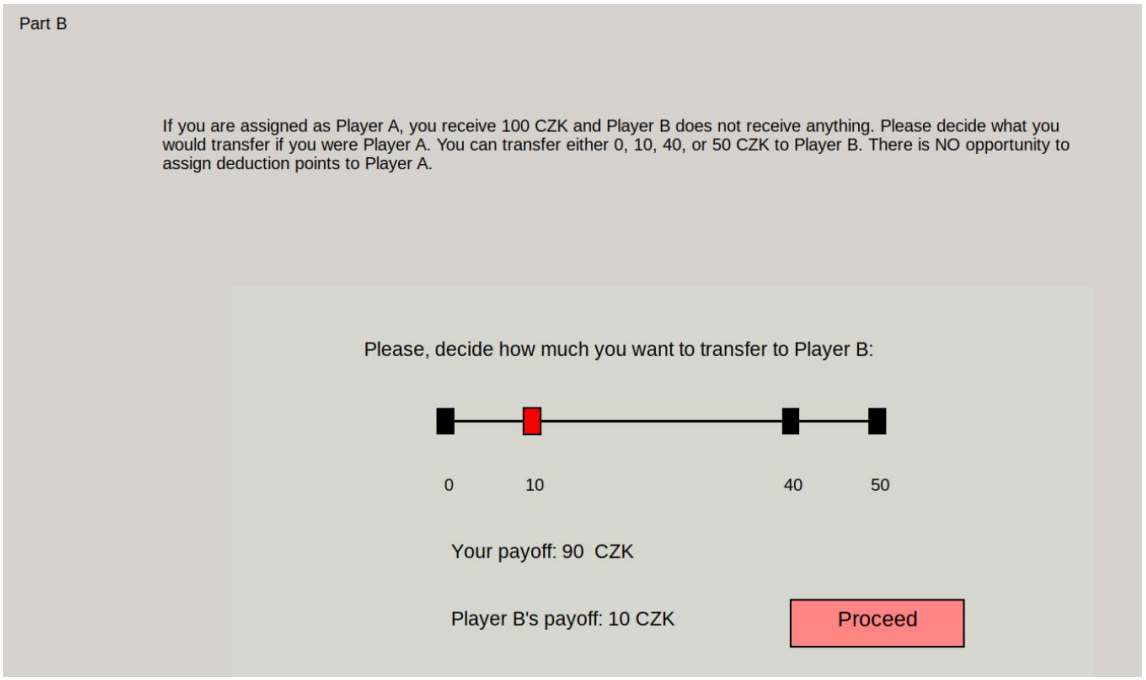
We have completed part A of this experiment. Now we will start with part B. In this part, you receive a base payment of 50 CZK that is independent of your future decisions and will be paid out for sure if part B is going to be picked for your payoff.

You will be paired with another participant of this experimental session. One of you will be randomly assigned to be Player A and the other to be Player B. Player A will receive 100 CZK and Player B will not receive anything. Player A can then decide to transfer either 0, 10, 40, or 50 CZK to Player B.

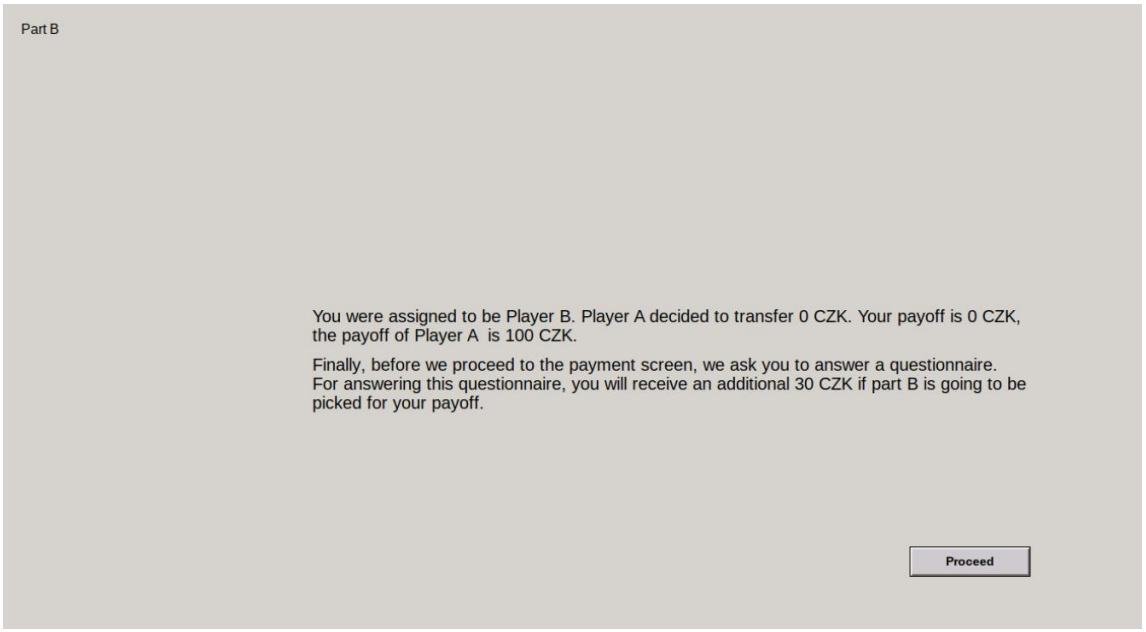
You will make a decision as Player A before you know if you are going to be assigned to be Player A or Player B.

