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Analysis

# Factors Affecting Support for Transnational Conservation Targeting Migratory Species

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ABSTRACT

International efforts to protect biodiversity depend on transnational collaboration and on public support for transnational policies to be implemented. Yet, we know little about what may compel citizens to support such transnational conservation efforts. In this paper, we design a lab-in-the-field experiment to explore how different framings and information about support shared across borders affect a citizen's conservation donations. Using a dictator game, we ask for donations from individuals in Denmark, Spain, and Ghana for the protection of natural habitats of the migratory Montagu's Harrier (*Circus pygargus*). We focus on citizens from Denmark, Spain and Ghana since these countries lie along the harrier's migratory route. We found that information affects donation behavior, albeit differently in each country. Our Danish and Ghanaian participants contributed more when (1) pre-donation information stressed that transnational collaboration is needed, and (2) they were told that a measure of their group's donation would be forwarded to other participants. In contrast, our Spanish participants donated less overall and were insensitive to the information treatments. The results document large differences across countries in supporting behavior in such transnational conservation settings and could influence how international conservation organizations organize and shape fundraising for their work.

## 1. Introduction

The loss of biodiversity and natural habitats remain a major threat worldwide. To effectively counter this threat, international collaborations are necessary (Millennium Ecosystem Assessment, 2005). Examples of such international collaborations include the European Natura 2000 framework (Davies, 2004), the Convention on Biodiversity (2010) and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES, 2017). Migratory species crossing several political borders are particular in need of international collaborations, like for instance the Bonn convention (UN, 1979). Nearly 40% of migratory birds are in decline, and about 200 classified as globally threatened (BirdLife International, 2017; Sutherland et al., 2012).

In this study, we undertook a lab-in-the-field donation experiment to investigate how information about collaboration needs and options to exchange signals of collaboration affect peoples' willingness to support through donations a transnational conservation program targeting migratory species. The framed experiments were run simultaneously in Ghana, Spain and Denmark, three countries on a migratory route of the Montagu's Harrier (*Circus pygargus*). This study was motivated by lessons from the conservation management and environmental valuation literature.

The conservation management literature has documented that international coordination may come with significant gains in cost-effectiveness (Kark et al., 2009; Moilanen and Arponen, 2011; Rodrigues and Gaston, 2002; Sultanian and van Beukering, 2008) and likely matter for migratory species (Runge et al., 2015; Tokunaga, 2015). Yet, real world policies struggle to capture these gains (Cumming et al., 2006; Dallimer and Strange, 2015; Guerrero et al., 2013). The challenge of transnational collaboration remains, and its resolution may depend on public support for biodiversity conservation — at home and across borders.

Several environmental valuation studies have found that, in general, people are more willing to pay for and support a conservation program the closer the program is to them geographically (Bateman et al., 2006;

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Campbell et al., 2009; Nielsen et al., 2016). Recent studies have also found this to be true when extending across national borders (Bakhtiari et al., 2018; Dallimer et al., 2014; Valasiuk et al., 2017) or if species change spatial distribution (Lundhede et al., 2014). While people are willing to support transnational conservation, when faced with a choice, they tend to prefer conservation in their home country to conservation abroad. This literature matter for understanding better the key aspects of public support for conservation, but both are limited by the methodological approach taken. Key behavioral questions remain unanswered. For example, the studies did not allow for any interaction between individuals (e.g., experimental subject pools). They also did not explore if and how awareness of conservation collaboration needs or signals of donations across countries and populations affect individual's donation decisions.

We applied a different approach and designed a transnational lab-in-the-field economic experiment to explore three behavioral questions. First, does willingness to support a transnational conservation program (donations) depend on information on the need for international collaboration? Second, does support depend on knowing that information about your group's support is forwarded to another group (of the same or different nationality)? And lastly, does willingness to support (donations) depend on the size of a signal of support from another group (of the same or different nationality)?

This study aimed to increase our understanding of how key factors such as awareness information and if forwarding or receiving signals (information about donations) may increase donations for transnational conservation. Results could be useful for discussing how such information mechanisms may affect transnational conservation collaboration efforts. We chose a case which focused on donations to conserve habitats which are necessary for protecting the endangered Montagu's Harrier in several countries along its migratory route. We implemented the donation experiment as a lab-in-the-field experiment and by applying a Dictator Game across Denmark, Ghana and Spain.

The paper proceeds as follows. We describe how our approach builds on and relates to relevant experimental research in the following section. We then elaborate on our experimental method and setup. Section 4 presents the results and Section 5 discusses our findings, caveats, and implications.

## 2. Related Experimental Literature

Economists now use various forms of incentivized experimental economic methods to better understand the behavioral underpinnings of decision-making, collaboration and preferences, including people's willingness to collaborate to secure public goods under different circumstances.

The literature divides humans into fairness and reciprocity-minded cooperators that act for the good of the group and selfish “free riders” that exploit the altruism of others (Hartig et al., 2015).

Some economic experiments have addressed such behavior in cross-country or other international settings. Buchan et al. (2011) had individuals from six countries play a non-simultaneous multilevel public goods game where individuals contributed to a private fund, a national fund and a global fund. Relating each participant's contribution to each fund with the participant's self-reported identification with the community, the nation, and the world, they found that individuals contributed more to the global fund when they identified themselves more with the world. Boarini et al. (2009) had participants from France and India play an ultimatum game. They found mostly unequal splits of money in favor of French when French made offers to Indian participants while almost equal splits when Indians made offers to French participants. Donation behavior is difficult to explain by the pure self-interest hypothesis. Social information and interaction may affect behavior in public good games, e.g. Croson and Shang (2008) found that individual donations were conditional on others' prior contributions. In a similar study Frey and Meier (2004) found that when students were presented with the information that many others donated to two charitable funds at the University of Zurich, their willingness to contribute increased. Information on the contribution of other participants or individuals (Croson and Shang, 2008; Frey and Meier, 2004) or about the recipient (Eckel and Grossman, 1996; Glazer and Konrad, 1996), have been shown to alter individual contribution decisions.

Within the conservation literature, experiments focusing on support for transnational conservation measures, a public good, is lacking. Most economic experiments in conservation management have used a variety of conservation settings to study the efficiency of and participation in conservation efforts across landowners (Fooks et al., 2016; Parkhurst et al., 2016). For example, Parkhurst et al. (2002) designed an economic lab experiment to examine voluntary transfer of land to conservation with the incentives of an agglomeration bonus for reuniting fragmented habitat. Our study differed from the above and other cross-country or cross-cultural comparative experimental studies (e.g. Henrich et al., 2001) as our groups interacted in varying degrees within the experiment through the transfer of donation signaling between groups.

