

**Participatory interventions for pro-social and collective action in natural
resource management: An institutional and behavioural approach**

Inauguraldissertation
zur Erlangung des akademischen Grades eines Doktors
der Wirtschaftswissenschaften des Fachbereichs Wirtschaftswissenschaften
der Universität Osnabrück

vorgelegt von

Juan Felipe Ortiz-Riomalo

Osnabrück,

07/2020

Dekanin: Prof. Dr. Valeriya Dinger

Referenten: Prof. Dr. Stefanie Engel

Prof. Dr. Juan Camilo Cárdenas

Tag der Disputation: 30/07/2020

Supervised by:

STEFANIE ENGEL
(Universität Osnabrück)

[Page intentionally left blank.]

Este trabajo va dedicado a quienes iniciaron el camino en primer lugar; a quienes han sentado las bases y marcado las guías iniciales para yo poder avanzar y seguir construyéndolo.

Va, pues, en memoria de Yolanda, Manuel y Jorge.

Va dedicado a Graciela, Patricia, Jairo, Andrés-Mauricio y al resto de quienes integran nuestras familias, Ortiz-Montúfar y Riomalo-Rivera. Aun distanciados, apoyo y compañía siempre.

[Page intentionally left blank.]

Acknowledgements

This thesis—on participation and collaboration in natural resource management and policy—is, in itself, the intended product of a collaborative effort. To an extent, it is also the by-product of contingent conditions that I could hardly have envisioned. In the end, I could capitalise on these conditions and satisfactorily complete this work thanks to my working in the appropriate environment and being surrounded and supported by the right people. As I was forming, revising, sharpening and implementing my ideas, their support was critical not only to start the journey but also to overcome the hurdles, keep the pace and not falter. I would then like to gratefully acknowledge the contributions, insights and input of all those who directly and indirectly, intendedly and unintendedly, contributed to the completion of the thesis. Of course, the responsibility for any remaining mistake or inaccuracy rests all upon my shoulders.

Stefanie Engel, the supervisor of the thesis, provided me with the intellectual impetus and the required conditions to structure and carry out this research endeavour. It was her understanding and encouragement that made my moving to Germany possible—and more straightforward than it could have been otherwise. From our initial exchanges on, she was keen to conduct this research from an interdisciplinary perspective, open to explore new approaches and ready to constructively scrutinise any new idea and development. In turn, Ann-Kathrin Koessler, Stefanie's right-hand co-supervising this process, provided enormous additional guidance and support, significantly adding on the rigour of the design and implementation of the economic experiments of the thesis. Both Stefanie and Ann-Kathrin deftly undertook the hard job of reading through and revising several drafts of the papers, usually long documents, filled with hard-to-read complex sentences. Their feedback, nonetheless, was always thorough and constructive, challenging and encouraging. Throughout several exchanges and rounds of revisions, their insights, comments and input underpinned most of the improvements upon the shape and depth of the initial concepts for this thesis. I thank their permanent interest, support and patience.

Mathias Janke made it possible for Stefanie, Ann-Kathrin and I to take from the drawer an idea we initially decided not to include in the thesis for space and time constraints, and he helped us develop and implement it. For his master thesis in economics, he built upon the initial concepts we had drafted, co-designing, implementing and analysing the initial rounds of the experiment reported in Chapter 3. Under Ann-Kathrin Koessler's lead, we expanded upon this initial contribution with additional experiment sessions and analyses, thereby completing the paper that corresponds to the third chapter of the thesis. As the laboratory assistant by then, Mathias also gave us useful feedback for the materials and the implementation of the laboratory experiment reported in Chapter 4. I appreciate his judgement, ideas and suggestions.

Industriously and thoroughly, Fabian Thomas provided immense support and advice in programming the laboratory experiments whose results we report in Chapter 3 and Chapter 4

of this thesis. Fabian Heitmann, Katharina Hembach, Dominik Kohl, Lea Kolb, Imke Lüdeke, Peter Naeve and Fabian Thomas provided key additional input and assistance during the implementation of the laboratory experiments in the Laboratory for Economics Research (LaER) at Osnabrueck University.

