ECONSTOR
Make Your Publications Visible.

A Service of
ZBW
Leibniz-Informationszentrum Wirtschaft
Leibniz Information Centre for Economics

Koessler, Ann-Kathrin

Working Paper

Setting new behavioural standards: Sustainabilty pledges and how conformity impacts their outreach

Suggested Citation: Koessler, Ann-Kathrin (2019) : Setting new behavioural standards: Sustainabilty pledges and how conformity impacts their outreach, ZBW – Leibniz Information Centre for Economics, Kiel, Hamburg

This Version is available at:
https://hdl.handle.net/10419/195048

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

WWW.ECONSTOR.EU

Mitglied der Leibniz-Gemeinschaft

SETTING NEW BEHAVIORAL STANDARDS: SUSTAINABILITY PLEDGES AND HOW CONFORMITY IMPACTS THEIR OUTREACH

Ann-Kathrin Koessler[1]

Alexander von Humboldt-Professorship of Environmental Economics,

Department of Economics, University of Osnabruck, Germany

ABSTRACT

Sustainability pledges are en vogue. In the business sector, but also in climate negotiations, pledges are used to signal actors' intention to act pro-environmentally. Laboratory experiments testify to the potential effectiveness of these public declarations. Previous work has examined under which conditions subsequent trust and cooperation can flourish.

In this study, I postulate that also conformity is an important determinant for the effectiveness of pledges. In specific, I examine what role social influence plays in the decision to pledge. In a public good game, subjects can make prior play a pledge to contribute to the public good in the socially optimal way. Across treatment conditions, I vary the way in which the pledges are elicited. Hence, the degree of social influence on pledge making is manipulated and its impact can be examined.

I find that when individuals are aware that the majority of other subjects decided to pledge, they are likely to conform and also make the pledge. The emergence of such a critical mass can be stimulated when the elicitation of pledges is based on previous contribution behavior. Overall, this commitment nudge is effective. Both socially-oriented and previously not socially-oriented subjects modify their behavior after the pledge.

Keywords: *voluntary approaches, pledge, social dilemma, public good, commitment, conformism, environmental policy*

JEL classification: A13, C72, C91, H41

Funding: This study was funded by the Alexander von Humboldt-foundation as part of the Alexander von Humboldt-Professorship of Environmental Economics at the University Osnabruck.

Acknowledgements: I thank Erik Ansink, Stefanie Engel, Aneeque Javaid, Peter Martinsson, Benjamin Ouvrard, and Caroline van Bers for their valuable comments on earlier versions of this manuscript.

[1]akoessler@uos.de, Tel.: +49-541-969-2424, Fax: +49 541 969-2599
Alexander von Humboldt Professorship `Behavioral Economics for the Environment´, Institute of Environmental Systems Research, University of Osnabruck, Barbarastr. 12. 49076 Osnabruck. Germany.

Introduction

To tackle climate change and other environmental challenges, behavioral changes in all aspects of daily life are needed. As crucial as these changes are, mandatory compliance with stricter behavioral norms are, in most cases, difficult to enforce. Hence, it seems reasonable to bank more on voluntary approaches and invest in identifying ways to change associated social norms (Nyborg et al., 2016). Voluntary commitments to adhere to certain behavioral standards can be one approach to promoting pro-social and pro-environmental behavior.

Sustainability pledges in climate negotiations or in the business sector (ClimateAction, 2018), are one example of this approach. Previous work has examined whether, and under which conditions, pledges can serve as effective commitment and coordination devices in such social dilemmas (Barrett & Dannenberg, 2016; Dannenberg, 2015b; Koessler, Page, & Dulleck, 2017; Tavoni, Dannenberg, Kallis, & Loschel, 2011). However, the effectiveness may depend not only on the characteristics of the pledge or the situation but may also be determined by the way in which the pledges are elicited.

The decision to make a public commitment, such as a sustainability pledge, may be motivated in different ways. For example, a commitment to act more sustainably may be based on self-centered reasons; the actor is anyway motivated to act according to the behavior suggested in the pledge, e.g. to cut greenhouse gas emissions or to make the business practice more sustainable.[2] On the other hand, the actor's reasons can be also external. Observing a critical mass of pledge-makers may motivate the actor to conform and follow the new trend of pledging.

[2]Self-centred motives can be intrinsically motivated, but they can also be a reaction to a higher environmental awareness on the part of citizens or consumers.

In this research, I examine what role social influence plays in the pledging process and I test how information about the decisions of others to pledge can affect the associated outcomes.

The following real-world example illustrates the role that social influence may play in the pledging process. At Climate Week NYC 2014, thirteen[3] multinational companies committed to sourcing 100% of their electricity from renewable energy in order to reduce CO2 emissions in the future. The initiative, which is now known as *RE100*, states as its aim the bringing together of influential businesses and the promotion of the transition to a low-carbon economy. Subsequently at Climate Week NYC 2015, more companies joined the initiative (TheClimategroup, 2015). Soon, a critical mass of first movers was achieved, who in turn motivated other companies to join in and sign the declaration. Today 93 companies, including some of the world's largest multinationals, such as Walmart and Apple, have made the commitment[4] to go '100% renewable' (RE100, 2017).

A second example, which other authors (Barrett & Dannenberg, 2016; Tavoni et al., 2011) also refer to, are the emission reduction pledges made in climate negotiations. Here too, path dependency in the outcomes is observable: the results of a summit often depend on which nation declares what goals at what point during the summit. In the appendix, a detailed case description is offered.

Thus, the motivation to articulate a commitment to pro-environmental behavior is for some actors self-motivated, but for others it is not. For the latter, making a pledge is the result of conformity motivated by a desire to go along with what the critical mass does. But is a promise motivated by the desire to conform also powerful enough to change behavior? So far, existing research on commitment has always highlighted the importance of autonomous decision

[3] IKEA Group, Swiss Re, BT Group, Formula E, H&M, KPN, Nestlé, Philips, RELX Group, J. Safra Sarasin, Unilever, YOOX Group, Mars Inc..

[4] Throughout the paper, I will use the term commitment to describe a promise which is non-binding and might or might not be fulfilled (Kerr & Kaufman-Gilliland, 1994).

making for a commitment effect to unfold (Charness & Dufwenberg, 2010b; Linder, Cooper, & Jones, 1967).

Using the controlled setting of a laboratory experiment, I examine how a pledge to act in a socially optimal manner affects behavior in a public good situation. By modifying the elicitation order, I control what information *followers* receive about the pledging decision of the other group members and which subjects are selected as *first-movers*. Further, I test whether pledges made on the basis of conformity concerns motivate higher contributions. In previous studies, the decision about the pledge was either elicited simultaneously (Barrett & Dannenberg, 2016; Dannenberg, 2015b; Koessler et al., 2017; Tavoni et al., 2011) or pledges arose endogenously in free-text communication (Bicchieri, 2002; Orbell, Dawes, & van de Kragt, 1990; Orbell, van de Kragt, & Dawes, 1988). Consequently, conformity as a behavioral driver has not yet been systematically analyzed.

Contrary to previous studies on conformity or leadership, I do not investigate the effects on behavior directly. Rather, the declaration of intent in my study serves as a preparatory act for subsequent behavior. While it is easier to conform on the basis of a word than an action, I find that the public commitment made still affects the behavior of the pledge-makers. If sequential elicitations of commitments (to environmental protection) motivate more people to pledge, and this expression of intent can also bring about a change in behavior, then a powerful mechanism has been found to promote pro-social and pro-environmental behavior.

The remainder of this paper is organized as follows: In Section 2, relevant insights from existing research are summarized. In Section 3, the experimental design is presented and behavioral predictions are derived. The experimental results are presented in Section 4. Section 5 concludes the paper with a discussion of the results and their implications for policy and practice.

Related literature

A long tradition of experimental studies proves the generally positive effect of pre-play communication on cooperation in social dilemmas (Chaudhuri, 2011). Early studies on free-form communication already point to the dominant role of promises in such communication (Bicchieri, 2002; Orbell et al., 1990, 1988). Subsequent studies identified promises as a stand-alone means of promoting cooperation, and examined whether, and under what conditions, announcements of intended contributions alone can help to motivate higher contributions to public goods. An initial finding of this research is that promises can only be effective if they are credible, i.e. the promise is understood as a signal of the true intentions of an actor (Barrett & Dannenberg, 2016; Bochet & Putterman, 2009; Dannenberg, 2015a). If, on the other hand, interaction partners discover that the promised and realized behavior differ, the pledge loses its effectiveness and can even be counterproductive for cooperation (Wilson & Sell, 1997). It can be assumed that this disappointment effect is stronger when only one player can make a declaration of intent. The pledge-maker, if his words are not credible, takes the role of an unreliable leader (see following page on leadership). If all players can announce their intentions, initial studies indicate that pledges are most effective in promoting cooperation when all players make the pledge (Koessler et al., 2017; Orbell et al., 1990).

Voluntary pledges are associated with a strong selection effect, that is that socially-oriented players who exhibit high rates of cooperation are more likely to make the pledge (Ismayilov & Potters, 2016; Koessler et al., 2017). Pledge-makers increase their contributions further if they want to behave consistently with the promised behavior (Festinger, 1962)[5] or if other players expressed similar intentions and a new group standard has been expressed (Bicchieri, 2002).

[55] The literature examining the effect in bilateral interactions discusses two potential motives as to why actors want to act consistently (a) due to a preference to keep one's word (Ellingsen & Johannesson, 2004; Vanberg, 2008) and (b) due to guilt aversion based on the expectations one has created in others through the pledge (Charness & Dufwenberg, 2006).

As far as form is concerned, previous experiments suggest that announcements in text format, rather than simple numerical pledges, have an effect on contribution behavior (Bochet, Page, & Putterman, 2006; Chen & Komorita, 1994; Wilson & Sell, 1997).

To the best of my knowledge no study has yet investigated how the decision to pledge is influenced by the decisions of others. In reality, however, the actors often know how others have decided before they decide to make the commitment. This social information is likely to influence the actor's decision on the pledge. Social influence can go so far that the *'individual expresses a particular opinion or behavior in order to fit in to a given situation or to meet the expectations of a given other, though he does not necessarily hold that opinion or believe that the behavior is appropriate'* (see definition of conformity, The Blackwell Encyclopedia of Sociology, 2007, p. 4426).

Research on conformity speaks in this context of an intrinsic desire to follow the behavior of others and of the experience of discomfort when standing out (Bernheim & Exley, 2015; Cialdini & Goldstein, 2004).[6][7] Taking into account the effect of social influence, sequential contribution structures are likely to influence the behavior in public good settings (Erev & Rapoport, 1990).[8] Steiger and Zultan (2014), for example, show that if players are able to observe previous moves, they condition their contribution in a linear public good game. As a result, early movers contribute more to motivate followers. Later movers, on the other hand,

[6] In Economics, the reasons underlying conformity are traditionally seen as being information-based (Banerjee, 1992; Bikhchandani, Hirshleifer, & Welch, 1992). Individuals rationally imitate the behavior of other individuals or groups in order to avoid sanctions for deviating from norms or to take advantage of the information acquired by others. More recent work, however, presents a new perspective which is more in line with the view of social psychology that conformity is mainly preference-based (Bernheim & Exley, 2015).

[7] Experimental studies in psychology even suggest that this experience of discomfort which follows the realization of being different, might not only motivate adaptation in behavior, but might ultimately also lead to a convergence in preferences (Nook, Ong, Morelli, Mitchell, & Zaki, 2016).

[8] Erev and Rapoport (1990), among others, find a positive effect of sequential giving on contributions in a threshold public good game. This finding contradicts Varian's early theoretical work on sequential contributions (1994) which predicts that sequential giving will lead to lower contributions than under simultaneous elicitation. Varian concluded that first movers would free-ride and it would be left to the followers to contribute sufficiently.

are more likely to observe previous, lower contributions and reduce in response their own contributions.

Complementary research on leadership examines the conditions under which one player's earlier move motivates higher contributions (from all players). A first mover can either lead by example, i.e. the player makes a costly commitment in the form of an actual contribution (Güth et al 2007, Levati et al. 2007, Dannenberg et al), or lead by suggestion, i.e. the player sends a non-binding message to the other group members (Wilson and Sell 997, Levy et al. 2011, Houser et al. 2014). Studies comparing the two forms do not give a consistent picture. Sahin et al. (2015) find that neither of the leadership institutions is effective in increasing contributions in a linear public good game. Pogrebna et al. (2011) find that both leadership styles increase average contributions to a similar extent. Dannenberg (2015a) finds that leading by example is more effective, but if subjects have a choice, the majority prefer to lead by words or not at all. This result supports an earlier finding of Güth (2007) showing that only a few groups succeed in installing a leader endogenously, although groups with leaders perform better. So even if actions are more effective in leading groups to higher contribution levels, it is not easy to find actors who are willing to do so.

The second dimension in leadership research which is of interest is how leadership differs when a leader has volunteered (Arbak & Villeval, 2013; Rivas & Sutter, 2011) as opposed to when a leader has been exogenously determined (Erev & Rapoport, 1990; Güth et al., 2007). Comparisons indicate that groups with voluntary leadership manage to achieve higher contribution levels than groups with exogenously selected leaders (Dannenberg, 2015a; Rivas & Sutter, 2011).