Fundraising is crucial for many conservation NGOs, which depend on donors willingness to economically support their conservation efforts and programs. Donations may be sensitive to information, and e.g. Veríssimo et al. (2017) studied observational donation data from conservation organizations and correlated them with different marketing information in the collection material. They showed that variation in marketing components can have a large impact on donations. While this study is close to ours in general subject, it is not experimental and potentially subject to self-selection biases in results.

Using experimental methods our study takes a first step in better understanding of aspects that may affect public support for trans-national conservation efforts across different countries. We do not presume to estimate valid willingness to pay measures; as the payment vehicle in our experiment is voluntary donation from a constrained sum of income earned as part of the experiment. Rather, we study the effects of different forms of information framing and signals between groups for people's donation decisions to an international public good secured through trans-national conservation efforts.

## 3. Methods

### 3.1. The Transnational Collaboration Case

Our donation experiment was framed around the case of transnational efforts in conservation, specifically the “protection of natural habitats, like dry shrub lands, used for resting and foraging by threatened migratory birds like the Montagu's Harrier” (see our experimental instructions in the Supplementary Material). The migratory aspect enhances the case for international collaboration and increase the realism of the experiment to the participants across the three countries. The Montagu's Harrier is 1 of 194 wild birds listed as threatened in the European Commission's Bird Directive Annex 1 (EU Commission, 2009). The Danish breeding population has a known migration pattern across the three countries/regions, and breeding birds in Spain also migrates south (Heldbjerg and Sørensen, 2014).

All participant donations went to BirdLife International's Migratory Birds Program. Participants were aware of this and were shown confirmation (donation receipts) that their donations actually went to the program. We chose BirdLife International because of its international reach and scope, and because of the absence of any inter-governmental conservation funding programs across all of Denmark, Spain, and Ghana. BirdLife International is a global partnership of 88 national conservation agencies, which focuses on protecting birds and natural habitats across the globe. At the time of our experiment BirdLife International was running a Migratory Birds Program which aimed at protecting migratory bird species travelling between Europe and Africa. BirdLife International activities depend on donations and it lists an

array of projects, to which people can donate.

### 3.2. Practical Setup

We ran the experiments in Denmark, Spain, and Ghana in a coordinated simultaneous action. Venues for the experiments were University of Copenhagen, Pompeu Fabra University, and University of Ghana, Legon. We recruited individuals over the age of 21 as participants in all three countries for the running of 20 sessions with 12 participants in each. All participants were nationals of their country of participation. Recruitment in Denmark and Spain was via the Online Recruitment System for Experimental Economics (ORSEE) database system (Greiner, 2015) and in Ghana via invitations in classes. The participants came from a broad range of academic disciplines and their teachers were not involved in setting up the experiment. Using student samples in all three countries allowed for an easier comparison of results, and student samples are generally found to be an appropriate subject pool for economic experiments (Exadaktylos et al., 2013; Falk et al., 2013). The experiment was carried out in accordance with the scientific and ethical guidelines of the University of Copenhagen, Faculty of Science's Good Scientific Practice, which follows the European Code of Conduct for Research Integrity.

Assignments to treatments were done randomly and the order of running treatments was distributed over the days so as to counter any morning or afternoon fatigue effects on our treatments (Whiting and English, 1925). We gave the experimental instructions in Danish in Denmark, Spanish in Spain and English in Ghana (Anderson-Hsieh and Koehler, 1988). These instructions were initially written in English, translated into Danish, Spanish, and then, translated back to English, to ensure a quality translation. A short socio-demographic questionnaire was conducted at the end of the experiment (Supplementary material). This questionnaire was translated into the different languages the same way the instructions were. In order to counter unstable electricity and internet coverage in Ghana the experiment was run with participants using pen and paper. In each country a native speaker read the instructions aloud and handled all interaction with participants so that the experimenter did not interact with participants during the experiments. Participants were seated with dividers between them in Denmark and Spain and three seats apart in Ghana for them not to interact and being able to see others' decisions.

### 3.3. Experimental Design

Our experiment had three main features: Earned wealth, Donations, and Hypotheses. First, to ensure people felt a sense of ownership over their initial endowment, they earned money through a small task (Kagel and Roth, 1995; Cherry et al., 2002). The task consisted of counting the number of “1's” in a series of “0's” and “1's” within 5 min. We measured each participant's performance by how far off from the correct count they were. If they counted the number of “1's” correctly, they received the full amount of 20 tokens. For every 5 mistakes either below or above, 1/20 of the full amount was deducted (see Supplementary Material). The exchange rate of 20 tokens was set to the minimum hourly wage in each country — 100 DKK in Denmark, 8 EUR in Spain, and 8 GDS in Ghana. On average participants in Denmark, Spain, Ghana earned 19.8, 19.8, and 19.5 tokens from this small task, which was just below the country specific minimum hourly wage.

Second, after having finalized the task, each group of participants was given the instruction sheets and material of the treatments the group was randomly assigned. In all treatments and our baseline case, participants were asked how much of their endowment they were willing to donate to BirdLife International. They were told that the money would be forwarded to BirdLife International's Migratory Bird's Program and used for financing the protection of natural habitats, like dry shrub lands, used for resting and foraging by threatened migratory birds such as the Montagu's Harrier. To visualize the case, we distributed a sheet with photos of the habitats and the Montagu's Harrier to each of the participants (Supplementary material). In the baseline treatment, denoted T0, the participants were then asked to make their donation decisions based on this information. Note that participants were not informed that trans-national collaboration would be needed for the protection of the harrier. In the remaining treatments, they were asked to donate following the additional information specific to the treatments outlined below. Finally, each participant was given a questionnaire on socio-demographic details and questions on trust in others and institutions, attitudes towards conservation, etc. (Supplementary Material).