Remember that there is a 20% chance that part B is going to be payoff relevant for you. If it is payoff relevant for you, your transfer as Player A will also be payoff relevant for Player B.

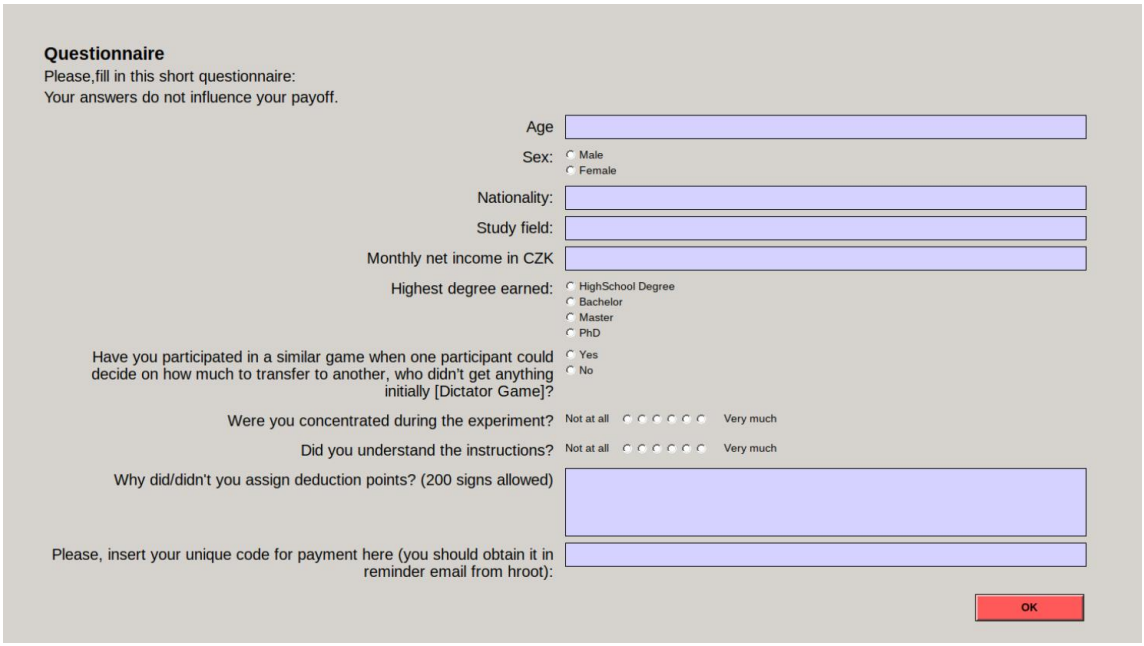
[screen 19 – part B]



