CESifo WORKING PAPERS

10946
2024

February 2024

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CESifo

Impressum:

CESifo Working Papers
ISSN 2364-1428 (electronic version)
Publisher and distributor: Munich Society for the Promotion of Economic Research - CESifo GmbH
The international platform of Ludwigs-Maximilians University's Center for Economic Studies and the ifo Institute
Poschingerstr. 5, 81679 Munich, Germany
Telephone +49 (0)89 2180-2740, Telefax +49 (0)89 2180-17845, email office@cesifo.de
Editor: Clemens Fuest
https://www.cesifo.org/en/wp
An electronic version of the paper may be downloaded
· from the SSRN website: www.SSRN.com
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CESifo *Working Paper No. 10946*

Perceived Legitimacy and Motivation Effects of Authority

Abstract

Organizational structures are an important determinant of individual incentives and thus individual motivation in organizations. We study whether their effects on individual motivation go beyond incentives and how they relate to the perceived legitimacy of organizational structure. To this end, we design a laboratory experiment in which we exogenously manipulate the organizational structure in a way that leaves the incentives of all individuals unaffected, but changes the perceived legitimacy of the organizational structure. Our data show that organizational structure indeed affects behavior beyond monetary incentive effects and that the observed changes are significantly associated with changes in perceived legitimacy.

JEL-Codes: D010, D230, D910, M500.

Keywords: legitimacy, organization, motivation.

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February 6, 2024
This experiment was pre-registered before data collection (https://aspredicted.org/blind.php?x=XPW_GPP) and approved by the IRB of the University of Fribourg, Switzerland. We are grateful for valuable comments by Patrick Haack, Christian Zehnder, seminar and conference participants at the University of Fribourg, the SIOE Annual Congress in Frankfurt 2023, and the Matterhorn Symposium 2023 in Brig. Holger Herz acknowledges financial support from the ERC Starting Grant 803332.

1 Introduction

It has long been argued that behavioral reactions to authority and power are mediated and positively influenced by an authority's legitimacy (Selznick et al., 1949; Parsons, 1956; French and Raven, 1959; Weber, 1978; Zelditch, 2001; Beetham, 2013).[1] Consequently, the question why and how authorities, institutions, or other social arrangements can obtain and maintain legitimacy has received significant attention, and a wide range of potential sources have been identified (for an overview, see for example Suchman, 1995; Tyler, 2006; Suddaby, Bitektine and Haack, 2017).[2]

Empirically, however, how perceived legitimacy of an authority affects the behavior of those subject to its influence remains less well understood. A key challenge in empirically examining the mediating role of legitimacy perceptions in behavior stems from the intertwined nature of factors influencing both legitimacy perceptions and the immediate incentives individuals encounter when interacting with the authority. For example, this interrelatedness is evident in Weber's definition of rational-legal authority, in which legitimacy is derived from enforceable law (Weber, 1978). Or, in the domain of organizations, in Suchman's definition of *pragmatic legitimacy*, according to which an organization's legitimacy is derived from *"the self-interested calculations of an organization's most immediate audiences"* (Suchman, 1995, p. 578).[3] Thus, perceived legitimacy and individual incentives may not only be co-determined by third factors, perceptions of legitimacy may even be directly shaped by individual incentives.

In this paper, we turn to a controlled laboratory experiment to assess the relationship between perceived legitimacy of an authority and individual behavior when individuals' pecuniary incentives are fully controlled for. We do so in the context of organizations, where legitimacy is widely recognized as an important property (Dowling and Pfeffer, 1975; Zucker, 1987). More specifically, we study the effects of legitimacy at the individual level, and thus treat legitimacy as perception and individual judgment (Dornbusch, Scott and Busching, 1975; Johnson, Dowd and Ridgeway, 2006; Tost, 2011; Suddaby et al., 2017; Zelditch Jr, 2018; Haack, Schilke and Zucker, 2021).

We focus on a specific aspect of organizations that affects their perceived legitimacy

[1] Tyler (2006), citing French and Raven (1959) and Ford and Johnson (1998), goes as far as arguing that "legitimacy is an additional form of power that enables authorities to shape the behavior of others distinct from their control over incentives or sanctions" (Tyler, 2006, p. 377).

[2] For example, Weber (1978) originally argued that legitimate authority can be traditional, rational-legal or charismatic. Focusing on organizational legitimacy, Suchman (1995) argued that legitimacy can be pragmatic, moral or cognitive.

[3] In principle, any utilitarian conception of legitimacy faces this challenge.

by stakeholders: The hierarchy of decision authority within the organization. Our conceptualization of legitimacy of authority within an organization thus closely follows the definition of French and Raven (1959, p. 160), who argue that *"acceptance of the social structure is another basis for legitimate power. If P accepts as right the social structure of his group, organization, or society, especially the social structure involving a hierarchy of authority, P will accept the legitimate authority of O, who occupies a superior office in the hierarchy."* It is also properly reflected in Deephouse, Bundy, Tost, Suchman et al. (2017, p. 37)'s definition of organizational legitimacy as *"the perceived appropriateness of an organization to a social system in terms of rules, values, norms, and definitions."*

More specifically, we use the authority-delegation game developed by Fehr, Herz and Wilkening (2013) ("FHW13"), which is based on the theory of formal and real authority in organizations introduced by Aghion and Tirole (1997). This experimental setup is well suited for our purposes because it allows studying behavior within different organizational structures, while fully controlling the pecuniary incentives that the involved parties face.

In this experiment, a principal and an agent form a minimal organizational unit and must select one of the N potential projects for implementation. The organizational relationship between the principal and the agent is characterized by a decision hierarchy: One of the parties is the controlling party that can ultimately determine the project choice, whereas the other party is a subordinate that can only make a project recommendation to the controlling party. Project choice determines payoffs to the principal and the agent, but the interests are only partially aligned. Two out of the N projects generate benefits for both parties, where one is best for the principal while the other is best for the agent, and this partial interest alignment is ex ante common knowledge. To implement one of the beneficial projects, a party needs to have successfully obtained relevant project information, which requires costly investments that both parties can undertake. Principal and agent have exactly identical costs of gathering information.

The communication and decision structure implies that the subordinate, if informed, will recommend their preferred project to the controlling party. If the controlling party is informed, they will implement their preferred project (and ignore any potential recommendation made by the subordinate). If the controlling party is uninformed, they will rubber-stamp the subordinate's recommendation. Both the controlling party and the subordinate have pecuniary incentives to invest in finding information in this setting. However, the subordinate's incentives are lower, due to the fact that if both parties are informed, the controlling party overrules the subordinate's proposal and chooses the project

which is best for him or her.

Initially, the principal has decision authority, but before the parties provide effort, the principal can delegate decision authority to the agent. In case of delegation, the agent becomes the controlling party, and the principal becomes the subordinate party. Thus, the principal can implement two different organizational structures, one in which the principal maintains formal decision authority and one in which the agent obtains formal decision authority. From the principal's individual point of view, whether they should keep or delegate decision authority is a matter of two opposing effects: Delegation has a positive motivation effect on the agent, from which the principal benefits, but there is also the negative effect of losing control over project choice.

This setup allows us to study the relationship between the motivation of the agent and the agent's perceived legitimacy of the decision hierarchy because it allows us to exogenously alter factors that impact perceptions of legitimacy of the decision hierarchy while keeping control of the pecuniary incentives that govern behavior.

To this end, we generate two different payoff structures, SYM and ASYM, that vary in the payment to the agent when the principal's preferred project is chosen. Both principal and agent always receive a fixed high payment if their respective preferred project is implemented. The treatment variation is in the payment that the parties receive if the respective other party's preferred project is chosen. In treatment SYM, the payouts are symmetric and both receive the same relatively high payment that is only marginally below what they receive at their own preferred project. There is thus a relatively high degree of interest alignment between the two parties, but it is not perfect. In treatment ASYM, this still holds true for the principal, but the agent receives a significantly smaller payment if the principal's preferred project is implemented. The payout structure thus is asymmetrically adverse for agents.

A very important feature of our design is that the treatment has no impact on pecuniary incentives in the organizational structure in which the principal retains decision authority. To see why this is the case, note that if the principal keeps decision authority, the agent understands that the principal's preferred project will be chosen whenever the principal is successful in finding information. The agent's incentive to invest thus comes from the contingency in which the principal remains uninformed and rubber-stamps the agent's proposal, which is always the agent's preferred project. However, this implies that only the payment of the outside option and the payment at the agent's preferred project matter for the pecuniary incentives of the agent under this organizational structure, and

these are identical across the two treatments.[4]

On the other hand, the perceived legitimacy of the decision hierarchy likely changes by the treatment. Because the principal and agent have initially been randomized in their respective roles and are completely identical in terms of the experimentally induced costs and payoff structure in treatment SYM, delegation of decision authority from the principal to the agent just switches roles between the two otherwise identical parties. Thus, there is no objective reason to perceive one of the organizational structures as more or less legitimate than the other. In treatment ASYM, however, the agent's payment is substantially less aligned with the principal than vice versa. If the agent's preferred project is chosen, the principal only suffers a minor loss, whereas the agent suffers a substantial loss if the principal's preferred project is chosen. Thus, implementing the principal's preferred project causes a welfare loss in this treatment, and social efficiency is higher when the agent's preferred project is implemented.

There are thus multiple reasons why the agent should perceive the organizational structure in which the principal keeps decision authority as less legitimate under ASYM than under SYM. Applying the definition of French and Raven (1959) stated previously, the negative implications for own payoffs and overall welfare should make the agent less likely to accept the organizational structure in which the principal keeps decision authority as "right", both subjectively (from the agent's point of view) as well as objectively (from a organizational efficiency point of view).[5] Similarly, following Deephouse et al. (2017)'s definition, the organizational rule that the principal controls final project selection can be seen as *inappropriate* for the social system. Because organizational structure is the consequence of a deliberate act, the perceived legitimacy of the resulting organizational structure is also related to the perceived fairness of the outcome as well as the procedure that led to the outcome, despite the fact that pecuniary incentives of the agent within the organizational structure in which the principal keeps decision authority remain unaffected.[6] Comparing agent motivation under the organizational structure in which the

[4] In contrast, when the agent is the controlling party, the agent's payment at the principal's preferred project matters for investment incentives, because if the agent's search for information is unsuccessful, the principal's recommendation (for the principal's preferred project) matters with some probability, and thus the agent's payment at the principal's preferred project partially determines the outcome when the agent herself is unsuccessful.

[5] Indeed, decision authority is delegated in the subgame perfect equilibrium of this game, and both parties turn out to be better off when the agent obtains decision authority compared to the situation in which the principal keeps it.

[6] For example, Tyler argues that authorities and institutions are viewed as more legitimate and, therefore, their decisions and rules are more willingly accepted when they exercise authority through procedures that people experience as fair (Tyler, 2001, 2006).

principal retains decision authority across the two treatments thus allows us to assess the relationship between perceived legitimacy and motivation, keeping pecuniary incentives constant. To assess whether the exogenous variation in the payoff structure of the organization in our experiment indeed affects perceived legitimacy of organizational structure, we collect individual perceptions of legitimacy by agents for both treatments.

Our data shows that the treatment variation indeed changes perceptions of legitimacy when the principal keeps decision authority. Under SYM, the vast majority of agents consider it equally legitimate that the principal keeps the decision right or transfers the decision right to the agent. However, under ASYM, we find strongly divergent legitimacy perceptions, and agents find it significantly more legitimate that the agent becomes the controlling party. Thus, our exogenous manipulation of the payoff structure significantly affected legitimacy perceptions of organizational structure across the two treatments.

Further, we find that agents are indeed less motivated to provide effort when principals retain decision rights in ASYM compared to SYM. Despite identical monetary incentives, the effort provision is reduced by approximately 7% in ASYM. We also find that the agents provide less effort relative to the theoretical best response, although statistical significance is weak for this result.

Finally, the effort reductions at the individual level are strongly related to the individual perceptions of legitimacy. Exploiting the within-subject nature of our design, we can show that there is a significant correlation between changes in effort provision and changes in the legitimacy perception at the individual level. Put differently, the strength of the change in perceived legitimacy when the principal keeps decision authority is significantly associated with agents' effort reduction between the SYM and ASYM treatments. Panel regressions further strengthen the statistical support for these relationships.

Our incentivized laboratory experiment sheds light on the relationship between perceived legitimacy and individual motivation within an organization. Most research on the effects of organizational legitimacy has so far focused on more macro-level organizational outcomes, such as organizational survival (Meyer and Rowan, 1977; Singh, 1986; Baum and Oliver, 1991; Ruef and Scott, 1998), the value of organizations at initial public offerings (Cohen and Dean, 2005), or stock market risk (Bansal and Clelland, 2004). Evidence on individual level effects of organizational legitimacy within organizations is much scarcer. Most research in this regard has focused on obedience and rule following (often in legal settings, see Milgram, 1963; Tyler, 2003; Tyler and Blader, 2005; Tyler and Jackson, 2014; Deephouse et al., 2017). In an early experiment, Zucker (1977) showed

how perceptions of legitimacy can strengthen norms and improve their transmissability. More recently, Choi and Shepherd (2005) showed that stakeholder support is more likely when organizations are cognitively more legitimate, Porter, Hollenbeck, Ilgen, Ellis, West and Moon (2003) showed that backing-up behavior is influenced by the legitimacy of the request, and Schnedler and Vadovic (2011) showed that negative reactions to being controlled are reduced when control can be perceived as legitimate, for example because it is aimed at preventing selfishness or theft. We contribute to this literature on individual level effects of organizational legitimacy by assessing the relationship between the perceived legitimacy of a decision hierarchy and motivation within an organization absent any pecuniary motivation effects. More generally, our paper contributes to the recent calls for more experimental research in legitimacy and power research (Deephouse et al., 2017; Haack et al., 2021; Sturm, Herz and Antonakis, 2021).

Our findings also contribute to the broader literature in management and organizational economics that studies the optimal design and evolution of organizational structure theoretically (Cyert and March, 1963; Grossman and Hart, 1986; Hart and Moore, 1990; Aghion and Tirole, 1997; Baker, Gibbons and Murphy, 1999; Garicano, 2000; Dessein, 2002; Aghion, Dewatripont and Rey, 2004), as well as empirically, both in the field and in the laboratory (Fehr et al., 2013; Bartling, Fehr and Herz, 2014; Wu, 2017; Bandiera, Best, Khan and Prat, 2021). While those papers empirically and theoretically demonstrate how the optimal allocation of authority is influenced by interest alignment, knowledge, the need for coordination vs. specialization or intrinsic desires to stay in control, our paper shows how perceived legitimacy of organizational structure constitutes another element that has to be considered when designing optimal decision hierarchies.

Finally, our findings also contribute to the literature that studies motivation within organizations and its determinants. In particular, it has been shown that if a leader exercises authority to control subordinates, non-pecuniary motivation is reduced (Falk and Kosfeld, 2006; Schnedler and Vadovic, 2011; Charness, Cobo-Reyes, Jiménez, Lacomba and Lagos, 2012; Herz and Zihlmann, 2021; De Chiara, Engl, Herz and Manna, 2022). Fehr et al. (2013), Dominguez-Martinez, Sloof and von Siemens (2014) and Sloof and von Siemens (2021) provide initial steps towards a better understanding of the non-pecuniary determinants of motivation when individuals are subjected to authority. Our study highlights the potential importance of perceived legitimacy in this respect.

The paper proceeds as follows: Section 2 presents the experimental design and derives the hypotheses. Section 3 presents our empirical results and section 4 concludes.

2 Experimental Design

The basis of our experiment is the Authority Game, developed by FHW13. The Authority Game is based on the model of formal and real authority developed in Aghion and Tirole (1997). As a consequence, the description of the Authority Game presented below borrows heavily from FHW13.

2.1 The stages of the game

In each period, a principal is matched with an agent and shown a set of 36 cards on her computer screen representing potential projects.[7] One of these cards has a small positive payoff for both players and is placed face up representing the outside option (project O). The remaining thirty-five cards are shuffled face down so that the location of each project is unknown. One of these cards is red and represents the principal's preferred project (project P). A second card is blue and represents the agent's preferred project (project A). The remaining thirty-three cards are white and result in zero payoff for both parties (projects N). The task of each principal-agent pair is to select a project that will be used for payment. The payoffs ensure that individuals prefer to implement the outside option in comparison to picking a project at random.

The game is played in six stages, which are illustrated in Figure 1 and discussed here. Initially, principals are given the decision right which corresponds to being able to select a project at the end of the round in stage 6.

In the first stage of the game, each principal is asked if they wish to keep the decision right or to transfer it to the agent. Giving the right to the agent is binding and irreversible.

In the second stage, participants choose their effort levels simultaneously and in private.[8] Both participants select their effort in increments of 5 from $\{0, 5, \ldots, 95, 100\}$. This effort corresponds to the probability that the participant will learn the location of all projects. Effort has an associated cost generated via a quadratic cost function which is constant across treatments and player types:

$$g_P(E) = 25\left(\frac{E}{100}\right)^2, \quad g_A(e) = 25\left(\frac{e}{100}\right)^2. \tag{1}$$

[7] Participants are randomly assigned the role of a principal or an agent and remain in this role throughout the experiment. In the instructions, they were neutrally referred to as participant A and participant B.

[8] In the experiment, we referred neutrally to effort and described it as "search intensity".

Participants are presented with information on the cost of effort in a table where each possible effort and its associated cost are displayed. The effort levels of the agents are recorded using the strategy method, which elicits an effort level for both cases, when the principals retain decision rights and when these rights are delegated.

In the third stage, both principals and agents are asked about their beliefs regarding the effort of the other party for the case in which decision rights are retained and for the case in which they are delegated. To prevent hedging, no incentives are used in the elicitation of beliefs.

In the fourth stage, the agent is informed about whether the principal kept or transferred the decision right, and the respective effort choice is implemented. In the following, the party that has (obtained) the decision right is defined as the controlling party, and the party without the decision right is defined as the subordinate party. Participants then either learn about the project payoffs or remain uninformed, which is determined by a random process based on their chosen effort for the implemented authority structure. The effort of the other party is not revealed, nor is information indicating the success or failure of the other party's effort. All information gained at this stage is private.