Third, our experiment examined how individuals' willingness to donate for the conservation of the Montagu's Harrier changed with information on the need for collaboration and sending and receiving signals from participants within and across countries. Our experiment included three treatments, apart from the mentioned baseline case, T0. In the first treatment, T1 (Collaboration Information), participants were informed that cross-country collaboration was needed for the conservation of birds like the harrier as they migrate through the three countries over the course of a year. They were also told that the experiment was undertaken simultaneously in the two other countries. In the second treatment, T2 (Forwarding Information), in addition to the information in T1, they were also told that information about the amount donated by their group would be shared with future participants from their own country or from either of the two other countries, prior to these other participants making their own decision on donation. In the third treatment, T3 (Donation Information), on top of the T1 collaboration information, the groups received information on the previous donations from one other group, either from their own country or one of the two other countries in T2. T3 included three variants. We kept all other wording in the instructions the same across treatments. We had a 3 × 6 experimental design (Table 1).

### 3.4. Formalizing Hypotheses

We formulate and test our hypotheses in terms of changes in donation behavior across treatments, relative to the baseline treatment T0, and draw upon the experimental literature (e.g. Croson and Shang, 2008; Eckel and Grossman, 1996; Frey and Meier, 2004; Glazer and Konrad, 1996). Our first hypothesis concerned T1 and the effect of adding information on the need for collaboration in preserving habitats along the migratory flyway. We hypothesized that this treatment would increase donations above the baseline (H0: T1 > T0), in appealing to social norms of collaboration. In T2, we informed participants that a measure of their group's donations would be forwarded to another group. We hypothesize that both the element of being in some sense observed and the element of being able to affect the contributions of others in a context of collaboration, works to increase donations compared to the baseline information (H1: T2 > T0). We also hypothesize donations would be larger than if they were only given the

**Table 1**
Experimental design and treatment labels.

| | Country | | |
|---|---|---|---|
| | Denmark | Spain | Ghana |
| Baseline Information (T0) | T0 D | T0 S | T0 G |
| Collaboration Information (T1) | T1 D | T1 S | T1 G |
| Forwarding Information (T2) | T2 D | T2 S | T2 G |
| Donation Information of Denmark (T3 D) | T3 D-to-D | T3 S-to-D | T3 G-to-D |
| Donation Information of Spain (T3 S) | T3 D-to-S | T3 S-to-S | T3 G-to-S |
| Donation Information of Ghana (T3 G) | T3 D-to-G | T3 S-to-G | T3 G-to-G |

Notes: D = Denmark, S = Spain, G = Ghana. D-to-D means that the donation information of Danes is given to Danes; S-to-D means that the donation information of Spaniards are given to Danes, G-to-D means that the donation information of Ghanaians are given to Danes, and so on.

**Table 2**
Summary of the number of sessions and participants in each session.

| Treatment | Number of Sessions | | | Number of Participants | | |
|---|---|---|---|---|---|---|
| | Denmark | Spain | Ghana | Denmark | Spain | Ghana |
| T0: Baseline Information | 4 | 4 | 4 | 48 | 47 | 48 |
| T1: Collaboration Information | 4 | 4 | 4 | 46 | 48 | 48 |
| T2: Forwarding Information | 3 | 3 | 3 | 36 | 36 | 36 |
| T3D: Donation Information Denmark | 3 | 3 | 3 | 35 | 36 | 36 |
| T3S: Donation Information Spain | 3 | 3 | 3 | 36 | 36 | 36 |
| T3G: Donation Information Ghana | 3 | 3 | 3 | 36 | 36 | 36 |
| Total | 20 | 20 | 20 | 237 | 239 | 240 |

collaboration information (H2: T2 > T1).

In T3, participants received a measure of the donations given by another group of participants. Here several hypotheses seem possible, which cannot be easily separated. The information may cause anchoring effects, well-known from both behavioral sciences and in environmental valuation studies (Tversky and Kahneman, 1974; Green et al., 1998; Furnham and Boo, 2011). The testable implication of this effect would be that donations would increase in the measure provided. Another effect may be a conditional giving effect (Croson and Shang, 2008), a positive effect on donations. For example, observing how much participants from other countries donated could induce higher donations from a reciprocity perspective, if they exceeded your expectations, and vice versa. However, free-riding (Isaac and Walker, 1988) may also result. The aggregate effect of these dynamics leaves us with competing hypotheses with opposite effects.

## 4. Results

We ran the experiments in April 2016. Table 2 shows the number of sessions and participants for each of our treatments. Although we aimed to run 20 sessions of 12 participants each, and over-recruited participants for each our sessions, two sessions in Denmark were run with just 10 and 11 participants and 1 session in Spain was run with just 11 participants. We also did not have a balanced dataset: there were more T0 and T1 sessions than T2 and T3 sessions. Since our independent level of observation was a participant per session, fewer T2 and T3 sessions should not matter. Our results below remained the same even when we dropped the last T0 and T1 sessions.

Out of 716 participants, 97.9% earned 17–20 tokens from the small effort task: 88.27% with 20 tokens, 4.89% with 19 tokens, 2.51% with 18 tokens and 2.23% with 17 tokens. The remaining 15 participants earned differing amounts of tokens between 0 and 16. This variation in the number of tokens earned constrained what participants could donate for habitat conservation. Therefore, we performed all statistical tests on data in percentage form. This allowed us to compare donations across treatments, without having to worry each participant's actual donation ceiling.

### 4.1. Effects of Information in T1 and T2

We examined the differences between treatments T0, T1 and T2 (see Fig. 1). Under T0, participants in Denmark donated 17.34% of their endowments, participants in Spain donated 19.25% of their endowments, and participants in Ghana donated 22.28% of their endowments. These percentage donations were not statistically significantly different across our three countries. When “Collaboration Information” was included, going from T0 to T1, we found that our Danish participants increased their contributions to 27.31%, our Spanish participants increased their contributions marginally to 19.32%, and our Ghanaian participants increased their contributions to 30.95%. Using a one-tailed *t*-test with unequal variances, we found the increase in Denmark and Ghana to be statistically significant (Denmark, $p = 0.0538$; Ghana, $p = 0.0238$), but not in Spain ($p = 0.4954$). Moving from T0 to T2, where both “Collaboration” and “Forwarding Information” was given, we found the same result. On average, participants in Denmark increased their contributions to 33.66% while in Ghana increased their contributions to 34.24%. Both were statistically significantly higher than T0 contributions (Denmark, $p = 0.0122$; Ghana, $p = 0.0127$). Spaniards, on the other hand, decreased their contributions to 16.49. This was not statistically significantly lower than their T0 contributions ($p = 0.2554$). However, when we looked at the effects of just “Forwarding Information”, comparing between T1 and T2, we found no statistically significant differences between these two treatments for all our three countries (Denmark, $p = 0.2072$; Spain, $p = 0.7357$; Ghana, $p = 0.235$). Note, however, these tests of means did not account for the fact that participants' donations were constrained by their initial earnings.