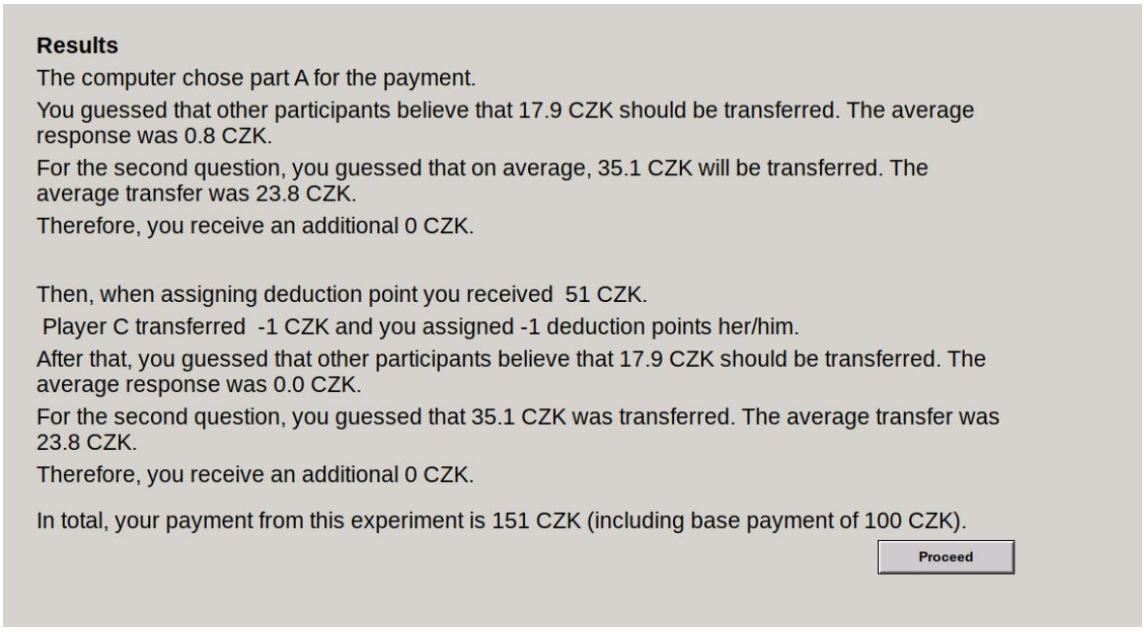
[screen 20 – part B results]



[screen 21 – questionnaire]



[screen 22 – payment screen]



Instructions – Punishees

[screen 1]

Experimental instructions

You are now taking part in an economic experiment. This experiment consists of one game that will be repeated for 4 rounds. You can earn a considerable amount of money depending on the decisions that you and the other participants make. Therefore, it is very important that you read the instructions carefully. It is important to us that you stay concentrated and in front of your computer. Communication with any of the participants is strictly forbidden and can lead to withholding of the payment.

You will receive your payoff on your bank account within two working days from the end of the experiment.

If you have questions or technical problems, please write to us through the chat in zoom.

[screen 2]

Experimental instructions

You will be paired randomly and anonymously with another participant. In each round, one of you will be randomly chosen to be Player C and the other Player D. Before making a decision, you will learn your role, which will be randomly assigned in each round anew.

Player C will receive 100 CZK and Player D will not receive anything. Player C can then decide to transfer either 0, 10, 40, or 50 CZK to Player D.

Other participants from this experiment (Players Y) have the opportunity to assign deduction points to Player C depending on Player C's transfer decisions. Each deduction point assigned to Player C will diminish Player C's income by 3 CZK. Players Y have to pay 1 CZK for each deduction point that they assign. They decide for each possible choice of transfer how many deduction points they want to assign to you. Before we start with the game, we will ask you about your emotions and opinions on the behavior of participants in this session.

