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The effects of social norms on motivation crowding: experimental evidence from the Tibetan Plateau

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Abstract: A growing literature examines conditions under which financial incentives for behavior change can undermine "crowd out" or reinforce ("crowd in") other sources of motivation for the behavior in question. Some of this literature points to a potential role of social norms, but it has not attempted to quantify that role. We present an interdisciplinary model from economics and communication science that measures the effects of financial incentives on social norms and

their joint effects on behavior, including after incentives have ended. In a framed field experiment with Tibetan herders in Qinghai, China, we find that a temporary payment for participation in a patrol against illegal wildlife trapping reinforces a perceived injunctive norm that this conservation behavior meets with social approval. This norm remains heightened even after the payment has ended, continuing to positively influence the decision to participate in anti-trapping patrols in the experiment. This finding suggests that, under certain circumstances, a carefully framed incentive for conservation behavior can support injunctive norms in favor of conservation behavior.

Keywords: China, collective action, conservation behavior, payment for ecosystem services, public good experiment, Qinghai, Sanjiangyuan

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1. Introduction

With the spread of payment for ecosystem services (PES) worldwide, recent years have seen growing interest in the importance of designing PES in a way that strengthens rather than competes with other sources of motivation regarding the behavior that it seeks to encourage (Bowles and Polánia-Reyes 2012; Kerr et al. 2014; Rode et al. 2015; Brent et al. 2017; Moros et al. 2018). This is based on evidence that payments for behavior change can result in motivation crowding – undermining (crowding out) or reinforcing (crowding in) nonfinancial sources of motivation via the use of payments.

The effects of PES on other sources of motivation is important because incentive payments for conservation tend to be financed by governments and donor agencies with budget pressures and changing priorities. Designing payments in a way that avoids undermining original pro-environment norms, especially when payments have ended, is critically important. Further, designing payments in a way that could yield positive impacts on behavior even after the payments have ended would be a major feat for conservation policy. However, without a better theoretical understanding of what drives motivation crowding out and crowding in, it will be difficult to devise behavioral payment programs with optimal long-term properties.

Some discussions of motivation crowding point to a possible role of social norms – that behavioral change payments such as PES alter the social norms regarding the behavior in question (Vatn 2009; Bowles and Polánia-Reyes 2012;

Bremer et al. 2014; Farrow et al. 2017; Moros et al. 2018). To our knowledge, however, this literature has not attempted to quantify the effects of payments on social norms, nor the effects of the interaction of payments and norms on the behavior that PES aims to influence.

Addressing this gap, Lapinski et al. (2017) presented and tested a model of Financial Incentives in Normative Systems (FINS) that measures the influence of financial incentives on social norms and the subsequent effects on behaviors, including after financial incentives have ended. In a public good experiment, they found that both financial incentives and measured descriptive norms (people's perceptions of prevalent behavior) contributed to increased contributions to a public good that benefitted the group as a whole as opposed to private goods that benefitted people only individually. At the same time, over the course of the experiment the financial incentive weakened the effect of descriptive norms on contributions to the public good, and the weakening effect was present even after the incentive had ended. In sum, they found that introducing and then removing a financial incentive led to an overall decline in contributions to the public good compared to a group that never received incentives.

This paper builds on the previous work by Lapinski et al. (2017), offering two main advances. First, it tests the model in a framed field experiment as opposed to a context-free lab experiment. Second, using a more thorough investigation of social norms, it explores the role of both descriptive norms and injunctive norms (perceptions about what people in a social group believe to be appropriate behavior) to reduce motivation crowding out or perhaps stimulate crowding in. The experiment tests the effects of both a temporary financial incentive and an injunctive norms message in support of the behavior. The details are described below.

The setting for our experiment is in the Sanjiangyuan region on the Tibetan Plateau in Qinqhai Province, China. The population consists mainly of ethnically Tibetan pastoralists, who traditionally lived a nomadic lifestyle. The Sanjiangyuan context is interesting for several reasons. A vast, sparsely populated area covering over 360,000 square kilometers, Sanjiangyuan comprises mountainous grasslands threaded with streams that converge to become the headwaters of three great rivers of China and Southeast Asia: the Yangtze, the Yellow and the Mekong. These rivers provide freshwater to over a billion people in the region. The Chinese government is concerned that degradation of the grasslands threatens the water supply to the river systems and thus to the security of the country as a whole. As part of a restoration strategy, the government has promoted resettlement of pastoralists to towns and cities (Du 2012). The area is also home to numerous threatened wildlife species such as snow leopards, Tibetan wolves and Tibetan antelope. The Chinese government introduced financial incentives for grassland management in 2003 and expanded them in 2005 with the Sanjiangyuan Ecological Conservation Program (Fang 2013). In 2016, a pilot project began to turn Sanjiangyuan into a national park. As part of this effort, a payment system is being introduced to recruit wildlife patrollers from each household living inside the national park area

(Sina News 2018). Past policies were often introduced without a great deal of consultation or clear framing, but the recent work to design the national park and the conservation role of local people builds on more than a decade of closer collaboration with environmental NGOs working in the area (Shen and Tan 2012; Foggin 2018).

Conservation organizations are also working with local institutions such as monasteries to promote wildlife conservation, because Tibetan Buddhism considers wildlife and their habitat to be sacred (Li et al. 2014). Still, efforts to promote wildlife conservation remain complicated by practical challenges. For example, blue sheep may compete for scarce grazing resources with domesticated yaks; snow leopards and wolves occasionally prey on yaks; bears occasionally raid houses; etc. (Worthy and Foggin 2008).

Another important contextual factor is the history of top-down national directives regarding grassland management that disrupt traditional resource management practices of pastoralists (Bum 2018). In many countries worldwide, pastoralism has posed challenges to governments trying to promote development on terms more familiar to sedentary people (e.g. Homewood 2004; Little 2014), and China is no exception. Over the years, fluctuation of grassland policies has brought uncertainty and skepticism regarding government motives (Bum 2018). Early policies promoted collectivization and more intensive stocking, but these gave way to new policies of privatization (Yeh and Gaerrang 2011), herd size resettlement, and resettlement away from the grasslands (Foggin 2008).