In the fifth stage, the subordinate is given the ability to recommend a project to the controlling party. This is accomplished by visibly marking a single project on the computer screen, which can include the outside option. The recommended project is shown to the controlling party.

In the final stage, after seeing the recommended project of the subordinate and the information about the projects that result from own effort, the controlling party selects a project for implementation. Payment for the round is based on the selected project and the costs of effort of each participant.

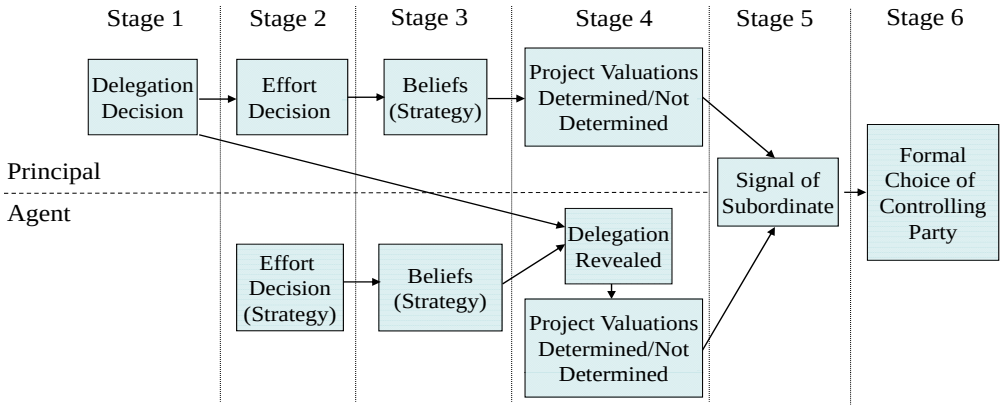


Figure 1: The six stages in the Authority Game

2.2 Theoretical predictions

The Authority Game allows us to derive precise theoretical predictions. Recall that there are four types of projects, P, A, N and O, the payoffs of which to the principal (P_i) and to the agent (A_i) can be ordered as follows: $P_P > P_A > P_O > P_N$ and $A_A > A_P > A_O > A_N$. The potential values of all projects are known, but all projects initially look identical ex ante (except for the outside option). Information must be collected in order to differentiate between them, at the costs specified in equation 1.

We can solve for the subgame perfect equilibria of this game under the assumption that the principal and agent are risk neutral. For a given effort level and implemented project k, the principal's utility is $P_k - g_P(E)$, and the agent's utility is $A_k - g_A(e)$.

For each party, subordinate and controlling party, the expected value for selecting a project at random is less than their respective outside option. Thus, an uninformed subordinate prefers to recommend the outside option rather than a random project. Similarly, an uninformed controlling party never unilaterally chooses to undertake a project other than the outside option.

Given that $A_A > A_P > A_O$, and $P_P > P_A > P_O$, the subordinate always has an incentive to recommend their preferred project to the controlling party. The controlling party has an incentive to follow this recommendation if uninformed and to overrule the project and implement their preferred project if informed. It follows that if the principal keeps control, the utilities of a risk-neutral principal and agent are

$$\Pi_P = E \cdot \hat{P}_P + (1 - E) \cdot e \cdot \hat{P}_A + P_O - g_P(E), \tag{2}$$

$$\Pi_A = E \cdot \hat{A}_P + (1 - E) \cdot e \cdot \hat{A}_A + A_O - g_A(e), \tag{3}$$

where

$$\hat{P}_i = P_i - P_O, \ \textit{for } i \in \{1, 2\}, \tag{4}$$

$$\hat{A}_i = A_i - A_O, \ \textit{for } i \in \{1, 2\}. \tag{5}$$

If the agent receives control, the utility of the principal and agent are

$$\Pi_P^d = (1 - e) \cdot E \cdot \hat{P}_P + e \cdot \hat{P}_A + P_O - g_P(E), \tag{6}$$

$$\Pi_A^d = (1 - e) \cdot E \cdot \hat{A}_P + e \cdot \hat{A}_A + A_O - g_A(e), \tag{7}$$

where the superscript d denotes the expected payoffs in the delegation case.

From Equations 2 and 3, the reaction functions if the principal keeps control are the solutions to the following first order conditions:

$$\hat{P}_P - e \cdot \hat{P}_A = g'_P(E), \tag{8}$$

$$(1 - E) \cdot \hat{A}_A = g'_A(e). \tag{9}$$

If the agent receives control, the reaction functions of the principal and agent are the solutions to:

$$(1 - e) \cdot \hat{P}_P = g'_P(E), \tag{10}$$

$$\hat{A}_A - E \cdot \hat{A}_P = g'_A(e), \tag{11}$$

The subgame perfect equilibria of both the subgame in which the principal keeps and the subgame in which the principal delegates control follow directly from these reaction functions.

2.3 Treatments

Our two treatments, SYM and ASYM, vary in the amount that the agent is paid for the selection of the principal's preferred project P. Table 1 summarizes the value of the projects in these two treatments. In both treatments, each party earns 40 points for the selection of their preferred project and a smaller amount for the other party's preferred project. In the SYM treatment, the payoffs from the other party's preferred project are symmetric and equal to 35 for the principal and agent. In the ASYM treatment, the payoffs from the other party's preferred project are asymmetric, with a payoff of 35 for the principal but only 20 for the agent.

Table 1: Overview of Project Payoffs

	Project P		**Project A**		**Outside**	**Other**
	Principal	Agent	Principal	Agent	**Option**	**Projects**
SYM	40	35	35	40	10	0
ASYM	40	20	35	40	10	0

Table 2 shows the predicted Nash equilibrium effort levels and expected profits for each treatment and both authority structures. As can be seen, the principal should optimally

delegate authority in both treatments because expected profits are higher in the case of delegation (SYM: $\Pi_P = 23.3$ vs. $\Pi_P^d = 24.0$; ASYM: $\Pi_P = 23.3$ vs. $\Pi_P^d = 25.6$).

Table 2: Predicted Nash effort levels and expected profits

	Principal has control				**Agent has control**				**Dele-**
	E^{NE}	e^{NE}	Π_P	Π_A	$E^{d^{NE}}$	$e^{d^{NE}}$	Π_P^d	Π_A^d	**gation?**
SYM	45	35	23.3	24.0	35	45	24.0	23.3	Yes
ASYM	45	35	23.3	17.2	25	55	25.6	20.1	Yes

Note: Nash equilibrium predictions for the principal's effort are denoted by E^{NE} in case of keeping authority and $E^{d^{NE}}$ in case of delegating the decision right to the agent. Nash equilibrium predictions for the agent's effort are denoted by e^{NE} in case the principal keeps the decision right and $e^{d^{NE}}$ in case the principal delegated the right to the agent. Π_P, and Π_P^d denote expected equilibrium profits for the principal depending on the decision right allocation. Π_A and Π_A^d denote expected equilibrium profits for the agent depending on the decision right allocation.

The main focus of our analysis will be on the effort provision of agents in the authority structure in which the principal retains control.

The key feature of our experimental design is, as table 2 shows, that the predicted effort levels of principal and agent under principal control are identical across the two treatments.[9] The reason for this can be seen in the first-order conditions derived above. The payoff to the agent when the principal's preferred project is chosen, $\hat{A}_P$, is the only parameter that varies between the two treatments. This parameter does not impact either of the two first-order conditions when the principal is the controlling party. It only affects incentives and subgame perfect equilibria in the delegation subgame. Thus, monetary incentives and in turn point predictions for agents' effort are identical across treatments when they are in the role of the subordinate.

2.4 Hypotheses

The asymmetry in payoffs in SYM and ASYM forms the basis of our legitimacy hypothesis: Under SYM, parties are fully symmetric and thus no party can derive a claim to be the legitimate holder of authority purely based on the game characteristics. In terms of French and Raven (1959), one cannot claim that one authority structure represents a more appropriate social structure that can be unambiguously accepted as "right". In contrast, agent control represents the efficient allocation of decision authority under ASYM.

[9]While the point predictions in table 2 are derived under the assumption of risk neutrality; it is important to point out that this assumption is inconsequential for our main hypotheses. The key insight that agent incentives are unchanged follows from the agent's first-order condition in equation 9, which can be written with more general utility functions and still remains constant across the two treatments.

Delegation raises expected profits of both agent and principal, implying that both the agent and a neutral observer would likely concur that agent control represents the "right" social structure for the mini-organization under ASYM.

Thus, the variation in the game structure is hypothesized to exogenously vary agents' perceived legitimacy of the organizational structure when the principal does not delegate. These considerations lead to our first hypothesis, which hypothesizes that the two conditions exogenously vary perceived legitimacy:

Hypothesis 1. *When project payoffs are asymmetric and adverse to agents (ASYM), agents perceive the principal retaining the decision right as less legitimate, compared to when project payoffs are symmetric (SYM).*

To assess this hypothesis directly, we elicit agents' perceptions of legitimacy over authority structure. Specifically, at the end of the experiment, agents were asked the following question: "Who should legitimately have the decision right?", which was answered on a 11-point Likert scale, where 0 meant "Principal", and 10 meant "Agent".[10]

If perceptions of legitimacy indeed affect motivation, then we should in turn observe a difference in agent effort under principal control between the two conditions.

Hypothesis 2. *When the principal does not delegate decision authority, agents provide less effort in a situation where they perceive the allocation of the decision right to be less legitimate (ASYM), compared to a situation in which they perceive the allocation as more legitimate (SYM).*

If perceptions of legitimacy are related to agent motivation, principals may anticipate such an effect and adjust their own effort provision, which in turn may be anticipated by agents. Therefore, agents' effort reduction could be simply strategic: because agents believe that principals will provide more effort in ASYM, the best response of agents is to reduce their effort because efforts are strategic substitutes. We therefore assess first whether agents' belief about principal effort is indeed different in ASYM than in SYM. As an additional assessment of the effects of perceptions of legitimacy on agent motivation, we assess the difference in actual effort provision to the best-response, based on agents' beliefs. If legitimacy indeed affects motivation, implying that agents effort reduction is not simply a strategic behavior, then agent effort relative to the best-response should be lower under principal control in ASYM:

[10]Recall that principal and agent were neutrally referred to as participant A and B.

Hypothesis 3. *When the principal retains the decision right, agents provide a lower effort relative to the theoretical best-response to their beliefs in a situation in which they perceive the allocation of the decision right to be less legitimate (ASYM) compared to a situation in which they perceive the allocation as more legitimate (SYM).*

2.5 Procedures

The experimental design and hypotheses were pre-registered prior to data collection on aspredicted.org, trial #80680. The Authority Game was computerized using the software oTree (Chen, Schonger and Wickens, 2016) and conducted at FriLab, the laboratory of the University of Fribourg, Switzerland. Sessions took place in November and December 2021 and in February 2022. The conditions SYM and ASYM were administrated in a within-subject design. The participants thus played first one condition and then the other. The order of the two conditions was randomized within session, allowing us to control for order effects. Each condition was played for five rounds. Thus, the experiment lasted a total of 10 rounds. Before playing SYM and ASYM, participants went through a three-period single-player Authority Game in order to familiarize themselves with the software, the game, and the effort-cost schedule.

The participant pool is composed of students of the bilingual University of Fribourg, Switzerland, which is why the experiment was conducted in German or French.[11] 116 participants participated in a French session and 86 participants participated in German sessions.[12] In total, 202 participants participated in the experiment, divided into 13 sessions. Thus, an average session featured around 16 participants. A session lasted on average 75 minutes. Participants received a show-up fee of CHF 10 and a variable part depending on their choices in the game. The variable payoff amounted on average to approximately CHF 33, yielding an average total payout of approximately CHF 43. This translates into an average hourly pay of approximately CHF 34 (approx. $38 or €35 as of 27 April 2023).

[11] The instructions and the computer program were carefully translated by bilingual staff at the university.

[12] Note that some participants may speak both languages. As a result, the language of the experimental session does not need to—but in most cases very likely does —align with participants' mother tongue.

3 Results

3.1 Agents' perception of legitimacy

Hypothesis 1 examines whether agents perceive the principal's retention of decision authority as more legitimate when project payoffs are symmetric (SYM) rather than asymmetric (ASYM). Figure 2 provides strong support for Hypothesis 1. When project payoffs are symmetric (SYM), 85.15% of agents express indifference as to whether the principal or the agent should have the decision right, and only 4.95% of agents perceive it as less legitimate for the principal to have the decision right.

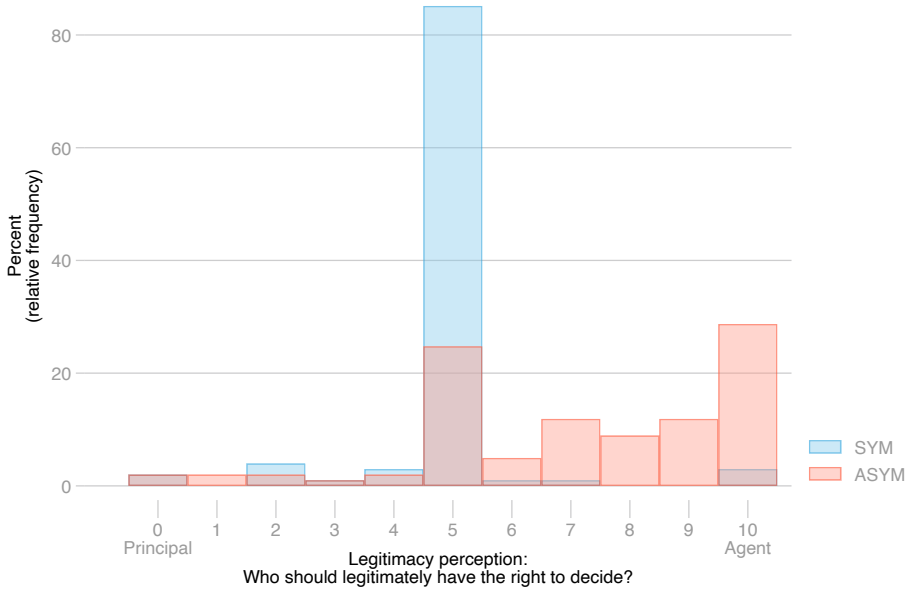
In sharp contrast, in ASYM, a large majority of agents (66.34%) consider it less legitimate for the principal to retain decision authority and believe that it should be delegated to them. The proportion of indifferent agents decreases to 24.75% in ASYM, compared to 85.15% in SYM. Therefore, agents perceive the allocation of the decision right to the principal as significantly less legitimate when project payoffs are asymmetrically in favor of the principal, confirming our pre-registered Hypothesis 1 (paired t test: $p < .001$, Wilcoxon signed-rank: $p < .001$).[13]

Result 1. *Agents consider it significantly less legitimate if the principal holds decision authority in treatment ASYM compared to treatment SYM. Thus, the payoff structure significantly affects the legitimacy perception of decision hierarchy.*

The within-subject structure of our design also allows us to look at the individual level. We find that the majority of agents (65.35%) indeed perceive the organizational structure in which the principal retains decision authority as less legitimate when project payoffs are asymmetric, but there are also 34.65% of agents who do not. Of these agents, 8.91% perceive the principal's decision authority to be more legitimate than in SYM, while 25.74% consider the principal's decision authority as equally legitimate in SYM and ASYM.

[13]Since the experiment was conducted at the bilingual University of ANONYMOUS, we also test our results for native language robustness. We find no difference in perceived legitimacy among French and German native speakers (t test: $p = .517$). For all results reported subsequently, we control for language in the Appendix A.2. We never find the language dummy or the interaction term to be significant. We therefore conclude that our effects are independent of native language.

Figure 2: The perception of legitimacy



Note: The graph displays a histogram of how legitimate the agents perceive the allocation of decision authority. On a 11-point Likert scale, agents were requested to state who they think should legitimately have the right to decide, with the midpoint of the scale, i.e., 5, representing indifference. The two groups significantly differ among their mean and median (paired t test: $p < .001$, Wilcoxon signed-rank: $p < .001$) as well as their distribution (Kolmogorov-Smirnov: $p < .001$).

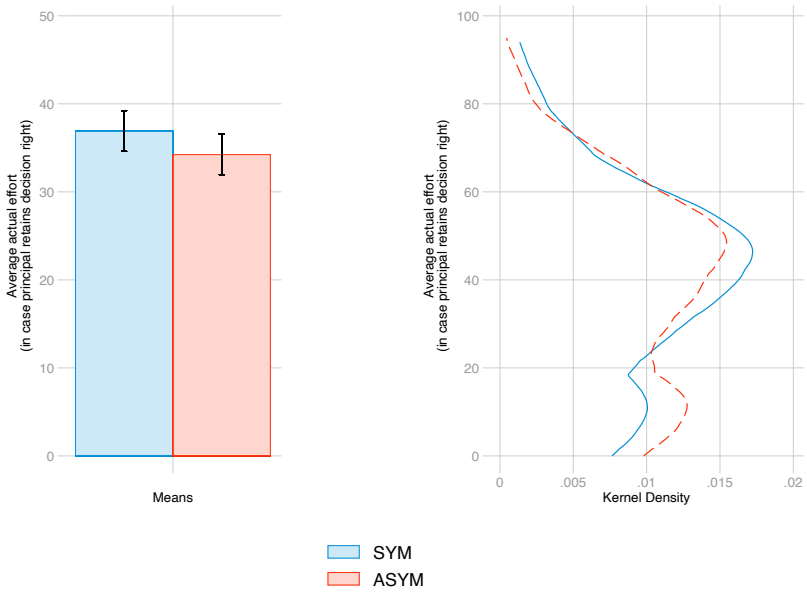
3.2 Agent effort in SYM and ASYM

The left panel of Figure 3 shows the mean of the agents' average effort in the five periods in case the principal retains the decision right. In treatment SYM, agents provide on average an effort of 36.91 when principals do not delegate. In treatment ASYM, agents exert on average an effort of 34.27. Therefore, in line with our hypothesis, agents reduce effort by 2.64 or approximately 7% in ASYM. However, this difference is only marginally significant (paired t test: $p = .086$, Wilcoxon signed-rank: $p = .067$).[14]

The full distribution of agents' effort is displayed in the right panel of Figure 3, in which the kernel densities of the two groups are plotted. We observe that the two distributions significantly differ (Kolmogorov-Smirnov: $p < .001$), and that there is more mass around lower effort levels and less mass at medium to high effort levels in treatment ASYM compared to treatment SYM, consistent with agents' average effort being lower in

[14]For the analysis, we average effort across the five periods by each participant and conduct paired tests. Using the panel structure of the dataset and clustering standard errors at the matching group level does not lead to substantially different p values than the paired tests. For example, for the paired t test reported in Figure 3, a random effect panel regression with clustered standard errors reveals a p value of $p = .084$, compared to the paired t test of $p = .086$. We report these analyses in Appendix A.1.