Once in the field, Alejandra Zúñiga, Yaddi Miranda-Montagut, Carlos Kong-Vega, Estefany Siccha-Lazaro and Tania Paredes-Zegarra deftly assisted us with the implementation of the lab-in-the-field experiment. When needed, Eliana Toledo-Ruiz, Katherine Trinidad-Huañec and Karina Cardenas provided key additional support. Various actors welcomed and provided me and the rest of the research team with valuable help and guidance at different stages of the fieldwork. In particular, I must thank the people of the ProAmbiente II programme (of GIZ in Peru); the MERESE-FIDA project; the *Nor Yauyos Cochas* landscape reserve; the agrarian agency of Cañete; Minkaprod; the *Colegio de Ingenieros en Cañete*; the *Instituto Montaña*; the community organisations of Yauyos; as well as the irrigation commissions, the board of irrigators and a good number of farmers of Cañete province. During my stay in Peru, I was hosted as a visiting researcher by the Institute for the Sciences of Nature, Territory and Renewable Energies (INTE), at the Pontifical Catholic University of Peru (PUCP), in Lima. I thank their cheerful hospitality. Pilar Anaya, Anita Arrascue, Pilar Bustillos, Sandra Carrillo, Sofía Castro, Jerónimo Chiarella, Juana Francia-Benavente, Adrián Hiller, Fausto Munayco, Manuel Rojas, Alfonso Santivañez, Maja Tillmann, Rodrigo Otero, Yolanda Puémape, Gisselle Vila and Abdías Villoslada helped at various critical points to commence and complete the fieldwork satisfactorily. I thank all the people and organisations mentioned in this paragraph for their time, for being so welcoming and supportive and for all the great recollections I have been able to take with me from Peru.

In the early stages of this project, while drafting the research proposal, Juan Camilo Cárdenas, Johannes Halbe, Claudia Pahl-Wostl and Geeske Scholz provided me with useful and valuable suggestions, insights and feedback. In a later stage, as an external reviewer, Juan Camilo Cárdenas read and commented on initial drafts of Chapters 2, 4 and 5 of this thesis, providing constructive revisions, thought-provoking questions and helpful comments. His comments let us identify remaining weak spots as well as possible strategies to tackle them. The research for this thesis also benefited from the feedback I received in the research seminars of the IUSF research centre and the LaER research group (both at Osnabrück University); the third and fifth workshops on experiments for the environment held at the University of Hamburg in February 2018 and at the University of Heidelberg in February 2020, respectively; and the Bogotá Experimental Economics Conference held at Universidad del Rosario in January 2019.

At several points, the insights exchanged with members of our research group on behavioural economics for the environment (aka the BEE group) provided additional inspiration, support and orientation. Here I mention Adriana Bernal-Escobar, Philipp Gorris, Elisabeth Gsottbauer, Nick Heinz, Fabian Heitmann, Katharina Hembach, Aneeque Javid, Abel-Gautier Kouakou, Bosco Lliso, Estelle Midler, Fabian Thomas and Tobias Vorlauffer.

Here I would also like to mention Bhagirath Behera, collaborator of our group on various projects; a meeting we had in August 2018 left me with very good insights and helpful tools. Eva-Maria Tolzmann and Laura Papendorf were always ready to generously provide essential administrative assistance and back up the implementation of the experiments, both in the lab and in the field. Adriana, Eva and Laura, as well as Debbie Coetzee-Lachmann and Anne Ilgener, facilitated my way through otherwise cumbersome bureaucratic and administrative processes.

Rachael Torkar and Isak Sexson provided essential editorial support. At various points of the process, when needed, Laura Herzog, Frank Lauterbach, Janna Gerdes, Andrés-Mauricio Ortiz-Riomalo, Fabian Thomas and Caroline van Bers provided additional support and guidance when addressing specific requests and queries.