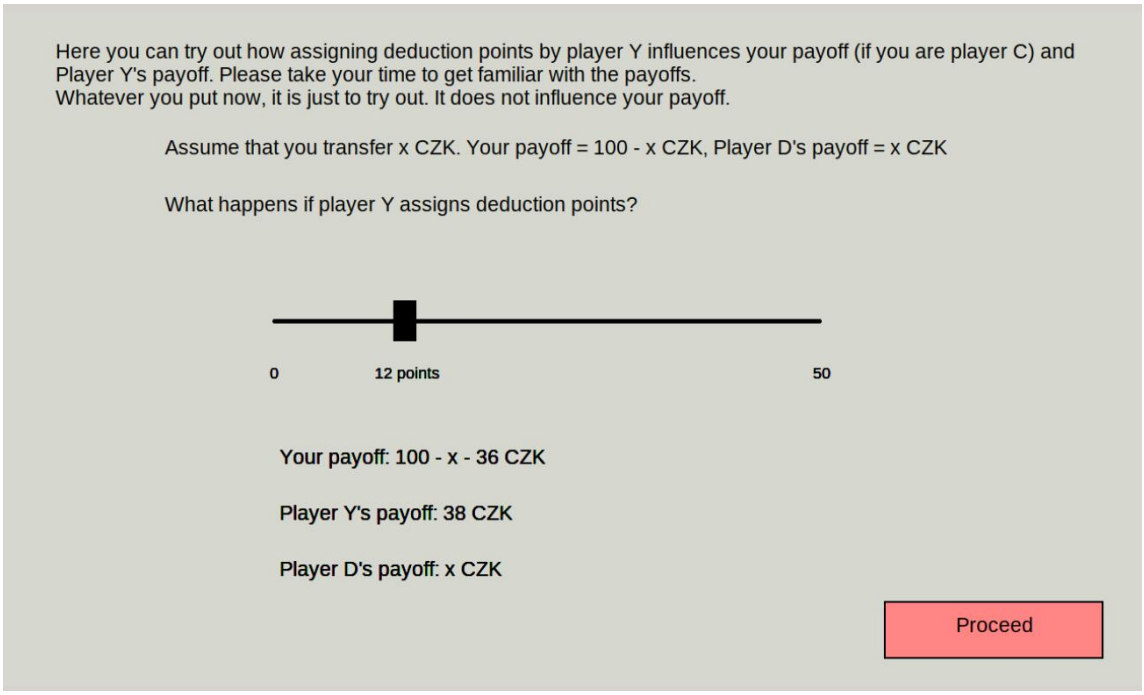
[screen 3 – tryout stage]

Here you can try out how assigning deduction points by player Y influences your payoff (if you are player C) and Player Y's payoff. Please take your time to get familiar with the payoffs.

Whatever you put now, it is just to try out. It does not influence your payoff.

Assume that you transfer x CZK. Your payoff = 100 - x CZK, Player D's payoff = x CZK

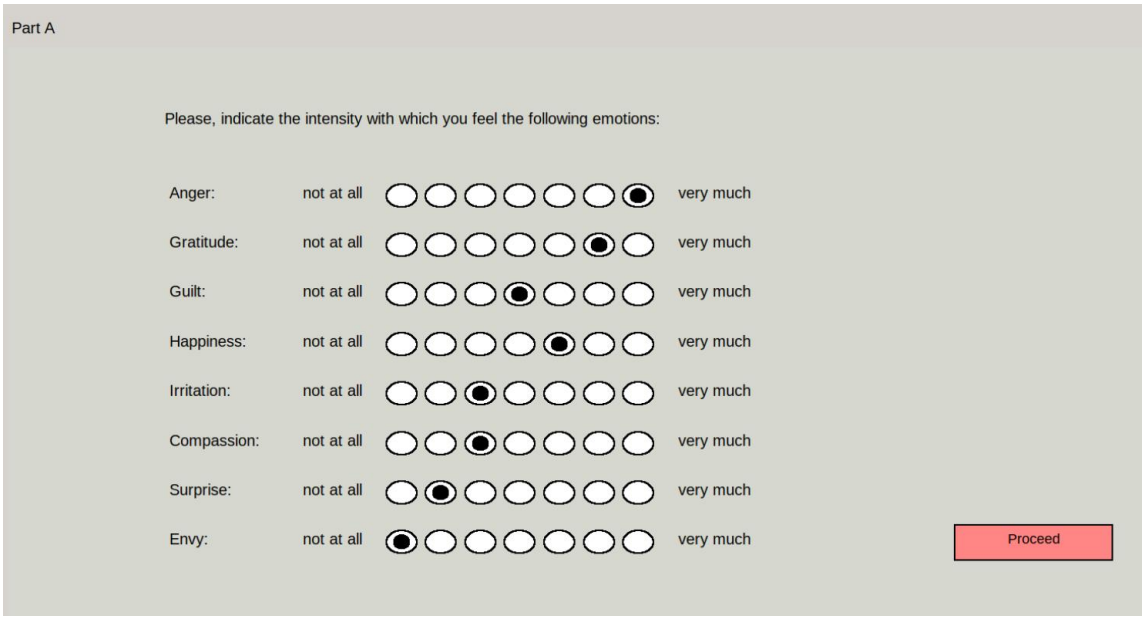
What happens if player Y assigns deduction points?