To account for constrained donations, we ran Tobit regressions on our data, imposing an upper censor of 100% and a lower censor of 0% on donation in all our regressions. Parameter estimates from these regressions confirmed our *t*-test results above. Regression results in Table 3 showed that Danish and Ghanaian participants under T1 and T2 donated more than Danish and Ghanaian participants in T0. A Wald test between the coefficients of T1 and T2 revealed that, unlike our t-test results above, the coefficient for T2 in Denmark was statistically significantly higher than its coefficient for T1 ($p = 0.0914$), though only at a 10% level. Similarly, the coefficient for T2 in Ghana was statistically significantly higher than its coefficient for T1 ($p = 0.0224$). This means that when we take into account the natural bounds on observations, by using censored regressions, and standard errors were robust, “Forwarding Information” had a positive effect on donations, even after controlling for “Collaboration Information”.

### 4.2. Effects of Receiving Information on Another Group's Donations

We then examined the effects of receiving information on another group's donations for donation behavior. We did this by comparing T2 with T3D, T3S and T3G. Since we ran 3 sessions of T2 in each country, we had a total of 9 signals (3 signals from each country × 3 countries). Receiving a signal from one of two foreign countries allowed participants to reveal their willingness to collaborate and reciprocate intentions towards already revealed donations from participants in other countries. The information forwarded from previous T2 groups presented to participants in T3 was the 75th percentile of the donations in T2 groups. This was chosen based on pilot studies indicating that it would provide for a larger spread in the information to be presented for the groups under T3. Mean and median donations were roughly at the same level in T2 and would have given little variation in the T3 analysis.

Ignoring the size of the signal, Danes contributed less when the signal comes from fellow Danes (average contribution of 24.28%), from Spaniards (average contribution of 22.64%), and from Ghanaians (average contribution 27.53%) while the opposite was the case for Spaniards. Then contributions increased to 19.60% when the signal was

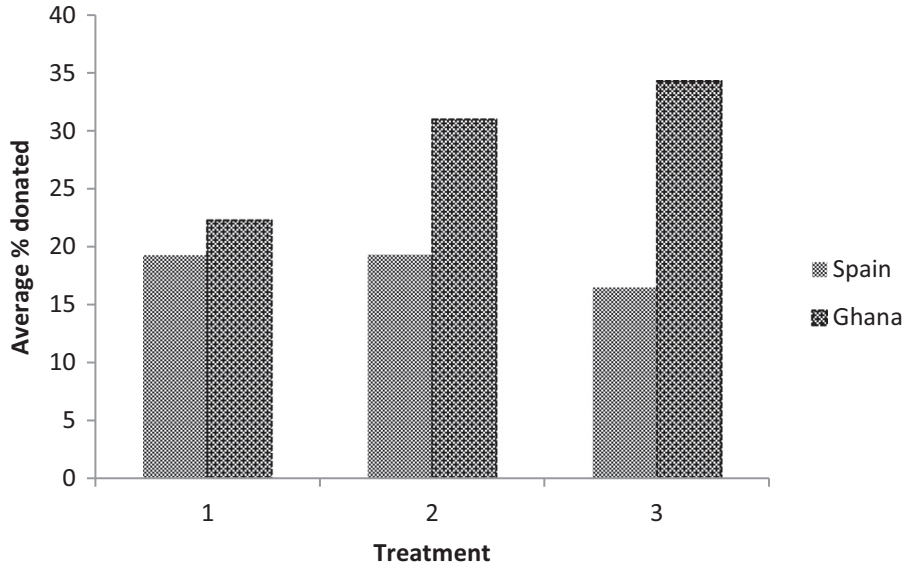


**Fig. 1.** Average percentage donations for treatments T0, T1 and T2.

**Table 3**
Censored regressions: effect of "Collaborative Information" and "Forwarding Information" treatments T1 and T2.

| Dependent variable: Percentage of tokens donated | | | |
|---|---|---|---|
| | Denmark | Spain | Ghana |
| T1 | 21.4106* | −0.6568 | 11.5156** |
| | (12.5890) | (6.3203) | (4.9811) |
| T2 | 32.1434** | −3.3670 | 15.3917** |
| | (13.6134) | (6.1416) | (6.0491) |
| Constant | −5.8369 | 14.0211*** | 18.9583*** |
| | (9.1304) | (4.2187) | (4.2711) |
| Sigma constant | 55.1529*** | 28.2879*** | 24.1912*** |
| | (6.4973) | (3.2756) | (2.3184) |
| Obs. | 130 | 131 | 132 |

Notes: T1 is a dummy variable equal to 1 if the treatment is T1, 0 otherwise. T2 is a dummy variable equal to 1 if the treatment is T2, 0 otherwise. Baseline treatment is T0. Robust standard errors in parentheses.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

from Denmark, 17.80% when the signal was from Spain, and 23.08% when the signal was from Ghana. Despite the increase, Spanish contributions were still lower than Danish contributions. Ghanaians, on the other hand, increased their contributions when they received signals from Denmark and Ghana (average contributions of 35.33% under a Danish signal and 36.94% under a Ghanaian signal).

The story changed when the value of the signal was taken into account. Average T2 donations in Denmark, Spain and Ghana were 33.66%, 16.49%, and 34.24%, respectively. From Table 4, we found that Danes consistently gave lower donations than the signal they received, except when the signal was very low, i.e., 15%. Spaniards also gave below the signal they received, but their donations seemed to increase with the signal, and we tested this hypothesis below. In contrast, Ghanaians appeared more likely to give higher than the signal, except when the signal was very high, i.e., 77.50%. Violin plots per signal per country are shown in Fig. 2. We tested hypothesis about the relation between T2 signals and T3 donations below.