In the experiment, participants must choose whether or not to participate in patrols against illegal trapping of wildlife. Participating in a wildlife patrol is considered to be prestigious among local people because it pleases the mountain deities (Bum 2016). On the other hand, it is arduous and time-consuming work that also involves costs of gasoline and wear and tear on vehicles. An environment in which payment for patrolling is being introduced into an area where practical concerns about the competitive relationship between wildlife and local livelihoods are juxtaposed with the cultural traditions and norms favoring conservation, is an ideal context for applying our model. The history of top-down policies brings an additional layer of complexity in interpreting the results of our study.

2. Financial incentives in normative systems (FINS) model

We apply the FINS model introduced by Lapinski et al. (2017) and further described by Kerr et al. (2017). When a financial incentive (or any other intervention) is used to promote behavior change, it is assumed to directly affect the behavior in question, but it also may affect social norms related to that behavior. The effect on norms may be direct or indirect. For example, when a behavior becomes more prevalent in response to a financial incentive, people may perceive this increased prevalence (i.e. descriptive norms), which might influence their inclination to adopt the behavior. They may also perceive that the increased prevalence of the behavior is only the result of the payment and this may influence their perceptions

about the extent to which people believe the behavior is worth doing (injunctive norms). Alternatively, people could perceive that if some entity (e.g. a government or a donor organization) is paying to promote the behavior it must be important, and perhaps this could reinforce any previously existing injunctive norm. These are just illustrations of possible ways in which norms could influence behavior.

As mentioned, Lapinski et al. (2017) tested a portion of this model using a public goods experiment. Using survey questions over the course of the experiment, they tracked participants' perceived descriptive norms for contributing to the public good alongside actual prevalence of such contributions (called *collective norms*). They found that participants' contributions to the public good increased with financial incentives and with perceived descriptive norms regarding such contributions. However, they also found that financial incentives weakened the effects of perceived descriptive norms, even after the incentives had been removed. In addition, removal of a temporary financial incentive reduced contribution to the public good, relative to before the incentive had been provided and relative to participants who had never received an incentive. This suggests motivation crowding out due to introduction followed by removal of incentives.

While Lapinski et al. (2017) provided important insights about the interaction of norms and incentives, their study only addressed descriptive norms, not injunctive norms. Questions remain about the role of injunctive norms both in contributing to motivation crowding out and the possibility that they could be put to work in support of a behavior about which there are strongly favorable public views. Specifically, in a behavioral payment program, perhaps framing the payment in a certain way, or coupling the payment with certain normative messages, could reinforce injunctive norms in favor of the targeted behavior, helping keep the injunctive norm salient to reduce crowding out or even stimulate crowding in. It is important to note that this approach is only applicable if an injunctive norm exists in favor of the behavior. Otherwise the message invoking the injunctive norm will not be believable and cannot be expected to have an impact.

In our experimental context, crowding out might occur if payments undermine the cultural norm in favor of conservation actions, or if they convey a sense of trying to control recipients' behavior (Bowles and Polánia-Reyes 2012). Crowding in might occur if a carefully framed payment were to reinforce existing positive attitudes, in part by demonstrating the authorities' recognition and respect for the public's role in environmental protection (Bowles and Polánia-Reyes 2012; Rode et al. 2015).

3. Experimental design and procedures

The experiment presented here is part of a larger research program between Michigan State University and Shanshui Conservation Center, a Chinese environmental NGO focusing on biodiversity conservation. In Qinghai, Shanshui works to integrate traditional Tibetan practices into conservation actions (Shen and Tan 2012). Among other specific activities, Shanshui helps organize local herders to

participate in patrols against illegal wildlife trapping. The joint research program began with detailed qualitative investigation to understand local social norms around grasslands management and protection of wildlife against poaching (Lapinski et al. 2018), before proceeding to a survey and a field experiment.

3.1. Design

In our field experiment, participants decided how many days (up to a maximum of seven) they would consider contributing to a common effort to patrol against illegal wildlife trapping and hunting. Each day allocated to the anti-trapping patrol contributes to wildlife conservation; a patrol consisting of one person reduces the number of traps on the ground in the designated area by an estimated 1% per day, but if four people work together they can cover much more ground and reduce the number of traps in the area by 10%. The more days of the patrol and the more patrollers per day, the more traps that can be removed and prevented. On the other hand, patrolling incurs costs in terms of both time and money (for gasoline costs and wear and tear on vehicles). These costs are not explicitly modeled in the experiment, but local people are well aware of them because patrolling is an established practice. The experiment is conducted in multiple rounds; in each round each player decides how many days to allocate to patrolling, and then the exercise is repeated in subsequent rounds.

Four participants make this decision separately but concurrently. After each round, each player can observe the decisions of the other three participants, but no player can identify exactly which participant made which decision. The logic of the experiment is that it is in the collective good to protect wildlife and it is more effective to patrol against illegal hunting in a group than individually, but an individual participant faces implicit costs of doing so and cannot be certain that others will volunteer their time.

The experiment followed a 2x2 design with two treatments, with participants randomly divided into four groups. First, half the participants were assigned to an injunctive norms treatment in which they were reminded repeatedly that most herders in Qinghai believe it is important to protect wildlife. Second, half the participants were assigned to a treatment in which they received a temporary incentive payment for participation in the anti-trapping patrol. The exact payment level was unspecified as described below, but it was clearly a trivial amount that represented more of a symbolic payment than an attempt to compensate the costs of participating.

The experiment lasted for three phases, each containing five rounds, for a total of fifteen rounds. In the control group, the terms of the request to participate in the patrol was constant throughout the three phases. In the injunctive norm treatment, participants received the injunctive norm message in all three phases (rounds 1–15). In the temporary incentive treatment, participants received the incentive to participate in the second phase (rounds 6–10), after which it was removed. A fourth treatment group combined the injunctive norm and incentive treatments. All other experimental conditions were the same for all groups and did not change over the course of the experiment.

The cultural context of our experiment prevented us from offering actual financial incentives. Based on previous experience with payments to community members for behavior change, Shanshui was concerned that any payment in our experiment would lead to expectations of future payment in its natural resource management programs that it would not be able to provide.

We offer three justifications for our use of hypothetical payments. First, unlike in a standard public good experiment, in our modified public good experiment there are not specific payoffs and opportunity costs associated with players' actions, because the payments are hypothetical, as are the costs that a player imposes on others through selfish behavior. The task for which payment would be offered is also hypothetical. From this perspective, our experiment is somewhat akin to survey-based choice experiments, which routinely investigate subjects' willingness to pay or willingness to accept basis without using real payments (Carlsson and Martinsson 2001). The main difference concerns the interaction among the four participants.