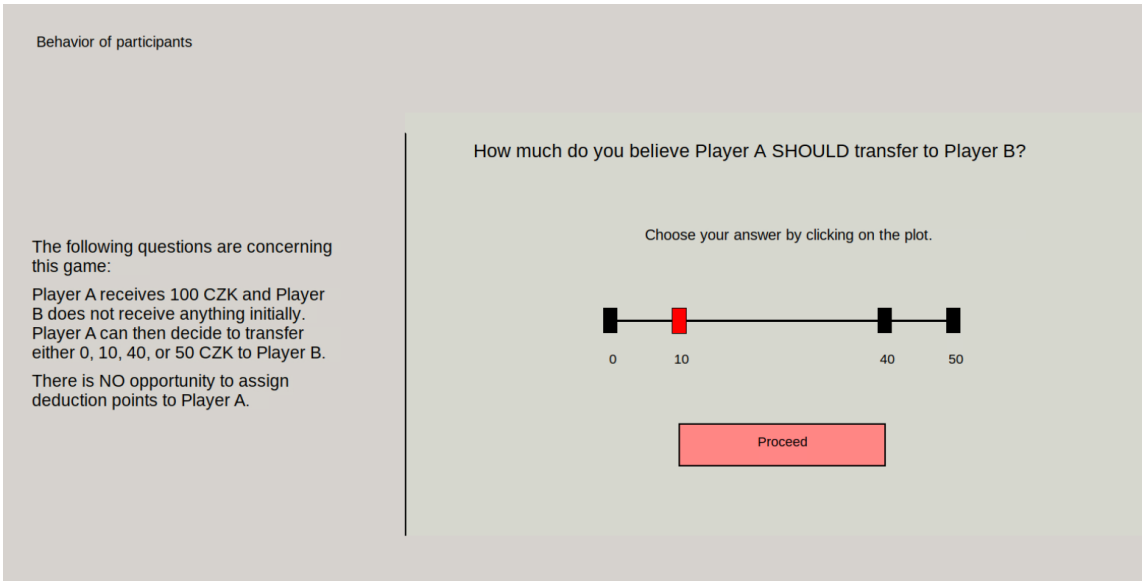
[screen 4]

Before we start with the experiment, we will ask you about your emotions and opinions on the behavior of participants in experimental session.

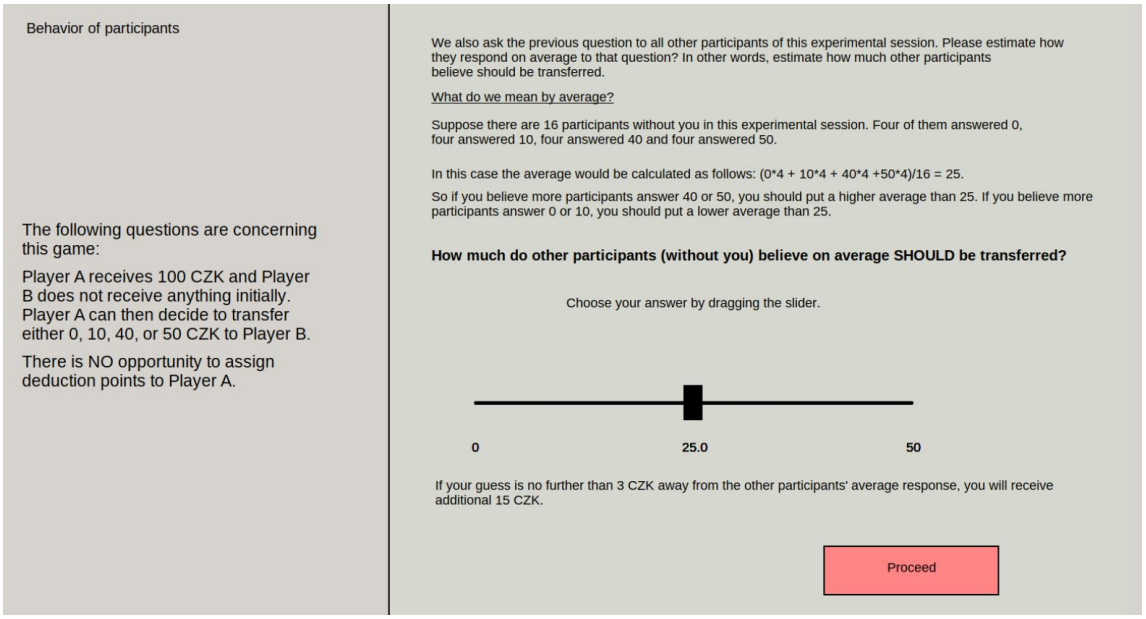
[screen 5 – Emotions elicitation]