Figure 3: Exerted effort in case of no delegation



Note: The left panel of the graph displays the means of agents' average effort over the five periods in case the principal retains decision authority for each treatment. Whiskers indicate standard errors of the mean. The right panel displays by treatment the kernel density estimates of agents' average effort over the five periods for each treatment. Epanechnikov kernel with the optimal bandwidth is used. The two groups significantly differ among their mean and median (Paired t test: $p = .086$, Wilcoxon signed-rank: $p = .067$) as well as their distribution (Kolmogorov-Smirnov: $p < .001$).

treatment ASYM.

We can gain further insight regarding Hypothesis 2 using existing data from the experiments in FHW13, in particular data from their HIGH and PHIGH treatments which are payoff equivalent to our SYM and ASYM treatments (for clarity, we will refer to PHIGH as ASYM and HIGH as SYM). The FHW13 dataset contains effort choices from 49 agent observations in SYM and 30 agent observations in ASYM. Their experiment differed from ours in that treatments were between subjects, and each subject participated in 10 rounds of the same treatment. In the symmetric SYM treatment, agents exert an average effort of 26.43 when principals did not delegate. In the asymmetric ASYM treatment, agents exert an average effort of 17.25, which is a reduction of 9.18 or approximately 35% compared to the SYM condition. While magnitudes are quite different across the two different subject pools, the effects in the FHW13 dataset go in the same direction and are economically more pronounced, but are also only marginally significant (two-sample t test: $p = .054$, Mann-Whitney-U: $p = .085$).

Result 2. *Agents reduce their effort in treatment ASYM, in which they perceive the decision authority of the principal as less legitimate. The reduction is statistically only marginally significant.*

3.3 Agents' deviation from the best response to their beliefs

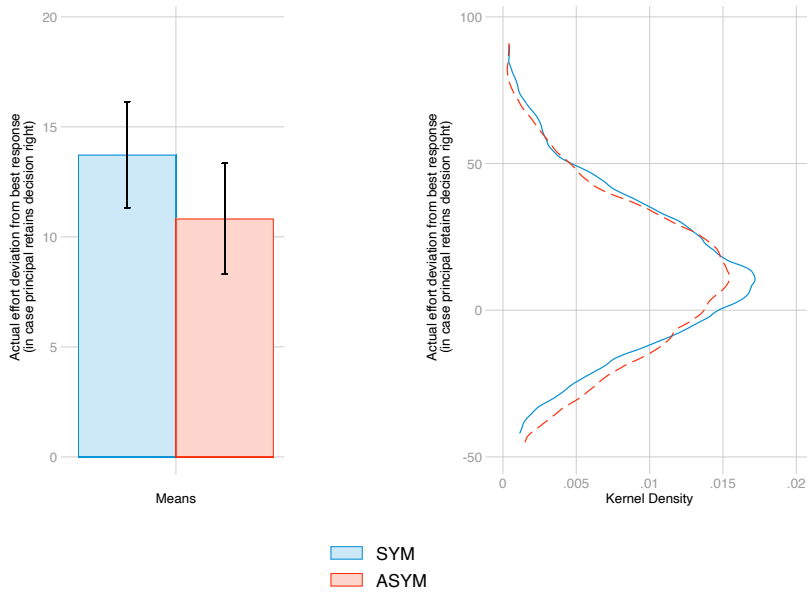
Hypothesis 3 argues that effort reductions may be caused by changes in beliefs rather than directly by motivation. To assess the extent to which behavioral changes across the two treatments are driven by strategic responses to changed beliefs versus motivation, we now integrate the data on beliefs into the analysis.

We find that agents believe that principals will exert on average an effort of 61, regardless of the treatment condition (61.37 in SYM and 60.93 in ASYM, paired t test: $p = .738$, Wilcoxon signed-rank: $p = .576$). The similarity in average beliefs already suggests that agents reduce their effort not due to a strategic reaction caused by different beliefs in the two treatments, but rather due to motivational effects.

Figure 4 substantiates this intuition and plots the difference of agents' actual exerted effort against the theoretical best-response. We find a similar pattern as with actual effort. In SYM, agents overprovide effort relative to their best-response by 13.73, while in ASYM, agents only overprovide effort by 10.83, a reduction of 2.9 points (paired t test: $p = .108$, Wilcoxon signed-rank: $p = .173$). However, integrating the beliefs increases the

noise in the data and thus the statistical significance of the observed difference further decreases.

Figure 4: Average deviation of agents' effort provision from the best response to their beliefs



Note: The left panel of the graph displays by treatment the means of the agent's average effort deviation over the five periods to the best response to their beliefs, for the case where the principal retains decision authority. Whiskers indicate standard errors of the mean. The right panel displays by treatment the kernel density estimates of agents' average effort deviation to the best response over the five periods. Epanechnikov kernel with the optimal bandwidth is used. The two groups do not differ significantly between their mean and median (Paired t test: $p = .108$, Wilcoxon signed-rank: $p = .174$) but regarding their distribution (Kolmogorov-Smirnov: $p < .001$).

We can again reassess the effect of organizational structure on beliefs and agent's best response to beliefs using the data from FHW13. In their data, agents believe the principals will provide more effort in ASYM than in SYM. Specifically, agents believe that principals will provide an average effort of 59.03 in SYM, but 69.32 in ASYM, which is a statistically significant difference (two-sample t test: $p < .001$). When controlling for the agents' beliefs about the principals' effort to assess potential effects on the best response to beliefs, agents provide 25% less effort under ASYM than under SYM, and the difference is highly statistically significant (two-sample t test: $p = .009$; Mann-Whitney-U: $p = .010$).

Result 3. *Agents lower their effort in treatment ASYM relative to SYM also relative to the theoretical best-response given their beliefs. However, the reduction is statistically insignificant in our data.*

3.4 The effect of perceived legitimacy on effort

Results 2 and 3 provide suggestive evidence that the agents indeed reduce their effort in treatment ASYM compared SYM. However, statistical significance is weak and the effect is also economically not particularly large. Therefore, one may conclude that the reduction in the perceived legitimacy of decision authority does not strongly impact agent motivation.

However, recall that not all agents react to the treatment in a way that leads to a reduction in the perceived legitimacy of decision authority in treatment ASYM. Thus, the effect of perceived legitimacy on effort could be diluted when considering the intent-to-treat effect only: agents who perceive both conditions as similarly legitimate ought not to adapt their effort—these agents do not react to the treatment assignment by changing their perception of legitimacy, and, in turn, ought not to react with a change in effort provision.

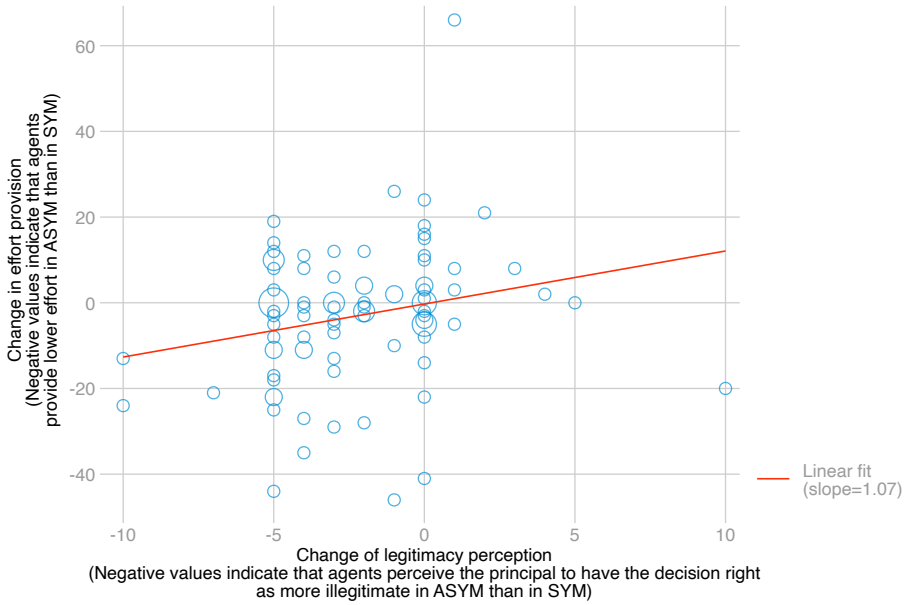
We thus now turn to an analysis of the association between perceived legitimacy of organizational structure and effort. Because treatment assignment is within-subject in our experiment, our data allows us to assess this association directly at the individual level. To this end, we compute the difference in perceived legitimacy of decision authority between treatments SYM and ASYM, as well as the change in effort provision between SYM to ASYM. If perceived legitimacy of decision authority translates into behavior, we would expect a significant correlation between these two variables.

Figure 5 displays a scatter plot of these data, along with a linear regression line. It illustrates that there is indeed a positive relationship between the two variables, indicating that a stronger shift in legitimacy perception is associated with a more substantial change in effort: The less legitimate the agents perceive the decision authority of the principal in ASYM relative to SYM, the stronger is the reduction in effort. The correlation is considerable and statistically significant (Pearson's $r = .20, p = .042$; Spearman's $\rho = .22, p = .025$).[15]

We can also exploit the panel structure of our data set to run regression analysis, allowing for more power and to control for fixed effects. Panel A in Table 3 displays the results. Model (1) is a random-effects estimation and shows that perceived illegitimacy of power is highly significantly associated with a reduction in agents' effort: a one-point

[15] Order effects do not play a role: the relationship between perceived legitimacy and effort provision does not depend on whether participants first played SYM or ASYM (SYM first: $\rho = .2042$, ASYM first: $\rho = .2024$).

Figure 5: The change in legitimacy perception predicts the change in provided effort



Note: The scatter plots the change in effort provision between SYM and ASYM against the change in perceived legitimacy of decision authority. The solid red line represents fitted values from a simple linear regression.

increase in the 11-point Likert scale is associated with an effort reduction of 1.11 (or 2.6%), which translates to a standardized effect size of 0.10. Model (2) to (4) include various fixed-effects controls, but the coefficient estimates remains remarkably stable.[16]

These results provide evidence that the agents' perception of the legitimacy of organizational structure is indeed highly predictive of reductions in effort, despite identical pecuniary incentives.

Finally, we again extend our analysis of the association between perceived legitimacy of decision authority and effort provision by additionally controlling for agents' beliefs about principal effort provision.

Panel B in Table 3 provides results from panel regressions with random effects and fixed effects, additionally controlling for agents' beliefs. We observe that the relationship between legitimacy perception and effort grows even stronger and remains statistically significant. This implies that the reduction in effort by agents who perceive the principal's

[16]The fixed-effects estimator controls for potential individual-specific, time-invariant characteristics that are correlated with the predictor, in our case the perception of illegitimacy. In contrast, the random-effects estimator assumes that there are no individual time-invariant characteristics that are correlated with perceived illegitimacy. A Wu-Hausman tests fails to reject the null ($p = .829$) and thus, both estimators are consistent but random-effects is also efficient. This is also visible from the coefficients, which do not vary between the random-effects estimator in model (1) and the fixed-effects estimator in model (4), suggesting that there are no individual-specific effects that are correlated with perceived illegitimacy.

Table 3: Perceived illegitimacy of power decreases agents' effort

	Agents' effort			
	(1)	(2)	(3)	(4)
	Random Effects			*Fixed Effects*
Panel A				
Illegitimacy perception	-1.11***	-1.11***	-1.14***	-1.11***
	(0.37)	(0.37)	(0.38)	(0.38)
Constant	42.33***	43.62***	32.89***	43.57***
	(3.18)	(3.02)	(2.42)	(2.38)
Panel B				
Illegitimacy perception	-1.13***	-1.13***	-1.15***	-1.11***
	(0.35)	(0.35)	(0.36)	(0.36)
A belief about P effort	0.16***	0.15***	0.16***	0.17***
	(0.06)	(0.06)	(0.06)	(0.06)
Constant	32.88***	34.25***	22.12***	32.94***
	(4.52)	(4.60)	(5.30)	(4.85)
Time FE		✓	✓	✓
Matching group FE			✓	✓
Individual FE				✓
Order FE				✓
N	1010	1010	1010	1010
N Matching Groups	22	22	22	22
N Panels	101	101	101	101

Note: The table displays linear panel regression results by regressing agents' actual effort on their legitimacy perception in Panel A, and regressing agents' actual effort on their legitimacy perception, conditional on their belief about principal's effort, in Panel B. Robust standard errors, clustered on matching group level, are reported in parentheses. Model (1) - (3) report the results of a random effects estimator. Model (4) reports the results of a fixed effects estimator. A Hausman test fails to reject the hypothesis that individual characteristics are correlated with legitimacy perception (Panel A: $p = .829$; Panel B: $p = .147$), suggesting that individual-specific effects are random and not fixed. Time FE means that we control for round fixed effects, matching group FE controls for fixed effects within the matching group a participants was part of, and order FE controls for order effects of which condition was played first.

decision authority as less legitimate is not driven by those agents' beliefs alone.

Result 4. *Reductions in agents' perceived legitimacy of organizational structure are significantly associated with reductions in agent's effort provision, both in absolute terms and when controlling for beliefs.*

4 Discussion and Limitations

A natural limitation of our approach is that we cannot claim a direct *causal* relationship between perception of legitimacy and the provision of effort. While such a causal relationship is, of course, a possibility, it is also possible that other factors codetermine both individual motivation and legitimacy perception. The set of potential channels codetermining both outcomes is considerable. For example, efficiency concerns, social comparisons, or procedural fairness concerns could simultaneously impact perceived legitimacy and motivation. What our experiment provides is exogenous variation in the organizational structure, fully controlling for monetary incentive effects. While incentives can thus be ruled out as a causal determinant of the observed effects, the ultimate channel remains causally unidentified.

Furthermore, our experiment was obviously fairly abstract, focused on a mini-organization consisting only of one principal and one agent, and was conducted with students in an experimental laboratory. While these factors are fundamentally helpful in addressing our research question by allowing us to exogenously vary organizational structure while holding monetary incentives constant and simultaneously observing legitimacy perceptions, effort choices, and beliefs, they also pose a significant limitation with respect to the external validity of our results. Thus, future field research would be useful to complement our laboratory results.

5 Conclusion

This paper provides evidence that the perceived legitimacy of an organizational structure is causally affected by factors beyond pecuniary incentives. Legitimacy is thus not solely determined by "rational-legal" considerations (Weber, 1978), and goes beyond "*the self-interested calculations of an organization's most immediate audiences*" (Suchman, 1995). Furthermore, we show that changes in perceived legitimacy are significantly associated

with changes in motivation. In particular, a reduction in the individually perceived legitimacy of the organizational structure is significantly associated with a reduction in the effort provided by agents in our experiment, both in terms of absolute effort provision and in terms of best response to beliefs.

Our results are consistent with the idea that "legitimacy provides a "reservoir of support" for institutions and authorities, something besides immediate self-interest, which shapes reactions to their policies" (Tyler, 2006, p.381, citing Weatherford (1992)), and suggests that organizational legitimacy is not only relevant for organizations in their interactions with the world outside of the organization, but also matters at the inside.

At the same time, it remains unclear whether legitimacy perceptions and motivation effects can be treated as independent, or whether they are outcomes that are codetermined by other factors. In most definitions of legitimacy, legitimacy is "derived from" other sources, such as rational-legal considerations, moral considerations, or self-interested calculations. Separating a potential mediating role of legitimacy on motivation from potential direct causal effects of these sources is only possible if legitimacy perceptions could be directly and exogenously manipulated, which seems non-trivial and perhaps impossible given existing constructs of legitimacy. In that sense, we see our approach of ruling out an obvious and crucial source with an impact on both motivation and legitimacy as an important step towards a better understanding of the relationship between organizational legitimacy and motivation within the organization. Future research could extend this approach to other potential sources of legitimacy perception, such as expertise, history, legacy, or personality. A more in-depth study of how legitimacy perceptions within organizations and with respect to organizational structure are formed at the individual level is also an interesting avenue for future research.

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For online publication: Appendix

A Further Results

A.1 Treatment effects assessed with panel regressions

Table A.1: Agent effort and deviation from best effort in SYM and ASYM, panel regression

	(1)	(2)	(3)	(4)
	Random Effects			*Fixed Effects*
Panel A	*Agents' effort*			
ASYM	-2.64*	-2.64*	-2.64*	-2.64*
Constant	36.91***	38.20***	27.11***	38.20***
	(2.31)	(2.28)	(1.39)	(1.37)
Panel B	*Deviation of agents' effort from best response to beliefs*			
ASYM	-2.91	-2.91	-2.91	-2.91
	(1.89)	(1.89)	(1.91)	(1.89)
Constant	13.74***	15.44***	8.68***	15.44***
	(2.42)	(2.46)	(1.59)	(1.58)
Time FE		✓	✓	✓
Matching group FE			✓	✓
Individual FE				✓
Order FE				✓
N	1010	1010	1010	1010
N Matching Groups	22	22	22	22
N Panels	101	101	101	101

Note: The table displays linear panel regression results by regressing agents' actual effort on the treatment condition in Panel A, and regressing agents' deviation of actual effort from the best response to their beliefs. Robust standard errors, clustered on matching group level, are reported in parentheses. Model (1) - (3) report the results of a random effects estimator. Model (4) reports the results of a fixed effects estimator. A Hausman test fails to reject the hypothesis that individual characteristics are correlated with the treatment (Panel A: $p = 1$; Panel B: $p = 1$), suggesting that individual-specific effects are random and not fixed. Time FE means that we control for round fixed effects, matching group FE controls for fixed effects within the matching group a participants was part of, and order FE controls for order effects of which condition was played first.