Adriana Bernal-Escobar, Fabian Heitmann and Raissa Ulbrich, my former office mates, created the appropriate working environment while I was conducting the research and gradually writing up each of the chapters for the thesis. Laura Herzog, Larissa Koch, Daniel Schweigatz, Anthony Sun and Caroline van Bers made life-in-Kubi even more lively and enjoyable.

The additional support needed to start and get through this process, overcoming the different challenges it brought along, came from both sides of the Atlantic, within and outside Colombia and Germany. For their encouragement and trust; for our sometimes endless, always inspiring and refreshing conversations; for their willingness to listen and provide their sincere reactions; for their emotional support; or for simply shedding some light and inspiration on the way with their example, here I must mention Adriana (both of them), Alejandra, Andrés (both of them), Ángela, Ann-Kathrin, Anthony, Carlos-Alberto, Carolina (the three of them), Caroline, Cindy, Christian, Cristina, Daniela, Danilo, Fabian (both of them), Fernando, Giovanna, Heyder, Iván, Laura, Leidy, Liseth, Jorge-Esteban (both of them), José-Luis, Juan-David, María-Alejandra, María-Camila, Natalia, Paola, Raissa, Sandra, Sindy, Sofía, Yaddi and Viviana. Mónica left us way too soon, leaving behind, nevertheless, a humbling, long-lasting and inspiring mark. I appreciate its influence, as I appreciate all the friendships that her enthusiasm brought together. To my families (Ortiz-Riomalo, Ortiz-Montúfar and Riomalo-Rivera), who have always been there, permanently bolstering and accompanying me in my projects, I dedicate this thesis, the result of the most recent—and hitherto most demanding—research project.

This thesis is a milestone in a professional career Dairo Orozco, José-Alejandro Aguilar, Miguel Urrutia, Angelika Rettberg and Juan-Camilo Cardenas have motivated me to start and keep up. I thank their insights and mentorship. Angelika was the one who gave the final nudge for me to move northwards, to the other side of the Atlantic, and I still cannot regret this decision. Ever since the early stages of this career, Ingrid Luna-Lopez has always been ready to answer my queries and generously provide her guidance and feedback. I thank her advice and encouragement; I still keep in mind our insightful and entertaining conversations. Also,

various teachers and professors of humanities and social sciences at *Colegio Javeriano* (in Pasto, Colombia) and *Universidad de los Andes* (in Bogotá, Colombia) have influenced my formation and judgement. They have contributed with the inspiration, motivation and structure to tackle, within academia, those pressing questions about our being, doing and living on the planet we happen to live. I noticed their influence during the last four years, and I would also like to acknowledge it. In particular, I would like to thank María-Eugenia Arango, Ignacio Abello, Jaime Borja, Adiel Castillo, Nohora Cerón, Adriana López, Miguel García, Juan-Carlos Echeverry, Gabriela Enríquez, Gladys Fajardo, Alejandro Gaviria, Jimena Hurtado, Carlo Nasi, Hernando Matallana, Juan-Carlos Merchán-Zuleta, Luis Javier Orjuela, Camilo Quintero, Felipe Rosero, Fanny Torres and Amanda Vallejo. The conversations I have had with Joe, Alberto Heredia, Gloria Pérez, Paula Ungar and Patricia Urbano, together with my volunteering at *Suyusama* in 2008 and 2009, have shaped my understanding and influenced my questions on the analysis and practice of participatory interventions for local and regional sustainability. Very much without them knowing, the people named in this and the previous paragraph provided me with valuable tools and sources of motivation, strength and support to bring this thesis to a satisfactory conclusion, as well as to keep and shape up my way forward. I am wholeheartedly grateful to them for that.

Funding for this research was provided by the Alexander von Humboldt-Foundation, in the framework of the Alexander von Humboldt-Professorship endowed by the German Federal Ministry of Education and Research. Complementary funding came from the Ministry of Science and Culture of Lower Saxony. Both of these funding bodies, as well as the aforementioned supporting organisations, provided the support and freedom required to research this thesis rigourously; none of them had direct influence on the research design or the data collection and analysis strategy. I acknowledge and thank their valuable and generous support.