Second, although economic experiments typically offer real payments, evidence shows that it does not always matter. For example, in a set of framed field experiments in southern India focusing on collective management of groundwater, Meinzen-Dick et al. (2016) randomly offered payments representing returns to crop production in half of their experimental sessions, with no payments in the other half. They found no difference in behavior between the two. Survey responses afterward indicated that participants took the experiment equally seriously regardless of whether they were paid. The authors concluded that the framed field experiments generated their own salience – payments were not necessary. Granted, additional research is needed to better understand when real payments are necessary or not necessary to generate salience for the subjects.

The third justification concerns the characteristics of our study population. Tibetans are known for taking promises seriously. A prevalent Tibetan saying that translates into English as, "Han Chinese live by written records/words, Tibetans live by spoken words/promises." Indeed, this is one of the reasons for Shanshui's interest in working in the area. In the context of this research, we asked the respondents to take the hypothetical payment very seriously even though it was not real. Shanshui officials suggest that, based on their experience, people in the local Tibetan population would do so.

The payment treatment in our experiment was framed as follows:

> Imagine that the government has agreed to hire one of the patrol members on an ad-hoc basis, providing monthly payment in exchange for performing anti-trapping patrols. This person would not be a regular employee but he would receive monthly payment. Imagine that people in your community who agree to patrol would be free to select which person becomes the ad-hoc employee and also how they want to divide up the payment among them.

The reason for this framing was twofold. First, it guards against a reaction by participating herdsmen that a direct payment was possible for participating in an anti-trapping patrol. Second, colleagues at Shanshui suggested that it is a plausible

way in which the Chinese government might actually execute an incentive payment system to promote wildlife protection. Colleagues from Shanshui also suggested that framing the payment in this way would represent official recognition and perhaps validation of the local tradition of patrolling sacred lands, while also recognizing local people's authority as the ones who should protect those lands. Note that the amount of the payment was not specified and the participant could not know what his actual share would be; this means that the payment treatment focused more on the idea of payment as opposed to a specific financial cost-benefit calculus. It also implies that the more people who participate in a patrol, the smaller each participant's share of the payment. In addition, we know from Shanshui and other NGOs that have organized such patrolling that gasoline costs are quite high and our payment as framed would be far too low to cover them.

Data on social norms were collected throughout the experiment. In particular, after rounds 1, 5, 10 and 15, participants responded to survey questions regarding their perceived descriptive and injunctive norms. Additional questions asked only after round 15 inquired about their group orientation (the extent to which they tend to work with others) and their group identity as a member of a nomadic herding community. Table 1 contains the survey questions.

Multiple survey questions with Likert-scale responses addressed perceived descriptive and injunctive norms, respectively. Following common practice in the communication science literature (e.g. Rimal and Real 2005; Lapinski et al. 2017), we subject the multiple measures to confirmatory factor analysis, which extends correlation analysis to test the extent to which these items are similar in measuring the underlying latent construct (PDN in this case). This yields composite measures of perceived descriptive and injunctive norms. We tested measurement models at all four points in time followed by a test of the overall model. We assessed factor invariance across time by examining confidence intervals around the factor loadings.

3.2. Procedures

We conducted the experiment using oTree, a software program designed for interactive experiments (Chen et al. 2016). Unlike z-Tree, the most commonly used software for laboratory-based public good experiments, oTree can be used in a field setting with a laptop connected to tablets or smartphones, without an internet connection. We ran the experiment on a laptop connected wirelessly to tablets that each participant operated.

The experiment interface accommodated illiteracy among many participants. On each participant's tablet, instructions and procedures appeared both in Tibetan script and as optional audio files in the local Kham Tibetan dialect. Each participant wore ear buds while participating in the experiment so that they could listen to the instructions without disturbing the other participants. In addition, following Gore and Kahler (2015), Likert-scale survey responses used both numeric and visual scales to help illiterate respondents more easily answer the questions. [Examples of the experiment interface are provided in the experiment instructions in the Appendix.]

Table 1: Qinghai survey questions.

1. I believe that most people in this group of four people doing this experiment right now are willing to join a team to remove traps. (PDN[1])
2. Most people in this group approve of giving our time to remove traps. (PIN[2])
3. The majority of nomads in my township think that giving time to remove traps is an important thing to do. (PIN)
4. The other three members of this group would disapprove of me if I didn't join the team to remove traps. (PIN)
5. The majority of people in this group would be on a team to remove traps. (PDN)
6. The majority of people in this group think that giving time to patrol with a team and remove traps is an important thing to do. (PIN)
7. Most people in this group will give their time to patrol with a team to remove traps. (PDN)
8. I believe that most nomads in my township approve of giving our time to remove traps. (PDN)
9. The majority of people in this group would work with a team to remove traps from the landscape. (PDN)

I usually sacrifice my self-interest for the benefit of others. (GO[3])

10. It is important for me to maintain harmony with others. (GO)
11. To me, pleasure is spending time with others. (GO)
12. I feel good when I cooperate with others. (GO)
13. My work as a nomad is an important part of how I see myself. (GID[4])
14. Being a nomad is an important part of who I am. (GID)
15. How many of the people in this group did you know before today?

Please think about people in this group for these questions. On the whole, how similar do you think most people in this group are to you…

	Extremely similar						Not at all similar
17. Intellectually?	1	2	3	4	5	6	7
18. In the way they think?	1	2	3	4	5	6	7
19. In their values?	1	2	3	4	5	6	7
20. In their behaviors?	1	2	3	4	5	6	7

Notes:
Questions 1–15 are Likert-scale questions with the following possible responses:
Strongly Disagree/Disagree/Neutral/Agree/Strongly Agree.
[1]PDN: perceived descriptive norm.
[2]PIN: perceived injunctive norm.
[3]GO: group orientation.
[4]GID: group identification.

The data were collected in July 2016 in two townships, Zhenqin (Denchen) and Xiewu (Shewo) townships of Chengduo County, several hours' drive from the city of Yushu on the Tibetan Plateau in southern Qinghai province. Attendants who administered the experiment came from these townships and recruited participants through people they knew. All the participants were males who herd yaks so that, relatively speaking, they would have a common perspective on the experimental task. Each session included four participants. With 32 participants in each of the four treatment groups, the total sample size was 128.