A.2 Language

Table A.2: Agent effort and deviation from best effort in SYM and ASYM, robustness to language

	(1)	(2)	(3)	(4)
	Random Effects			
Panel A	*Agents' effort*			
ASYM	-2.64*	-2.86	-2.64*	-2.86
	(1.53)	(2.26)	(1.53)	(2.27)
German	-5.66	-5.92	-5.66	-5.92
	(4.73)	(4.55)	(4.74)	(4.56)
ASYM × German		0.51		0.51
		(2.96)		(2.97)
Constant	39.32***	39.43***	40.61***	40.72***
	(2.58)	(2.68)	(2.84)	(2.90)
Panel B	*Deviation of agents' effort from best response to beliefs*			
ASYM	-2.91	-4.13	-2.91	-4.13
	(1.89)	(2.78)	(1.89)	(2.78)
German	-4.61	-6.04	-4.61	-6.04
	(4.98)	(4.85)	(4.99)	(4.86)
ASYM × German		2.87		2.87
		(3.63)		(3.64)
Constant	15.70***	16.31***	17.40***	18.01***
	(2.80)	(2.82)	(2.99)	(3.00)
Time FE			✓	✓
N	1010	1010	1010	1010
N Matching Groups	22	22	22	22
N Panels	101	101	101	101

Note: The table displays linear panel regression results by regressing agents' actual effort on the treatment condition in Panel A, and regressing agents' deviation of actual effort from the best response to their beliefs. Model (1) and (3) control for the native language of the participants, model (2) and (4) test for heterogeneous treatment effects. Robust standard errors, clustered on matching group level, are reported in parentheses. All models report the results of a random effects estimator. A Hausman test fails to reject the hypothesis that individual characteristics are correlated with the treatment (Panel A: $p = 1$; Panel B: $p = 1$) for model (1), suggesting that individual-specific effects are random and not fixed. Time FE means that we control for round fixed effects.

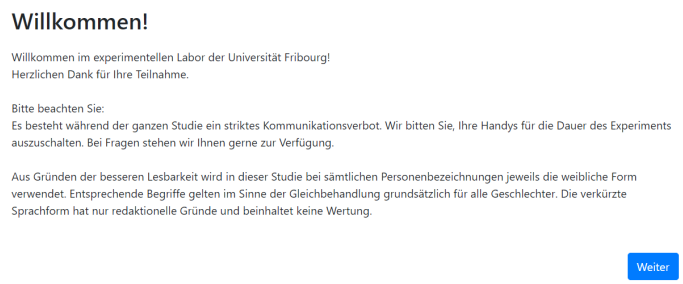
Table A.3: Perceived illegitimacy of power decreases agents' effort

	Agents' effort			
	(1)	(2)	(3)	(4)
	Random Effects			
Panel A				
Illegitimacy perception	-1.12***	-1.06*	-1.12***	-1.06*
	(0.37)	(0.55)	(0.37)	(0.55)
German	-5.87	-4.96	-5.87	-4.96
	(4.73)	(6.09)	(4.74)	(6.10)
German × Illegitimacy perception		-0.15		-0.15
		(0.66)		(0.66)
Constant	44.85***	44.50***	46.14***	45.79***
	(3.53)	(4.36)	(3.60)	(4.29)
Panel B				
Illegitimacy perception	-1.14***	-1.03**	-1.14***	-1.03**
	(0.35)	(0.51)	(0.35)	(0.51)
A belief about P effort	0.16***	0.16***	0.15***	0.16***
	(0.06)	(0.06)	(0.06)	(0.06)
German	-6.15	-4.43	-6.15	-4.43
	(4.82)	(6.10)	(4.83)	(6.11)
German × Illegitimacy perception		-0.29		-0.29
		(0.63)		(0.63)
Constant	35.48***	34.74***	36.85***	36.12***
	(5.14)	(5.67)	(5.38)	(5.76)
Time FE			✓	✓
N	1010	1010	1010	1010
N Matching Groups	22	22	22	22
N Panels	101	101	101	101

Note: The table displays linear panel regression results by regressing agents' actual effort on their legitimacy perception in Panel A, and regressing agents' actual effort on their legitimacy perception, conditional on their belief about principal's effort, in Panel B. Robust standard errors, clustered on matching group level, are reported in parentheses. All models report the results of a random effects estimator. A Hausman test fails to reject the hypothesis that individual characteristics are correlated with legitimacy perception (Panel A: $p = .763$; Panel B: $p = .165$) for model (1), suggesting that individual-specific effects are random and not fixed. Time FE means that we control for round fixed effects.

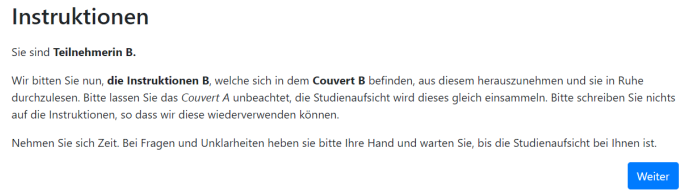
B Instructions for Agents

Figure 1: Screen 1



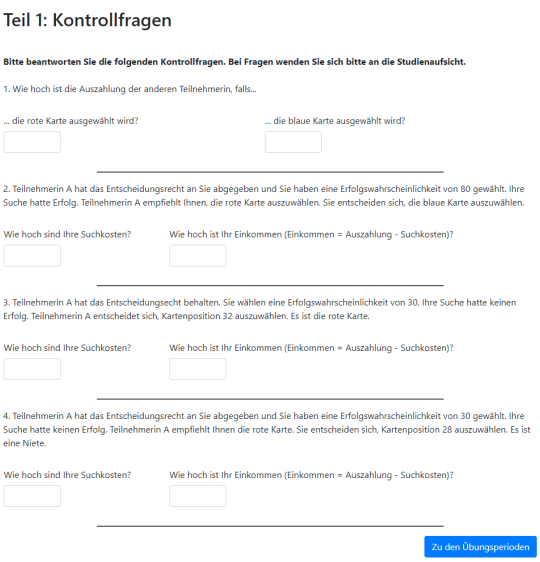
Translation: **Welcome!** Welcome to the experimental laboratory of the University of Fribourg! Thank you very much for your participation. Please note: There is a strict communication ban throughout the study. We ask you to turn off your cell phones for the duration of the experiment. If you have any questions, please do not hesitate to contact us. For reasons of better readability, the female form is used in this study for all references to persons. In the interest of equal treatment, the corresponding terms apply to all genders. The abbreviated form of language is for editorial reasons only and does not imply any valuation.

Figure 2: Screen 2



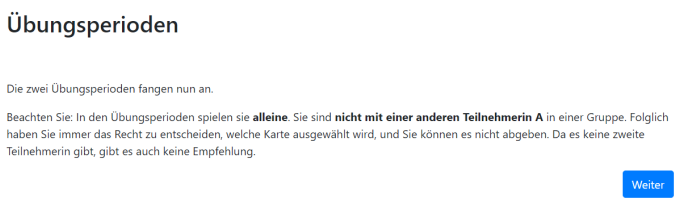
Translation: **Instructions.** You are participant B. We now ask you to take the instructions B, which are in the envelope B, out of it and read them through at your leisure. Please leave the envelope A unattended, the study supervisor will collect it in a moment. Please do not write anything on the instructions so that we can reuse them. Take your time. If you have any questions or something is unclear, please raise your hand and wait until the study supervisor is with you.

Figure 3: Screen 3



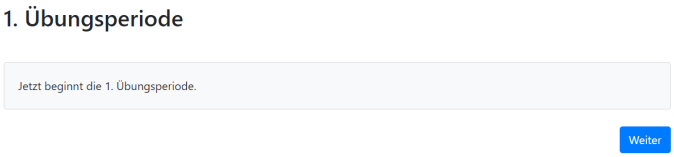
Translation: **Part 1: Control questions.** Please answer the following control questions. If you have any questions, please contact the study supervisor. 1.What is the payoff of the other participant if.... ...the red card is selected? ...the blue card is selected? 2. Participant A has given the right to decide to you and you have chosen a probability of success of 80. Your search was successful. Participant A recommends that you select the red card. You decide to select the blue card. What are your search costs? What is your income (income = payout - search costs)? 3. Participant A has retained the right to decide. You choose a probability of success of 30. Your search was not success. Participant A decides to select card position 32. It is the red card What are your search costs? What is your income (income = payout - search costs)? 4. Participant A has given the decision right to you and you have chosen a probability of success of 30. Your search was unsuccessful. Participant A recommends the red card. You decide to select card position 28. It is a blank. What are your search costs? What is your income (income = payout - search costs)? To the exercise periods

Figure 4: Screen 4



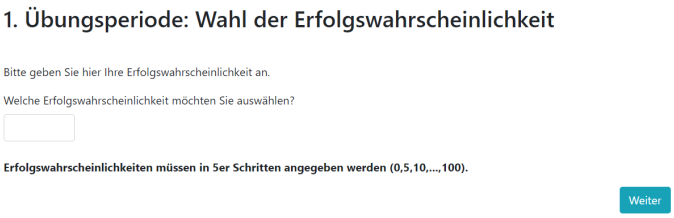
Translation: **Practice periods.** The two exercise periods will now begin. Note: In the practice periods, you play alone. You are not in a group with another participant A. Consequently you always have the right to decide which card is selected, and you cannot give it away. Since there is no second participant, there is no recommendation.

Figure 5: Screen 5



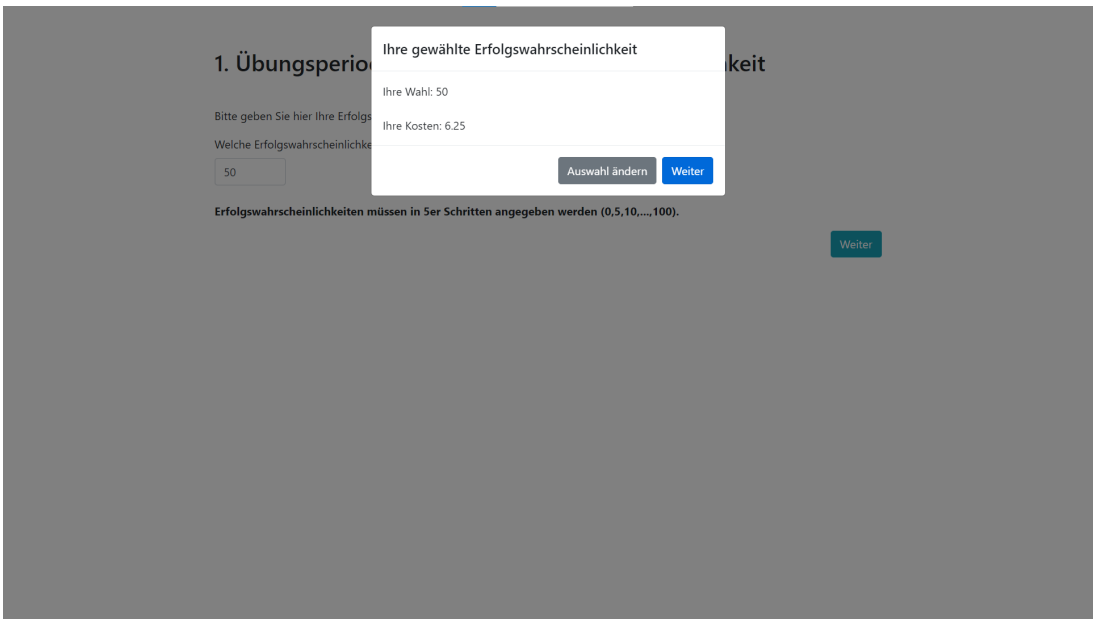
Translation: **1. Practice periods.** Now the 1. exercise period begins.

Figure 6: Screen 6



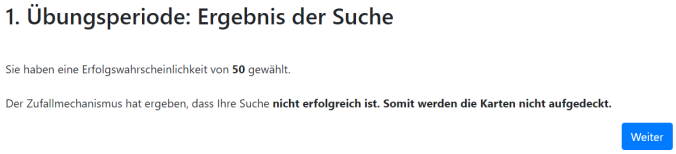
Translation: **1. Practice period: Choice of the probability of success.** Please enter your probability of success here. Which probability of success do you want to select? Probabilities of success must be specified in increments of 5 (0,5,10,..., 100).

Figure 7: Screen 7



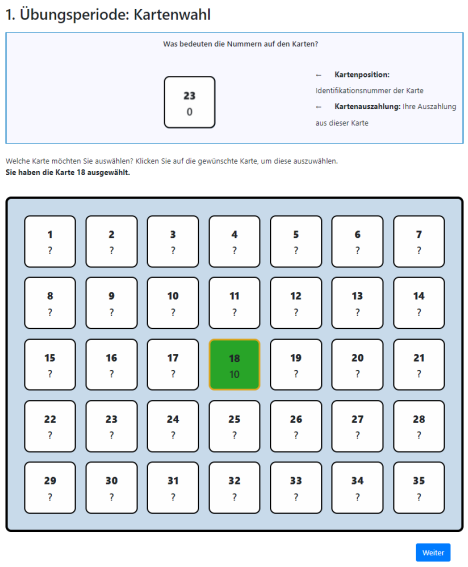
Translation: **Your selected probability of success.** Your choice: 50. Your cost: 6.25.

Figure 8: Screen 8



Translation: **1. Exercise period: Result of the search.** You have selected a success probability of 50. The random mechanism has shown that your search is not successful. Thus, the cards will not be revealed.

Figure 9: Screen 9

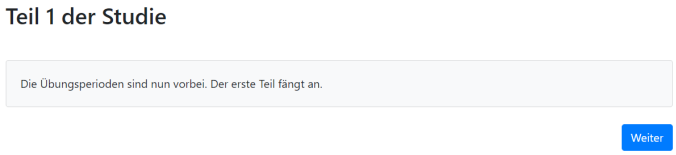


Translation: **1. Exercise period: Card selection.** What do the numbers on the cards mean? Card position: 23 = Card identification number. Card payout: 0 = Your payout from this card. Which card do you want to select? Click on the desired card to select it. You have selected card 18.

Figure 10: Screen 10

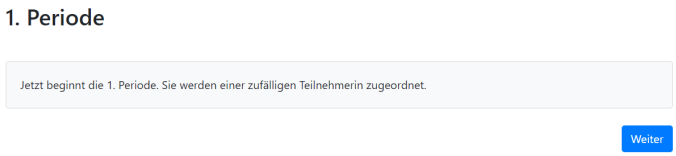
Translation: **1. Exercise period: Result.** You have selected the following card: green card. Your income from this card: 10 points. Your probability of success in this period: 50. Your search cost: 6.25 points. Your total income in this period: 3.75 points.

Figure 11: Screen 11



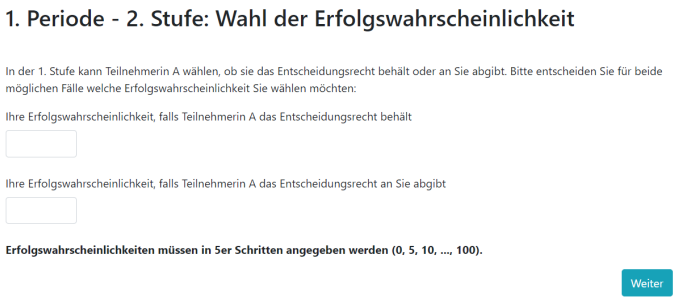
Translation: **Part 1 of the study.** The practice periods are now over. The first part begins.

Figure 12: Screen 12



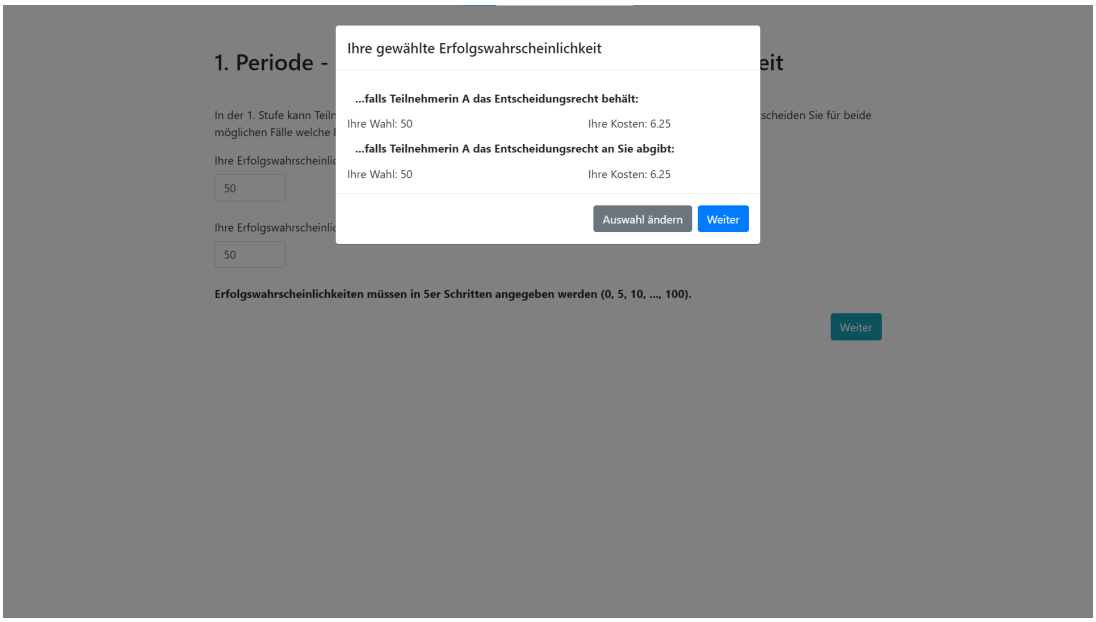
Translation: **1. Period.** Now the 1. period begins. You will be assigned to a random participant.