Summary

One of the main environmental policy challenges is convincing individuals and organisations to engage in socially desirable courses of action; that is, to have them internalise the consequences of their decisions. As contributions from institutional and behavioural economics have indicated, policies aimed at fostering pro-social action can be ineffective and even counterproductive if the interests and concerns of the relevant actors are not properly considered throughout the policy process. In fact, international conventions and national legislation around the world generally recommend stakeholder involvement in order to properly address pressing environmental challenges. The evidence that underpins and informs this recommendation, however, is still insufficient and scattered across different strands of literature.

On the one hand, research on participatory governance has indeed systematically documented the potential for policymakers and resource managers to obtain high-quality, context-specific and legitimate input for environmental policymaking from participatory processes. On the other, the available research has also cast doubt on the potential of participatory processes to produce concrete change in (pro-social) action on the ground. In general, the success of these processes ultimately depends on their design, implementation and context. However, most of these conclusions stem from rich qualitative accounts of participatory processes, structured comparisons of cases and systematic reviews of case studies and the available literature. With this type of evidence, it is difficult to neatly identify the impact of participatory interventions on pro-social and cooperative behaviour and systematically assess the underlying mechanisms. This thesis addresses these knowledge gaps.

The thesis investigates the extent to which and the mechanisms by which participatory interventions could foster (or hinder) pro-social and collective action for natural resource management and environmental protection. It comprises four chapters, each constituting a stand-alone, self-contained academic paper. Throughout the different chapters, the thesis reviews and integrates insights from the literature on participatory governance and from the institutional and behavioural analyses of pro-social and collective action. Furthermore, using two laboratory economic experiments (Chapters 3 and 4) and one framed lab-in-the-field experiment (Chapter 5), the thesis systematically assesses specific hypotheses concerning the potential impacts of participatory interventions on cooperative and pro-social behaviour and the underlying mechanisms of these impacts. The introductory chapter of the dissertation gathers, presents and discusses the insights gathered from each chapter. It expands on the motivations for the thesis, presents the general and specific research gaps and questions the thesis tackles and clarifies the conceptual, theoretical and methodological foundations upon which the thesis is grounded.

Chapter 2 (entitled *Participatory interventions for collective action in environmental and natural resource management*) reviews the literature on participatory governance together with the literature on collective action in natural resource and environmental management. The main goal of this review is to contribute to integrating the main insights from both strands of literature regarding (a) the potential of participatory interventions to foster collective action and (b) the channels through which they might foment (or hinder) collective action. It therefore seeks to help integrate the insights from these different strands of literature, which, although related, have generally been disconnected until now. The chapter draws on the Institutional Analysis and Development (IAD) framework to organise these insights within a coherent conceptual framework. As the results of this literature review indicate, participatory interventions have the potential to foster collective action through two channels. Firstly, by helping resource users to change (and enhance) the rules, norms and strategies that constrain and guide their behaviour (the indirect channel) and, secondly, by directly influencing the specific behavioural factors (e.g. knowledge, trust, preferences, perceptions and beliefs) that collective action hinges upon (the direct channel). However, to sustain collective action, the relevant literature has consistently emphasised that trust needs to be continually cultivated and ensured. Therefore, in line with insights from earlier studies on participatory governance, the results of this literature review also indicate that practitioners and policymakers must not only design participatory interventions carefully to effectively build the trust needed to heighten and sustain collective action, but participatory interventions must also be adequately embedded within the broader (social-ecological and governance) context, providing for follow-up, enforcement, monitoring and conflict-resolution mechanisms.

From Chapter 3 through Chapter 5, the thesis focuses on the direct channel, studying the potential of participatory interventions to directly influence behaviour within relevant economic action situations such as social dilemma and distributive action situations. Within a given environment and institutional context, the studies recreate processes commonly facilitated within participatory interventions. Chapter 3 assesses the effects of externally structured and facilitated processes of information exchange, and Chapters 4 and 5 examine the impact of inducing perspective-taking via role-switching techniques (Chapter 4) and instructions (Chapter 5). Thanks to this experimental approach, it is possible to systematically assess the behavioural impacts of these types of processes as well as the underlying mechanisms.