In my research, I do not explicitly study leadership, but rather the wider role of social influence on the announcement of intentions and consequent behavior. In the present study, not only the *first-movers*, but all players make a pledge before the contribution decision is due for everyone.

Since a critical mass of supporters can be found ex ante, `words´ may in this case be more powerful to guide group behavior. In addition, conforming is, in this study, not associated with immediate (material) costs, so that subjects may follow the pledging example of others more easily. Whether the nudged pledges are also effective in motivating pro-social behavior is examined in the following sections.

Experimental Design

The experiment is based on a two-stage design. All subjects played first the standard public good game (baseline stage), then groups were reshuffled and the treatments were installed before the second stage.

The baseline stage

Subjects were randomly paired in groups of four and played the standard linear public good game (with a voluntary contribution mechanism) for ten rounds (Marwell & Ames, 1979). The framing of the game was kept neutral, the matching groups remained fixed, and players were identifiable by constant player labels.

In each round, subjects were equipped with 20 experimental taler (game currency) and were asked how they wanted to allocate the endowment between a private and a public account with which a common project was financed. Money assigned to the personal account turned into personal earnings. Money assigned to the public account was summed up and multiplied by a factor of 1.6, and the resulting amount was equally distributed among all members of the group. While the social optimum was to contribute the entire endowment, the Nash equilibrium was to contribute nothing and free-ride on the contributions of others. The payoff function of the individual player was: $\pi_i = (20 - c_i) + 0.4 \sum^{4}_{j=1} c_j$.

After deciding on their own contribution, subjects were asked to report how many talers they thought the other players in their group had contributed (first-order beliefs).[9] Thereupon, subjects were informed about the individual contributions of each group member and received feedback on their (potential) payoff from this round. At the end of both stages, only one round was randomly selected to determine the payoff for the contribution decision and belief entry.

The second stage

After the tenth round, subjects were informed that the first part of the experiment was over and that new groups were formed for the second stage. The task, however, would remain the same as in the first stage. Subjects in the *Control* group then confirmed their participation for a second time, with a consent statement. In the *Pledge treatment* groups (*Simultaneous, SQ.Random, SQ.Endog* and *SQ.Average*), subjects learned about the possibility of making a public declaration about socially-optimal contributions prior to the start of play. It was made clear that the declaration was voluntary, would apply to all rounds in Stage 2, and would influence neither the later decision options nor the payoff structure. Subjects were also informed that they would learn how many players in their group made the declaration before the first contribution decision was due and that pledge-makers would be recognizable by a colored label in all the following rounds.

Pledging was undertaken in two steps. Subjects were asked whether they wanted to make the declaration and if so, they had to type the following statement*: 'I promise to contribute 20 taler in each of the following rounds'*.[10] Table I provides an overview of the treatment groups and observation numbers.

[9] The belief elicitation was incentivized with help of the quadratic scoring rule. To facilitate understanding, the payoff consequences were listed in the instructions for each possible deviation between guess and realized contribution by the other players.

[10] If subjects decided against the declaration, it was common knowledge that they would then need to type in the consent statement a second time. The consent statement was similar in length to the pledge, so that no consequences could be drawn from the typing behavior of the other participants.

Table I: Treatments

Group	**Description**	**Subjects**	**Groups**
Control	*Control group*	96	24
Simultaneous	*Simultaneous pledge*	96	24
SQ.Random	*Pledging order randomly determined*	96	24
SQ.Average	*Pledging order determined based on average contributions in the first stage*	96	24
SQ.Endog	*Pledging order determined endogenously*	96	24
Total		**480**	**120**

In the treatment group *Simultaneous*, subjects were simultaneously asked to make a decision about the pledge. e.[11] In the sequential treatment groups, the elicitation of the pledge was either done in turn or developed endogenously within the groups. In all treatments, subjects were informed about how many players were previously asked whether they wanted to make the pledge. Further, they learned how many of those opted to make the pledge. Thus, subjects always knew in the sequential treatments how others decided, before they had to make the decision themselves. In *SQ.Random*, the order in which subjects were asked about the pledge was randomly determined. In *SQ.Average*, the decision order was determined based on the subject's average contributions in the first stage. Subjects whose average baseline contribution was highest in the new matching group were asked first. This selection mechanism was unknown to the subjects. In *SQ.Endog*, no decision order was given, but the instructions stated that all group members had to make a decision, regardless of whether they wanted to make the pledge. As soon as a subject made a decision, it was shown to all group members in real time. The game instructions can be found in the supplementary material.

[11] This treatment is a replication of the pledge used in Koessler et al. (2017), whereby the promised contribution level in this study was at 75% of the endowment.

The experiment was conducted at the experimental laboratory of the University Osnabruck using the experimental software SOPHIE (Hendriks, 2012). Subjects were students recruited from the local database of potential subjects via ORSEE (Greiner, 2015). Average earnings were 12 €uro and one session lasted about one hour.

Behavioral Predictions

Under the assumption that individuals are only interested in maximizing their own profits, players should always make the promise to motivate other group members to contribute, but never contribute to the public good themselves. However, also assuming common rationality, the other players are aware of the true intentions of the pledge-maker and will not attach importance to the declaration. Following this logic, pledges do not change the prediction of rational choice that no contributions will be made to the public good.

The results of a myriad of empirical studies contradict this prediction. In general, players contribute between 40% and 60% of the optimal level to the public good, and communication prior to the start of the game can increase contributions significantly (Chaudhuri, 2011). In addition, contributions are conditional. Fischbacher et al. (2001) demonstrate that a high proportion of individuals act as conditional cooperators, meaning that contribution behavior correlates strongly with a subject's beliefs about how much others will contribute. Thus, cooperation is strongly belief-dependent. Some players are only willing to contribute (on high levels), when they believe that others do so as well. Communication in general, and a pledge in specific can prompt such a change in beliefs, if it is understood as a credible signal of other players' intention to contribute (Bicchieri, 2002; Orbell et al., 1988). For the present work, I assume that the intention of socially optimal contributions is more credible, the more unanimous a group is in its pledging decision, i.e. the more individuals make the pledge.

Prediction 1 - Salience: *The number of group members who made the pledge reinforces the group's intention of socially-optimal contributions. In consequence, the contributions after the pledge are higher the more group members made the pledge.*

Support for this hypothesis is found in the early studies of Orbell et al. (1990, 1988) in which the authors show that pledges in open communication are particularly effective in increasing contributions when all group members make the promise.

The second question of this research was how higher uniformity in the pledging decision can be reached. A finding from previous research gives direction in this regard. It has been shown that a strong selection effect in promise-making exists (Ismayilov & Potters, 2016; Koessler et al., 2017). Promises are more likely to be made by subjects who generally act in a more socially-oriented way, i.e. they contribute more than others to the public good. Therefore, I assume that when subjects who contributed most in the baseline stage are asked first about the pledge, they are highly likely to make the pledge. Further, I assume that when no decision order is determined, previously over-average contributing subjects move first and make the pledge.

Prediction 2a – Social Leaders in SQ.Avg: *When individuals who contributed previously on a high level to the public good are asked first about the pledge, they are more likely to make the pledge than a randomly selected player.*

Prediction 2b – Social Leaders in SQ.Endog: *When no decision order is determined, individuals who contributed previously on a high level are the ones who move first and make the pledge.*

As stated earlier, individuals dislike being different to others (Asch, 1961; Jones, 1984). Consequently, behavior or thinking is either consciously or subconsciously adjusted to the behavior that others exhibit. Following this, I assume that if a critical mass of pledge-makers is established in a group, i.e. the majority of previous players made the pledge, subsequent subjects conform with this behavior and also make the pledge.

Prediction 3 - Conformity: *When an individual observes that the majority of previously asked group members made the pledge, he or she also makes the pledge.*

This dynamic is independent from how the pledge was elicited. However, following the two former predictions, it can be assumed that in *SQ.Average* and *SQ.Endog* pledge-makers will more often be in the majority among the group-members than in the other treatment groups.

> ***Prediction 4a - Elicitation based on previous behavior:*** *When the decision order of the pledges is based on the level of previous contributions, pledge-making is more frequent than when the pledge is elicited randomly.*
>
> ***Prediction 4b – Endogenous elicitation order:*** *When the decision order of the pledges is not determined, pledge-making is more frequent than when the pledge is elicited randomly.*

Once individuals make a promise, it is likely that they follow through on it, so as not to experience a disutility from not keeping a promise (Charness & Dufwenberg, 2006; Ellingsen & Johannesson, 2004; Vanberg, 2008). Following this logic, total contribution levels should be highest in *SQ.Average.*

> ***Prediction 5 – Effect on contribution behavior:*** *Since significantly more pledges are made in SQ.Average, the resulting contributions in this treatment group are higher than under other elicitation schemes.*

Lastly, I will examine the reactions of low contributors. This group is not intrinsically motivated to act pro-socially, but according to prediction 3 makes the pledge when facing a critical mass of previous pledge-makers.

> ***Prediction 6 - Low contributors:*** *Individuals who previously showed no interest in contributing on a high level to the public good, make the pledge when the information about a critical mass of previous pledge-makers is available.*

The interesting question is whether these individuals will also change their behavior after the non-binding pledge. Previous work in Social Psychology and Behavioral Economics suggests that promises create an effective commitment, particularly when the individual decides autonomously to make the promise (Charness & Dufwenberg, 2010a; Joule & Beauvois, 1998; Linder et al., 1967). Whether the pledge in this study, which is precipitated with the help of

social pressure, is understood as an autonomous decision, is unclear and an integral part of this investigation.

Results

The section on results is structured in two parts. First, I present the results of the pledging decisions. In the second part, I analyse what effect the pledges have on contribution behavior. Hereby, I pay special attention to subjects who contributed low amounts in the baseline stage but then pledged to contribute the socially-optimal amount in the second stage.

Pledge-making

When the pledging decision was elicited simultaneously, 61.46% of the subjects decided to make the declaration. When the elicitation order was random (*SQ.Random*), 60.42% of the subjects decided to make the pledge. Hence, no significant difference was observed (Pearson χ^2 test *Simultaneous* vs. *SQ.Random:* $\chi^2 = 0.022$, $p = 0.882$). Also in *SQ.Endog*, where individuals decided themselves at what point they wanted to make the decision about the pledge, the pledging rate of 59.38% was similar to the rate in the two previous settings (Comparison with *Simultaneous:* $\chi^2 = 0.087$, $p = 0.768$; with *SQ.Random:* $\chi^2 = 0.022$, $p = 0.883$). When, however, the decision order was determined by the average contributions in the baseline stage, significantly more subjects made the pledge, specifically 80.21% in *SQ.Average* (Comparison with *Simultaneous*: $\chi^2 = 8.168$, $p = 0.004$, with *SQ.Random* $\chi^2 = 9.007$, $p = 0.003$; with *SQ.Endog:* $\chi^2 = 9.882$, $p = 0.002$).

Moreover, in the *SQ.Average* treatment group, pledge-makers formed the majority in most matching groups. Figure 1 depicts how the number of pledge-makers per group is distributed in the respective treatment conditions.

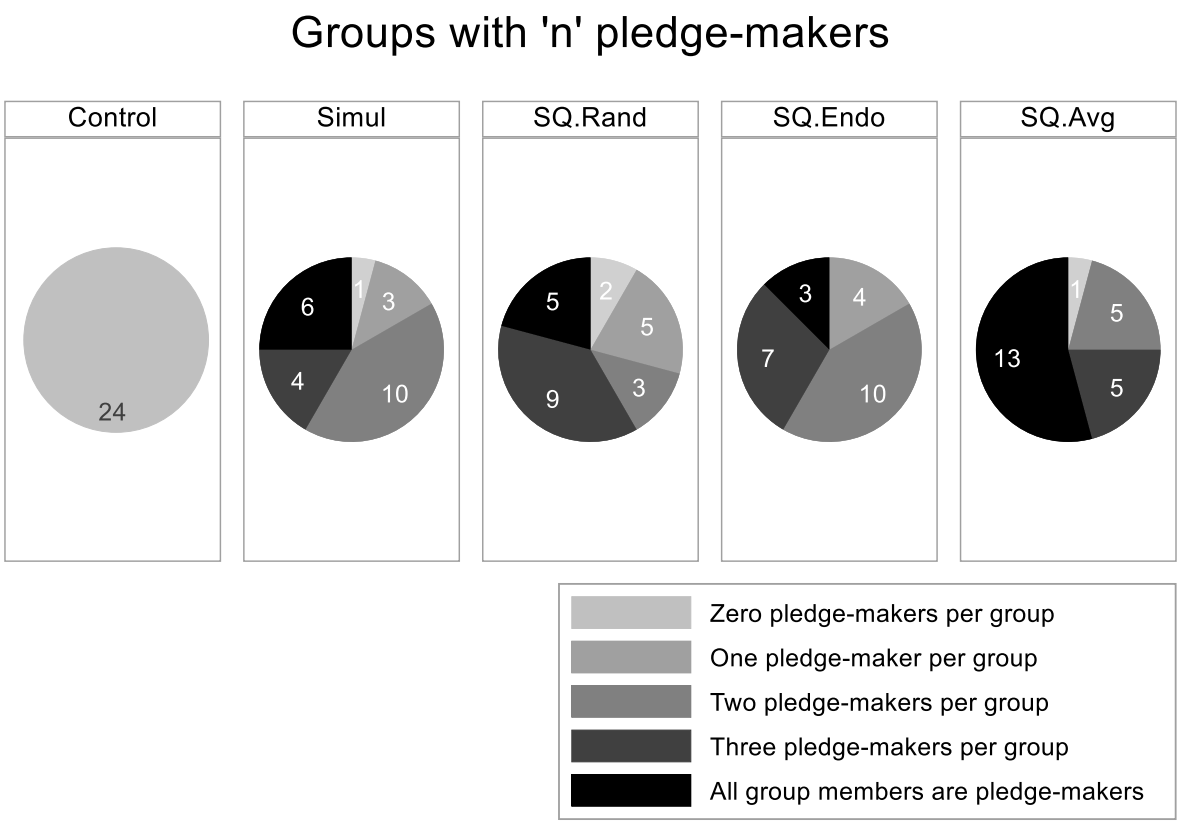


Figure 1: Distribution of groups with a specific number of pledge-makers per group

This graph shows how often groups with a specific number of pledge-makers were observed in a treatment group. Each treatment group has a total of 24 groups. The increasing shading of the segments indicates the increasing number of pledge-makers within one group. The numbers in each shaded segment indicate how many of the 24 participating groups had the same number of pledge-makers.