Figure 13: Screen 13



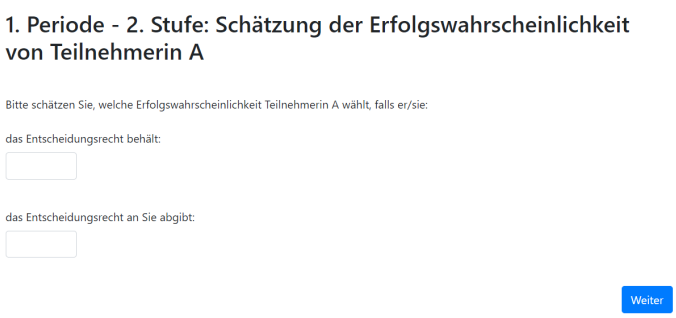
Translation: **1. Period - 2. Stage: Choice of probability of success.** In the 1. stage, participant A can choose whether she keeps the decision-making right or gives it to you. Please decide for both possible cases which probability of success you would like to choose: Your probability of success if participant A retains the right to decide. Your probability of success if participant A gives up the right of decision to you. Probabilities of success must be given in increments of 5 (0, 5, 10, ..., 100).

Figure 14: Screen 14



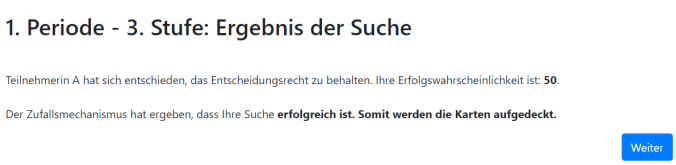
Translation: **Your selected probability of success.** ...if participant A retains the right to decide: Your choice: 50 Your cost: 6.25 ...if participant A gives up the right of decision to you: Your choice: 50 Your cost: 6.25

Figure 15: Screen 15



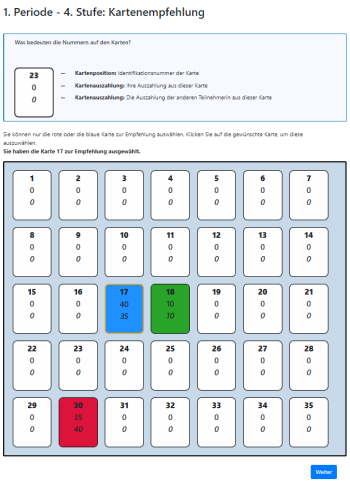
Translation: **1. Period - 2. Stage: Estimation of the probability of success of participant A.** Please estimate what probability of success Participant A chooses if he/she: retains the right to decide: gives up the right of decision to you:

Figure 16: Screen 16



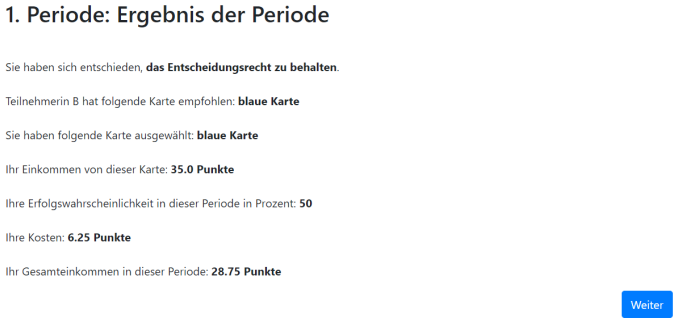
Translation: **1st Period - 3rd Stage: Result of the search.** Participant A has decided to retain the right to decide. Your probability of success is: 50. The random mechanism has shown that your search is successful. Thus, the cards are turned over.

Figure 17: Screen 17



Translation: **1. Period - 4. Stage: Card recommendation.** What do the numbers on the cards mean? Card position: 23 = Card identification number. Card payout: 0 = Your payout from this card. Card payout: 0 = The other participant's payout from this card. You can select only the red or the blue card for recommendation. Click on the desired card to select it. You have selected card 17 for recommendation.

Figure 18: Screen 18

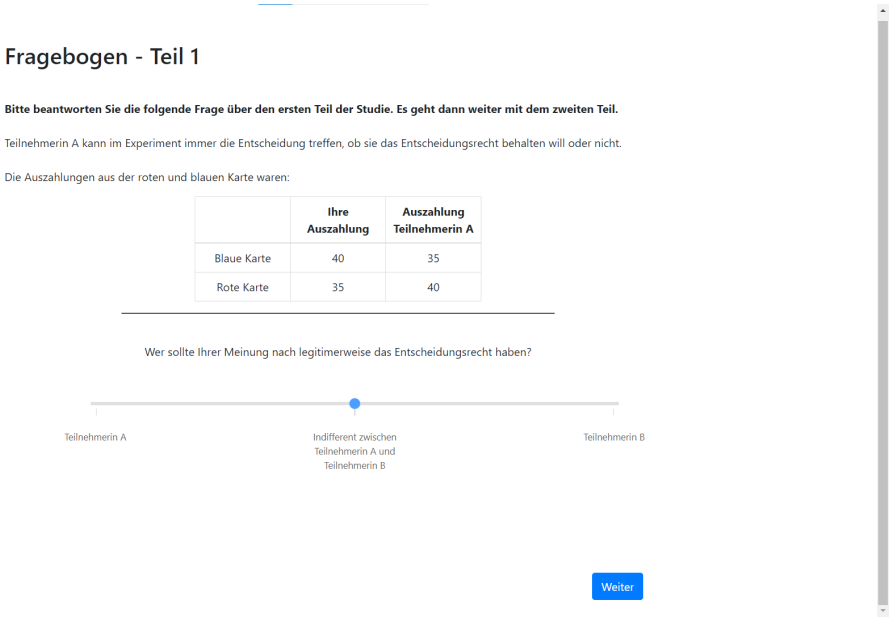


Translation: **1. Period: Result of the period.** You have decided to keep the right to decide. Participant B has recommended the following card: blue card. You have chosen the following card: blue card. Your income from this card: 35.0 points. Your probability of success in this period in percent: 50. Your cost: 6.25 points. Your total income in this period: 28.75 points.

Figure 19: Screen 19

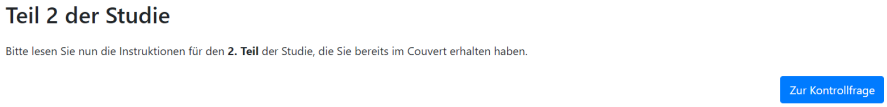
Translation: **Part 1 of the study.** The first part of the study is now over. On the next page comes a short questionnaire about the first part of the study.

Figure 20: Screen 20



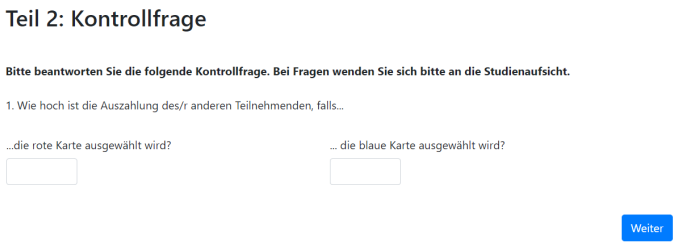
Translation: **Questionnaire - Part 1.** Please answer the following question about the first part of the study. It then continues with the second part. Participant A can always make the decision in the experiment whether to keep the right to decide or not. The payoffs from the red and blue cards were: Blue card, your payoff = 40. Blue card, participant A's payoff = 35. Red card, your payoff = 35. Red card, participant A's payoff = 40. Who do you think should legitimately have the right to decide? Participant A. Indifferent between participant A and participant B. Participant B.

Figure 21: Screen 21



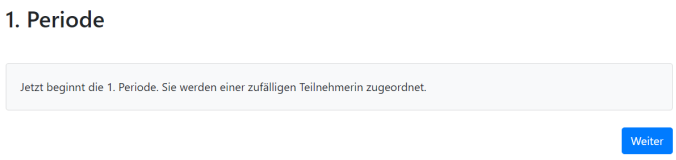
Translation: **Part 2 of the study.** Please now read the instructions for the 2. part of the study, which you have already received in the envelope.

Figure 22: Screen 22



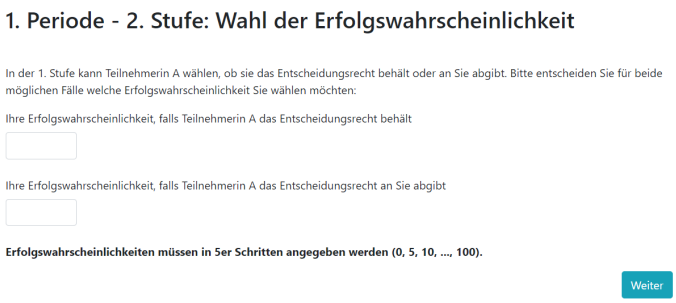
Translation: **Part 2: Control question.** Please answer the following control question. If you have any questions, please contact the study supervisor. 1.What is the payout of the other participant(s) if... ...the red card is selected? ...the blue card is selected?

Figure 23: Screen 23



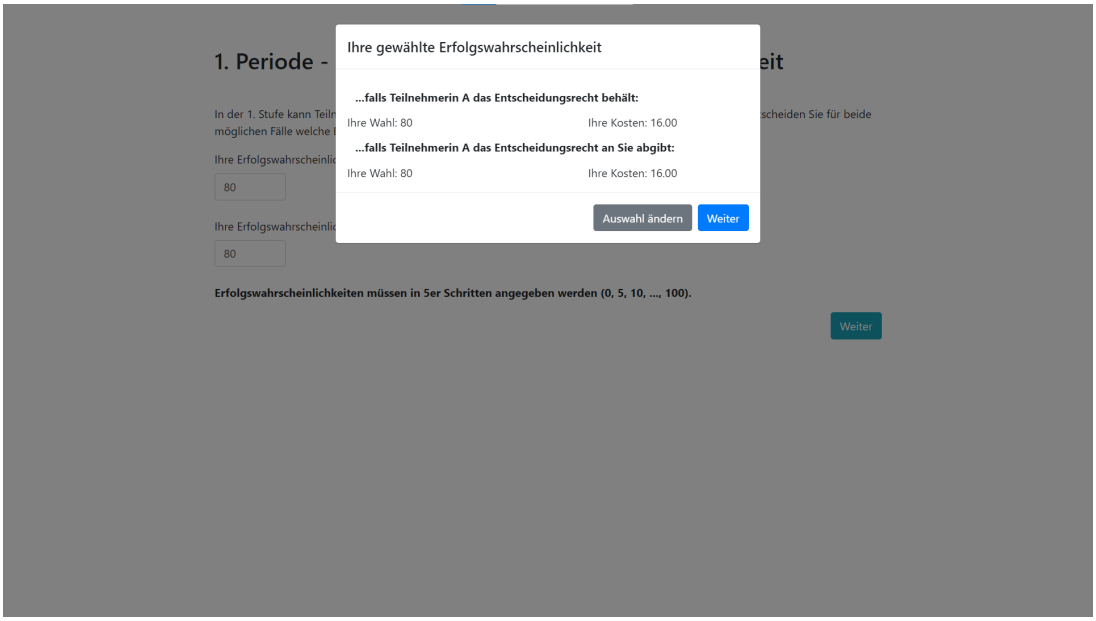
Translation: **1. Period.** Now the 1. period begins. You will be assigned to a random participant.

Figure 24: Screen 24



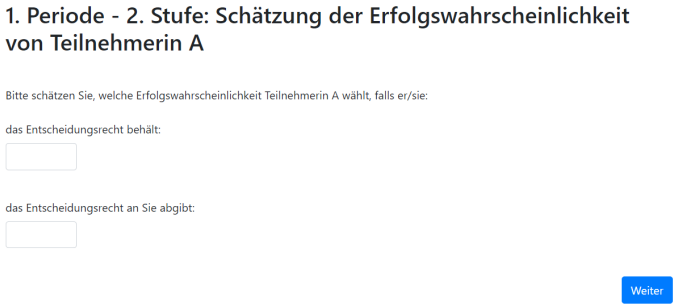
Translation: **1. Period - 2. Stage: Choice of probability of success.** In the 1. stage, participant A can choose whether she keeps the decision-making right or gives it to you. Please decide for both possible cases which probability of success you would like to choose: Your probability of success if participant A retains the decision-making right. Your probability of success if participant A gives up the right of decision to you. Probabilities of success must be given in increments of 5 (0, 5, 10, ..., 100).

Figure 25: Screen 25



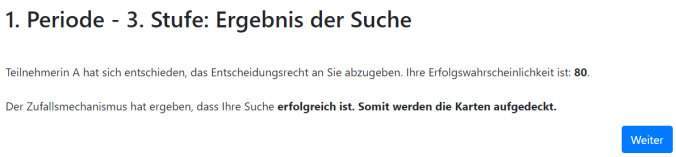
Translation: **Your selected probability of success.** ...if participant A retains the right to decide: Your choice: 80 Your cost: 16.00 ...if participant A gives up the right of decision to you: Your choice: 80 Your cost: 16.00

Figure 26: Screen 26



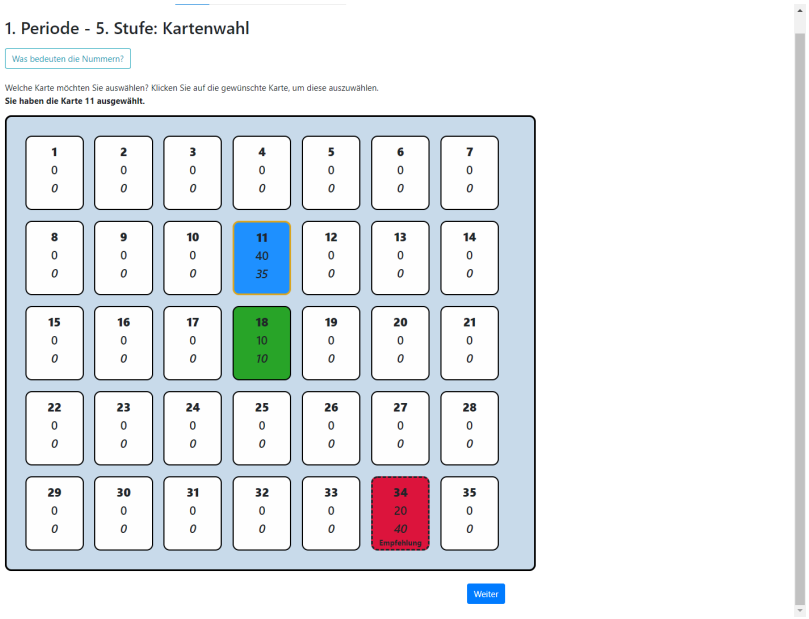
Translation: **1. Period - 2. Stage: Estimation of the probability of success of participant A.** Please estimate what probability of success Participant A chooses if he/she: retains the right to decide: gives up the right of decision to you:

Figure 27: Screen 27



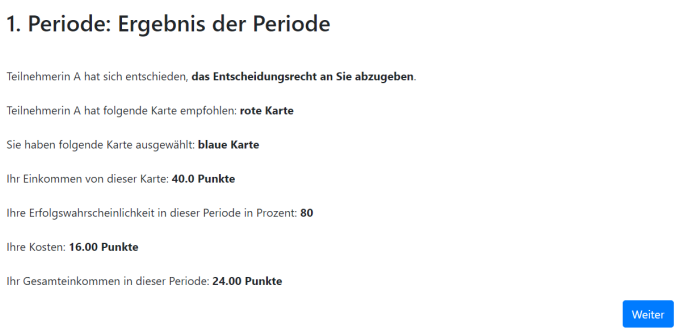
Translation: **1. Period - 3. Stage: Result of the search.** Participant A has decided to hand over the right of decision to you. Your probability of success is: 80. The random mechanism has shown that your search is successful. Thus, the cards are turned over.

Figure 28: Screen 28



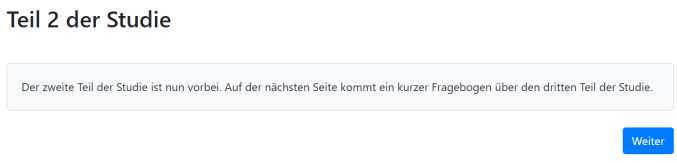
Translation: **1. Period - 5. Stage: Card selection.** What do the numbers mean? Which card do you want to select? Click on the desired card to select it. You have selected card 11.

Figure 29: Screen 29



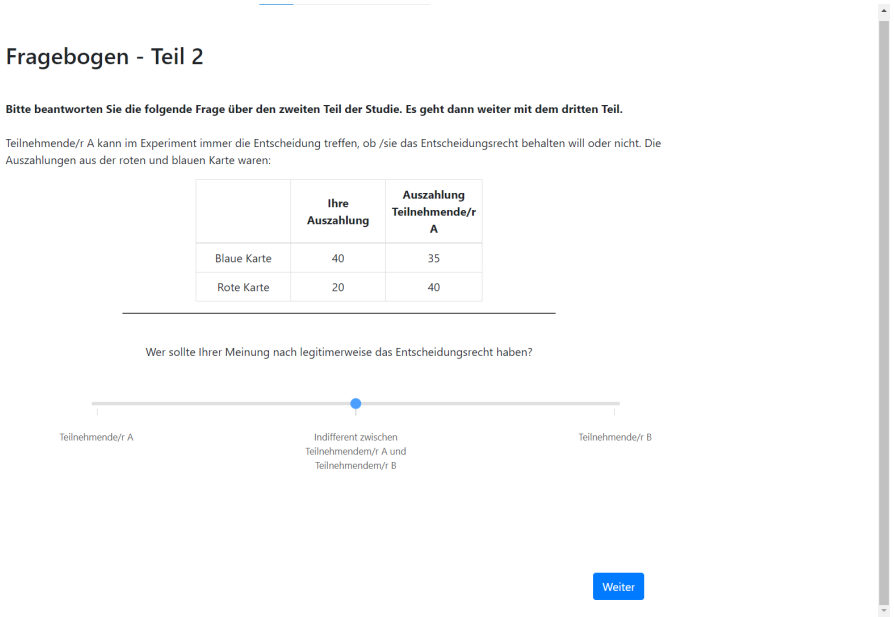
Translation: **1. Period: Result of the period.** Participant A has decided to give the right of decision to you. Participant A has recommended the following card: red card. You have chosen the following card: blue card. Your income from this card: 40.0 points. Your probability of success in this period in percent: 80. Your cost: 16.00 points. Your total income in this period: 24.00 points.