Chapter 3 (entitled *Structuring communication effectively for environmental cooperation*) starts by reviewing previous experimental studies on the effects of two-way communication in social dilemmas to identify the elements that are commonly involved in effective communication processes. This review notes four cooperation-enhancing components of communication: (i) problem awareness, (ii) exploration of strategies to tackle the problem at hand, (iii) agreement on desirable joint strategies and (iv) ratification of agreed-upon strategies. A total of 560 students at Osnabrück University participated in a laboratory implementation of a voluntary contribution mechanism; a public goods game. The experiment implemented a series of interventions that represented these components of communication and contrasted the

resulting levels of cooperation with the average outcomes of control groups interacting under either free (unstructured) communication or no communication whatsoever. The intervention that facilitated agreement on a common strategy (i.e. the combination of (ii) and (iii)) was particularly effective at boosting cooperation. Furthermore, combined with interventions promoting problem awareness and ratification, this intervention produced levels of cooperation similar to the average levels of cooperation observed in groups with free-form communication. The results of this experiment expand the understanding in the literature of the role of communication in social dilemmas and provide insights into the potential of structured and facilitated processes of information exchange and social interaction to foster collective action for environmental management.

Chapter 4 (*The effects of inducing perspective-taking through role reversal in a give-and-take a dictator game on pro-social behaviour*) and Chapter 5 (*Perspective-taking for pro-social behaviour in watershed management*) deal with the effects of inducing perspective-taking on unilateral pro-social behaviour. The results outlined in Chapter 4 indicate that perspective-taking, induced through role reversal, can be associated with significant average changes in the participants' self-reported state of emotions (in terms of both empathic and positive as well as in distressing and negative emotions). The emotional reactions that the role reversal seems to influence, however, do not appear to result in significantly more (or less) pro-social behaviour. The chapter explores and discusses two plausible explanations for these results, namely the transient effects of emotional reactions and the opposing effects of diverging emotional reactions on pro-social behaviour. These results come from the analysis of data from 144 students at Osnabrück University who participated as dictators in a laboratory implementation of a give-and-take dictator game. The design of the experiment allows the identification of the effect of inducing decision-makers to experience the other person's position through unilateral role reversal on pro-social behaviour. During the simulation round, dictators in treatment groups experienced how it would feel to be in the role of the recipient. Dictators in the control groups only learned about the distributional consequences of their allocation decisions on recipients. Hence, through a treatment comparison, it was possible to single out the effects resulting from temporarily taking on the position of the other participant. To understand the underlying drivers of a potential behavioural change, the study elicited participants' emotional states both before and after the simulation round.

The results in Chapter 5 indicate that inducing perspective-taking can be associated with relatively greater pro-social behaviour based on an experimental study of downstream farmers' behaviour in a watershed management context. Moreover, the provision of information on the social-ecological context during the perspective-taking exercise cannot account for the different behavioural patterns in the treatment and control groups. These results come from a lab-in-the-field experiment carried out with 177 downstream farmers in a Peruvian watershed. In the experiment, farmers in the treatment groups were motivated to imagine the upstream farmers' perspective (i.e. to think about their thoughts and feelings) before deciding on whether or not to contribute to an initiative in the upper watershed. The initiative intends to help upstream farmers improve their well-being without compromising the water supply

downstream. The behaviour of farmers in the treatment groups was compared against the behaviour of farmers in the control groups wherein perspective-taking was not induced.

Taken together, the results of Chapter 4 and Chapter 5 illustrate the potential of inducing perspective-taking—commonly promoted in participatory processes—to trigger pro-social behaviour in economic situations. It can indeed alter relevant behavioural variables and trigger pro-social behaviour in distributive and social-dilemma situations. Nevertheless, as the literature on perspective-taking has previously indicated, the final effects depend on the specific procedures by which and the situations and contexts wherein perspective-taking is induced.