In 54% of the groups in *SQ.Average,* all group members made the pledge. In 75% of the groups, the pledge-makers constituted a majority among the group members. The high number of pledge-makers is a consequence of the way in which the elicitation of the pledging decision was done. In *SQ.Random,* pledge-makers were in the majority in 58% of the groups. In the *Simultaneous* and, surprisingly, also in the *SQ.Endog* treatment, pledge-makers formed the majority only in 42% of the groups. This finding supports prediction 4a.

> ***Result 1****: When pledges were elicited sequentially, with the order based on previous contribution levels, pledging was more common and pledge-makers formed the majority in more matching groups.*

As stated, it was part of the design in *SQ.Average* to exploit the fact that previous contribution behavior serves as a good proxy for the willingness to pledge (see table AI in the appendix). But, due to this manipulation, the social information to which a low or a high contributor was

exposed, differed strongly among the treatment groups. To account for these differences, I perform a multivariate regression analysis. Table II presents the results of a probit regression estimating the likelihood of a subject making the pledge.

Table II: Treatment effects on the likelihood of pledging

	(1)	(2)		(3)	(4)
Y_i =		***pledging likelihood*** *[corresponding decisions in treatment group Simultaneous serve as reference]*			
SQ.Random	0.001	0.025	*First movers*	-0.022	-0.018
	(0.071)	(0.071)		(0.107)	(0.104)
SQ.Endog	-0.078	-0.077		0.054	-0.007
	(0.111)	(0.114)		(0.137)	(0.138)
SQ.Average	0.185***	0.166**		0.249**	0.058
	(0.064)	(0.065)		(0.120)	(0.124)
SQ.Random × pledge_preexist ≥ 50 %			*Information about the pledging decision of others was available*	0.108	0.152*
				(0.090)	(0.090)
SQ.Endog × pledge_preexist ≥ 50 %				-0.083	-0.074
				(0.117)	(0.121)
SQ.Average × pledge_preexist ≥ 50 %				0.238***	0.255***
				(0.085)	(0.087)
SQ.Random × pledge_preexist < 50 %				-0.129	-0.112
				(0.098)	(0.101)
SQ.Endog × pledge_preexist < 50 %				-0.114	-0.075
				(0.128)	(0.130)
SQ.Average × pledge_preexist < 50 %				0.035	0.086
				(0.135)	(0.139)
Contrib_Avg1		0.039***			0.041***
		(0.008)			(0.009)
Otherscontrib_Avg1		-0.006*			-0.006*
		(0.003)			(0.003)
Demographic controls	yes	yes		yes	yes
Observations	384	384		384	384

*Notes: This table presents the average marginal effects (calculated at means of all variables) from probit regressions on the likelihood of making a pledge. The pledging behavior in the Simultaneous setting serves as a reference point. In this treatment group, no information on the pledging decision of other group members was available before the subject's own pledging decision. 'pledge_preexist ≥ 50%' is a dummy variable that takes the value of one when a subject in the sequential treatments (SQ.Random, SQ.Endog or SQ.Avg) faced the situation that the majority of the previous players made the pledge. pledge_preexist < 50%' is a dummy variable that takes the value of one when the subject faced the situation that less than half of the previous players made the pledge. A subject's previous average contribution level is taken into consideration with 'Contrib_Avg1'. 'Otherscontrib_Avg1' accounts for the average contribution level observed by a subject to have been contributed by others in the baseline stage. All models include experimenter fixed effects. Robust standard errors are shown in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

Model 1 replicates the results from the non-parametric tests. Pledge-making in *SQ.Average* is significantly more likely than under all other treatment conditions ($p < 0.01$). Among the remaining schemes no significant difference in the pledging likelihood is found. This also means that prediction 4b is not supported; the pledging likelihood does not differ whether group members themselves decided when to make the pledge, the elicitation order was determined randomly, or group members decided simultaneously.

Model 2 accounts for the average contribution levels of individuals before the pledge ('Contrib_Avg1'), and the average contribution level observed by an individual to have been contributed by other group members in Stage 1 ('Otherscontrib_Avg1'). By controlling for these factors, the coefficient describing the additional increase in the pledging likelihood in *SQ.Average* becomes smaller, but the difference is still highly significant compared to the pledging likelihood in *Simultaneous* ($p = 0.011$) or in the two other sequential elicitation schemes (for the comparison with *SQ.Random:* $p = 0.041$; for the comparison with *SQ.Endog:* $p = 0.021$). Furthermore, the finding from previous studies is replicated: subjects who previously contributed more to the public good were more likely to make the pledge.[12]

Models 3 and 4 focus on the conformity aspect and take into account what social information was available to the decision-makers. Thus, the likelihood of pledge-making is estimated for three subgroups. First, for the individuals who were first in their group to decide on the pledge *(first movers)*. This group had no information about the other group members' decisions when making the pledge. Second, for all group members who were not first movers *(followers)*. In this group, I distinguish between (i) the individuals who observed that previous players predominantly decided to make the pledge ('pledge_preexist ≥ 50 %'), and (ii) individuals who

[12] The coefficient of others' contributions is negative and also statistically significant at a level of 5 %. This finding can be explained by the fact that the average contribution levels of other group members ('Otherscontrib_Avg1') are estimated relative to an individual's own average contributions in Stage 1 ('Contrib_Avg1'). Hence, the contribution levels of others are higher when the individual is a low contributor, but if this is the case, he or she is also less likely to make the pledge, independent of the contributions of others.

observed that previous players predominantly decided against the pledge ('pledge_preexist < 50 %'). Please note that the pledging likelihood of all three subgroups is estimated against the pledging likelihood in *Simultaneous*. Hence, the two dummy variables for the impact of social information do not cancel each other out.

Pledging decision of *first movers*

Overall, the likelihood of first movers making a pledge was highest when the elicitation order was based on previous average contribution levels. Compared to the pledging likelihood in *Simultaneous*, the pledging likelihood of first movers in *SQ.Average* was 25 percentage points higher (p = 0.039). And, compared to the pledging likelihood of first movers in *SQ.Random* where the elicitation was also undertaken sequentially, but in random order, the likelihood in *SQ.Average* was 28 percentage points higher (p = 0.067).[13] Therefore, I find support for prediction 2a. When high-contributing individuals got asked first about the pledge, the likelihood was higher that the first pledging decision was positive. In *SQ.Endog*, where it was up to the group members to determine the decision order, the pledging likelihood of first movers was slightly higher than in *Simultaneous* or *SQ.Random*, but not in a statistically significant manner (p = 0.692 and p = 0.651, respectively).

As part of prediction 2b, I expected that high-contributing individuals would be the first group members to make the pledge when there was no predetermined decision order. However, this is not the case. By constructing a variable which simulates the selection process in *SQ.Average*, thus a variable which ranks the players in their Stage 2 matching group according to their average contributions in Stage 1, it becomes apparent that the first movers in *SQ.Endog* were more heterogeneous than expected. Only 37.5% of the first movers in *SQ.Endog* would have been asked first if the decision order had been based on previous average contributions. On the

[13] In *Simultaneous*, the pledging ratio among first movers was 61%, in *SQ.Random* the ratio was 58%.

other hand, 33% of first movers would have made the pledging decision being the last movers if previous contributions had determined the decision order.[14] [15] In summary, prediction 2b is not supported. Once the decision order was left to the group, it was no longer predetermined that previously high contributors acted first and made the pledge.

Finally, Model 4 shows that the higher probability of pledging among the first movers in *SQ.Average* disappears once one controls the average previous contributions on which the selection mechanism was based.

> ***Result 2:*** *(a) When individuals who had previously contributed to the public good at a high level were asked first whether they wanted to make a pledge about socially optimal contributions in the future, they largely agreed. As a result, the first decision on the pledge was significantly more often positive than when a randomly selected person was asked first. (b) If, on contrast, it was left to the individuals to decide on a pledging order, former high contributors did not necessarily act first.*

<u>Pledging decisions of *followers*</u>

In the group of *followers*, subjects were more willing to make the pledge when they learned that the majority of previous players did so (pledge_preexist ≥ 50 %). In *SQ.Average*, the effect of this information was strongest. A subject in *SQ.Average*, who observed that the majority of previous players made the pledge, was 24 percentage points more likely to pledge than a subject in the *Simultaneous* treatment group who did not receive this information (p = 0.005 in Model 3 and p = 0.003 in Model 4, respectively). One can argue that this effect is due to the artificial decision order in *SQ.Average.* But the same result is also obtained in *SQ.Random*, although in a weaker form. Once one controls for previous contribution behavior (and experience), a player in

[14] This pattern is also mirrored in the average contribution levels of first movers, these are weakly significantly higher in *SQ.Average* than in *SQ.Endog* (MWW test: p=0.074).

[15] These two groups also differed in their decisions about the promise. All first movers who would have been selected in *SQ.Average* to make the pledging decision first also made the promise, but for the others the pledging ratio was with 50% much lower. Overall, however, the difference in the pledge probability among the first movers was not statistically significant between *SQ.Endog* and *SQ.Average* (p = 0.239).

SQ.Random observing that the majority of previous players made the pledge was weakly significantly more likely to pledge than a player in *Simultaneous* who had not received this information ($p = 0.103$ for *SQ.Random* × pledge_preexist ≥ 50 % in Model 4). Hence, for the treatment groups *SQ.Random* and *SQ.Average*, prediction 3 is supported.

> ***Result 3:*** *When an individual observed that the majority of previously asked group members made the pledge, she was more likely to make the pledge herself than if she had not received this information.*

In *SQ.Endog*, the information that former players predominantly made the pledge did not increase the likelihood of followers pledging. If anything, the social information reduced the probability. This represents a significant difference to the effect the same message had in the other two treatment groups (for the comparison with *SQ.Random:* $p = 0.116$, for the comparison with *SQ. Average*: $p = 0.012$).

To examine why the response to the social information was different in *SQ.Endog*, it helps to break down the pledging decisions by the decision order and pre-existing amount of pledge-makers. Table AII in the appendix shows the respective likelihoods of observing a pledge in the treatment groups for each possible scenario. Based on this analysis, two observations can be made. First, players were generally more likely to make a pledge when previous players had done so. This reaffirms the conformity effect described in Result 3. Second, the proportion of first movers making the pledge differed among the treatment groups. In *SQ.Average*, a high proportion of first movers decided to make the pledge (83%). In *SQ.Endog*, the proportion of pledge-makers among first movers was slightly lower (71%). This difference at the outset increased in the subsequent rounds. In each elicitation round, fewer players were willing to make the pledge in *SQ.Endog* than in the analogous setting in *SQ.Average.* I see two explanations for this. First, the pledge in *SQ.Endog* constituted a weaker signal for a new behavioral standard because of the lower unanimity within groups. Second, the pledge in

SQ.Endog was perceived as a less credible signal for the other group members' intentions than in the other two treatment groups. In *SQ.Average* and *SQ.Random*, subjects on the same rank in the elicitation order and facing the same amount of previous pledge-makers were more likely to pledge than their counterparts in *SQ.Endog* (see table AII in the appendix). This suggests that the followers in *SQ.Endog* were less susceptible to the information. In consequence, I do not find support for prediction 4b.

> ***Result 4:*** *Letting subjects decide themselves when to make the pledge reduces the effectiveness of the pledges as a coordination mechanism.*

Behavior after pledging

This section examines whether and how the promised behavior carried over to actual behavior. First, the average group contributions across the treatments are compared. After, I investigate changes in individuals' contribution behavior, controlling for the subject's and other group members' pledging decisions, as well as their previous contribution behavior.