Figure 30: Screen 30



Translation: **Part 2 of the study.** The second part of the study is now over. On the next page comes a short questionnaire about the third part of the study.

Figure 31: Screen 31

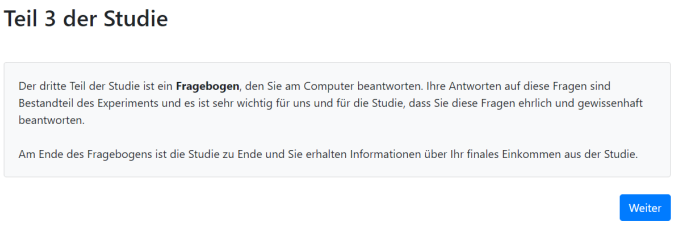


Translation: **Questionnaire - Part 2.** Please answer the following question about the second part of the study. It then continues with the third part. Participant A can always make the decision in the experiment whether he/she wants to keep the right of decision or not. The Payoffs from the red and blue cards were: Blue card, your payoff = 40. Blue card, participant A's payoff = 35. Red card, your payoff = 20. Red card, participant A's payoff = 40. Who do you think should legitimately have the right to make decisions? Participant A. Indifferent between participant A and participant B. Participant B.

Figure 32: Screen 32

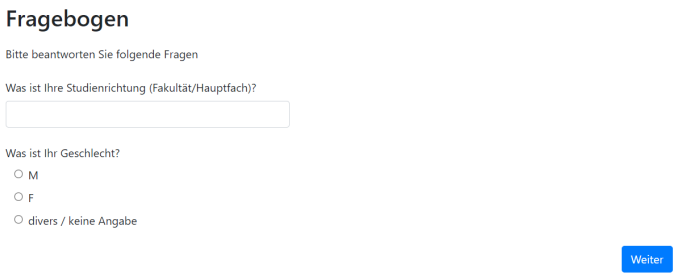
Translation: **Questionnaire - Part 1 + 2.** Please answer the following questions about your answers. It then continues with the third part. Participant A can always make the decision in the experiment whether he/she wants to keep the right to decide or not. Payoffs in part 1: Blue card, your payoff = 40. Blue card, participant A's payoff = 35. Red card, your payoff = 35. Red card, participant A's payoff = 40. Payoffs in part 2: Blue card, your payoff = 40. Blue card, participant A's payoff = 35. Red card, your payoff = 20. Red card, participant A's payoff = 40. Your answers to the question "Who do you think should legitimately have the right to decide?" in Parts 1 and 2 were as follows: Your answer for part 1: Participant A. Indifferent between participant A and participant B. Participant B. Your answer for part 2: Participant A. Indifferent between participant A and participant B. Participant B. In your own words, what are the reasons for any differences or similarities in your answers to the above questions?

Figure 33: Screen 33



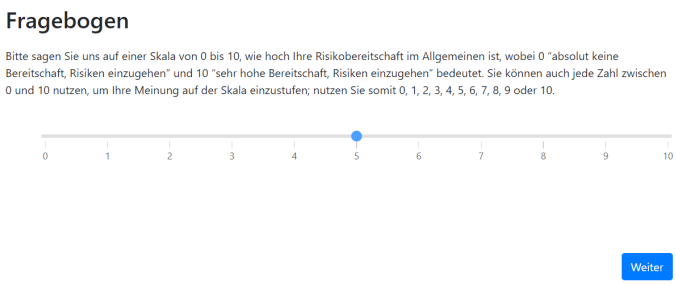
Translation: **Part 3 of the study.** The third part of the study is a questionnaire that you answer on the computer. Your answers to these questions are part of the experiment and it is very important for us and for the study that you answer these questions honestly and conscientiously. At the end of the questionnaire the study is over and you will receive information about your final income from the study.

Figure 34: Screen 34



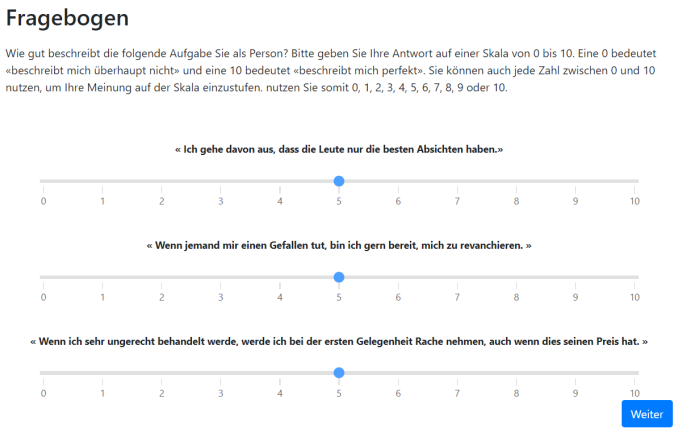
Translation: **Questionnaire.** Please answer the following questions What is your field of study (faculty/major)? What is your gender? - M - F - diverse / not specified

Figure 35: Screen 35



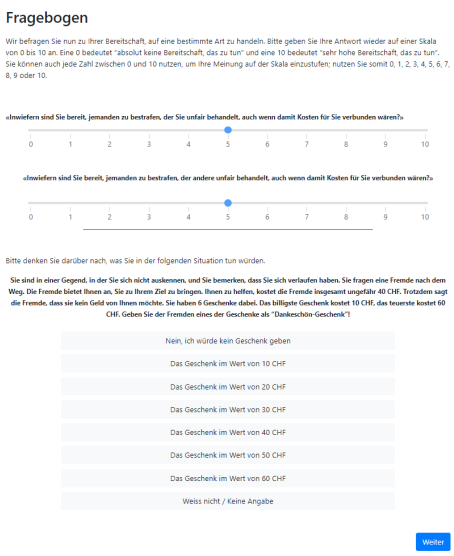
Translation: **Questionnaire.** On a scale of O to 10, please tell us how willing you are to take risks in general, where 0 means "absolutely not willing to take risks" and 10 means "very willing to take risks." You can also use any number between 0 and 10 to rank your opinion on the scale; thus, use 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, or 10.

Figure 36: Screen 36



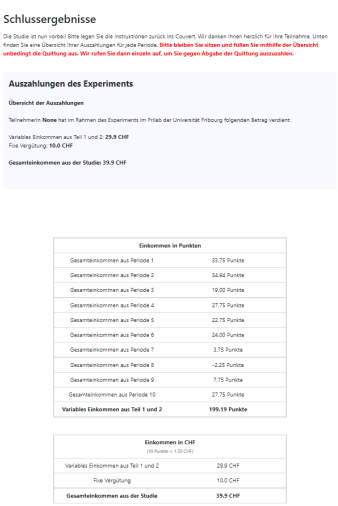
Translation: **Questionnaire.** How well does the following task describe you as a person? Please give your answer on a scale from 0 to 10. A 0 means "does not describe me at all" and a 10 means "describes me perfectly". You can also use any number between 0 and 10 to rank your opinion on the scale; thus, use 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, or 10. "I assume that people have only the best intentions." "If someone does me a favor, I'm happy to return the favor." "If I am treated very unjustly, I will take revenge at the first opportunity, even if it comes at a price."

Figure 37: Screen 37



Translation: **Questionnaire.** We will now ask you about your willingness to act in a certain way. Again, please indicate your answer on a scale from 0 to 10. A 0 means "absolutely not willing to do this" and a 10 means "very willing to do this". You can also use any number between 0 and 10 to rank your opinion on the scale; thus, use 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, or 10. "To what extent are you willing to punish someone who treats you unfairly, even if there would be a cost to you?" "To what extent are you willing to punish someone who treats others unfairly, even if there was a cost to you!" Please think about what you would do in the following situation. You are in an area where you are unfamiliar and you realize you are lost. You ask a stranger for directions. The stranger offers to take you to your destination. Helping you costs the stranger a total of about 40 CHF. Nevertheless, the stranger says that she does not want any money from you. You have 6 gifts with you. The cheapest gift costs 10 CHF, the most expensive one costs 60CHF. Give the stranger one of the gifts as a "thank you gift"! No, I would not give a gift. The gift worth 10 CHF. The gift worth 20 CHF. The gift worth 30 CHF. The gift worth 40 CHF. The gift worth 50 CHF. The gift worth 60 CHF. Do not know / Not specified

Figure 38: Screen 38



Schlussergebnisse

Die Studie ist nun vorbei Bitte legen Sie die Instruktionen zurück ins Couvert. Wir danken Ihnen herzlich für Ihre Teilnahme. Unten finden Sie eine Übersicht Ihrer Auszahlungen für jede Periode. **Bitte bleiben Sie sitzen und füllen Sie mithilfe der Übersicht unbedingt die Quittung aus. Wir rufen Sie dann einzeln auf, um Sie gegen Abgabe der Quittung auszuzahlen.**

Auszahlungen des Experiments

Übersicht der Auszahlungen

Teilnehmerin **None** hat im Rahmen des Experiments im Frilab der Universität Fribourg folgenden Betrag verdient:

Variables Einkommen aus Teil 1 und 2: **29.9 CHF**
Fixe Vergütung: **10.0 CHF**

Gesamteinkommen aus der Studie: 39.9 CHF

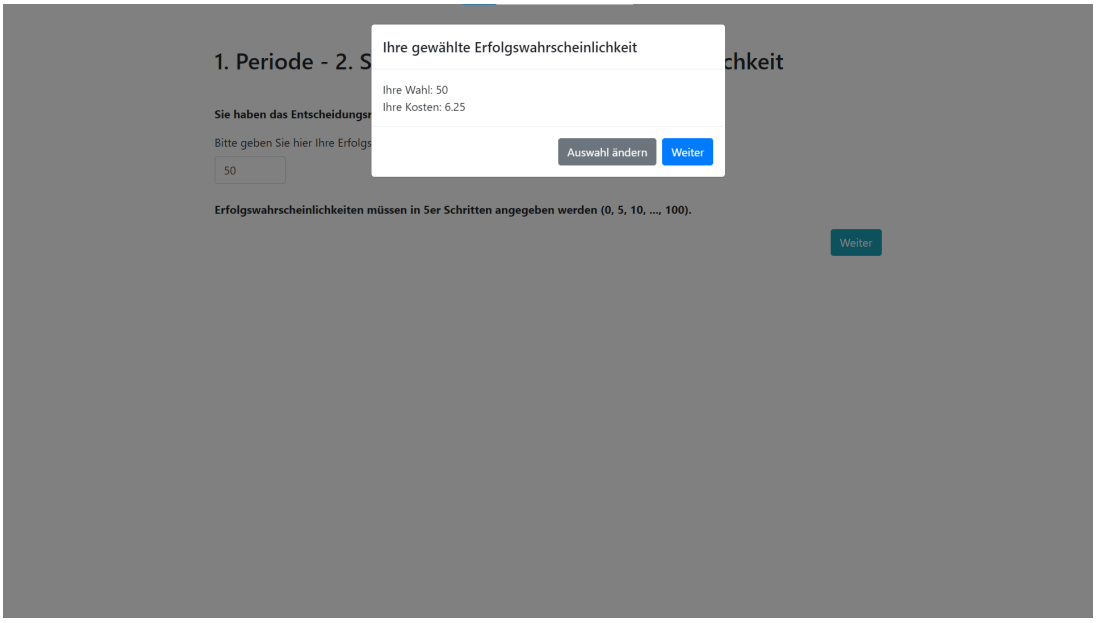
Einkommen in Punkten	
Gesamteinkommen aus Periode 1	33.75 Punkte
Gesamteinkommen aus Periode 2	34.94 Punkte
Gesamteinkommen aus Periode 3	19.00 Punkte
Gesamteinkommen aus Periode 4	27.75 Punkte
Gesamteinkommen aus Periode 5	22.75 Punkte
Gesamteinkommen aus Periode 6	24.00 Punkte
Gesamteinkommen aus Periode 7	3.75 Punkte
Gesamteinkommen aus Periode 8	-2.25 Punkte
Gesamteinkommen aus Periode 9	7.75 Punkte
Gesamteinkommen aus Periode 10	27.75 Punkte
Variables Einkommen aus Teil 1 und 2	**199.19 Punkte**

Einkommen in CHF (10 Punkte = 1.50 CHF)	
Variables Einkommen aus Teil 1 und 2	29.9 CHF
Fixe Vergütung	10.0 CHF
Gesamteinkommen aus der Studie	**39.9 CHF**

Translation: **Final results.** The study is now over! Please put the instructions back into the envelope. Thank you very much for your participation. Below you will find an overview of your payouts for each period. Please remain seated and be sure to fill out the receipt using the overview. We will call you individually to pay you out upon submission of the receipt. Payouts of the experiment Overview of disbursements Participant NONE earned the following amount during the experiment at Frilab of the University of Fribourg: Variable income from parts 1 and 2: 29.9 CHF. Fixed payment: 10.0 CHF. Total income from the study: 39.9 CHF. Income in points: Total income from period 1 = 33.75 points. Total income from period 2 = 34.94 points. Total income from period 3 = 19.00 points. Total income from period 4 = 27.75 points. Total income from period 5 = 22.75 points. Total income from period 6 = 24.00 points. Total income from period 7 = 3.75 points. Total income from period 8 = -2.25 points. Total income from period 9 = 7.75 points. Total income from period 10 = 27.75 points. Variable income from part 1 and 2 = 199.19 points. Income in CHF: (10 points = 1.50 CHF). Variable income from part 1 and 2 = 29.9 CHF. Fixed remuneration = 10.0 CHF. Total income from the study = 39.9 CHF.

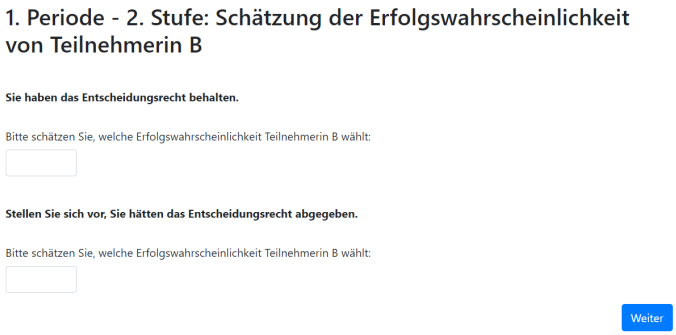
C Instructions for Principals

Figure 39: Screen 1



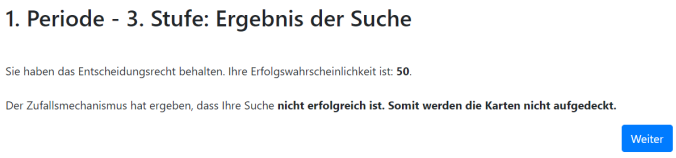
Translation: **Your selected probability of success.** Your choice: 50. Your cost: 6.25.

Figure 40: Screen 2



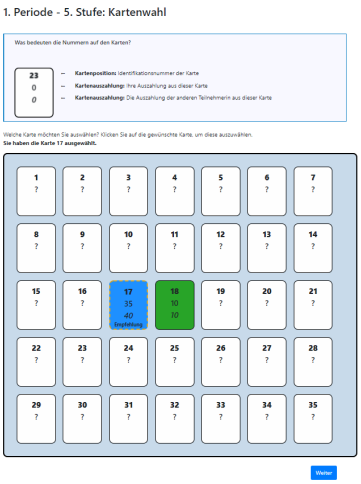
Translation: **1. Period - 2. Stage: Estimation of the probability of success from participant B.** You have retained the right to decide. Please estimate the probability of success that participant B chooses: Imagine that you had given up the right of decision. Please estimate which probability of success participant B chooses:

Figure 41: Screen 3



Translation: **1. Period - 3. Stage: Result of the search.** You have retained the right to decide. Your probability of success is: 50. The random mechanism has shown that your search is not successful. Thus, the cards will not be revealed.

Figure 42: Screen 4



Translation: **1. Period - 5. Stage: Card selection.** What do the numbers on the cards mean? Card position: 23 = Card identification number. Card payout: 0 = Your payout from this card. Card payout: 0= The other participant's payout from this card. Which card do you want to choose? Click on the desired card to select it. You have selected card 17.

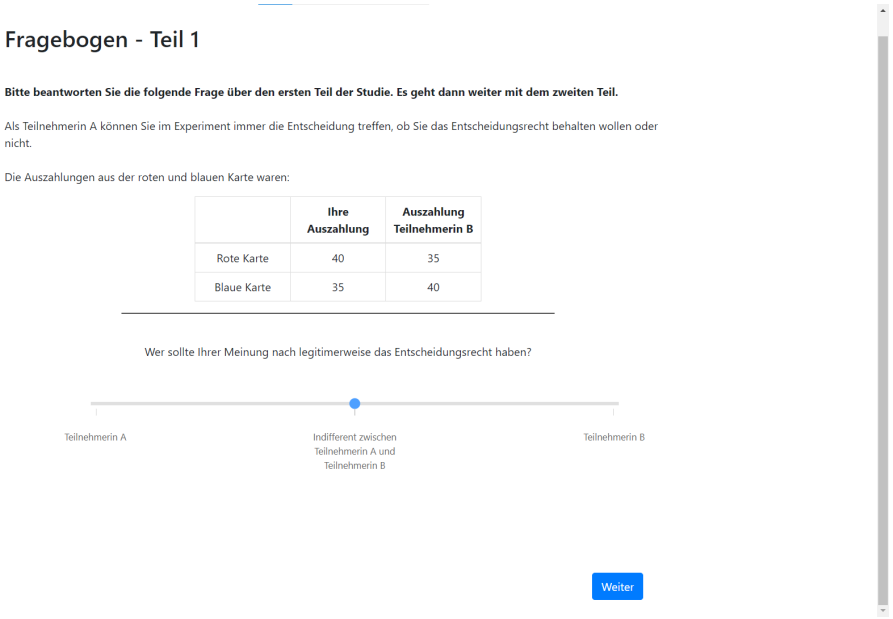
Figure 43: Screen 5

Translation: **1. Period: Result of the period.** You have decided to keep the right to decide. Participant B has recommended the following card: blue card. You have chosen the following card: blue card. Your income from this card: 35.0 points. Your probability of success in this period in percent: 50. Your cost: 6.25 points. Your total income in this period: 28.75 points.