Three attendants facilitated each session, monitoring the progress and being ready to assist. An attendant read the instructions and participants answered a series of questions on their tablet to ensure they understood the procedures and were comfortable with the user interface. Any participant who answered a question incorrectly had to repeat the question. Communication among participants was not allowed once the experiment began. The experiment sessions proceeded smoothly, taking less than an hour. Smartphones are common in the area, so participants had no trouble using the tablets and software. Attendants reported that the participants generally found the sessions interesting and enjoyable.

4. Hypotheses

This experiment tests several key hypotheses stemming from our model, as follows. The first few hypotheses set the stage, and the last few test the key areas of interest in our model.

H1: Financial incentives for a socially desirable behavior will increase that behavior when the financial incentive is in place.

This hypothesis is straightforward; it tests whether financial incentives have their usual expected effect. This test is important given the unique study population.

H2: A particular behavior increases with (i) the collective descriptive norm and (ii) perceived descriptive norm regarding prevalence of that behavior.

H2 is in line with the FINS model as described above, including the findings of Lapinski et al. (2017). It is also consistent with the information cascade literature (Banerjee 1992; Bikhchandani et al. 1992). When someone perceives that others are behaving in a certain way, they might believe that the payoff from doing so must be higher, leading them to engage in that behavior as well.

H3: Perceived injunctive norms in favor of a particular behavior will increase prevalence of that behavior.

The communication literature has found that perceptions of injunctive norms have both direct and moderated effects on behaviors (Rimal and Real 2005; Lapinski et al. 2014). In addition, when injunctive norms interact with descriptive norms, they heighten the effect of descriptive norms on behavior.

H4: An injunctive norms appeal in favor of a behavior will increase the perceived injunctive norms in favor of it.

This hypothesis serves two purposes. First, it is a manipulation check in our experiment: does a treatment in which some people receive a message about the injunctive norm affect their perception of the injunctive norm? Second, it also has

practical implications as a message to reiterate injunctive norms in favor of a certain behavior would be an obvious component of a norms-based effort to reduce crowding out or promote crowding in.

H5: Financial incentives for undertaking a behavior will reduce the perceived injunctive norm in favor of that behavior.

This hypothesis addresses a possible explanation for motivation crowding out from the FINS model that if people know that others are participating in a behavior because they are being paid for it, they may draw the conclusion that the behavior is only worth doing in exchange for payment, thus weakening the injunctive norm for that behavior. This hypothesis focuses on the direct effects of incentives on perceived norms without accounting for the information accompanying the incentive, a point we return to below.

H6: Recipients of a financial incentive for a behavior will exhibit a greater reduction in that behavior once the incentive is removed, compared to those who do not receive a financial incentive.

This is the basic motivation crowding out hypothesis first tested by Deci (1971), that introducing and then removing a financial incentive can reduce a given behavior below what it would have been had the financial incentive never been introduced. It is consistent with the experimental findings of Lapinski et al. (2017). Like H5, H6 focuses on the direct effects of incentives without accounting for information accompanying the incentive.

H7: A stronger perceived injunctive norm in favor of a behavior will reduce or reverse negative effects of removing a financial incentive on that behavior.

This hypothesis, which is related to H3, reflects the most important contribution of this paper. It addresses our main interest of trying to mitigate motivation crowding out via injunctive social norms treatments, i.e. reminding participants that the social group to which they belong strongly supports the behavior in question, or by framing a payment in a way that promotes rather than undermines an injunctive norm in favor of the behavior. The theory behind these treatments is that they make injunctive norms salient and, by doing so, enhance their effects on action.

5. Results

5.1. Descriptive analysis

Figure 1 displays the mean number of days volunteered by round and treatment group, and Figure 2 shows the same but by phase as opposed to by round. Recall that in treatments 3 and 4, incentive payments are offered only in phase 2