The left-hand panel in figure 2 shows the mean and median of group contributions in stage 2 across the treatment groups. Average contributions are clearly higher when a pledging option is available. Using average group contributions across rounds as the unit of observation, a Mann-Whitney Wilcoxon rank-sum test (MWW) reveals that, in *SQ.Endog* and *SQ.Average*, the pledging intervention led to a significant improvement in comparison to the contributions in the *Contro*l group ($p = 0.036$ and $p = 0.002$, respectively). Also in the *Simultaneous* setting, contributions improved close to statistical significance ($p = 0.101$). Among the treatment groups, however, there is no significant difference in the average group contributions.[16]

[16] The comparison between *Simultaneous* and *SQ.Average* points to weak significance ($p = 0.117$)

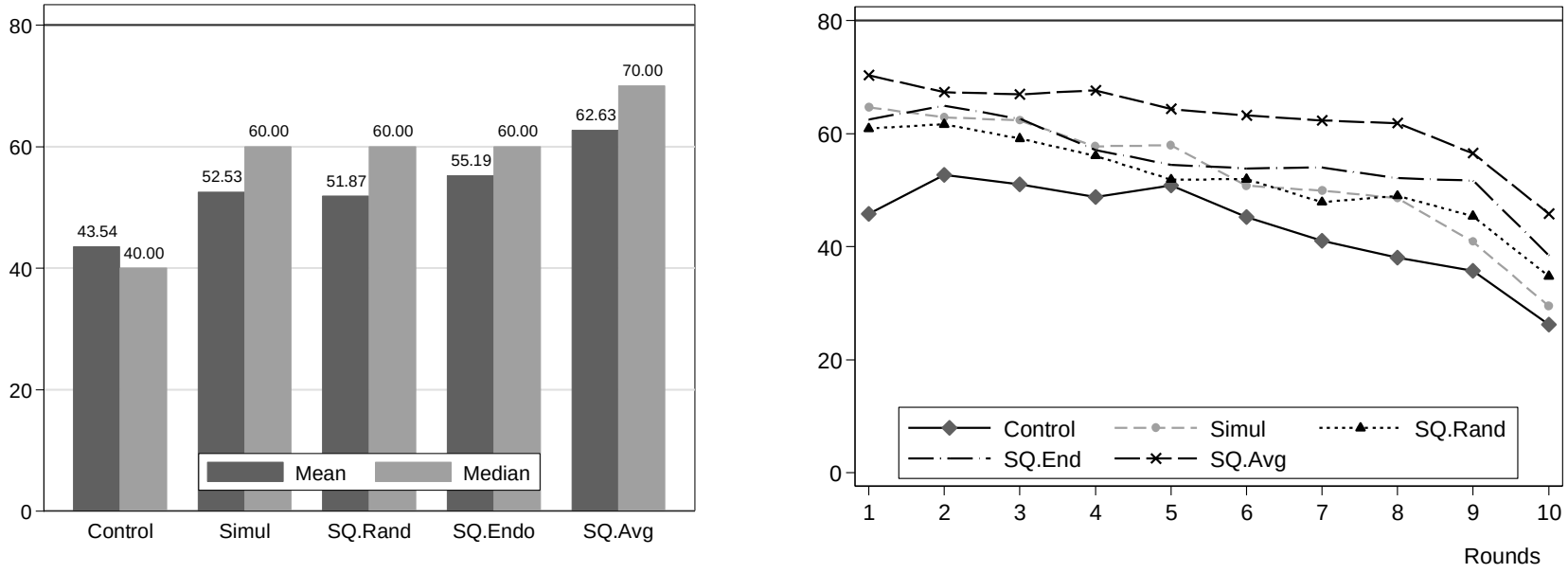


Figure 2: Group contributions in Stage 2

The left-hand panel shows the group contribution per treatment group in Stage 2 (after the pledge). The mean and median group contributions across rounds are displayed. The right-hand panel shows the development of average group contributions over time.

The right-hand panel in figure 2 shows the development of group contributions in stage 2 over time. In all treatment groups, the pledge led right at the outset to a change in contributions. Thereafter, the contributions in the sequential treatment groups deteriorated in a similar way to those in the *Control* group. The decay in *Simultaneous*, in contrast, was much steeper. I will come back to this when discussing the dynamic development of individual contributions. Among the treatment groups, the highest contribution level could be achieved in *SQ.Average*, in the first round immediately after the pledge, as well as in all subsequent rounds.

In summary, I find that the possibility of pledging leads to higher group contributions to the public good. However, I do not find that any of the sequential elicitation mechanisms additionally increase group contributions compared with the simultaneous setting. An additional analysis, based on individual contributions is performed to prevent that having group contributions chosen as the unit of analysis obscured differences in the dynamics and between the groups.

At first, the pure effect of the pledge is analyzed. When Stage 2 started, new groups were formed so that subjects could not make predictions, based on previous behavior, as to how new group members would behave. The pledges were the only available indication of how other group members intended to contribute. I begin the analysis by examining the effect of the pledge made in the first round, with no prior interaction having taken place between new group members.

Table III presents the results of OLS regression models estimating the contribution levels in the first round of Stage 2. The variables 'Contrib_Avg1' (the average contribution levels of individuals before the pledge) and 'Otherscontrib_Avg1' (the average contribution levels of other group members contributed in Stage 1) control for heterogeneities with which the subjects

may have entered the second stage.[17] [18] Model 1 measures the overall treatment effects. Having a pledging option available led to higher contribution levels in all treatment groups, compared with contributions in the control group ($p < 0.001$). Between the treatment groups, however, contributions were similar. Model 2 estimates separately the contributions for individuals who made the pledge and those who decided against it. Pledge-makers are clearly the source of the observed increase in contributions. In all treatment groups, contributions of pledge-makers were significantly higher than contributions of individuals who decided against the pledge ($p < 0.001$). The extent to which contributions of pledge-makers increased did not differ between the treatment groups. This suggests that for the first contribution decision after the pledge it was important whether a pledge was made, but not under which elicitation scheme the pledge was elicited.

Models 3 and 4 include the number of (other) pledge-makers in one's matching group as an explanatory variable. To facilitate readability, I present only the simplified model in which the difference between the pledging treatment groups is not distinguished. However, the patterns in the treatment groups are similar. Table AIV in the appendix shows the corresponding regression model and figure A1 illustrates graphically the increase in contribution, based on the number of pledge-makers in one's group and the corresponding treatment group.

[17] An example of these is the significantly lower contribution levels in *SQ.Random.* This is caused by one session in which subjects contributed very low amounts in the baseline. I decided to leave this session in to show the results on basis of the complete dataset. However, I have also performed the analysis without this session, and the results did not change. Note that the changes in *SQ.Random* do not constitute the main results, but serve as a control comparison with the behavioral changes in *SQ.Average* and *SQ.Endog*. Table AIII in the appendix shows the average contributions for all treatment groups and stages.

[18] For a robustness check, I have performed the same analysis using the change in contributions between the first rounds in Stage 2 and Stage 1 as dependent variables. The findings did not change.

Table III: OLS estimations of the change in contributions *(betw. the first rounds of Stage 1 and Stage 2)*

	(1)	(2)	(3)		(4)	
VARIABLES			***Contribution in first round after pledge***			
Simultaneous	5.063***	-0.026	N° pledge-makers = 0	-2.284***	N° pledge others = 0	-2.490***
	(0.805)	(0.997)		(0.729)		(0.742)
SQ.Random	4.739***	-1.042	N° pledge-makers = 1	-0.009	N° pledge others = 1	-2.377**
	(1.025)	(1.149)		(0.844)		(0.992)
SQ.Endog	4.522***	0.587	N° pledge-makers = 2	3.768***	N° pledge others = 2	0.382
	(1.129)	(1.265)		(0.711)		(0.998)
SQ.Average	5.600***	-0.982	N° pledge-makers = 3	6.876***	N° pledge others = 3	2.495*
	(0.818)	(1.378)		(0.703)		(1.334)
			N° pledge-makers = 4	7.719***		
				(0.619)		
Simul × pledge-maker		8.116***			N° pledge others = 0 × pledge-maker	5.998***
		(0.640)				(1.252)
SQ.Rand × pledge-maker		8.088***			N° pledge others = 1 × pledge-maker	7.004***
		(0.728)				(0.805)
SQ.Endo × pledge-maker		7.298***			N° pledge others = 2 × pledge-maker	8.264***
		(0.939)				(0.715)
SQ.Avg × pledge-maker		7.387***			N° pledge others = 3 × pledge-maker	7.828***
		(0.690)				(0.635)
Contrib_Avg1	0.824***	0.578***		0.695***		0.572***
	(0.103)	(0.081)		(0.090)		(0.079)
Otherscontrib_Avg1	-0.103***	-0.063**		-0.082***		-0.065***
	(0.037)	(0.027)		(0.031)		(0.025)
Constant	5.549***	7.041***		6.314***		7.138***
	(0.959)	(0.925)		(0.926)		(0.912)
Observations	480	480		480		480
R-squared	0.322	0.554		0.466		0.574

*Notes: This table presents the results of an OLS regression of the contributions in the first round of Stage 2, after the pledging decision was made. The variables Simultaneous, SQ.Random, SQ.Endog and SQ.Average are dummy variables that take the value one in the corresponding treatments, and zero otherwise. 'N° pledge-makers' accounts for the number of pledge-makers in one's matching group. 'N° pledge others' accounts for the number of other pledge-makers. The interaction with 'pledge-maker' estimates the change in contributions for individuals who have decided to pledge. All models include experimenter fixed effects. Robust standard errors, clustered on the group level, are shown in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

Eventually, the highest contribution levels were reached in groups in which all members made the pledge. This result is in line with previous findings in the literature (Koessler et al., 2017; Koessler, Torgler, Feld, & Frey, 2019; Orbell et al., 1990); the more group members comply with the pledging request, the more salient is the new behavioral standard, or as Bicchieri interprets the same result in Orbell et al. (1990): *"Individuals are more likely to cooperate when everyone in the group promises to cooperate, that is, when a consensus on how to behave is reached and an informal social contract is established."* (Bicchieri, 2005). This result provides support for prediction 1.

> ***Result 5****: The greater the number of group members that made the pledge, the stronger the positive influence of the pledge on contributions. The highest contribution levels were reached when all group members made the pledge.*

Model 4 examines separately the effect of social influence on pledge-makers and subjects who decided against the pledging. For subjects who decided <u>against</u> the pledge, the change in contributions was dependent on the actions of the majority of other players. When a critical mass of pledge-makers (2 or more) was present, non-pledge-makers contributed significantly more than subjects in the *Control* group, regardless of the fact that they previously decided against the pledge.[19] When the majority of other players, however, also decided against the pledge, the first round contributions of the non-pledge-makers were significantly smaller than in the *Control* group ($p = 0.001$ for no pledge and $p = 0.018$ for one pledge).

On the other hand, when individuals were pledge-makers, contributions always increased significantly after the pledge, whereas the impact of social influence was comparatively small. The smallest increase in pledge-makers' contributions was found when the subject was the only pledge-maker in her matching group. Being in the company of another pledge-maker strengthened the pledging effect ($p = 0.079$). However, it had no statistically significant impact

[19] H0: *N° pledge others* = 1 = *N° pledge others* = 2: $F_{1,119} = 6.19$, $p = 0.014$,
H0: *N° pledge others* = 1 = *N° pledge others* = 3: $F_{1,119} = 11.92$, $p = 0.001$.

on the contributions in the first round after the pledge (p = 0.385) whether two additional or all group members made the pledge. Knowing that the majority of others had also decided to make the pledge was sufficient to support an individual's intention and motivated, in accordance with prediction 1, an increase in contributions.

> ***Result 6****: Subjects who decided against the pledge nonetheless increased their contributions when a critical mass of their group members made the pledge.*
>
> ***Result 7****: Subjects who made the pledge increased their contributions significantly after the pledge. This effect is independent of how the pledge was elicited. The presence of one other pledge-maker increased the contributions of others.*

Another way to analyze the effect of the pledge is to examine compliance with the promised behavior. When a pledge-maker was the only group member who made the pledge, 83% of pledge-makers fulfilled their promise and contributed the socially optimal amount in the first round after the pledge (N = 12). When other group members also made the pledge, the compliance rate increased. When all group members made the pledge, up to 99.1% of the individuals contributed in a socially-optimal way (N = 108).[20] Hence, also the compliance with the pledge is higher when more group members made the pledge. This is another finding which supports prediction 1.

So far, I have examined the direct effect on the contribution behavior. After the pledge, subjects who made the pledge contributed significantly more to the public good than subjects in the *Control* group. Moreover, subjects who decided against the pledge also contributed significantly more when there was a critical mass of pledge-makers in their group. But how effective was this newly (induced) behavioral standard in the longer run? Did the positive effect of the pledge collapse after a few interactions or could a long-lasting behavioral change be manifested? Table IV shows the results of random effects panel regressions estimating the

[20] 97.3% when two other group members made the pledge; 99.1 % when all players in the group made the pledge.

levels of contributions for all rounds and treatment groups in Stage 2. In Model 1, average contributions are compared. The analysis reveals that contributions in all pledging treatment groups are significantly higher than in the *Control* group. In *Simultaneous* and *SQ.Random,* the contributions are higher on a 5% level of statistical significance. For *SQ.Endog,* the effect is weaker and contributions are only higher on a 10% level of statistical significance ($p = 0.105$). In line with the previous results, the strongest positive impact of the pledging option is found in *SQ.Average*. Here, significantly more players made the pledge, with the salience of the new behavioral standard thus being stronger and inducing more extensive behavioral changes than under all other treatments. Comparisons with the contributions in *Simultaneous* and *SQ.Random* reveal weakly significant differences ($p = 0.102$ for the comparison with *Simultaneous* and $p = 0.085$ for the comparison with *SQ.Endog*).