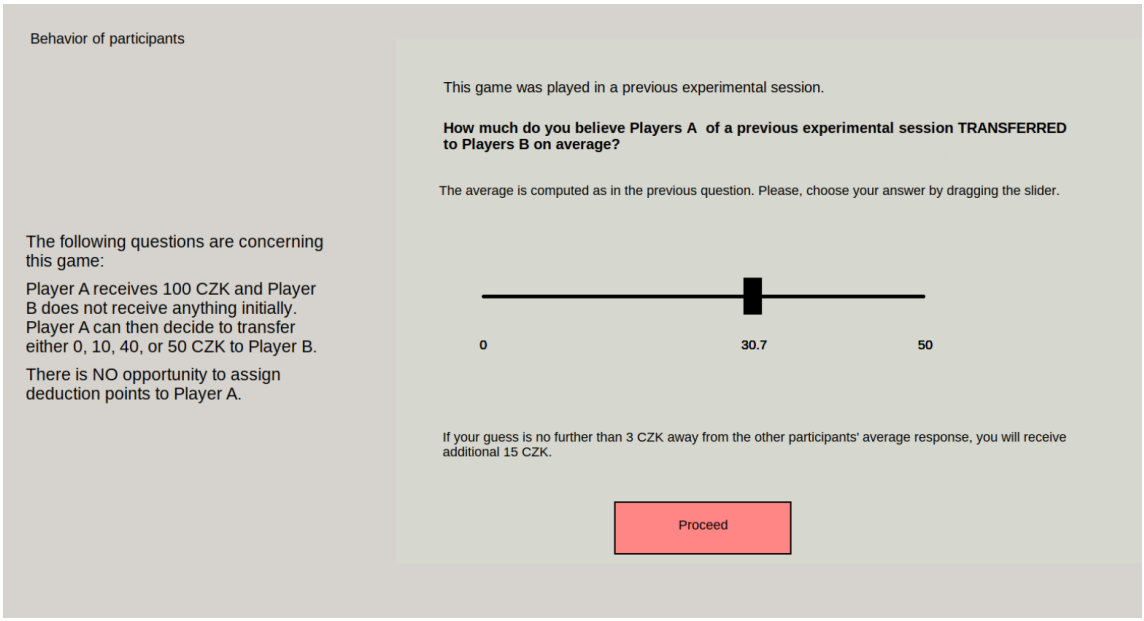
[screen 6 – Norms elicitation – Personal norm]