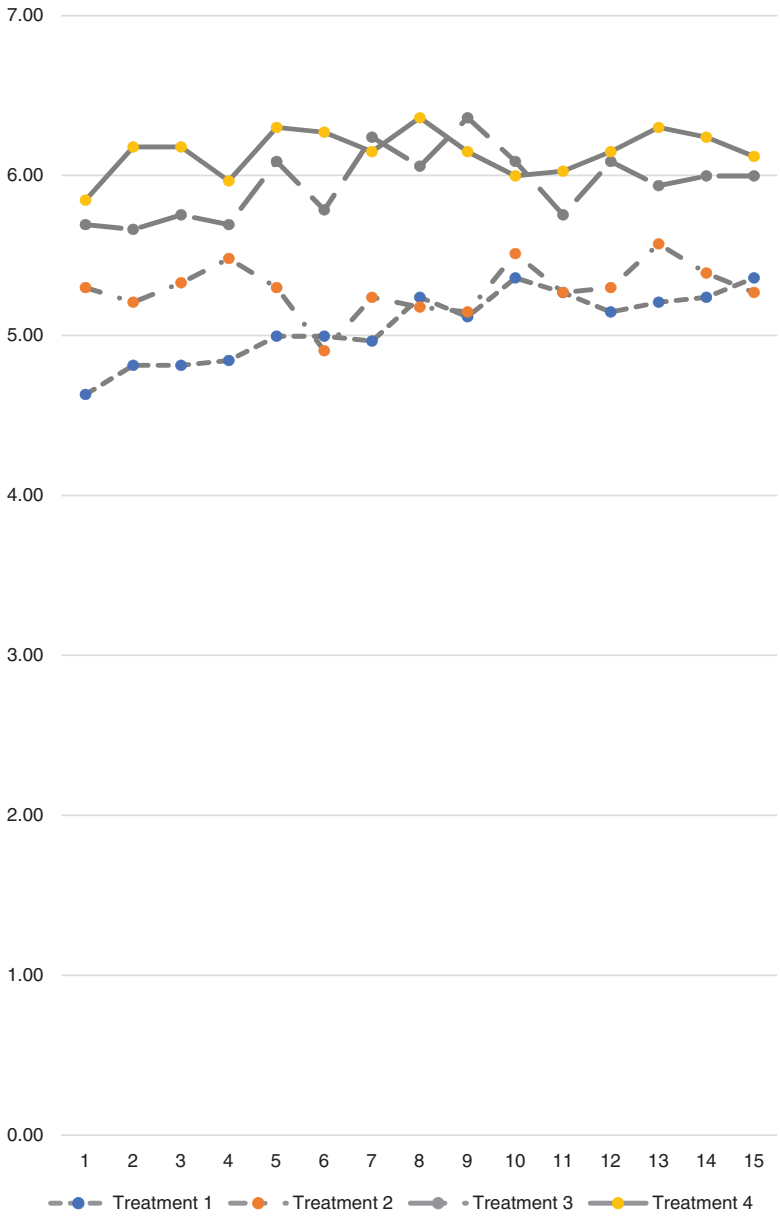

Figure 1: Mean days volunteered for anti-trapping patrol (vertical axis) by treatment and round (horizontal axis).
Note: Treatments: Control, Injunctive norms (IN) message, payment, injunctive norms (IN) message+payment.

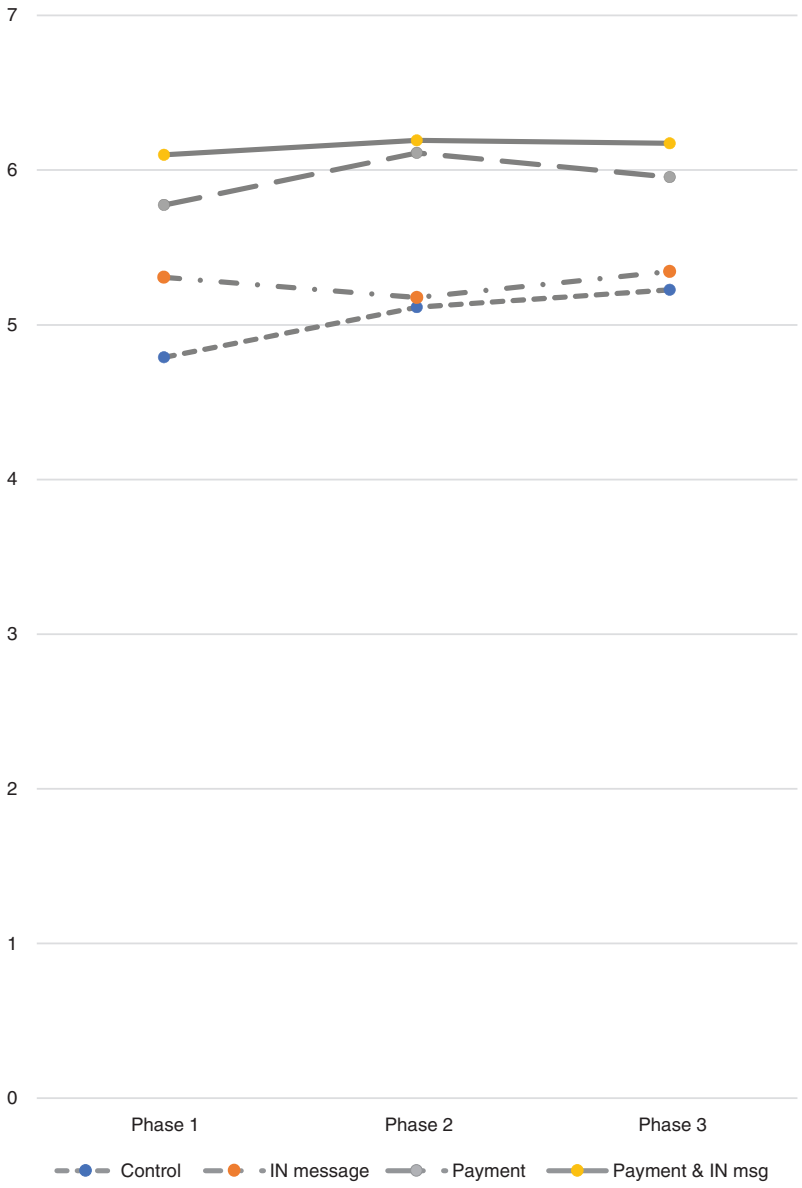

Figure 2: Mean days volunteered for anti-trapping patrol (vertical axis) by treatment and phase (horizontal axis).
Note: Treatments: Control, Injunctive norms (IN) message, payment, injunctive norms (IN) message+payment.

(rounds 6–10), and in treatments 2 and 4, injunctive norms messages are offered in all rounds.

Figures 1 and 2 show that the initial number of days volunteered is high in all treatment groups. This can be attributed both to the initially high willingness to engage in patrolling against illegal hunting and to the fact that the experiment is hypothetical. It has been long established that people overstate their willingness to undertake certain actions when the question is only hypothetical (Murphy et al. 2005; Norwood and Lusk 2011).

On the other hand, the number of days is not constant across the groups at the start of the experiment, and this variation is not related to the injunctive norms treatments. Figures 1 and 2 also show that payments in rounds 6–10 (phase 2) slightly raise the number of days volunteered relative to the groups that did not receive payments – the gap in the number of days volunteered across these groups is highest during this part of the experiment. Figures 1 and 2 show no decline in the number of days volunteered for participants who received an incentive payment after that payment was removed, relative to people who never received a payment.

Figures 3 and 4 show the evolution of measures of perceived descriptive norms (PDN) and perceived injunctive norms (PIN), respectively, over the course of the experiment. As introduced above, these measures are based on survey responses collected after rounds 1, 5, 10 and 15.