Again, the constraints on donations implied by initial earnings calls for censored regressions. Running censored Tobit regressions to examine the effect of signals on the percentage of tokens donated, we found that a signal did increase the amounts Spaniards donated. We did

**Table 4**
Average percentage donations per country given signals received.

| Country | Signals from Denmark | | |
|---|---|---|---|
| | 28.80% | 66.30% | 77.50% |
| Denmark | 27.43 | 21.36 | 23.79 |
| Spain | 12.38 | 17.73 | 28.55 |
| Ghana | 35.83 | 44.74 | 25.42 |
| **Country** | **Signals from Spain** | | |
| | 15% | 28.80% | 32.50% |
| Denmark | 30.00 | 15.83 | 22.08 |
| Spain | 20.90 | 9.17 | 23.33 |
| Ghana | 36.15 | 31.51 | 26.11 |
| **Country** | **Signals from Ghana** | | |
| | 40% | 46.30% | 53.80% |
| Denmark | 26.71 | 30.42 | 25.44 |
| Spain | 14.17 | 19.67 | 35.42 |
| Ghana | 40.40 | 40.29 | 30.12 |

not see this effect in Denmark and Ghana at all. In fact, while coefficients for 'Signal' in Danish and Ghanaian groups were not statistically significant, they were slightly negative (Table 5). This shows the difficulty in creating a hypothesis as to how a signal can influence donation behavior.

### 4.3. Robustness Checking With Controls

We performed a robustness analyses and investigated how responses varied with key socio-demographics and perceptions collected with the questionnaire during the experiments. Overall, all the above results were robust to the inclusion of such control variables. We found that many control variables were insignificant and irrelevant for explaining variations in individual behaviors. Across the models, people who self-identified as 'bird watchers' tended to donate significantly more in particular in Denmark, and in some models also for Ghana and Spain. The age of participants tended to be a significant positive factor for donations from our Danish and Ghanaian participants though not from

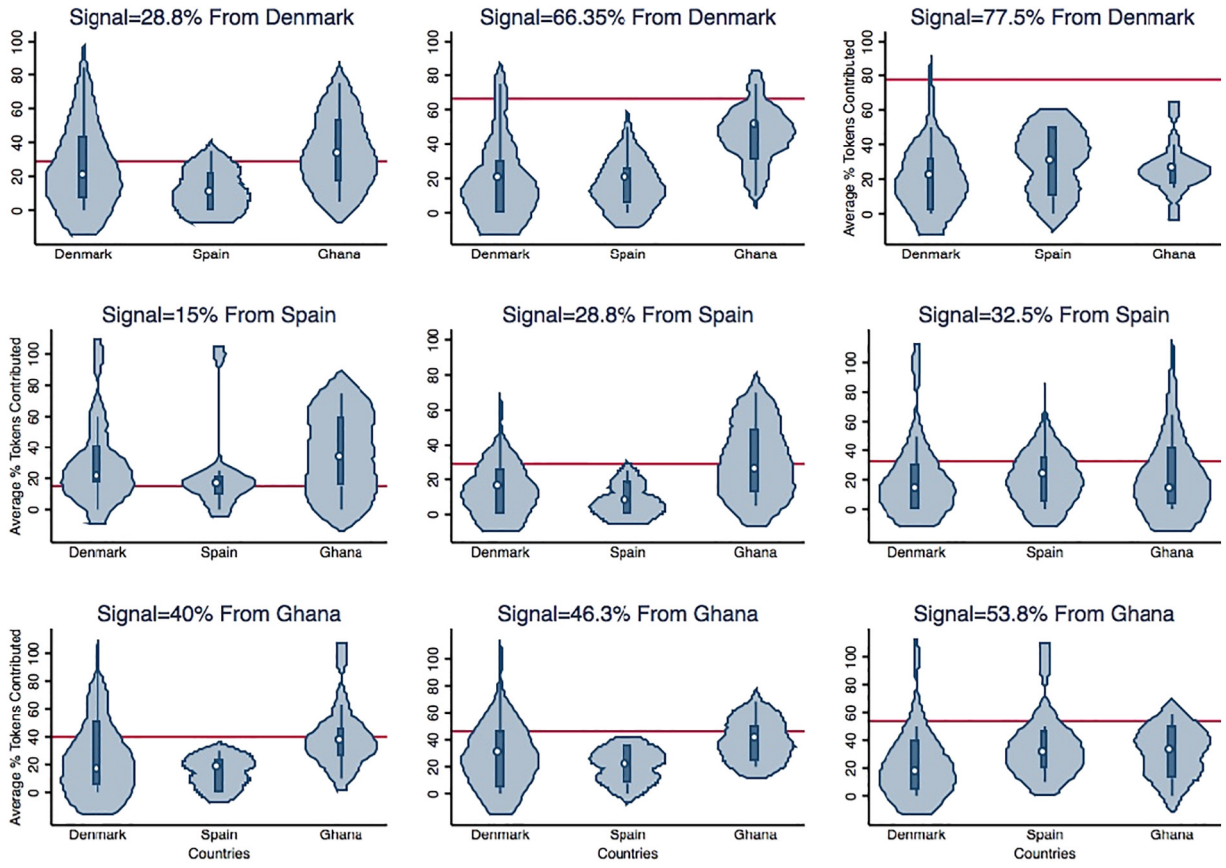


**Fig. 2.** Violin plots by country given signals.
Notes: Red horizontal lines are the signals. The white dots inside the box plots are markets for the median data. The box plot indicates interquartile range with spikes extending to the upper- and lower-adjacent values. Overlaid on the box plots is the estimated kernel density. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

**Table 5**
Effect of signals on percentage of tokens donated.

| | Denmark (1) | Spain (2) | Ghana (3) |
|---|---|---|---|
| Signal | −0.0849 | 0.2496* | −0.0189 |
| | (0.1842) | (0.1299) | (0.1163) |
| Constant | 22.6024*** | 6.3939** | 34.7638*** |
| | (8.5419) | (6.0943) | (5.9855) |
| Sigma constant | 35.5865*** | 23.5127*** | 23.8315*** |
| | (4.1424) | (3.5576) | (2.0192) |
| Obs. | 107 | 107 | 108 |

Notes: Signal is amount shown to participants. Robust standard errors in parentheses.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

our Spanish participants. The explanatory power of these and other variables was generally found to be poor, which possibly could be a result of the homogenous groups of (student) participants in each country.

## 5. Concluding Discussion

The motivation for this study was based on two observations. First, the conservation management science tells us that there a significant potentials and gains to reap from international coordination (Moilanen and Arponen, 2011; Rodrigues and Gaston, 2002). Second, environmental valuation studies have generally found public support for conservation efforts to decrease with distance to the policy site and a preference for conservation at home relative to in foreign countries for comparable habitats (Dallimer et al., 2014; Valasiuk et al., 2017; Bakhtiari et al., 2018). Exceptions may exist, when conservation sites are not easily comparable, e.g. Brouwer et al. (2008) found Dutch taxpayers willing to pay as much for conservation in African countries as they would in their own country.