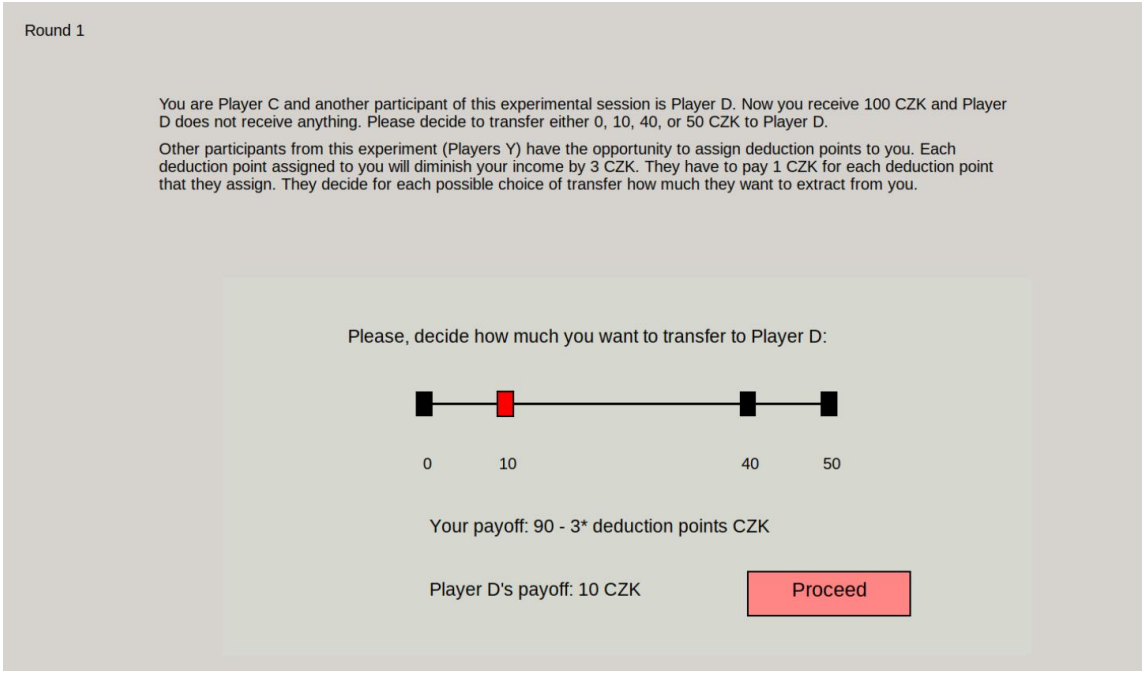
[screen 7 – Norms elicitation – Normative expectations]



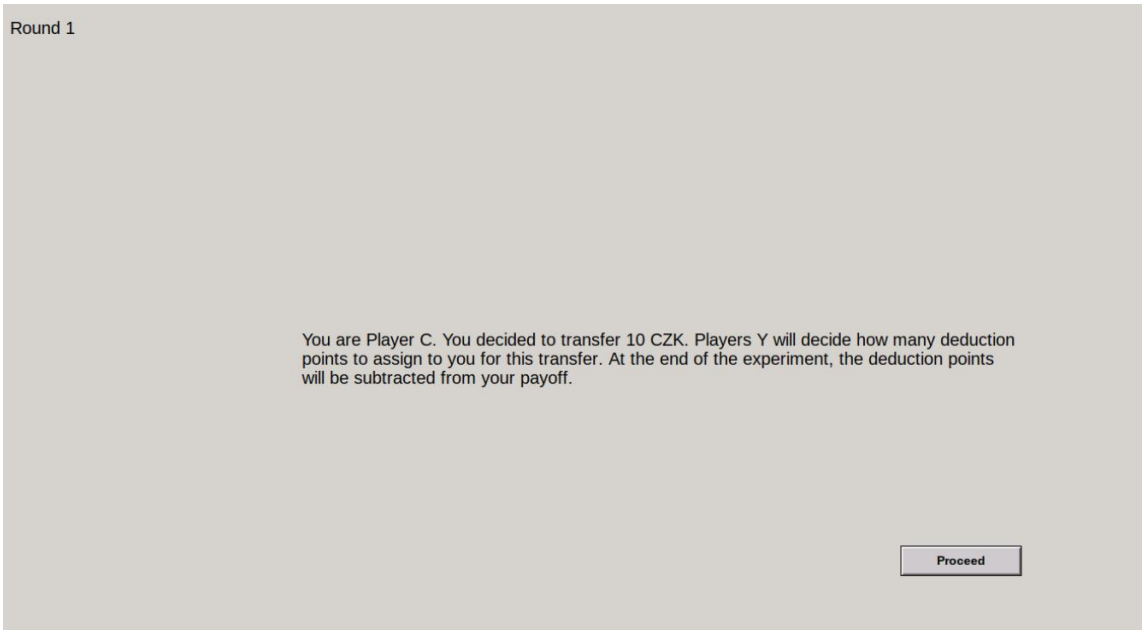
[screen 8 – Norms elicitation – Empirical expectations]