Norms research shows that it is PDN that influences behavior more than actual prevalence of behavior, i.e. collective norms (Lapinski and Rimal 2005). The two

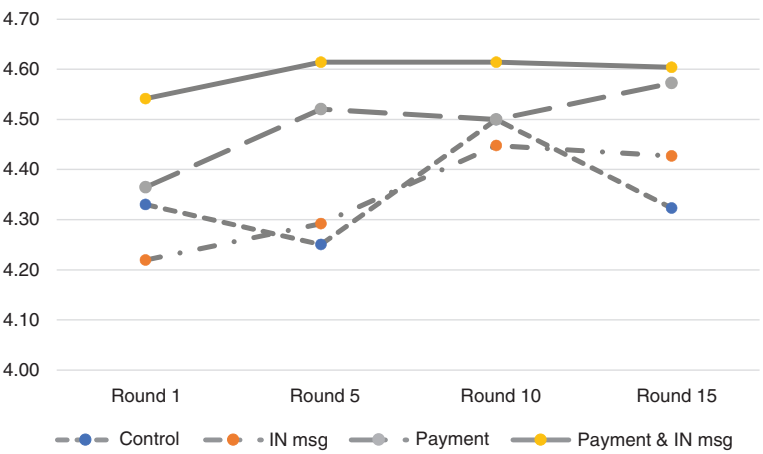

Figure 3: Perceived descriptive norms (vertical axis) by treatment, rounds 1, 5, 10, 15 (horizontal axis).
Note: perceived descriptive norms measures are a composite of responses to survey questions 1, 5, 7 and 8 in Table 1, each of which reflects descriptive norms. Treatments: Control, Injunctive norms (IN) message, payment, injunctive norms (IN) message+payment.

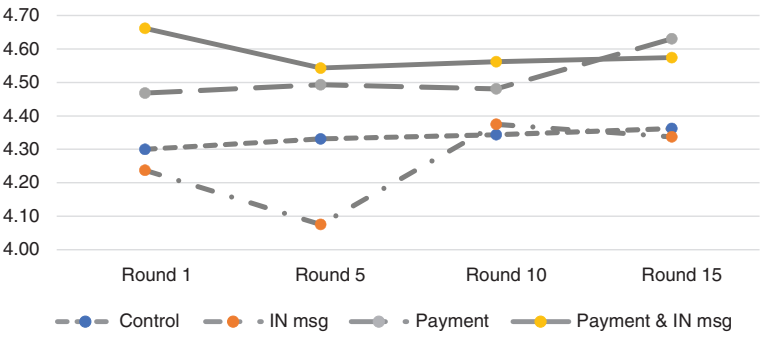

Figure 4: Perceived injunctive norms (vertical axis) by treatment, rounds 1, 5, 10, 15 (horizontal axis).
Note: perceived injunctive norms measures are a composite of responses to survey questions 2, 3, 4 and 6 in Table 1, each of which reflects injunctive norms. Treatments: Control, Injunctive norms (IN) message, payment, injunctive norms (IN) message+payment.

are not always identical due to misperceptions of the prevalence of behavior. Figure 4 shows that, as with the number of days volunteered, the PDN for volunteering to patrol against illegal wildlife trapping is high across all treatment groups, and also that it varies in round 1 in ways that we cannot explain. A comparison between Figures 2 and 3 shows that PDN follows a pattern fairly similar to that of actual days volunteered, i.e. it maps fairly well onto the collective norm. As with actual days volunteered, PDN rises over the course of the experiment.

Regarding perceived injunctive norms (PIN), Figure 4 again shows an immediate difference across treatment groups, and also that the pattern for PIN matches that both for actual days volunteered and for PDN. The PIN is high in all groups, with relatively little change after round 1, although the average PIN score gradually rises over the course of the experiment for three of the four groups. The groups that received the PIN message do not have the highest PIN measures: one of them has the lowest average PIN among all groups and the other has the highest PIN. The two groups with the highest PIN at the end of the experiment, after removal of the payment, are those that previously received payment.

5.2. Econometric analysis

Table 2 presents the variables in the analysis and their descriptive statistics. In the basic ordinary least squares (OLS) econometric model, the number of days volunteered to patrol is the dependent variable. The explanatory variables include not only those directly related to our hypotheses (e.g. descriptive and injunctive norms, financial incentives, etc.) but also other covariates that could potentially influence the number of days volunteered (e.g. experiment rounds and phases).

Table 3 presents the findings for the regression of the number of days volunteered. Model 1 tests the effect of the injunctive norms treatment. Model 2 replaces the

Table 2: Summary statistics of variables in the model.

	N	Minimum	Maximum	Mean	Std. Deviation
Days volunteered for antitrapping patrol	1920	0.00	7.00	5.605	1.69
Initial group average days (in round 1)	1920	128	1.0	7.0	5.35
Collective descriptive norm (CDN)[1]	1920	1792	0.0	7.0	5.61
Perceived descriptive norm (PDN)[2]	512	1.00	5.00	4.45	0.76
Perceived injunctive norm (PIN)[2]	512	1.80	5.00	4.42	0.68
Injunctive norms message[3]	1920	0.00	1.00	0.50	0.50
Financial incentive[4]	1920	0.00	1.00	0.17	0.37
Post-financial incentive[5]	1920	0.00	1.00	0.17	0.37

[1]Lagged average days for other participants in the group (the non-self mean). Round 15 is excluded.
[2]PDN and PIN are computed using confirmatory factor analysis on the responses to survey questions listed in Table 1 designed to measure PDN and PIN, respectively.
[3]Dummy variable set equal to 1 for cases in the injunctive norms message treatment. This message is delivered in all 15 rounds.
[4]Dummy variable set to equal 1 for cases in the financial incentive treatment groups during phase 2 when the financial incentive is in effect, otherwise zero.
[5]Dummy variable set to equal 1 for cases in the financial incentive treatment groups during phase 3, when the incentive has been withdrawn.

Table 3: Estimation results: number of days volunteered.

	Model 1	Model 2	Model 3
Initial group avg. days (phase 1, round 1)	0.10	0.11	0.11
	(0.06)*	(0.05)**	(0.5)**
Financial incentive	0.12	0.10	0.36
	(0.10)	(0.09)	(0.42)
Post-financial incentive	0.15	0.13	–0.28
	(0.09)	(0.08)	(0.49)
Collective descriptive norm (CDN)	0.00	–0.02	–0.02
	(0.06)	(0.05)	(0.06)
Own days volunteered in previous round	0.73	0.71	0.70
	(0.06)***	(0.06)***	(0.06)***
Injunctive norms message	–0.01		
	(0.09)		
Perceived descriptive norm (PDN)		–0.01	–0.01
		(0.08)	(0.07)
Perceived injunctive norm (PIN)		0.17	0.16
		(0.06)***	(0.07)**
Financial incentive*perceived injunctive norm			–0.06
			(0.09)
Post-financial incentive*perceived injunctive norm			0.09
			(0.10)
N	1792	1792	1792
r^2	0.60	0.60	0.60