While these important findings have relevance for both the study of conservation management and pertinent policy questions they are limited by the methodological approach taken. We took a different approach and designed a transnational lab-in-the-field economic experiment to explore three behavioral questions of relevance for conservation policies. Our results answered these questions, but also highlighted considerable variation in behavior across countries.

We did find that participants willingness to support a trans-national conservation program depend on awareness of the need for international collaboration for success. However, this was only a significant effect for Danish and Ghanaians, but not for our Spanish groups. We stress that the migratory aspect of our case provided a particular strong case for transnational collaboration.

We also found that when we inform participants that a measure of their group's donations would be forwarded to others, both Ghanaians and Danes again increased their contributions, which signaled an increased commitment to collaboration. Again, this decision context had no significant effect on the donations from the Spanish groups. Interestingly, however, among the groups receiving information about the donations of other groups (which could be interpreted as a collaboration signal), the Spanish groups were the only one to increase their bid with signal. Danes and Ghanaians did not systematically react in

this way. Overall, Danish participants donated the largest share of their earnings followed by the Ghanaians, whereas the Spanish participants donated significantly less, in particular in treatments T1 and T2. Our study does not explain these patterns, but awareness about them is important. It is well-documented that there are significant cultural differences affecting behavior in many different kinds of experiments. Kocher et al. (2008) found in a conditionally cooperation experiment across three countries (Austria, Japan, and USA) that both the relative frequency of conditional cooperators and the extent of conditional cooperation vary across the sample countries. Engelmann and Normann (2010) found a significant participant-pool effect and found Danes to be more cooperative and trusting than participants in other countries, including some higher-income countries.

Our robustness checks investigated how results varied with socio-demographic characteristics, general economic environment, trust in institutions or trust in the experiment. However, our explorative investigation of the role of these effects using the questionnaire data did not offer an explanation for the variations across countries. This of course could also be a result of the fairly homogenous groups of participants in each country.

Participants' perception of habitats in own and in the foreign countries might vary across the countries. To minimize these differences, we provided hand-outs with pictures of the bird and relevant habitats in each country to all participants. Nevertheless, Montagu's Harrier and dry shrub lands could have been regarded differently across the three countries. In Denmark, a country with high precipitation and dominated by agriculture and forest, dry shrub lands could be regarded as a scarce habitat type that demands conservation in itself. The same could be the case for Ghana, where many parts are naturally forest covered especially in the Southern part. For Spain, large areas are naturally dry shrub lands and could be regarded as a common and unimportant habitat to protect further. However, while such differences may explain average donations, it is less obvious how it may relate to differences in treatment effects.

### 5.1. Caveats and Further Work

There is always a chance that participants are sensitive to information about the species included in such an experiment (Jacobsen et al., 2008). The Montagu's Harrier is a rare species in the three countries, with several similar looking species, and we found it reasonable to assume that most people would not be aware of its existence in the three countries. It was beyond the current study to test the sensitivity of the results to different migratory species. Despite any perceived iconic characteristics of the harrier the information about the species may have affected the overall level of donation, but as it is constant across treatments we expect it would not affect the treatment effects (Fischer et al., 2011).

While it may have been preferable to use a basket of species to counter any effects from iconized species or country specific preferences for any species (Jacobsen et al., 2008), our emphasis was on habitat conservation for migratory species, with the Montagu's Harrier as an example of such a migratory species.

In this study we designed a transnational lab-in-the-field economic experiment to explore behavioral questions of relevance for trans-national conservation policies. We implemented a one-shot game allowing for forwarding and receiving signals, but without any feed-back and interactions within and between participating subjects across countries. Including such dynamics in future research would increase the realism and our understanding of individuals' and group's behavior.

Most conditional cooperation games on public good provision include a well-defined utility function measuring individual gains and gains from cooperation. We applied a donation experiment without a well-defined utility function, implying that we are unable to capture individual benefits and costs of cooperation. This point may be relevant for trans-national cooperation on human-wildlife conservation problems with inherent conflicts. Conservation may be seen as a benefit by some stakeholders and imposing a cost to others. One example is the African savanna elephants, which cross country borders (Lindsay et al., 2017). Here while some people benefit from the tourism the rural communities, others may suffer economic losses to agricultural production and even human life from attacks by elephants.

We found a large variation between countries in their response to signals. Spaniards appeared to be the only ones who increased their donations when the signal increased. Studies have found that subjects may be sensitive to information on the distribution of 'cooperator' contributions. The signals in our study were given by forwarding contributions from other countries or groups. Hartig et al. (2015) found that although the majority is mainly guided by the average contribution, a significant fraction of 'conditional cooperators' systematically adjusts their own contribution to the composition of others' individual contributions. This indicates that understanding subjects' donations conditional to signals is a complex matter.

### 5.2. Policy Perspectives

Our study may help to a better understanding of two interlinked policy issues: i) public support for international collaboration to protect biodiversity at a global scale, and ii) the future of conservation funding strategies. Recent studies have raised the discussion on the spatial mismatch between biodiversity and administrative borders that direct the protection (Dallimer and Strange, 2015). Migratory species require a range of resources and habitats through their annual cycles, and management actions that address the many different environmental conditions and threats they are exposed to. A significant potential exists for spatial mismatches between the habitats that support species and areas that are in place to protect them. This creates a challenge to the management and funding of conservation actions. Transnational agreements on the protection of migratory species target the required habitats along the migratory routes. A transnational management authority linked with on the ground organizations could work for the implementation and enforcement of coordinated management agreements and management plans. However, top-down approaches need to be designed to avoid generating antagonism and apathy locally or discomfort with unequal transnational conservation priorities (Kark et al., 2009). This requires the political and financial support at many levels, from governments and NGOs and local communities (Smith et al., 2009).

Finally, may be of interest for NGOs and inspire their approaches to fundraising and targeting and matching of potential donors. People donate significant amounts to charitable causes each year (Andreoni, 2006), and these charities spend enormous amounts on fundraising (Kelley, 1997). Fundraisers know that wording and framing of a given fundraising campaign will likely impact the final collected money amount (Bekkers and Wiepking, 2010; Small et al., 2007). We found that this feature of fundraising also holds for donations to a migratory birds program. Applicable to future campaigns of both NGO's and politicians is our finding that Danish and Ghanaian participants were motivated by the existence of the need for collaboration. Fundraisers might positively impact the final collected amount by focusing their efforts on exploring how to better stress the need for collaboration in transnational conservation cases.