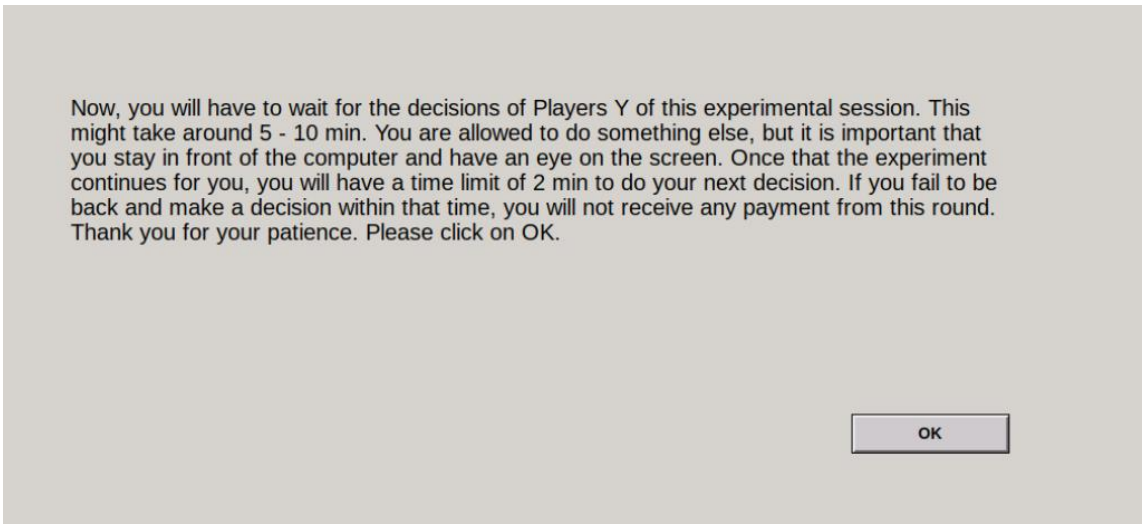
[screen 9 – DG round 1]



[screen 10 – DG results]

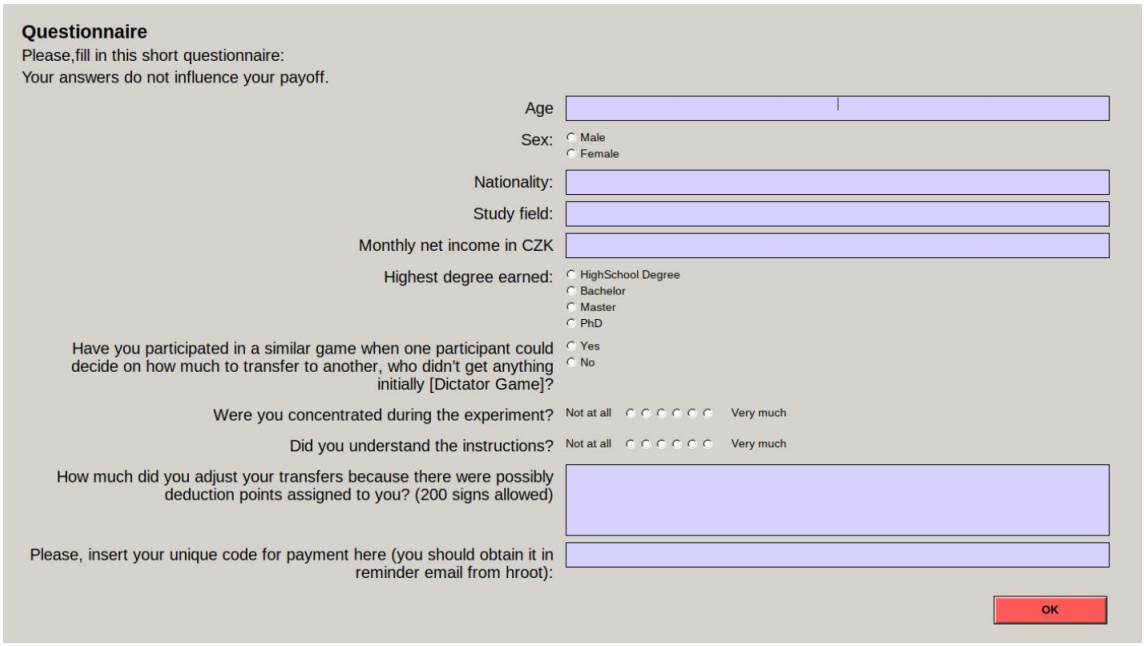


[waiting stage]



[screen 9 and 10 repeated 4 times]

[screen 11 – questionnaire]



[screen 12 – payment screen]