Notes: OLS regression; standard errors in parentheses, * $p<0.10$, ** $p<0.05$, *** $p<0.01$. All models contain a variable for round (1–5) and dummy variables for phases 2 and 3.

injunctive norms message dummy with the measured PIN, and Model 3 introduces interactive terms between the financial incentive and the PIN. In Models 2 and 3, receiving a financial incentive payment in phase 2 has a positive effect on the number of days volunteered as expected, but it is not significant, thus not fully consistent with H1. This is not surprising given the high initial number of days volunteered. PDN has a small, negative, insignificant impact on number of days volunteered, not consistent with H2. In contrast, PIN has a strong positive effect on the number of days volunteered, significant at 1% in Model 2 and 5% in Model 3. This result supports H3. (Note however that the injunctive norms message (in Model 1) did not have a significant impact on the number of volunteered.) The results also show that receiving a financial incentive in phase 2 but then having it removed has an insignificant impact on the number of days volunteered in phase 3, but it has opposite signs in Models 2 and 3. We return to questions about the effects of withdrawing payment below.

Table 4 tests H4 and H5 regarding the effect on PIN of the financial incentive and the injunctive norms message, respectively. In Table 4 we see that the injunctive norms message has no effect on PIN, which is inconsistent with H4. On the other hand, the prevalence of volunteering among participants in the previous round has a positive effect on PIN; this suggests that high prevalence of the behavior signals to people that others believe that it is important, consistent with Farrow et al. (2017). The striking findings in this table are the positive and significant coefficients of the financial incentive and the post-financial incentive variables. They signal that the incentive payment raises the injunctive norm, and that this effect persists even after withdrawal of the temporary payment. The former result directly contradicts H5. We return to these results below.

We examine multiple models to test H7, whether a PIN in favor of undertaking a behavior mitigates the negative effect of removing a payment for that behavior.

Table 4: Estimation results: perceived injunctive norm.

Initial group avg. days volunteered (phase 1, round 1)	–0.05
	(0.02)***
Financial incentive	0.11
	(0.05)**
Post-financial incentive	0.12
	(0.05)**
Injunctive norms message	0.03
	(0.03)
Collective descriptive norm (CDN)	0.12
	(0.02)***
Own days volunteered in previous round	0.16
	(0.02)***
N	1792
r^2	0.07

Notes: OLS regression; clustered (by group) robust standard errors in parentheses, * $p<0.10$, ** $p<0.05$, *** $p<0.01$.
Model also contains a variable for round (1–5) and dummy variables for phases 2 and 3.

In Table 3, we test whether PIN moderates the effect of the post-financial incentive variable on the number of days volunteered. As discussed above, we know that neither receiving a financial incentive nor having the incentive taken away has a significant effect on days volunteered. In Table 3, model 3, we see the results of interacting 1) the incentive and the PIN, and 2) removal of the incentive and the PIN. Neither of these interactive variables has a statistically significant effect on the number of days volunteered.

On the other hand, we know from Table 3 that PIN has a strong, positive effect on days volunteered, and we know from Table 4 that payment and post-payment both have a significant and positive effect on PIN. This suggests a new hypothesis: that payment and post-payment can indirectly raise the number of days volunteered, mediated by PIN. Tables 5 and 6 present the findings of the standard Sobel mediation test of this new hypothesis. The procedure involves three OLS regressions: 1) the mediator (perceived injunctive norms) regressed on the exogenous variable (financial incentive or post-incentive), 2) the dependent variable (days

Table 5: Mediation model: regression of days volunteered on perceived injunctive norms (mediator) and payment (exogenous variable).

Panel A: regression of perceived injunctive norms (mediator) on financial incentive

	Model 1
Financial incentive	0.06
	(0.03)*
Constant	1.02
	(0.08)***
N	1792
r^2	0.66
F	435.5

Panel B: regression of days volunteered on perceived injunctive norms (mediator) and financial incentive (exogenous variable)

	Model 2	Model 3
Perceived injunctive norms (mediator)		0.17
		(0.08)***
Financial incentive (independent variable)	0.10	0.09
	(0.09)	(0.9)
Constant	0.39	–0.26
	(0.28)	(0.22)
N	1792	1792
r^2	0.6	0.6
F	337.09	301.44

Notes: Control variables: initial group average days, collective descriptive norm, own number of days volunteered in previous round, perceived descriptive norm, round, phase 1, phase 2.

OLS regression; standard errors in parentheses, * $p<0.10$, ** $p<0.05$, *** $p<0.01$; Sobel-Goodman Tests indicate 31% of the variance in perceived descriptive norms is explained by the mediator, Sobel coefficient=0.032; *SE*=0.018, z=1.82, p=0.10.

Table 6: Mediation model: regression of days volunteered on perceived injunctive norms (mediator) and post-payment (exogenous variable).

Panel A: regression of perceived injunctive norms (mediator) on post-financial incentive

	Model 1
Post-financial incentive	0.07
	(0.03)**
Constant	1.01
	(0.08)***
N	1792
r^2	0.65
F	436.09

Panel B: regression of days volunteered on perceived injunctive norms (mediator) and post-financial incentive (exogenous variable)

	Model 2	Model 3
Perceived injunctive norms (mediator)		0.17
		(0.07)***
Post-financial incentive (independent variable)	0.13	0.12
	(0.11)	(0.09)
Constant		–0.26
		(0.22)
N	1792	1792
r^2	0.6	0.6
F	337.4	301.67

Notes: Control variables: initial group average days, collective descriptive norm, own number of days volunteered in previous round, perceived descriptive norm, round, phase 1, phase 2.

Standard errors in parentheses; * $p<0.10$, ** $p<0.05$, *** $p<0.01$; Sobel-Goodman Tests indicate 28% of the variance in perceived descriptive norms is explained by the mediator, Sobel coefficient=0.037; *SE*=0.017, z=2.12, p=0.05.

volunteered) regressed on the exogenous variable, and 3) the dependent variable (days volunteered) regressed on both the exogenous variable and the mediator.

The mediation model confirms that both the financial incentive and post-financial incentive variables indirectly affect the number of days volunteered, via their effects on PIN and the direct effect of PIN in raising the number of days.

6. Discussion and conclusion

This research was driven by concerns about motivation crowding of financial incentives, the possibility that social norms might play a role, and the lack of measurement of such a relationship in the literature. The research reported here measures participants' perceived descriptive and injunctive norms over the course of the experiment to see how financial incentives affect the norms and how the norms in turn affect behavior.