To examine the development of the effect on contributions over time, round parameters are included in Model 2. The steep decay of contributions in the *Simultaneous* treatment group, previously observed in figure 2, now becomes visible. Over time, contributions in all groups, control or treatment, deteriorated significantly, but the decline in contributions in *Simultaneous* is significantly stronger than in all other groups.[21] It seems that this is the consequence of the lower proportion of pledge-makers in the *Simultaneous* treatment condition. Here, the newly introduced behavioral standard was less adhered to by large parts of the groups. Consequently, pledge-makers seemed to reduce their contributions more rapidly when they realized they were in the minority, regardless of the pledge they made or their initial interest in coordinating on better outcomes. This finding provides additional support for prediction 1.

> ***Result 8****: When there were more pledge-makers in a matching group, the increase in contributions due to the pledge was sustained for longer.*

[21] H0: *Simultaneous* × Round = *SQ.Random* × Round: $\chi2 = 2.76$, $p = 0.097$,
H0: *Simultaneous* × Round = *SQ.Endog* × Round: $\chi2 = 5.94$, $p = 0.015$,
H0: *Simultaneous* × Round = *SQ.Average* × Round: $\chi2 = 8.00$, $p = 0.005$.

Table IV: OLS Panel regression on the development of contributions in Stage 2

	(1)	(2)
VARIABLES	**Contributions in Stage 2**	
Simultaneous	2.482**	3.990***
	(1.221)	(1.056)
SQ.Random	2.929**	3.221**
	(1.397)	(1.344)
SQ.Endog	2.169	2.022
	(1.337)	(1.246)
SQ.Average	4.415***	3.993***
	(1.019)	(0.966)
Round		-0.590***
		(0.073)
Simultaneous × Round		-0.274*
		(0.157)
SQ.Random × Round		-0.053
		(0.157)
SQ.Endog × Round		0.027
		(0.119)
SQ.Average × Round		0.077
		(0.121)
Contrib_Avg1	0.883***	0.883***
	(0.064)	(0.064)
Others Contrib_Avg1	-0.177***	-0.177***
	(0.024)	(0.024)
Constant	6.667***	9.911***
	(1.002)	(1.012)
Observations	4,800	4,800
Number of ID	480	480

*Notes: This table presents the results of random effect Panel OLS models on the contribution levels in Stage 2. The contribution behavior in the Control group serves as reference. The 'Round' variable accounts for the round iteration in which the contribution was made. A subject's previous average contribution behavior is taken into consideration with 'Contrib_Avg1'. 'Otherscontrib_Avg1' accounts for the average contribution level a subject experienced through others in the baseline stage. All models include experimenter fixed effects. Robust standard errors, clustered on the group level, are shown in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

Behavior of low contributors in the pledging treatments

One key motivation for this study was the question of whether subjects who are not socially oriented can be nudged to promise socially-optimal behavior, motivated by the desire to do what the majority does, and whether this commitment would be strong enough to motivate a behavioral change in these subjects. To examine this question, I identify subjects who contributed less than average in the baseline stage (mean contribution from Stage 1 < 11.03)[22] as low contributors, and test whether they behave differently before and after the pledge. Table V shows the regression results estimating the likelihood of a pledge and the difference in contribution behavior for those low contributors.

Model (1) indicates that low contributors were particularly susceptible to the pledge in the *SQ.Average* treatment group. The exposure to a critical mass of pledge-makers was obviously effective. Low contributors were 27 percentage points more likely to make the pledge in *SQ.Average* than, for example, in the *Simultaneous* setting ($p = 0.022$). In the *SQ.Endog* treatment, the likelihood of a low contributor making the pledge is close to being statistically significant ($p = 0.102$). Model (2) estimates the average difference in contributions between Stage 1 and Stage 2 rounds. Low contributors, who have been motivated to make the pledge, increased their contributions in a statistically significant manner ($p < 0.001$).

> ***Result 9****: Subjects who previously acted in a non-social way and chose to make a pledge, significantly increased their contributions after the pledge.*

To probe for the robustness of this finding, I examine the changes in contributions based on the decision order in *SQ.Average*. Figure A2 in the appendix shows how much respective group members increased their contributions. The finding is confirmed; group members who were

[22]As a robustness check, I performed the same analysis using the mean contribution from only the first round of Stage 1 as a cut-off level (10.43 Taler). At this point, group members had not yet influenced each other. The results did not change.

asked last about the pledge, i.e. the previous low-contributing subjects, increased their contributions significantly.

Table V: Behavior of low contributors

VARIABLES	(1) Pledge-making	(2) Difference in Contributions
Simultaneous		-0.246
		(1.49)
SQ.Random	0.058	0.598
	(0.094)	(1.344)
SQ.Endog	0.062	-1.685
	(0.038)	(1.206)
SQ.Average	0.257**	0.671
	(0.112)	(1.535)
Simultaneous × pledge-maker		6.912***
		(1.971)
SQ.Random × pledge-maker		7.702***
		(1.213)
SQ.Endog × pledge-maker		8.298***
		(1.383)
SQ.Average × pledge-maker		8.608***
		(1.043)
Contrib_Avg1	0.016	
	(0.015)	
Otherscontrib_Avg1	-0.007*	-0.154***
	(0.004)	(0.033)
Constant		3.569
		(3.04)
Demographic controls	yes	yes
Observations	200	2,520
IDs	200	252

*Note: **Pledge-making:** Column (1) presents the marginal effects of a probit regression on the likelihood that a subject classified as 'Low contributor' (i.e. contributed less than 11.03 taler) made the pledge. The pledging behavior in the Simultaneous treatment serves as reference. **Contributions:** Column (2) presents the results of a Random Effects GLS Regression on the difference between Stage 2 and Stage 1 contributions for low contributors. The change in contributions of low contributors in the Control group serves as reference. Robust standard errors are shown in parentheses. In column (2) standard errors are clustered on the group level. *** p<0.01, ** p<0.05, * p<0.1*

Conclusion and Discussion

In this paper, I have examined how social information influences the motivation of individuals to publicly commit to act socially-optimal in the future. I elicited pledges sequentially 1) by a random mechanism, 2) by a self-determined elicitation order, or 3) based on previously-exhibited social behavior. In doing so, I controlled for the role of social influence in the pledging decision. Subsequently, I examined whether decision-makers can be nudged to make a pledge when information about the decisions of their peers is available, and if so, whether a pledge motivated by conformity concerns is effective in stimulating socially-beneficial behavior.

Subjects who made the pledge in this study increased their contributions in the subsequent rounds regardless of how the pledge was elicited, that is, in which treatment the individuals made the pledge. What made a difference was whether another person in their group also decided to make the pledge. If so, this increased contributions further.

By determining the elicitation order based on previous contribution behavior, I have identified a way in which to increase the likelihood of positive announcement among *first movers*. Under this scheme, subjects who had previously contributed more than average were the first to be asked whether they wanted to pledge. This allowed a critical mass of pledge-makers to be established, before it was the turn of the previous low contributors to make a decision about the pledge. Since they were then facing a critical mass of pledge-makers a desire to conform was stimulated. Consequently, many of the previous low contributors also pledged and, interestingly, also changed their behavior after the pledge. The highest contribution levels were reached when all players made the pledge.

In the treatment group, in which no decision order was determined, pledging decisions were more heterogeneous than when previous high-contributors were targeted to make the first decision.

Even though my findings come from a laboratory experiment and their external validity is limited, in my opinion, some lessons can be learned which can be applied in practice. First, it is not only the inherent social orientation of an individual that plays a role in the decision whether or not to make a pledge, but also the behavior of relevant peers. Thus, providing information about the pledging decisions of others can be a 'nudge' that not only motivates the individuals (who are not socially-oriented) to pledge, but which can also initiate a later change in behavior. Second, when doing so, special attention should be paid to from whom the first pledges are elicited if new behavioral standards in a social group are to be promoted. For climate negotiations as well as for sectoral transformations towards more sustainability, it is advisable to develop a protocol on which basis potential pledge-makers are approached and how the information about their pledging decision is made public. The results of this paper suggest that the first pledges should be elicited from actors who have a self-centered motivation to act as the pledge suggests.

For future research (at least) two questions remain open. First, what happens when actors can remain silent on their pledging decision? Research has shown that humans have a preference to respond positively to pro-social requests, yet, when given the option of avoiding being asked, a substantial percentage of us makes use of this possibility (Andreoni, Rao, & Trachtman, 2011). Second, in my study, the main effect took place directly after the pledge, contributions increased, and the level effect remained in most treatment groups over the course of the ten rounds. But it is unclear what happens were interactions to be analyzed for a longer period of

time. Does the pledging effect fade over time? Overall, sustainability pledges remain an interesting voluntary approach to foster pro-social behavior without being a deterrent.

References

Andreoni, J., Rao, J., & Trachtman, H. (2011). Avoiding The Ask: A Field Experiment on Altruism, Empathy, and Charitable Giving. *Journal of Political Economy*, *125*(3), 625–653. https://doi.org/10.3386/w17648

Arbak, E., & Villeval, M. C. (2013). Voluntary leadership: Motivation and influence. *Social Choice and Welfare*, *40*(3), 635–662. https://doi.org/10.1007/s00355-011-0626-2

Asch, S. E. (1961). Effects of group pressure upon the modification and distortion of judgments. In M. Henle (Ed.), *Documents of Gestalt Psychology* (pp. 187–200). Berkley: University of California Press.

Banerjee, A. V. (1992). A Simple Model of Herd Behavior. *The Quarterly Journal of Economics*, *107*(3), 797–817. https://doi.org/10.2307/2118364

Barrett, S., & Dannenberg, A. (2016). An experimental investigation into 'pledge and review' in climate negotiations. *Climatic Change*, *138*(1–2), 339–351. https://doi.org/10.1007/s10584-016-1711-4

Bernheim, B. D., & Exley, C. L. (2015). *Understanding conformity: an experimental investigation* (Harvard Business School Working Paper No. 16-070).

Bicchieri, C. (2002). Covenants without swords: Group identity, norms, and communication in social dilemmas. *Rationality and Society*, *14*(2), 192–228. https://doi.org/10.1177/1043463102014002003

Bicchieri, C. (2005). *The grammar of society: The nature and dynamics of social norms*. *The Grammar of Society: The Nature and Dynamics of Social Norms*. Cambridge University Press. https://doi.org/10.1017/CBO9780511616037

Bikhchandani, S., Hirshleifer, D., & Welch, I. (1992). A Theory of Fads, Fashion, Custom, and Cultural Change as Informational Cascades. *Journal of Political Economy*, *100*(5), 992–

1026. https://doi.org/10.1086/261849

Bochet, O., Page, T., & Putterman, L. (2006). Communication and punishment in voluntary contribution experiments. *Journal of Economic Behavior & Organization*, *60*(1), 11–26. https://doi.org/10.1016/j.jebo.2003.06.006

Bochet, O., & Putterman, L. (2009). Not Just Babble: Opening the Black Box of Communication in a Voluntary Contribution Experiment. *European Economic Review*, *53*(2006), 309–326. https://doi.org/10.1016/j.euroecorev.2008.09.005

Charness, G., & Dufwenberg, M. (2006). Promises and partnership. *Econometrica*, *74*(6), 1579–1601. Retrieved from http://onlinelibrary.wiley.com/doi/10.1111/j.1468-0262.2006.00719.x/abstract

Charness, G., & Dufwenberg, M. (2010a). Bare Promises: An Experiment. *Economics Letters*, *107*(2), 281–83.

Charness, G., & Dufwenberg, M. (2010b). Bare promises: An experiment. *Economics Letters*, *107*(2), 281–283. https://doi.org/10.1016/j.euroecorev.2008.09.005

Chaudhuri, A. (2011). Sustaining cooperation in laboratory public goods experiments: A selective survey of the literature. *Experimental Economics*, *14*(1), 47–83. https://doi.org/10.1007/s10683-010-9257-1

Chen, X., & Komorita, S. S. (1994). The Effects of Communication and Commitment in a Public Goods Social Dilemma. *Organizational Behavior and Human Decision Processes*, *60*(3), 367–386. https://doi.org/https://doi.org/10.1006/obhd.1994.1090

Cialdini, R. B., & Goldstein, N. J. (2004). Social Influence: Compliance and Conformity. *Annual Review of Psychology*, *55*(1), 591–621. https://doi.org/10.1088/0957-4484/27/42/425203

ClimateAction. (2018). Corporate companies winning the race to become 100% renewable. Retrieved May 9, 2018, from http://www.climateactionprogramme.org/news/corporate-companies-winning-the-race-to-become-100-renewable

Dannenberg, A. (2015a). Leading by example versus leading by words in voluntary contribution experiments. *Social Choice and Welfare*, *44*(1), 71–85. https://doi.org/10.1007/s00355-014-0817-8

Dannenberg, A. (2015b). Non-binding agreements in public goods experiments. *Oxford Economic Papers*, *68*(1), 279–300. https://doi.org/10.1093/oep/gpv048

Ellingsen, T., & Johannesson, M. (2004). Promises, Threats and Fairness. *The Economic Journal*, *114*(495), 397–420. https://doi.org/10.1111/j.1468-0297.2004.00214.x

Erev, I., & Rapoport, A. (1990). Provision of Step-Level Public Goods: The Sequential Contribution Mechanism. *Journal of Conflict Resolution*, *34*(3), 401–425. https://doi.org/10.1177/0022002790034003002

Festinger, L. (1962). *A theory of cognitive dissonance* (Vol. 2). Stanford: Stanford University Press.