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## Appendix A. Supplementary Data

Instructions for Small Effort Game Ghana (Appendix A), Instructions for T0 Ghana (Appendix B), Instructions for T1 Ghana (Appendix C), Instructions for T2 Ghana (Appendix D), Instructions for T3 for Ghana with Information from Denmark (Appendix E), Questionnaire Ghana (Appendix F), and Censored regression estimates for T3 (Appendix G) are available online. The authors are solely responsible for the content and functionality of these materials. Queries (other than absence of the material) should be directed to the corresponding author. Supplementary data to this article can be found online at https://doi.org/10.1016/j.ecolecon.2018.11.011.

## References


Anderson-Hsieh, J., Koehler, K., 1988. The effect of foreign accent and speaking rate on native speaker comprehension. Lang. Learn. 38 (4), 561–613.

Andreoni, J., 2006. Philanthropy. In: Kolm, S.C., Ythier, J.M. (Eds.), The Handbook of Giving, Reciprocity and Altruism. 2. North Holland, Amsterdam, pp. 1201–1269.

Bakhtiari, F., Jacobsen, J.B., Thorsen, B.J., Lundhede, T.H., Strange, N., Boman, M., 2018. Valuation of biodiversity protection across borders: limits to the public good? Ecol. Econ. 147, 11–20.

Bateman, I.J., Day, B.H., Georgiou, S., Lake, I., 2006. The aggregation of environmental benefit values: welfare measures, distance decay and total WTP. Ecol. Econ. 60, 450–460.

Bekkers, R., Wiepking, P., 2010. A literature review of empirical studies of philanthropy: eight mechanisms that drive charitable giving. Nonprofit Volunt. Sect. Q. 40 (5), 924–973.

BirdLife International, 2017. Migratory Birds. Available at: http://www.birdlife.org/worldwide/programmes/migratory-birds (Accessed June 2017).

Boarini, R., Laslier, J.F., Robin, S., 2009. Interpersonal comparisons of utility in bargaining: evidence from a transcontinental ultimatum game. Theor. Decis. 67 (4), 341–373.

Brouwer, R., van Beukering, P., Sultanian, E., 2008. The impact of the bird flu on public willingness to pay for the protection of migratory birds. Ecol. Econ. 64 (3), 575–585.

Buchan, N.R., Brewer, M.B., Grimalda, G., Wilson, R.K., Fatas, E., Foddy, M., 2011. Global social identity and global cooperation. Psychol. Sci. 22, 821.

Campbell, D., Hutchinson, W.G., Scarpa, R., 2009. Using choice experiments to explore the spatial distribution of willingness to pay for rural landscape improvements. Environ. Plan. A41, 97–111.

Cherry, T.L., Frykblom, P., Shogren, J.F., 2002. Hardnose the dictator. Am. Econ. Rev. 92 (4), 1218–1221.

Convention on Biodiversity, 2010. The 2010 biodiversity target. Available at: https://www.cbd.int/2010-target/, Accessed date: 21 September 2018.

Croson, R., Shang, J.Y., 2008. The impact of downward social information on contribution decisions. Exp. Econ. 11 (3), 221–233.

Cumming, G., Cumming, D.H.M., Redman, C., 2006. Scale mismatches in social-ecological systems: causes, consequences, and solutions. Ecol. Soc. 11 (1), 14. [online] URL: http://www.ecologyandsociety.org/vol11/iss1/art14/.

Dallimer, M., Strange, N., 2015. Why socio-political borders and boundaries matter in conservation. Trends Ecol. Evol. 30 (3), 132–139.

Dallimer, M., Jacobsen, J.B., Lundhede, T.H., Takkis, K., Giergiczny, M., Thorsen, B.J., 2014. Patriotic values for public goods: transnational trade-offs for biodiversity and ecosystem services? Bioscience 65, 33–42.

Davies, P.G.G., 2004. The protection of European habitats and species. In: Davies, P.G.G. (Ed.), European Union Environmental Law — An Introduction to Key Selected Issues. Ashgate Publishing Limited, England, pp. 119–155.

Eckel, C.C., Grossman, P.J., 1996. Altruism in anonymous dictator games. Games Econ. Behav. 16, 181–191.

Engelmann, D., Normann, H.T., 2010. Maximum effort in the minimum-effort game. Exp. Econ. 13 (3), 249–259.

EU Commission, 2009. The Birds Directive. http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32009L0147 (Accessed June2017).

Exadaktylos, F., Espín, A.M., Branas-Garza, P., 2013. Experimental subjects are not different. Sci. Rep. 3, 1213.

Falk, A., Meier, S., Zehnder, C., 2013. Do lab experiments misrepresent social preferences? The case of self-selected student samples. J. Eur. Econ. Assoc. 11 (4), 839–852.

Fischer, A., Bednar-Friedl, B., Langers, F., Dobrovodská, M., Geamana, N., Skogen, K., Dumortier, M., 2011. Universal criteria for species conservation priorities? Findings from a survey of public views across Europe. Biol. Conserv. 144 (3), 998–1007.

Fooks, J.R., Higgins, N., Messer, K.D., Duke, J.M., Hellerstein, D., Lynch, L., 2016. Conserving spatially explicit benefits in ecosystem service markets: experimental tests of network bonuses and spatial targeting. Am. J. Agric. Econ. 98 (2), 468–488.

Frey, B.S., Meier, S., 2004. Social comparisons and pro-social behavior: testing "conditional cooperation" in a field experiment. Am. Econ. Rev. 94 (5), 1717–1722.

Furnham, A., Boo, H.C., 2011. A literature review of the anchoring effect. J. Socio-Econ. 40 (1), 35–42.

Glazer, A., Konrad, K.A., 1996. A signaling explanation for charity. Am. Econ. Rev. 86 (4), 1019–1028.

Green, D., Jacowitz, K.E., Kahneman, D., McFadden, D., 1998. Referendum contingent valuation, anchoring, and willingness to pay for public good. Resour. Energy Econ. 20 (2), 85–116.

Greiner, B., 2015. Subject pool recruitment procedures: organizing experiments with ORSEE. J. Econ. Sci. Assoc. 1 (1), 114–125.

Guerrero, A.M., McAllister, R.Y.A.N., Corcoran, J., Wilson, K.A., 2013. Scale mismatches, conservation planning, and the value of social-network analyses. Conserv. Biol. 27 (1), 35–44.