Figure 44: Screen 6

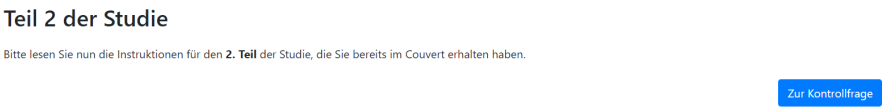
Translation: **Part 1 of the study.** The first part of the study is now over. On the next page comes a short questionnaire about the first part of the study.

Figure 45: Screen 7



Translation: **Questionnaire - Part 1.** Please answer the following question about the first part of the study. It then continues with the second part. As participant A, you can always make the decision in the experiment whether you want to keep the right to decide or not. The payoffs from the red and blue cards were: Red card, your payoff = 40. Red card, participant B's payoff = 35. Blue card, your payoff = 35. Blue card, participant B's payoff = 40. Who do you think should legitimately have the right to decide? Participant A. Indifferent between participant A and participant B. Participant B.

Figure 46: Screen 8

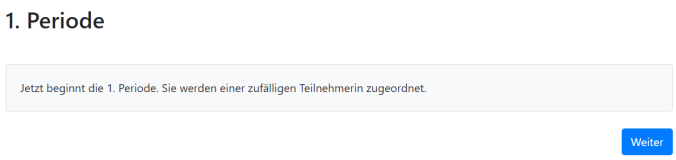


Translation: **Part 2 of the study.** Please now read the instructions for the 2. part of the study, which you have already received in the envelope.

Figure 47: Screen 9

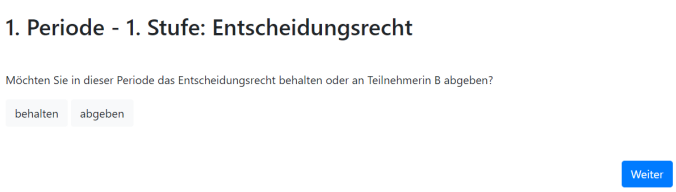
Translation: **Part 2: Control question.** Please answer the following control question. If you have any questions, please contact the study supervisor. 1.What is the payout of the other participant if.... ...the red card is selected? ...the blue card is selected?

Figure 48: Screen 10



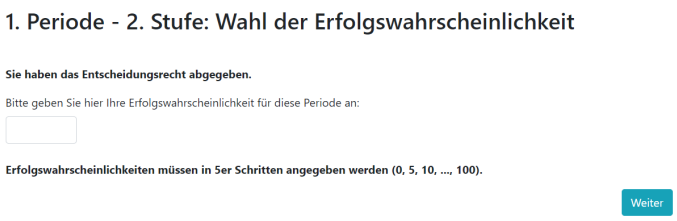
Translation: **1. Period.** Now the 1. period begins. You will be assigned to a random participant.

Figure 49: Screen 11



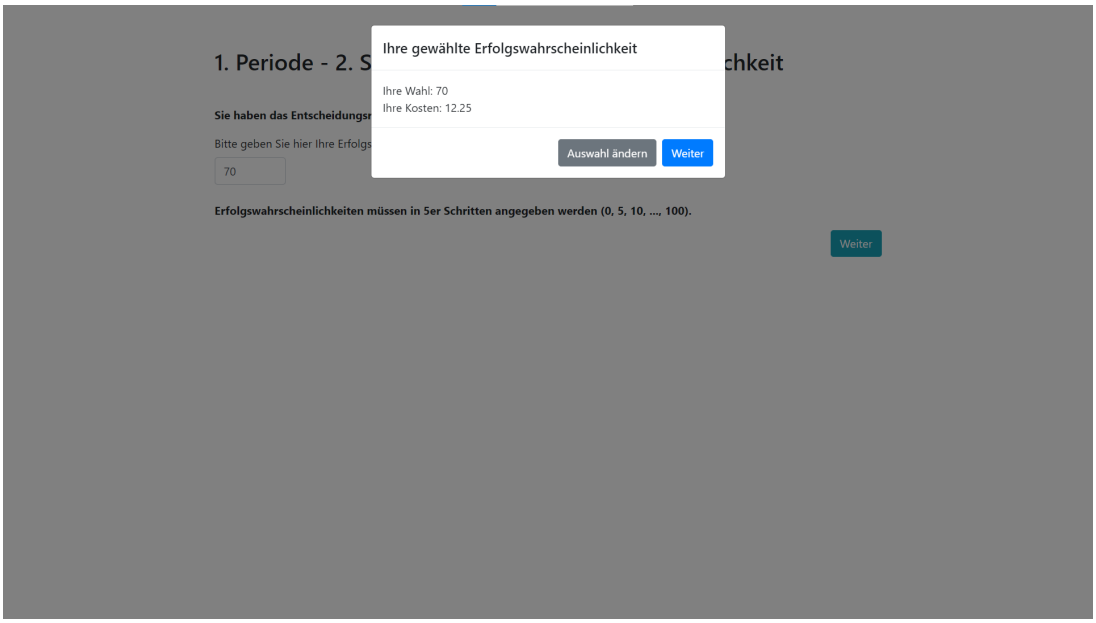
Translation: **1. Period - 1. Stage: Right to decide.** Do you want to keep the decision-making right in this period or give it to participant B? keep; hand over

Figure 50: Screen 12



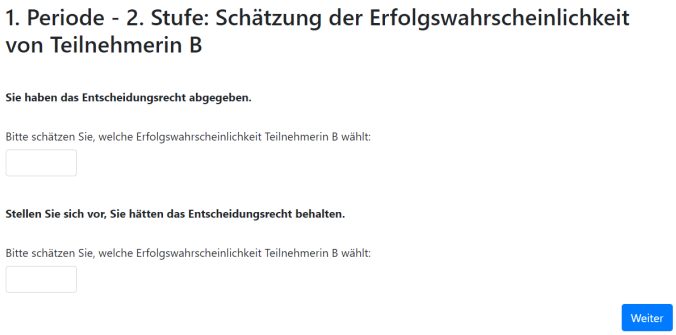
Translation: **1. Period - 2. Stage: Choice of probability of success.** You have surrendered the right to decide. Please enter your probability of success for this period here: Probabilities of success must be given in increments of 5 (0, 5, 10, ..., 100).

Figure 51: Screen 13



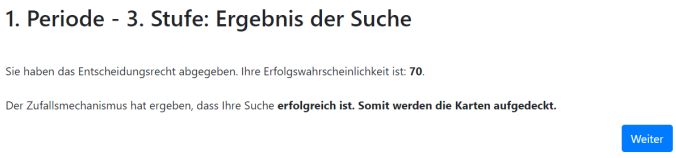
Translation: **Your selected probability of success.** Your choice: 70. Your cost: 12.25.

Figure 52: Screen 14



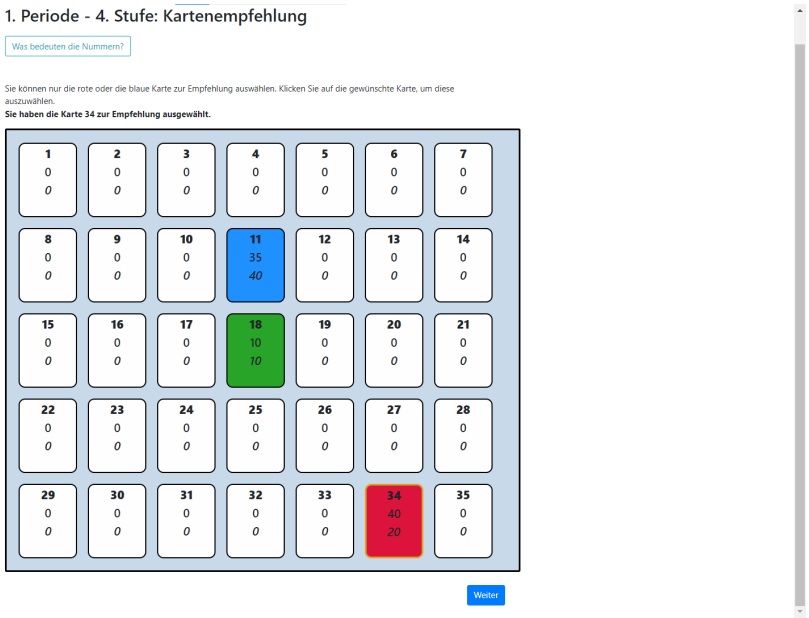
Translation: **1. Period - 2. Stage: Estimation of the probability of success of participant B.** You have given up the right to decide. Please estimate the probability of success that participant B chooses: Imagine that you had retained the right to decide. Please estimate which probability of success participant B chooses:

Figure 53: Screen 15



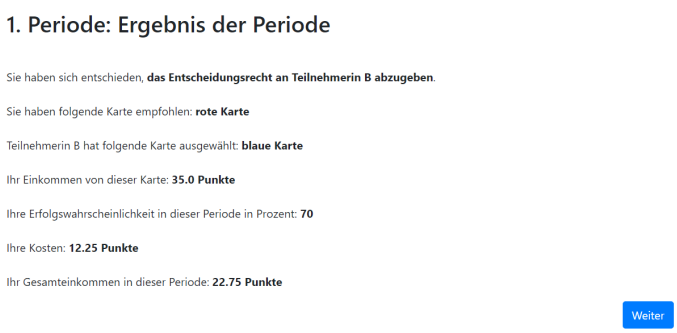
Translation: **1. Period - 3. Stage: Result of the search.** You gave up the right of decision. Your probability of success is: 70. The random mechanism has shown that your search is successful. Thus, the cards are revealed.

Figure 54: Screen 16



Translation: **1. Period - 4. Stage: Card recommendation.** What do the numbers mean? You can select only the red or the blue card for recommendation. Click on the desired map to select it. You have selected map 34 for recommendation.

Figure 55: Screen 17

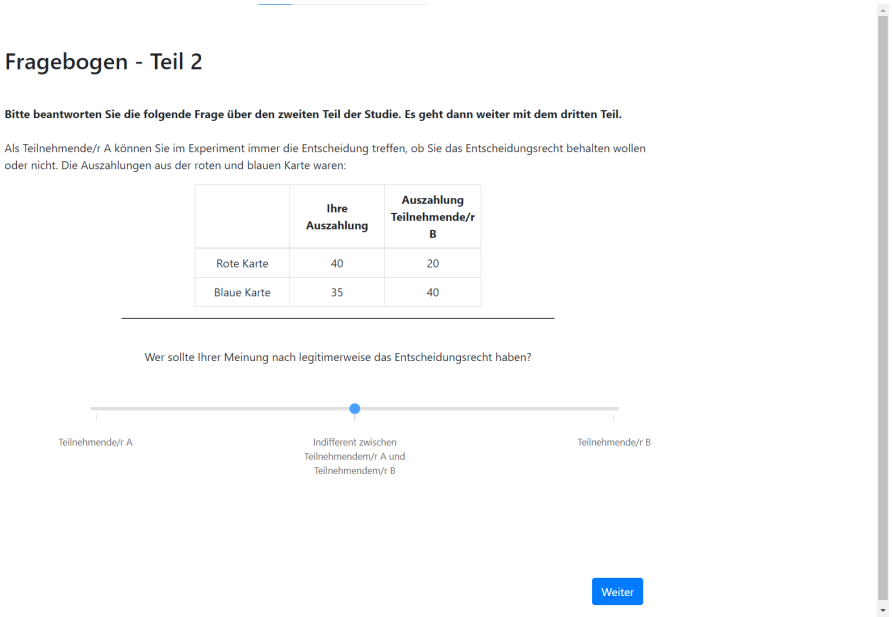


Translation: **1. Period: Result of the period.** You have decided to give the right of decision to participant B. You have recommended the following card: red card. Participant B has chosen the following card: blue card. Your income from this card: 35.0 points. Your probability of success in this period in percent: 70. Your cost: 12.25 points. Your total income in this period: 22.75 points.

Figure 56: Screen 18

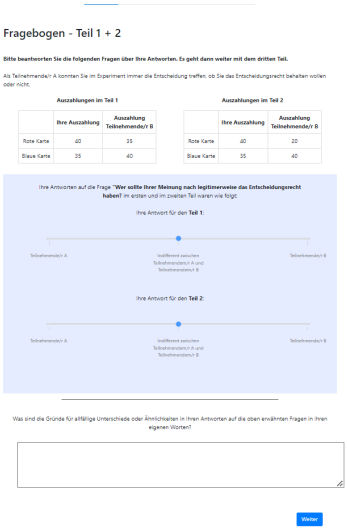
Translation: **Part 2 of the study.** The second part of the study is now over. On the next page comes a short questionnaire about the third part of the study.

Figure 57: Screen 19



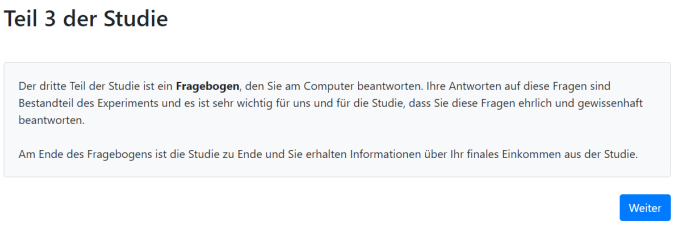
Translation: **Questionnaire - Part 2.** Please answer the following question about the second part of the study. It then continues with the third part. As participant A, you can always make the decision in the experiment whether you want to keep the right to decide or not. The payoffs from the red and blue cards were: Red card, your payoff = 40. Red card, participant B's payoff = 20. Blue card, your payoff = 35. Blue card, participant B's payoff = 40. Who do you think should legitimately have the right to decide? Participant A. Indifferent between participant A and participant B. Participant B.

Figure 58: Screen 20



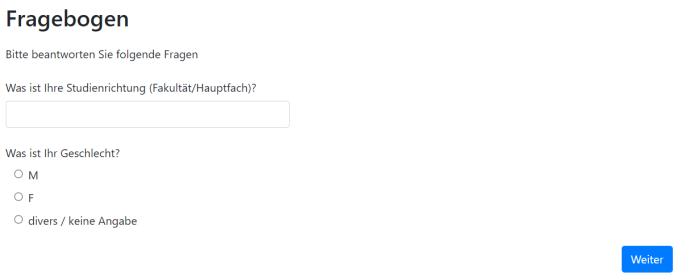
Translation: **Questionnaire - Part 1 + 2.** Please answer the following questions about your answers. It then continues with the third part. As participant A, you can always make the decision in the experiment whether you want to keep the right to decide or not. Payoffs in part 1: Red card, your payoff = 40. Red card, participant B's payoff = 35. Blue card, your payoff = 35. Blue card, participant B's payoff = 40. Payoffs in part 2: Red card, your payoff = 40. Red card, participant B's payoff = 20. Blue card, your payoff = 35. Blue card, participant B's payoff = 40. Your answers to the question "Who do you think should legitimately have the right to decide?" in Parts 1 and 2 were as follows: Your answer for part 1: Participant A. Indifferent between participant A and participant B. Participant B. Your answer for part 2: Participant A. Indifferent between participant A and participant B. Participant B. In your own words, what are the reasons for any differences or similarities in your answers to the above questions?

Figure 59: Screen 21



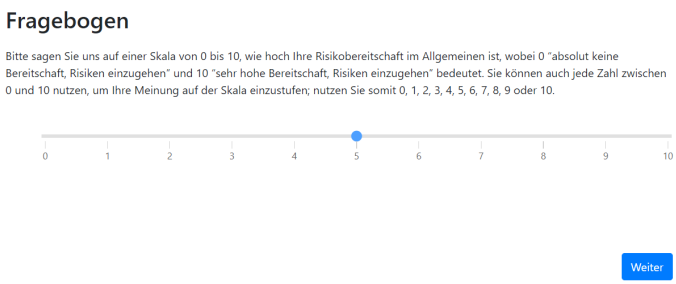
Translation: **Part 3 of the study.** The third part of the study is a questionnaire that you answer on the computer. Your answers to these questions are part of the experiment and it is very important for us and for the study that you answer these questions honestly and conscientiously. At the end of the questionnaire the study is over and you will receive information about your final income from the study.

Figure 60: Screen 22



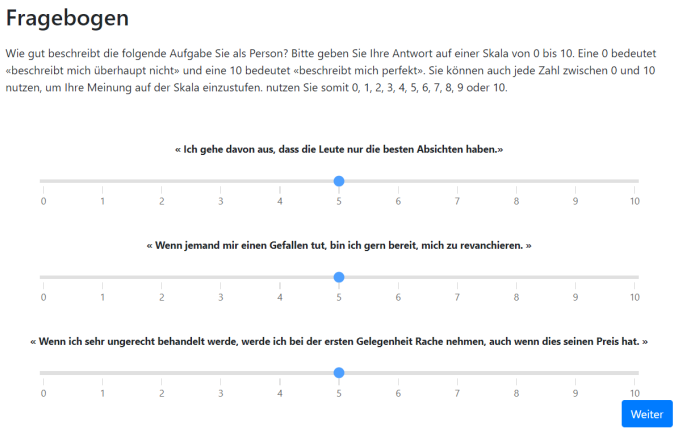
Translation: **Questionnaire.** Please answer the following questions What is your field of study (faculty/major)? What is your gender? - M - F - diverse / not specified

Figure 61: Screen 23



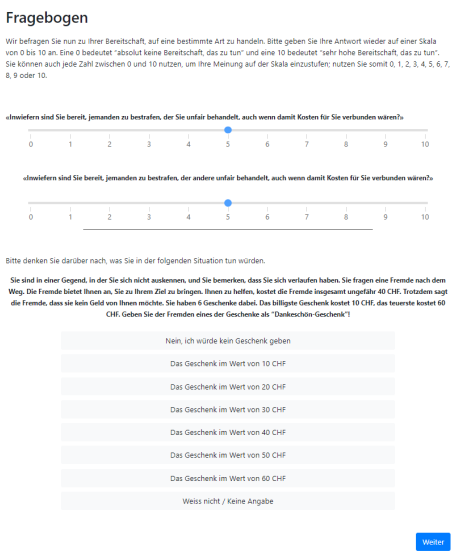
Translation: **Questionnaire.** On a scale of O to 10, please tell us how willing you are to take risks in general, where 0 means "absolutely not willing to take risks" and 10 means "very willing to take risks." You can also use any number between 0 and 10 to rank your opinion on the scale; thus, use 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, or 10.