Fischbacher, U., Gächter, S., & Fehr, E. (2001). Are people conditionally cooperative? Evidence from a public goods experiment. *Economics Letters*, *71*(3), 397–404. https://doi.org/10.1016/S0165-1765(01)00394-9

Greiner, B. (2015). Subject pool recruitment procedures: Organizing experiments with ORSEE. *Journal of the Economic Science Association*, *1*(1), 114–125. https://doi.org/10.1007/s40881-015-0004-4

Güth, W., Levati, M. V., Sutter, M., & van der Heijden, E. (2007). Leading by example with and without exclusion power in voluntary contribution experiments. *Journal of Public Economics*, *91*(5), 1023–1042. https://doi.org/https://doi.org/10.1016/j.jpubeco.2006.10.007

Hendriks, A. (2012). SoPHIE-Software platform for human interaction experiments. *University of Osnabrück, Osnabrück*.

Ismayilov, H., & Potters, J. (2016). Why do promises affect trustworthiness, or do they? *Experimental Economics*, *19*(2), 382–393.

Jones, S. R. G. (1984). *The economics of conformism*. Oxford: Blackwell.

Joule, R. V, & Beauvois, J. L. (1998). *The free will compliance: How to get people to freely do what they have to do. Paris: PUF*.

Kerr, N. L., & Kaufman-Gilliland, C. M. (1994). Communication, commitment, and cooperation in social dilemma. *Journal of Personality and Social Psychology*, *66*(3), 513–529. https://doi.org/10.1037/0022-3514.66.3.513

Koessler, A.-K., Page, L., & Dulleck, U. (2017). *Promoting pro-social behavior with public statements of good intent* (MPRA Paper). University Library of Munich, Germany. Retrieved from https://econpapers.repec.org/RePEc:pra:mprapa:80072

Koessler, A.-K., Torgler, B., Feld, L. P., & Frey, B. S. (2019). Commitment to Pay Taxes: Results from a Field and Laboratory Experiments. *European Economic Review*. https://doi.org/https://doi.org/10.1016/j.euroecorev.2019.02.006

Linder, D. E., Cooper, J., & Jones, E. E. (1967). Decision freedom as a determinant of the role of incentive magnitude in attitude change. *Journal of Personality and Social Psychology*, *6*(3), 245.

Marwell, G., & Ames, R. E. (1979). Experiments on the Provision of Public Goods. I. Resources, Interest, Group Size, and the Free-Rider Problem. *American Journal of Sociology*, *84*(6), 1335–1360. https://doi.org/10.1086/226937

Nyborg, K., Anderies, J. M., Dannenberg, A., Lindahl, T., Schill, C., Schlüter, M., … de Zeeuw, A. (2016). Social norms as solutions. *Science*, *354*(6308), 42 LP-43. https://doi.org/10.1126/science.aaf8317

Orbell, J., Dawes, R., & van de Kragt, A. (1990). The Limits of Multilateral Promising. *Ethics*, *100*(3), 616–627. https://doi.org/10.1086/293213

Orbell, J., van de Kragt, A. J. C., & Dawes, R. M. (1988). Explaining Discussion-Induced Cooperation. *Journal of Personality and Social Psychology*, *54*(5), 811–819. https://doi.org/10.1037/0022-3514.54.5.811

Pogrebna, G., Krantz, D. H., Schade, C., & Keser, C. (2011). Words versus actions as a means to influence cooperation in social dilemma situations. *Theory and Decision*, *71*(4), 473–502. https://doi.org/10.1007/s11238-011-9248-5

RE100. (2017). 93 RE100 companies have made a commitment to go “100% renewable.” Retrieved May 11, 2017, from http://there100.org/companies

Ritzer, G. (Ed.). (2007). *The Blackwell Encyclopedia of Sociology*. Oxford: Wiley-Blackwell.

Rivas, M. F., & Sutter, M. (2011). The benefits of voluntary leadership in experimental public goods games. *Economics Letters*, *112*(2), 176–178. https://doi.org/https://doi.org/10.1016/j.econlet.2011.04.007

Sahin, S. G., Eckel, C., & Komai, M. (2015). An experimental study of leadership institutions in collective action games. *Journal of the Economic Science Association*, *1*(1), 100–113. https://doi.org/10.1007/s40881-015-0010-6

Tavoni, A., Dannenberg, A., Kallis, G., & Loschel, A. (2011). Inequality, communication, and the avoidance of disastrous climate change in a public goods game. *Proceedings of the National Academy of Sciences*, *108*(29), 11825–11829. https://doi.org/10.1073/pnas.1102493108

TheClimategroup. (2015). Fortune 500 listed companies pledge to use 100% renewable electricity. Retrieved May 11, 2017, from https://www.theclimategroup.org/what-we-do/news-and-blogs/fortune-500-listed-companies-pledge-to-use-100-renewable-electricity/

Vanberg, C. (2008). Why Do People Keep Their Promises? An Experimental Test of Two Explanations. *Econometrica*, *76*(6), 1467–1480. https://doi.org/10.3982/ECTA7673

Varian, H. R. (1994). Sequential contributions to public goods. *Journal of Public Economics*, *53*(2), 165–186. https://doi.org/https://doi.org/10.1016/0047-2727(94)90019-1

Wilson, R. K., & Sell, J. (1997). “Liar, Liar... ”: Cheap Talk and Reputation in Repeated Public Goods Settings. *Journal of Conflict Resolution*, *41*(5), 695–717. https://doi.org/10.1177/0022002797041005005

Appendix I

Another case: Pledges about emission reductions made in climate negotiations

Another example for illustrating the sequential character is the announcement process of the intended nationally-determined contributions (INDCS) in preparation for e.g. the Paris summit in 2015. In 2014, during the COP 20 in Lima, all member countries were called upon to submit their INDCS to the UN by the first quarter of 2015, so that a reference point for the upcoming negotiations could be set and the scope of necessary action be determined. While all member countries declared during the Lima summit that they were willing to do so, only a few governments submitted their INDCS in time.[23] All other countries, including three of the five biggest polluters, China, Japan and India, delayed their decision with a 'you first' attitude. Then, just after the declarations of the six first movers and the resulting public discussion, 182 additional countries also declared their contribution intentions publicly (CarbonBrief 2015).

Table AI: Average Contributions in Stage 1 and Consequent Decision Order

Decision Order		Treatment				
		Control	***Simultaneous***	***SQ.Random***	***SQ.Endog***	***SQ.Average***
All	1			9.76 (4.23)	12.72 (4.72)	17.20 (3.22)
	2		-	10.13 (5.10)	11.33 (4.73)	14.43 (3.76)
	3		-	8.88 (5.36)	9.61 (5.59)	10.89 (3.31)
	4		-	9.61 (6.41)	9.61 (3.87)	7.38 (4.13)
	Total	**11.46 (5.22)**	**10.79 (4.70)**	**9.59 (5.27)**	**10.82 (4.87)**	**12.48 (5.15)**
Pledge-makers	1			11 (4.33)	13.76 (4.47)	17.67 (3.26)
	2		-	10.13 (5.10)	11.67 (5.66)	15.45 (2.98)
	3		-	8.86 (5.36)	9.98 (6.10)	11.39 (3.25)
	4		-	9.61 (6.41)	9.64 (4.59)	7.82 (3.92)
	Total	**11.46 (5.22)**	**12.13 (4.64)**	**10.82 (5.07)**	**11.51 (5.40)**	**13.24 (5.00)**

Table AI shows how in *SQ.Endog* individuals with higher average contributions in Stage 1 were more willing to make the pledge as first movers. This selection effect is exploited in *SQ.Average* and the elicitation order is exogenously determined based on the average contributions in Stage 1.

[23] Switzerland became the first country to formally communicate its contributions to a UN climate change deal (27.02.2015), i.e. 50% greenhouse gas reduction by 2030, compared to the level of 1990. Shortly after also the EU (06.03.2015), Norway (27.03.), Mexico (30.03.), the United States and Russia (31.03.) announced their intended contributions.

Table AII: Pledging likelihood by Decision order and the number of pre-existing Pledge-takers

Decision Order		T1: Simul	T2: *SQ.Random*					T3: *SQ.Endog*					T4: *SQ.Average*				
			N° of pre-exist. Pledge-takers					N° of pre-exist. Pledge-takers					N° of pre-exist. Pledge-takers				
			Total	**0**	**1**	**2**	**3**	**Total**	**0**	**1**	**2**	**3**	**Total**	**0**	**1**	**2**	**3**
1	%		0.58	0.58	-	-	-	0.71	0.71	-	-	-	0.83	0.83	-	-	-
	N			*24*	-	-	-		*24*	-	-	-		*24*	-	-	-
2	%		0.63	0.40	0.79	-	-	0.67	0.71	0.65	-	-	0.8	0.75	0.85	-	-
	N	0.61		*10*	*14*	-	-		*7*	*17*	-	-		*4*	*20*	-	-
3	%		0.63	0.17	0.86	0.73	-	0.50	1	0.36	0.55	-	0.79	0	0.67	0.88	-
	N			*6*	*7*	*11*	-		*2*	*11*	*11*	-		*1*	*6*	*17*	-
4	%		0.58	0.60	0	0.67	0.63	0.50	-	0.56	0.44	0.50	0.75	0	1	0.50	0.87
	N			*5*	*2*	*9*	*8*		*0*	*9*	*9*	*6*		*1*	*2*	*6*	*15*
Total	%	0.61	0.60					0.59					0.80				
		96	*96*					*96*					*96*				

Note: This table shows the likelihood that a player made the pledge, depending on the position in the decision order (vertical) and the number of preexisting Pledge-makers (horizontal). The rows in italic show the number of observation for each case.

Table AII shows the likelihood that a player made a pledge, depending on its treatment group, the position in the elicitation order, and the information that was available about the pledging choice of the previous players. For example, a player who made in *SQ.Average* as the second player the decision about the pledge, was 75% likely to make the pledge when the player before him decided against the pledge. When the previous player, however, made the pledge then the second player also made the pledge with a likelihood of 85%.

Three observations can be made from the table. First, the likelihood of observing a pledge increases with the number of pledge-makers who previously made the pledge. Second, the proportion of pledge-makers at the outset (first row, decision order =1) differs among the treatment groups and this difference amplifies from one row to the next. Third, comparing the cases when the amount of predominant previous pledge-makers and the position in the decision order match, the likelihood that a player makes the pledge is lower in *SQ.Endog* than in the other two treatment groups.

Table AIII. Average Contributions per Stage and Treatment

Decision setting	**Stage 1** *Mean contributions*	**Stage 2** *Mean contributions*	**Pledge-takers**
Control	11.46 (6.85)	10.89 (7.56)	0.00%
Simultaneous	10.79 (6.95)	13.13 (8.56)	61.46%
SQ.Random	9.59 (7.40)*	12.97 (8.59)	60.42%
SQ.Endog	10.82 (7.20)	13.80 (8.23)	59.38%
SQ.Average	12.47 (6.70)	15.66 (7.15)	80.21%
Total observation per treatment: 96, Standard deviation in parentheses.			

*****Note: Despite the random allocation of sessions in treatments average contributions in the baseline stage were not identical. In *SQ.Random*, average Stage 1 contributions are significantly lower than in the other treatment groups. This difference is caused by one session in which subjects contributed very low amounts in the baseline stage. I decided to leave this session in to show the results based on the complete dataset. Robustness checks, however, have been performed without the session and results do not change. Please also note that this difference in the baseline potentially curtails, but not magnifies the effects I have found and discussed in the paper.