The focus of the study is a unique population of Tibetan herders in Qinghai Province, China. This population is characterized by a strong tradition of protecting

wildlife and other natural resources, and upheaval in livelihood systems driven in part by top-down policies that encourage destocking and resettlement. Currently, the Chinese government is expanding the use of PES in the area including for wildlife patrolling, so it is an interesting context in which to test the FINS model.

Our test of the model is based on a framed field experiment, contextualized around decisions of whether and how much to participate in patrolling against illegal wildlife trapping. Treatments included a temporary financial incentive and a message reminding people of local injunctive norms in favor of patrolling against illegal trapping. The incentive is for a small, unspecified amount, unlikely to shift the cost-benefit calculus in favor of participating.

Our key finding is that perceived injunctive norms had a strong, positive, and statistically significant effect on participation. Moreover, the incentive payment had a strong, positive and statistically significant impact on the perceived injunctive norm, and this effect remained even after the payment had been withdrawn. In other words, even when the payment had been removed, the PIN was higher among participants who had previously received a payment, relative to before they had received the payment and relative to participants who had not received a payment. A mediation model confirms that the payment indirectly raised participation in anti-trapping patrols through its effect on PIN, even though it did not have a direct effect. As mentioned, the small incentive would not have been enough to make patrolling profitable; rather, our analysis suggests that its effect is through injunctive norms.

These finding represent support for H1, that financial incentives raise participation, but only through the indirect effect of increasing the perceived injunctive norm in favor of participation (supporting H3 and H7). In contrast, the findings directly contradicted H5, that a financial incentive would reduce the perceived injunctive norm in favor of participation, and H6, that removing the incentive would reduce the extent of participation. For the remaining hypotheses the findings did not show any significant effects. These include that collective norms and perceived descriptive norms would increase participation (H2), that an injunctive norms appeal would raise the perceived injunctive norm in favor of participation (H4).

Our key result of financial incentives raising participation via their positive effects on perceived injunctive norms represents strong evidence of motivation crowding in by financial incentives. On the one hand this outcome is surprising, because previous experimental evidence documents crowding out much more frequently than crowding in (Deci 1971). Moreover, Bowles and Polánia-Reyes (2012) suggest that motivation crowding out will be more likely in cases when people already have a strong social motivation in favor of the behavior that is being incentivized. On the other hand, our finding is consistent with the idea raised by Bowles and Polánia-Reyes (2012) and by Rode et al. (2015) that a payment can crowd *in* other sources of motivation if it enhances self-esteem through social recognition. Discussions with Shanshui colleagues about the experimental results reveal that it is consistent with their work experiences in Qinghai. In their experience with Tibetan pastoralists, outsiders offering recognition of their environmental protection efforts leaves a strong positive impression on them because

it validates their cultural practices, which they feel have been suppressed. In addition, the way the payment was framed, with the government hiring a local person on an ad hoc basis and inviting the group to divide the funds among themselves as they see fit, demonstrates recognition of local people's authority to protect sacred lands, pursuing that protection according to their best judgement. This impression on participants would be particularly strong given their long experience with top-down directives inconsistent with the local way of life.

A very interesting result is the strong connection between payments and injunctive norms, even after their removal. A possible explanation is that by demonstrating recognition and validation of local cultural practices, the payment also acted as a reminder or reinforcement among participants regarding the importance their cultural beliefs about this practice, and thus about the injunctive norm surrounding it.

Our finding is consistent with the conclusions of Foggin (2018) based on years of socioeconomic research on environmental conservation initiatives in the Sanjiangyuan region. He argues that community engagement and participation in the development of localized conservation approaches have been critical elements of successful programs.

Unfortunately, due to resource constraints and the great logistical challenges of conducting research in our study area, we were not able to test alternative arrangements for framing the payment, for example by simply offering it as a wage, with no connotations regarding the funding source or its intentions. This is an area for subsequent research.

Two important issues in our study raise caution in considering its broader implications. One is the fact that it was conducted with a unique population group of Tibetan nomadic herders who are strongly motivated by an interest in conservation and who have had a difficult relationship with government policies over the years. Indeed, we selected this group specifically to examine responses to conservation incentives by a population that already had a strong conservation ethic. As mentioned above, stimulating or invoking an injunctive norm in favor of conservation is only possible if that injunctive norm already is present in the local population. Undoubtedly this group may respond differently to the scenarios raised in our experiments than others would. Testing the same model in other contexts will help us identify how robust the findings are; we are in the process of preparing such research. Second, as discussed above, the experimental setting made it impossible to test the effects of real as opposed to hypothetical payments and we cannot be certain that the effects would hold with real payments.

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Appendix

Instructions for participants regarding the use of symbols and pictures

In this activity we will use a lot of symbols in place of words. Let's go over the symbols you will see on your screen:

When you see this symbol, touch the triangle (the "play" button) and you will hear a recording. You can do this instead of reading the words on the screen, which say the same thing as the recording.

 This symbol means "correct" or "true" or "yes." When you are asked a question and the answer is correct or true or yes, touch this symbol.

 This symbol means "incorrect" or "false" or "no." If you are asked a question and the answer is incorrect or false or no, touch this symbol.

 This symbol means move to the next screen. When you have completed the task on one screen, you can press this symbol to go to the next one.

As you know, you and the other three people in your group will be asked to make hypothetical decisions about participating in patrols against illegal hunting and trapping. You won't speak with each other, but we will give you feedback about what the decisions the other people in your group make. We will use the following symbols to indicate the number of days that each person in your group chooses:

*

*

*

*

When you see these symbols, please know that the red star represents you, and the three black ones represent the other three people in your group.

There will be some questions that ask you to indicate your level of agreement with a statement. A statement will be made to you that you can either read or listen to, and then we would like to know to what extent you agree or disagree with the statement. Your answers will be private. When the statement is made, please use the diagram of the boxes as shown below to indicate your level of agreement. If you agree strongly, touch the circle below the largest box. If you disagree strongly, press the circle below the smallest box. The second biggest box indicates agreement but not very strong agreement; the middle box indicates that you are neutral (you don't agree or disagree), and the second smallest box indicates that you disagree but not very strongly. When you touch the circle under one of the boxes, the computer will register it as your response.