Based on these findings, it is possible to sustain that participatory interventions do have the potential to effect changes in pro-social and cooperative behaviour at both the collective and individual level. Whether this impact is realised or hindered hinges on the procedures and contexts of participatory interventions. It would also depend on the mechanisms provided to follow up on the initiated processes and sustain and build upon the early outcomes.

The contributions of this thesis are threefold. Firstly, it integrates insights from the literature on the institutional and behavioural analysis of pro-social and collective action and the literature on participatory governance for natural resource management. Secondly, it generates new evidence, based on experimental methods, in terms of the potential for participatory interventions to foster pro-social and collective action, and in terms of the mechanisms by which participatory methods and processes could effectively impact (or hinder) pro-social and cooperative behaviour. In this way, the thesis helps to bridge the gap of knowledge in terms of how participatory interventions can effectively change behaviour and, subsequently, encourage socially desirable social-ecological outcomes. In doing so, it also adds to the understanding of pro-social and cooperative human behaviour and the way that the processes of information-exchange and perspective-taking, which are often facilitated by participatory processes, may (or may not) advance it. Research on participation is, however, still ongoing and, in terms of the way forward, the thesis makes a third, methodological contribution. It demonstrates how experimental research in both the laboratory and in the field, conducted under a coherent conceptual and methodological framework, can complement one another and shed light on the extent to which and the means by which participatory interventions can produce changes in behaviour. The experimental method, in terms of both laboratory and field experiments, can therefore complement the set of methods traditionally employed to analyse participatory processes.

The results of the studies comprising the thesis underscore the importance of carefully analysing the policy process. As contributions from the behavioural literature have repeatedly indicated, human behaviour is driven by a combination of self-regarding, social and procedural preferences. Hence, addressing pressing environmental challenges involving externalities and social dilemmas not only entails getting the policy design right to synergistically coordinate and orchestrate these different types of preferences. It also requires careful design, analysis and

implementation of the activities and methods that structure and facilitate stakeholder interactions throughout the policy process.

[Page intentionally left blank.]

Zusammenfassung

Eine der wichtigsten umweltpolitischen Herausforderungen besteht darin, Individuen und Organisationen davon zu überzeugen, sich auf gesellschaftlich wünschenswerte Handlungsoptionen einzulassen, d.h. die Konsequenzen ihrer Entscheidungen zu verinnerlichen. Wie Beiträge aus der Institutionen- und Verhaltensökonomie gezeigt haben, kann eine Politik, die darauf abzielt, pro-soziales Handeln zu fördern, wirkungslos und sogar kontraproduktiv sein, wenn die Interessen und Anliegen der relevanten Akteure im gesamten politischen Prozess nicht angemessen berücksichtigt werden. Tatsächlich empfehlen internationale Konventionen und nationale Gesetze in vielen Teilen der Welt generell die Einbeziehung von Interessengruppen, um drängenden Umweltproblemen angemessen begegnen zu können. Die Evidenz, die diese Empfehlung untermauert, ist jedoch immer noch unzureichend erforscht und unterschiedliche Forschungsstränge kommen zu unterschiedlichen Erkenntnissen bezüglich ihrer Wirkungskraft.

Einerseits hat die Forschung zu partizipativer „Governance“ systematisch das Potenzial dokumentiert, das Politikern und Ressourcenmanagern zur Verfügung steht, um aus partizipativen Prozessen einen qualitativ hochwertigen, kontextspezifischen und legitimen Input für umweltpolitische Entscheidungen zu erhalten. Andererseits hat die vorliegende Forschung Zweifel am Potenzial partizipativer Prozesse für konkrete Veränderungen des (pro-sozialen) Handelns vor Ort aufkommen lassen. Generell hängt der Erfolg dieser Prozesse von ihrer Gestaltung, ihrer Umsetzung und ihrem Kontext ab. Die Meisten dieser Schlussfolgerungen ergeben sich aus reichhaltigen qualitativen Darstellungen partizipativer Prozesse, strukturierten Vergleichen von Fällen und systematischen Übersichten von Fallstudien und der verfügbaren Literatur. Basierend auf diesen vielseitigen und unterschiedlichen Untersuchungen ist es jedoch schwierig, die Auswirkungen partizipatorischer Interventionen auf pro-soziales und kooperatives Verhalten sauber zu identifizieren und die zugrundeliegenden Mechanismen systematisch zu bewerten. Die vorliegende Arbeit befasst sich mit genau diesen Wissenslücken.