Figure A1: Increase in Round 1 contributions from Stage 1 to Stage 2

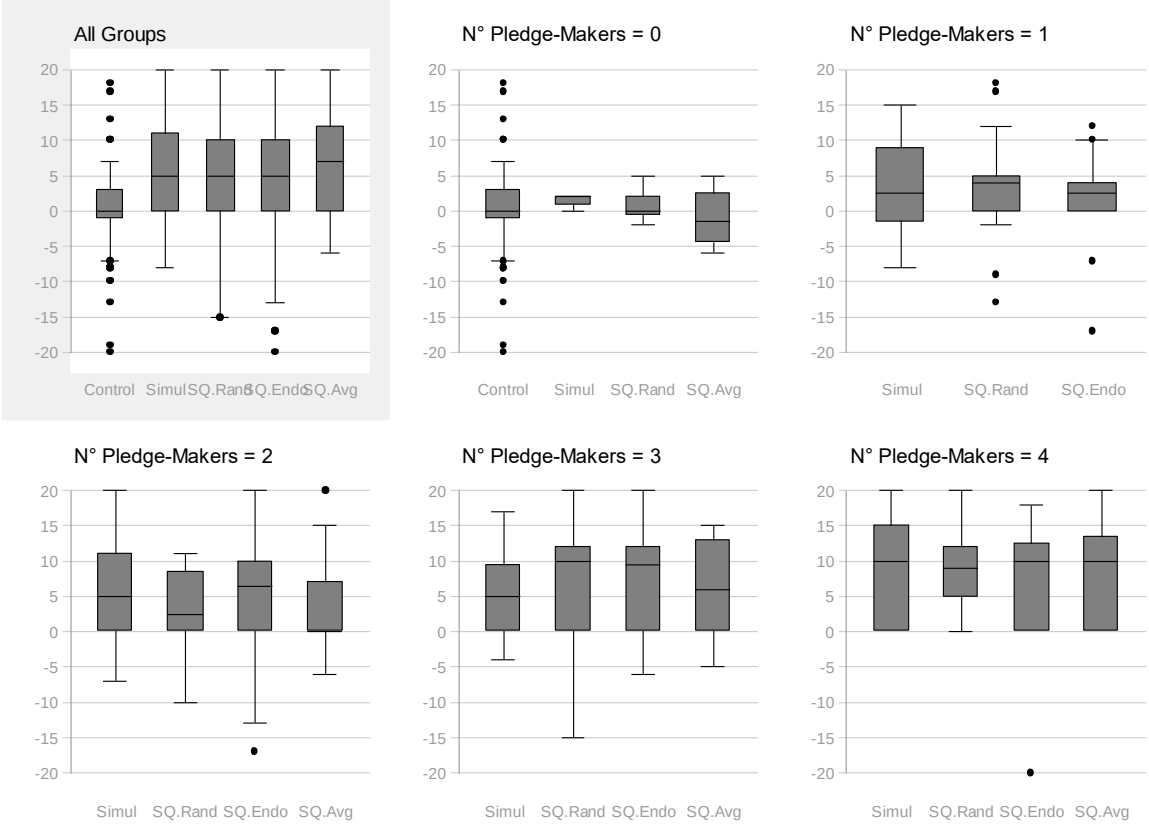


Figure A1 shows how the increase in Round 1 contributions between Stage 1 and Stage differs between treatment groups and the number of present pledge-takers in one's group. The overall increase in contributions was stronger the more pledge-takers were present in one's matching group. This pattern is found in all treatment groups. The effect size in this subgroups partly differs between treatment groups, but also observation numbers for each box chart are very low. In total, each treatment consisted of 24 matching groups.

Table AIV: OLS estimations of the change in contribution
(between first round of Stage 1 and Stage 2 (after the pledge))

VARIABLES												
		Contribution in first round after pledge										
N° pledge others = 0	*Simultaneous*	-2.719***	*SQ.Random*	-1.920**	*SQ.Endog*	*na*	*SQ.Average*	-3.608***
		(0.742)		(0.746)				(0.646)
N° pledge others = 1		-1.626**		-2.416*		-2.879		*na*
		(0.746)		(1.252)		(1.966)		
N° pledge others = 2		0.652		-1.918		1.507		-0.903
		(1.303)		(3.497)		(1.485)		(1.957)
N° pledge others = 3		2.410		2.300		4.032**		0.790
		(3.116)		(2.573)		(1.934)		(1.992)
N° pledge others = 0 × pledge-maker		8.148***		5.601***		5.012**		*na*
		(1.066)		(1.971)		(2.087)		
N° pledge others = 1 × pledge-maker		8.050***		5.656***		7.148***		5.748**
		(0.744)		(0.956)		(1.104)		(2.237)
N° pledge others = 2 × pledge-maker		8.455***		8.569***		8.006***		8.068***
		(0.730)		(0.746)		(1.555)		(0.839)
N° pledge others = 3 × pledge-maker		8.034***		8.750***		7.333***		7.549***
		(0.732)		(0.784)		(1.569)		(0.663)
Contrib_Avg1				0.556***				
				(0.085)				
Otherscontrib_Avg1				-0.061**				
				(0.027)				
Constant				7.221***				
				(0.973)				
Observations				480				
R-squared				0.584				

*Notes: This table presents the results of an OLS regression of the contributions in the first round of Stage 2, after the pledging decision was made. The variables Simultaneous, SQ.Random, SQ.Endog and SQ.Average are dummy variables that take the value one in the corresponding treatments, and zero otherwise. 'N° pledge-makers' accounts for the amount of pledge-makers in one's matching group. 'N° pledge others' accounts for the number of other pledge-makers. The interaction with 'pledge-maker' estimates the change in contributions for individuals who have decided to pledge. All models include experimenter fixed effects. Robust standard errors, clustered on the group level, are shown in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

Figure A2: *SQ.Average* - Average change in contributions of pledge-makers by decision order

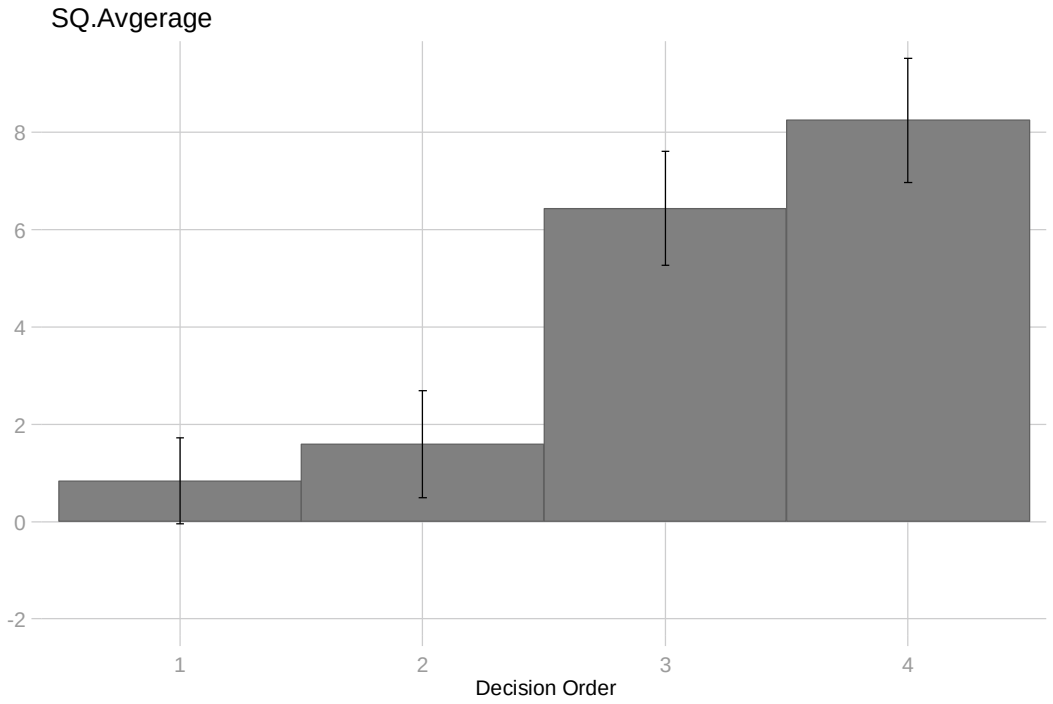


Figure A2 shows the average difference in contributions before and after the pledge of pledge-makers in *SQ.Average*. The graph displays the difference for each position in the order in which subjects were asked whether they wanted to make the pledge. By treatment design, subjects with higher baseline contributions were asked first. The observation in the main text is confirmed; low contributors, who were asked later in time about the pledge, increased their contributions significantly more than subjects who were the first to be asked about the pledge (Wilcoxon rank sum test of 1+2 vs. 3+4: $z = 4.062$, $p < 0.001$).

Appendix II: Experimental Material

Instructions – Baseline [TRANSLATION]

Welcome to this experiment

You are about to participate in an economic experiment. Please read the following instructions carefully. Depending on your decisions and those made by the other participants, you can earn a substantial amount of money.

Please note that all information provided during the experiment is treated confidentially. You are not allowed to communicate with the other participants during the experiment. If you have any questions now or during the experiment, please indicate this by raising your hand. A member of our team will then come to your seat and answer your question.

Your earnings during the experiment are counted in points. At the end of the experiment, your profit will be converted and added to your 3 € show up fee.

The exchange rate complier:

7 points = 1 Euro

At the end of the experiment you receive your payout in exchange for your participant code.

Course of the experiment

The experiment is divided in two sections. Each section is seen as independent and decisions from a previous section do not affect the possibilities or payments in the second section. At the beginning of every section the participants will be randomly matched in groups of 4. You will be therefore in a group with 3 other participants. Each section consists of 10 rounds. The group will remain the same throughout all rounds of the section.

Each round consists of two phase: The *contribution* phase and the *guessing phase*.

Payoff

Each section has ten rounds. At the end of each section, one of the 10 rounds will be randomly chosen. This round will determine your payoff for this section.

Contribution phase

As mentioned before you will be a member of a group consisting of 4 people. At the beginning of each round each group member receives 20 ECUs and has to decide what to do with them. You have to determine how many of the 20 ECUs you want to contribute to a project and how many of them to keep for yourself. Each point that you keep increases your income by one point. Each point that you contribute is multiplied by 1.6. At the end of each round, the sum of multiplied points in the project is split equally among all group members. The group member's individual contribution is not relevant for this distribution of points.

Example: Suppose the sum of the contributions of all group members is 60 ECUs, then each group member receives an income from the project of 0.4 * 60 = 24 ECUs. If the sum of all contributions is 9, then every member receives an income of 0.4 * 9 = 3:6 ECUs from the project.

Once all the players have decided their contribution to the project you will be informed about the group's total contribution and your personal income from this round.

Income

Your round income consists of two parts: Firstly, of the points which you kept for yourself and secondly, of the points which you received from the project.

Your income per round can be thus written as:

Income = *(20 – Your contribution to the project) + 0.4 * (sum of the contributions of all four group members)*

To make a contribution to the project, type a number between 0 and 20 in the input field. Then you have to press the Continue button. After that your decision cannot be revised anymore.

Once all group members have decided which amount they want to contribute to the project, you will learn how much each group member contributed to the project and what your payoff will be, if this is the round chosen by the random draw as the payoff round.

Guessing phase

After you made your contribution, we ask you to guess how many points the other group members contributed. Please indicate what you think how much each single member of your group contributed.

For your guess you can also earn points. How many points depend on the discrepancy between your guess and the actual contribution of the other player.

At the end of each section, only one of your guesses will be chosen as relevant for the payout.

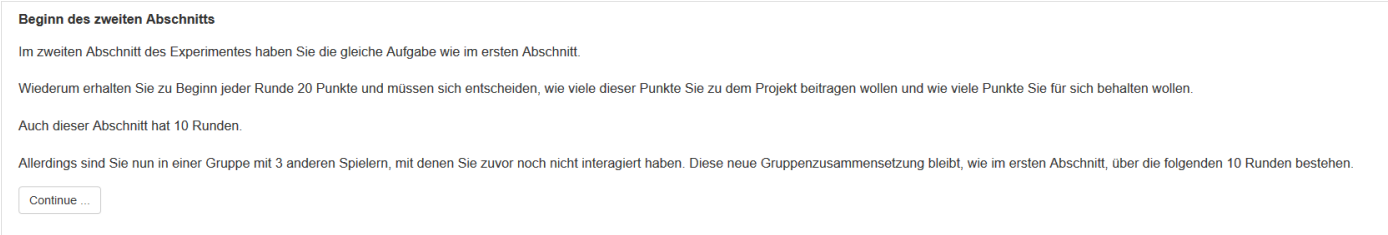
Your guess:

- is just right. You receive 10 points.
- has a discrepancy of 1 point. You receive 9 points.
- has a discrepancy of 2 points. You receive 6 points.
- has a discrepancy of 3 points. You receive 1 point.
- has a discrepancy of more than 3 points. You receive 0 points.

Example: Suppose your guess about Player 2's contribution in round 6 is chosen randomly as payoff determining. Your best guess about Player 2's contribution was 13, but his actual contribution is 12. Following the payment rule you get 9 ECUs for the accuracy of your best guess.

Screenshots – Pledges

Figure 1: Screenshot - Information Stage 2



Beginn des zweiten Abschnitts

Im zweiten Abschnitt des Experimentes haben Sie die gleiche Aufgabe wie im ersten Abschnitt.

Wiederum erhalten Sie zu Beginn jeder Runde 20 Punkte und müssen sich entscheiden, wie viele dieser Punkte Sie zu dem Projekt beitragen wollen und wie viele Punkte Sie für sich behalten wollen.

Auch dieser Abschnitt hat 10 Runden.

Allerdings sind Sie nun in einer Gruppe mit 3 anderen Spielern, mit denen Sie zuvor noch nicht interagiert haben. Diese neue Gruppenzusammensetzung bleibt, wie im ersten Abschnitt, über die folgenden 10 Runden bestehen.

Continue ...