Hartig, B., Irlenbusch, B., Kölle, F., 2015. Conditioning on what? Heterogeneous contributions and conditional cooperation. J. Behav. Exp. Econ. 55, 48–64. https://doi.org/10.1016/j.socec.2015.01.001.

Heldbjerg, H., Sørensen, I.H., 2014. Træk og overvintring for hedehøge (*Circus pygargus*) ynglende i Danmark. Projekt Fokuseret Fugleforvaltning Dansk Ornitologisk Forening. [In Danish]. http://pub.dof.dk/dof/Rapport/Tr%C3%A6k_og_overvintring_for.pdf (accessed June 2017).

Henrich, J., Boyd, R., Bowles, S., Camerer, C., Fehr, E., Gintis, H., McElreath, R., 2001. In search of homo economicus: behavioral experiments in 15 small-scale societies. Am. Econ. Rev. 91 (2), 73–78.

IPBES, 2017. Intergovernmental Science—Policy Platform on Biodiversity and Ecosystem Services. https://www.ipbes.net/about, Accessed date: 21 September 2018.

Isaac, R.M., Walker, J.M., 1988. Communication and free-riding behavior: the voluntary contribution mechanism. Econ. Inq. 26 (4), 585–608.

Jacobsen, J.B., Boiesen, J.H., Thorsen, B.J., Strange, N., 2008. What's in a name? The use of quantitative measures versus 'iconized' species when valuing biodiversity. Environ. Resour. Econ. 39, 247–263.

Kagel, J.H., Roth, A.E., 1995. The Handbook of Experimental Economics, First ed. Princeton University Press, New Jersey.

Kark, S., Levin, N., Grantham, H.S., Possingham, H.P., 2009. Between-country collaboration and consideration of costs increase conservation planning efficiency in the Mediterranean Basin. Proc. Natl. Acad. Sci. U. S. A. 106, 15368–15373.

Kelley, K.S., 1997. From motivation to mutual understanding: shifting the domain of donor research. In: Burlingame, D. (Ed.), Critical Issues in Fundraising. Wiley, New York.

Kocher, M.G., Cherry, T., Kroll, S., Netzer, R.J., Sutter, M., 2008. Conditional cooperation on three continents. Econ. Lett. 101, 175–178.

Lindsay, K., Chase, M., Landen, K., Nowak, K., 2017. The shared nature of Africa's elephants. Biol. Conserv. 215, 260–267. https://doi.org/10.1016/j.biocon.2017.08.021.

Lundhede, T.H., Jacobsen, J.B., Hanley, N., Fjeldså, J., Rahbek, C., Strange, N., Thorsen, B.J., 2014. Public support for bird conservation is at odds with likely climate change impacts. PLoS One 9 (7), e101281. https://doi.org/10.1371/journal.pone.0101281.

Millennium Ecosystem Assessment, 2005. Ecosystems and Human Well-being: Synthesis. Island Press, Washington, DC.

Moilanen, A., Arponen, A., 2011. Administrative regions in conservation: balancing local priorities with regional to global preferences in spatial planning. Biol. Conserv. 144 (5), 1719–1725.

Nielsen, A.S.E., Lundhede, T.H., Jacobsen, J.B., 2016. Local consequences of national policies — a spatial analysis of preferences for forest access reduction. Forest Policy Econ. 73, 68–77.

Parkhurst, G.M., Shogren, J.F., Bastian, C., Kivi, P., Donner, J., Smith, R.B., 2002. Agglomeration bonus: an incentive mechanism to reunite fragmented habitat for biodiversity conservation. Ecol. Econ. 41 (2), 305–328.

Parkhurst, G.M., Shogren, J.F., Crocker, T., 2016. Tradable set-aside requirements (TSARs): conserving spatially dependent environmental amenities. Environ. Resour. Econ. 63 (4), 719–744.

Rodrigues, A.S., Gaston, K.J., 2002. Rarity and conservation planning across geopolitical units. Conserv. Biol. 16 (3), 674–682.

Runge, C.A., Watson, J.E.M., Butchart, S.H.M., Hanson, J.O., Possingham, H.P., Fuller, R.A., 2015. Protected areas and global conservation of migratory birds. Science 350, 1255–1258.

Small, D.A., Loewenstein, G., Slovic, P., 2007. Sympathy and callousness: the impact of deliberative thought on donations to identifiable and statistical victims. Organ. Behav. Hum. Decis. Process. 102 (2), 143–153.

Smith, R.J., Veríssimo, D., Leader-Williams, N., Cowling, R.M., Knight, A.T., 2009. Let the locals lead. Nature 462, 280–281.

Sultanian, E., van Beukering, P.J., 2008. Economics of migratory birds: market creation for the protection of migratory birds in the Inner Niger Delta (Mali). Hum. Dimens. Wildl. 13 (1), 3–15.

Sutherland, W.J., Alves, J.A., Amano, T., Chang, C.H., Davidson, N.C., Finlayson, C.M., Gill, J.A., Gill Jr., R.E., González, P.M., Gunnarsson, T.G., Kleijn, D., Spray, C.J., Székely, T., Thompson, D.B.A., 2012. A horizon scanning assessment of current and potential future threats to migratory shorebirds. Ibis 154 (4), 663–679.

Tokunaga, K., 2015. Cooperative Management of Trans-boundary Fish Stocks: Implications for Tropical Tuna Management in the Pacific Island Region. Ocean Alliance, University of Tokyo 39 pp.

Tversky, A., Kahneman, D., 1974. Judgment under uncertainty: heuristics and biases.

Science 185 (4157), 1124–1131.
UN, 1979. United Nations Convention on the conservation of migratory species of wild animals. http://www.cms.int/en/convention-text, Accessed date: June 2017.
Valasiuk, S., Czajkowski, M., Giergiczny, M., Żylicz, T., Veisten, K., Elbakidze, M., Angelstam, P., 2017. Are bilateral conservation policies for the Białowieża Forest unattainable? Analysis of stated preferences of polish and Belarusian public. J. For. Econ. 27, 70–79.
Veríssimo, D., Vaughan, G., Ridout, M., Waterman, C., MacMillan, D., Smith, R.J., 2017. Increased conservation marketing effort has major fundraising benefits for even the least popular species. Biol. Conserv. 211, 95–101.
Whiting, H.F., English, H.B., 1925. Fatigue tests and incentives. J. Exp. Psychol. 8 (1), 33.