Figure 62: Screen 24



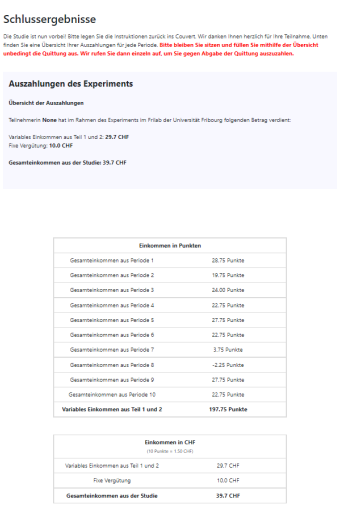
Translation: **Questionnaire.** How well does the following task describe you as a person? Please give your answer on a scale from 0 to 10. A 0 means "does not describe me at all" and a 10 means "describes me perfectly". You can also use any number between 0 and 10 to rank your opinion on the scale; thus, use 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, or 10. "I assume that people have only the best intentions." "If someone does me a favor, I'm happy to return the favor." "If I am treated very unjustly, I will take revenge at the first opportunity, even if it comes at a price."

Figure 63: Screen 25



Translation: **Questionnaire.** We will now ask you about your willingness to act in a certain way. Again, please indicate your answer on a scale from 0 to 10. A 0 means "absolutely not willing to do this" and a 10 means "very willing to do this". You can also use any number between 0 and 10 to rank your opinion on the scale; thus, use 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, or 10. "To what extent are you willing to punish someone who treats you unfairly, even if there would be a cost to you?" "To what extent are you willing to punish someone who treats others unfairly, even if there was a cost to you!" Please think about what you would do in the following situation. You are in an area where you are unfamiliar and you realize you are lost. You ask a stranger for directions. The stranger offers to take you to your destination. Helping you costs the stranger a total of about 40 CHF. Nevertheless, the stranger says that she does not want any money from you. You have 6 gifts with you. The cheapest gift costs 10 CHF, the most expensive one costs 60CHF. Give the stranger one of the gifts as a "thank you gift"! No, I would not give a gift. The gift worth 10 CHF. The gift worth 20 CHF. The gift worth 30 CHF. The gift worth 40 CHF. The gift worth 50 CHF. The gift worth 60 CHF. Do not know / Not specified

Figure 64: Screen 26



Schlussergebnisse

Die Studie ist nun vorbei Bitte legen Sie die Instruktionen zurück ins Couvert. Wir danken Ihnen herzlich für Ihre Teilnahme. Unten finden Sie eine Übersicht Ihrer Auszahlungen für jede Periode. **Bitte bleiben Sie sitzen und füllen Sie mithilfe der Übersicht unbedingt die Quittung aus. Wir rufen Sie dann einzeln auf, um Sie gegen Abgabe der Quittung auszuzahlen.**

Auszahlungen des Experiments

Übersicht der Auszahlungen

Teilnehmerin **None** hat im Rahmen des Experiments im Frilab der Universität Fribourg folgenden Betrag verdient:

Variables Einkommen aus Teil 1 und 2: **29.7 CHF**
Fixe Vergütung: **10.0 CHF**

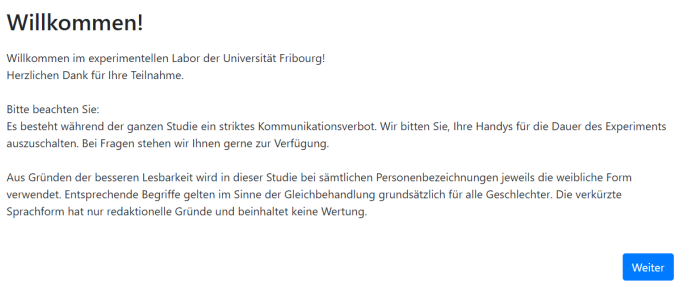
Gesamteinkommen aus der Studie: 39.7 CHF

Einkommen in Punkten	
Gesamteinkommen aus Periode 1	28.75 Punkte
Gesamteinkommen aus Periode 2	19.75 Punkte
Gesamteinkommen aus Periode 3	24.00 Punkte
Gesamteinkommen aus Periode 4	22.75 Punkte
Gesamteinkommen aus Periode 5	27.75 Punkte
Gesamteinkommen aus Periode 6	22.75 Punkte
Gesamteinkommen aus Periode 7	3.75 Punkte
Gesamteinkommen aus Periode 8	-2.25 Punkte
Gesamteinkommen aus Periode 9	27.75 Punkte
Gesamteinkommen aus Periode 10	22.75 Punkte
Variables Einkommen aus Teil 1 und 2	**197.75 Punkte**

Einkommen in CHF (10 Punkte = 1.50 CHF)	
Variables Einkommen aus Teil 1 und 2	29.7 CHF
Fixe Vergütung	10.0 CHF
Gesamteinkommen aus der Studie	**39.7 CHF**

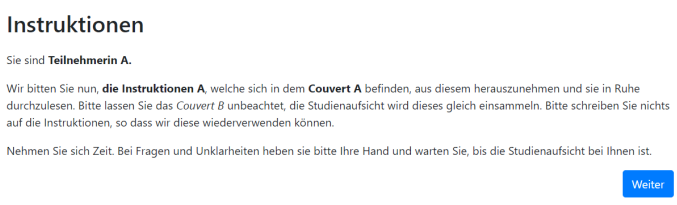
Translation: **Final results.** The study is now over! Please put the instructions back into the envelope. Thank you very much for your participation. Below you will find an overview of your payouts for each period. Please remain seated and be sure to fill out the receipt using the overview. We will call you individually to pay you out upon submission of the receipt. Payouts of the experiment Overview of disbursements Participant NONE earned the following amount during the experiment at Frilab of the University of Fribourg: Variable income from parts 1 and 2: 29.7 CHF. Fixed payment: 10.0 CHF. Total income from the study: 39.7 CHF. Income in points: Total income from period 1 = 28.75 points. Total income from period 2 = 19.75 points. Total income from period 3 = 24.00 points. Total income from period 4 = 22.75 points. Total income from period 5 = 27.75 points. Total income from period 6 = 22.75 points. Total income from period 7 = 3.75 points. Total income from period 8 = -2.25 points. Total income from period 9 = 27.75 points. Total income from period 10 = 22.75 points. Variable income from part 1 and 2 = 197.75 points. Income in CHF: (10 points = 1.50 CHF). Variable income from part 1 and 2 = 29.7 CHF. Fixed remuneration = 10.0 CHF. Total income from the study = 39.7 CHF.

Figure 65: Screen 27



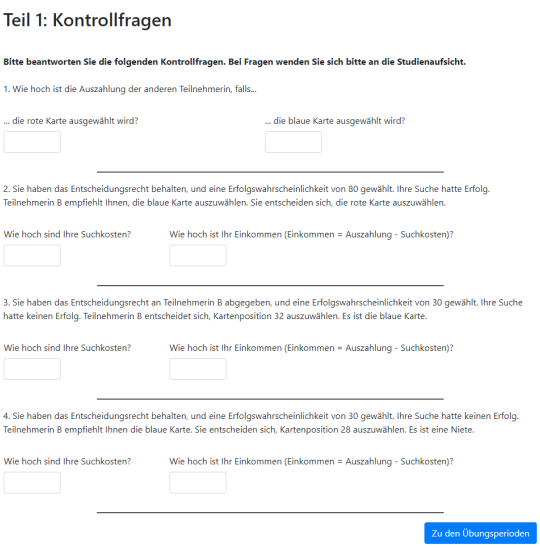
Translation: **Welcome.** Welcome to the experimental laboratory of the University of Fribourg! Thank you very much for your participation. Please note: There is a strict communication ban throughout the study. We ask you to turn off your cell phones for the duration of the experiment. If you have any questions, please do not hesitate to contact us. For reasons of better readability, the female form is used in this study for all references to persons. In the interest of equal treatment, the corresponding terms apply to all genders. The abbreviated form of language is for editorial reasons only and does not imply any valuation.

Figure 66: Screen 28



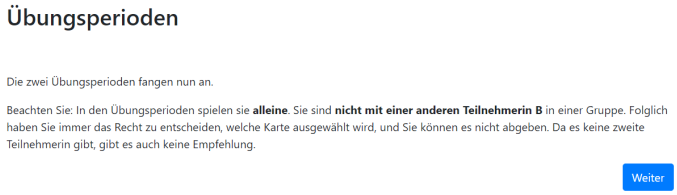
Translation: **Instructions.** You are participant A. We now ask you to take the instructions A, which are in the envelope A, out of it and read them through at your leisure. Please leave the envelope B unattended, the study supervisor will collect it in a moment. Please do not write anything on the instructions so that we can reuse them. Take your time. If you have any questions or something is unclear, please raise your hand and wait until the study supervisor is with you.

Figure 67: Screen 29



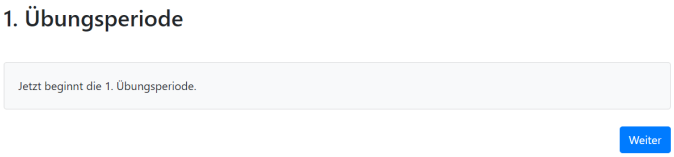
Translation: **Part 1: Control questions.** Please answer the following control questions. If you have any questions, please contact the study supervisor. 1.What is the payoff of the other participant if.... ...the red card is selected? ...the blue card is selected? 2. You have retained the right to decide, and selected a probability of success of 80. Your search was successful. Participant B recommends that you select the blue card. You decide to select the red card. What are your search costs? What is your income (income = payout - search costs)? 3. You have given the right of decision to participant B, and you have chosen a probability of success of 30. Your search was not successful. Participant B decides to select card position 32. It is the blue card. What are your search costs? What is your income (income = payout - search costs)? 4. You have kept the right to decide, and you have chosen a success probability of 30. Your search was unsuccessful. Participant B recommends the blue card to you. You decide to select card position 28. It is a blank. What are your search costs? What is your income (income = payout - search costs)? To the exercise periods

Figure 68: Screen 30



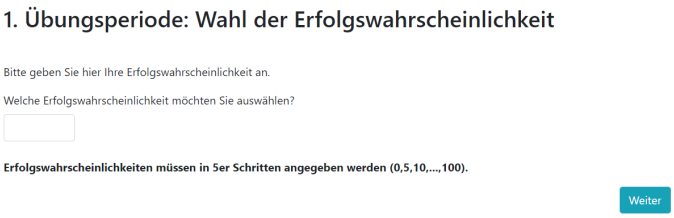
Translation: **Exercise periods.** The two exercise periods will now begin. Note: In the practice periods, you play alone. You are not in a group with another participant B. Consequently you always have the right to decide which card is selected, and you cannot give it away. Since there is no second participant, there is no recommendation.

Figure 69: Screen 31



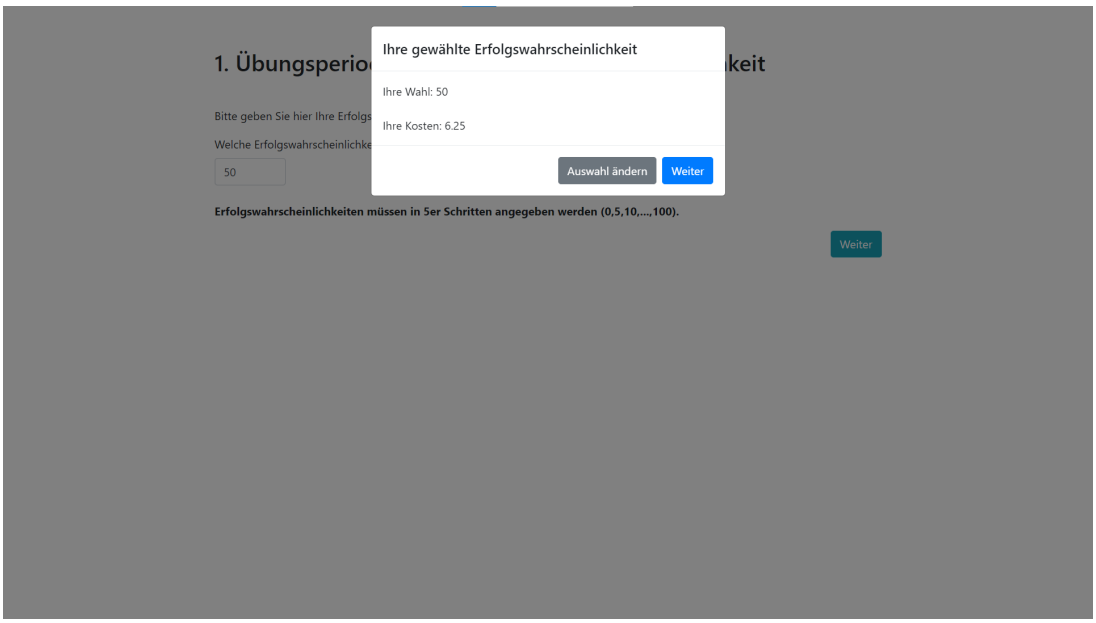
Translation: **1. Exercise period.** Now the 1. exercise period begins.

Figure 70: Screen 32



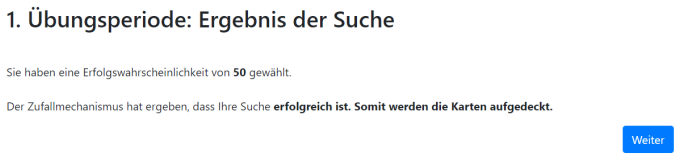
Translation: **1. Practice period: Choice of the probability of success.** Please enter your probability of success here. Which probability of success do you want to select? Probabilities of success must be specified in increments of 5 (0,5,10,..., 100).

Figure 71: Screen 33



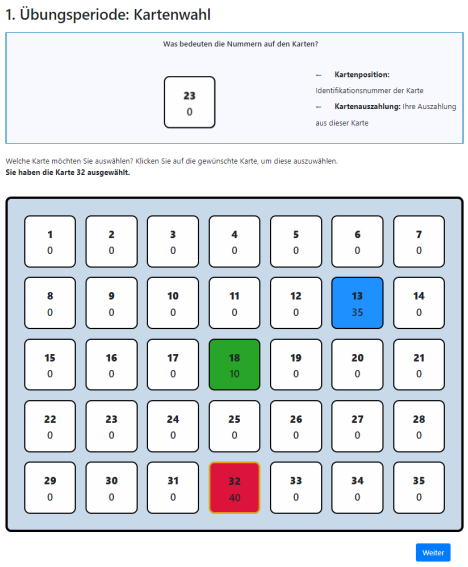
Translation: **Your selected probability of success.** Your choice: 50. Your cost: 6.25.

Figure 72: Screen 34



Translation: **1. Exercise period: Result of the search.** You have selected a probability of success of 50. The random mechanism has shown that your search is successful. Thus, the cards are revealed.

Figure 73: Screen 35

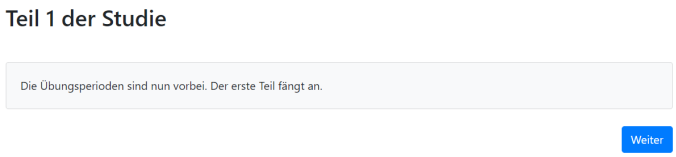


Translation: **1. Exercise period: Card selection.** What do the numbers on the cards mean? Card position: 23 = Card identification number. Card payout: 0 = Your payout from this card. Which card do you want to select? Click on the desired card to select it. You have selected card 32.

Figure 74: Screen 36

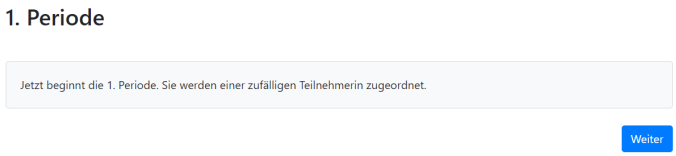
Translation: **1. Exercise period: Result.** You have selected the following card: red card. Your income from this card: 40 points. Your probability of success in this period: 50. Your search cost: 6.25 points. Your total income in this period: 33.75 points.

Figure 75: Screen 37



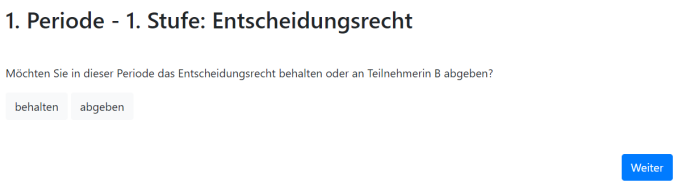
Translation: **Part 1 of the study.** The practice periods are now over. The first part begins.

Figure 76: Screen 38



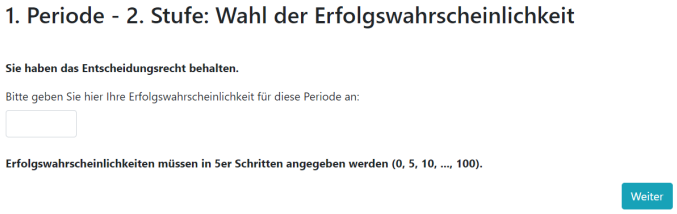
Translation: **1. Period.** Now the 1. period begins. You will be assigned to a random participant.

Figure 77: Screen 39



Translation: **1. Period - 1. Stage: Right of decision.** Do you want to keep the decision-making right in this period or give it to participant B? keep hand over

Figure 78: Screen 40



Translation: **1. Period - 2. Stage: Choice of probability of success.** You have retained the right to decide. Please enter your probability of success for this period here: Probabilities of success must be specified in increments of 5 (0, 5, 10, ..., 100).