Translation: ***Beginning of the second section***

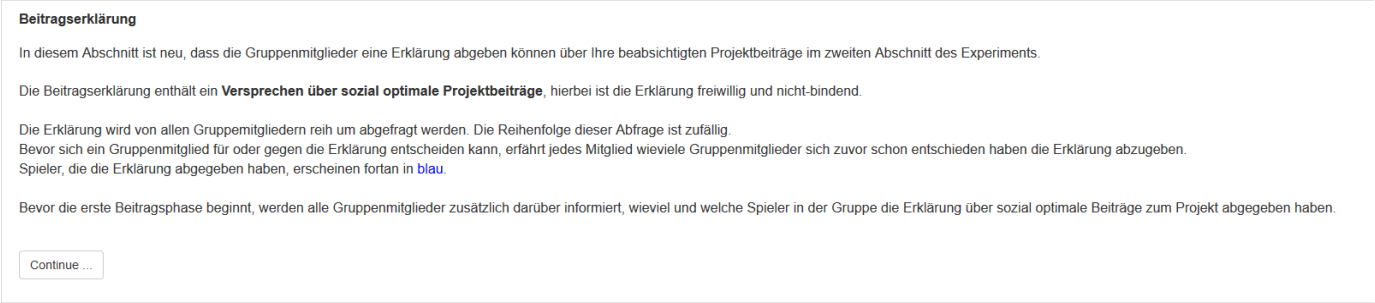
In the second section, you have the same task as you had in the first section.

Again, you receive 20 points at the beginning of each round and you have to decide how many of these points you would like to contribute to the project and how many points you would like to keep for yourself.

This section also has 10 rounds.

But this time, you are in a group with 3 other participants with whom you haven't interacted before. This new group matching remains, like in the first section, throughout the ten following rounds.

Figure 2: Screenshot – Information Pledge



Beitragserklärung

In diesem Abschnitt ist neu, dass die Gruppenmitglieder eine Erklärung abgeben können über Ihre beabsichtigten Projektbeiträge im zweiten Abschnitt des Experiments.

Die Beitragserklärung enthält ein **Versprechen über sozial optimale Projektbeiträge**, hierbei ist die Erklärung freiwillig und nicht-bindend.

Die Erklärung wird von allen Gruppemitgliedern reih um abgefragt werden. Die Reihenfolge dieser Abfrage ist zufällig.
Bevor sich ein Gruppenmitglied für oder gegen die Erklärung entscheiden kann, erfährt jedes Mitglied wieviele Gruppenmitglieder sich zuvor schon entschieden haben die Erklärung abzugeben.
Spieler, die die Erklärung abgegeben haben, erscheinen fortan in blau.

Bevor die erste Beitragsphase beginnt, werden alle Gruppenmitglieder zusätzlich darüber informiert, wieviel und welche Spieler in der Gruppe die Erklärung über sozial optimale Beiträge zum Projekt abgegeben haben.

Continue ...

Translation**: *Contribution pledge***

In this section it is new that the group members can make a statement about their intended project contributions in the second stage of the experiment.

The contribution pledge contains a promise of socially optimal project contributions; the commitment is voluntary and non-binding.

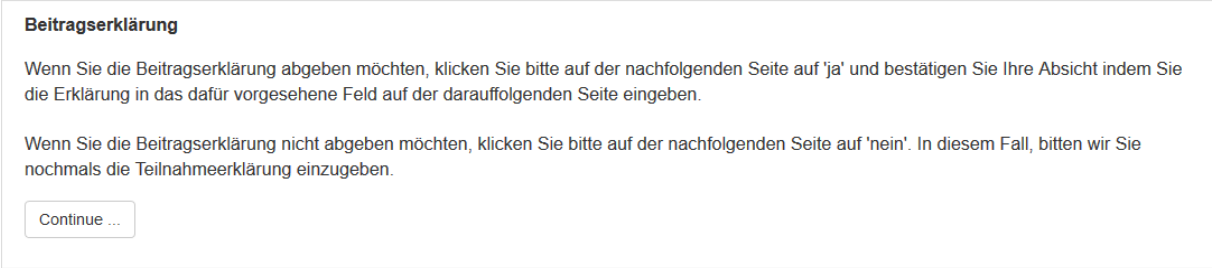
for Sequential treatment groups *[The pledge will be requested by all group members in turn.]*
for SQ.Random *[The order of this query is random.]*

Before a group member can decide for or against the declaration, each member is informed about how many members in his or her group have already decided to make the declaration.

Players who have made the declaration will appear from now on in blue.

Before the first contribution is due, all group members are informed about how many and which players in their group made the declaration of socially optimal contributions to the project.

Figure 3: Screenshot - Information Pledge II



Beitragserklärung

Wenn Sie die Beitragserklärung abgeben möchten, klicken Sie bitte auf der nachfolgenden Seite auf 'ja' und bestätigen Sie Ihre Absicht indem Sie die Erklärung in das dafür vorgesehene Feld auf der darauffolgenden Seite eingeben.

Wenn Sie die Beitragserklärung nicht abgeben möchten, klicken Sie bitte auf der nachfolgenden Seite auf 'nein'. In diesem Fall, bitten wir Sie nochmals die Teilnahmeerklärung einzugeben.

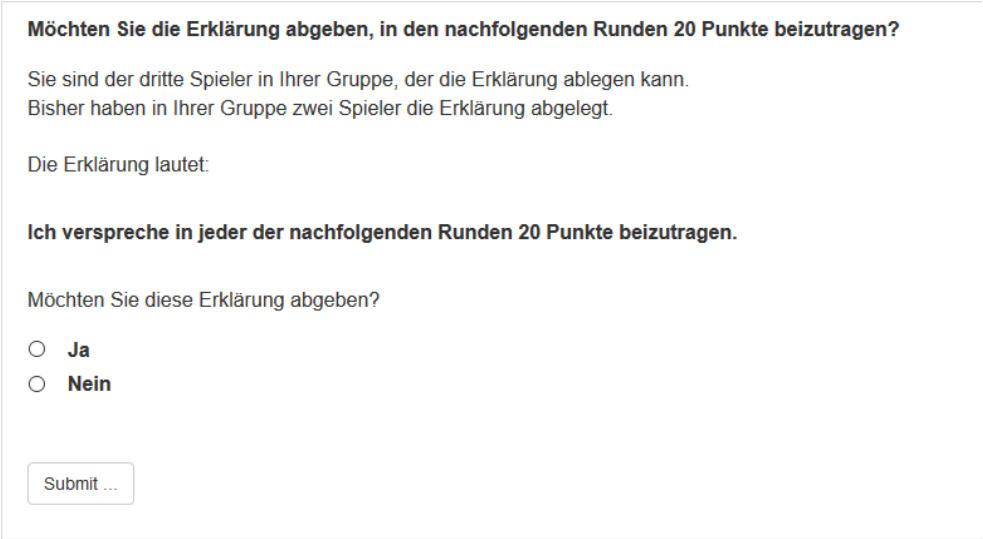
Continue ...

Translation: ***Contribution pledge***

If you want to make the pledge, click "yes" on the upcoming screen and confirm your intention by typing the commitment in the provided box.

If you do not want to make the pledge, please click "no" on the upcoming screen. In this case, we ask you to type the declaration of participation a second time.

Figure 4a: Screenshot - Pledge Decision [Simultaneous, SQ.Random, SQ.Average]



Möchten Sie die Erklärung abgeben, in den nachfolgenden Runden 20 Punkte beizutragen?

Sie sind der dritte Spieler in Ihrer Gruppe, der die Erklärung ablegen kann.
Bisher haben in Ihrer Gruppe zwei Spieler die Erklärung abgelegt.

Die Erklärung lautet:

Ich verspreche in jeder der nachfolgenden Runden 20 Punkte beizutragen.

Möchten Sie diese Erklärung abgeben?

○ **Ja**
○ **Nein**

Submit ...

Translation: ***Would you like to make the declaration that you will contribute 20 points in the following rounds?***

For the sequential treatment groups *[You are the first/second/third/last player in your group who can make a decision about the pledge.]*

[So far, one/two/three players in your group have made the pledge/ decided against the pledge.]

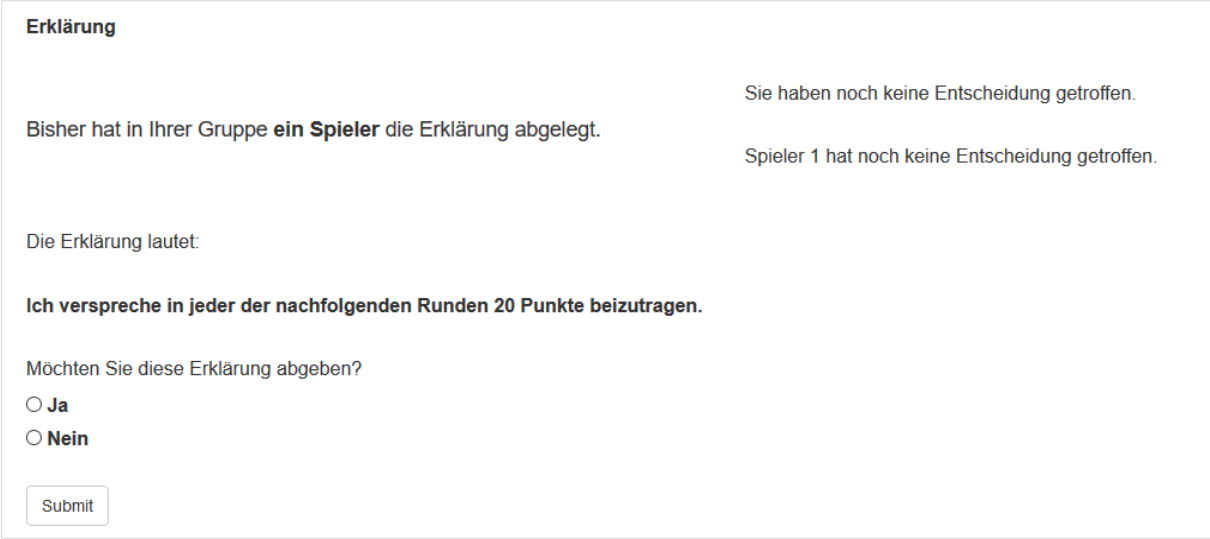
The pledge is:

I promise to contribute 20 points in each of the following rounds.

Would you like to make this pledge?

- *Yes*
- *No*

Figure 4b: Screenshot - Pledge Decision [SQ.Endog]



Translation:

You have not made a decision yet.

So far, one/two/three players in your group have made the pledge.

Player 1 has not made a decision yet.

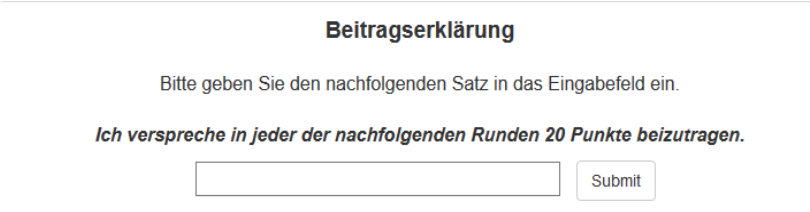
The pledge is:

I promise to contribute 20 points in each of the following rounds.

Would you like to make this pledge?

- *Yes*
- *No*

Figure 5: Screenshot - Enter Pledge

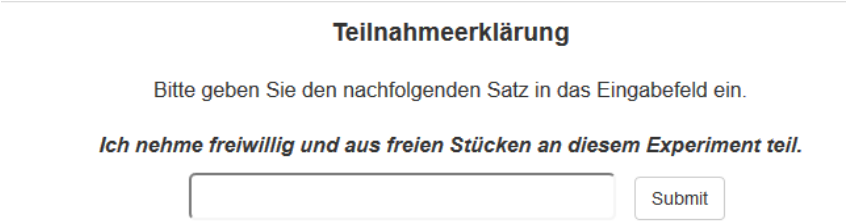


Translation: ***Contribution pledge***

Please type the following sentence in the box.

I promise to contribute 20 points in each of the following rounds.

Figure 6: Alternative statement

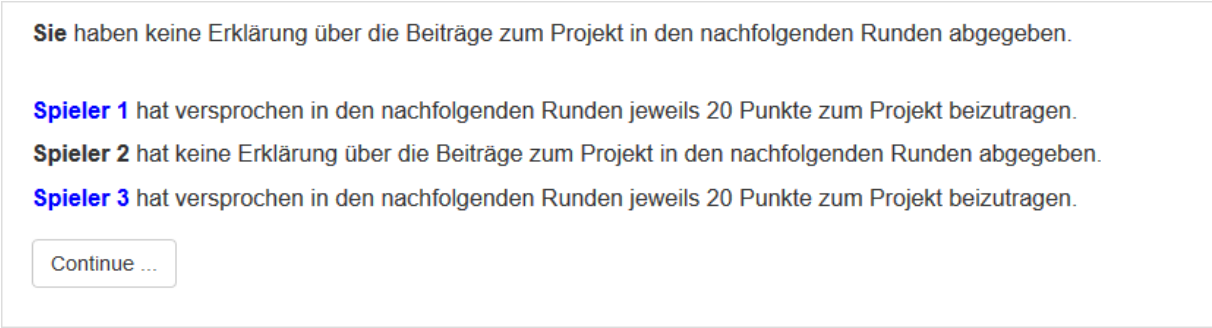


Translation: ***Statement about participation***

Please type the following sentence in the box.

I participate in this experiment voluntarily and on my own will.

Figure 7: Screenshot – Result Pledging



Translation:

You *have not made the pledge about future contributions to the project.*

Player 1 *has pledged to contribute 20 points in each of the following rounds to the project.*

Player 2 *has not made the pledge about future contributions to the project.*

Player 3 *has pledged to contribute 20 points in each of the following rounds to the project.*