Die Arbeit untersucht, inwieweit und mit welchen Mechanismen partizipative Interventionen pro-soziales und kollektives Handeln für die Bewirtschaftung natürlicher Ressourcen und den Umweltschutz fördern (oder behindern) könnten. Sie besteht aus vier Kapiteln, die jeweils eine eigenständige, in sich geschlossene wissenschaftliche Arbeit darstellen. In den verschiedenen Kapiteln werden Erkenntnisse aus der Literatur über partizipatorische „Governance“ und aus den institutionellen und verhaltensbezogenen Analysen pro-sozialen und kollektiven Handelns überprüft und integriert. Darüber hinaus werden anhand von zwei ökonomischen Laborexperimenten (Kapitel 3 und 4) und einem kontextualisierten Lab-in-the-Field-Experiment (Kapitel 5) systematisch spezifische Hypothesen zu den möglichen Auswirkungen partizipatorischer Interventionen auf kooperatives und pro-soziales Verhalten sowie zu den diesen Auswirkungen zugrunde

liegenden Mechanismen getestet. Im Einführungskapitel der Dissertation werden die aus den einzelnen Kapiteln gewonnenen Erkenntnisse vorgestellt und diskutiert. Das Einführungskapitel präsentiert die Beweggründe für die Dissertation, stellt die allgemeinen und spezifischen Forschungslücken und die Forschungsfragen der Arbeit vor und klärt die konzeptuellen, theoretischen und methodischen Grundlagen, auf denen die Dissertation beruht.

Kapitel 2, mit dem Titel „*Participatory interventions for collective action in environmental and natural resource management*“, gibt einen Überblick über die Literatur über partizipatorische „Governance“ und die Forschung zu kollektivem Handeln im Bereich des Managements natürlicher Ressourcen und der Umwelt. Hauptziel dieser Übersicht ist es, einen Beitrag zur Integration der wichtigsten Erkenntnisse aus beiden Literatursträngen zu leisten hinsichtlich (a) des Potenzials partizipatorischer Interventionen zur Förderung kollektiven Handelns und (b) der Kanäle, durch die sie kollektives Handeln anregen (oder behindern) könnten. Die Arbeit macht einen Vorschlag zur Integration der Erkenntnisse aus diesen verschiedenen Literatursträngen, die zwar miteinander verwandt, aber bisher im Allgemeinen nicht miteinander verbunden worden sind. Das Kapitel stützt sich auf das „Institutional Analysis and Development“ (IAD) Rahmenwerk, um diese Erkenntnisse innerhalb eines kohärenten konzeptionellen Rahmens zu ordnen. Wie die Ergebnisse dieser Literaturübersicht zeigen, haben partizipatorische Interventionen das Potenzial, kollektives Handeln über zwei Kanäle zu fördern. Erstens, indem sie den Ressourcennutzenden helfen, ihre Regeln, Normen und Strategien zu ändern (und zu verbessern), die ihr Verhalten einschränken und lenken (der indirekte Kanal); und zweitens, indem sie die spezifischen Verhaltensfaktoren (z.B. Wissen, Vertrauen, Präferenzen, Wahrnehmungen und Überzeugungen), von denen kollektives Handeln abhängt, direkt beeinflussen (der direkte Kanal). Um kollektives Handeln aufrechtzuerhalten, wird in der einschlägigen Literatur jedoch immer wieder betont, dass Vertrauen kontinuierlich gepflegt und gesichert werden muss. Im Einklang mit den Erkenntnissen aus früheren Studien über partizipatorische Regierungsführung weisen die Ergebnisse dieser Literaturübersicht daher auch darauf hin, dass Praktiker und politische Entscheidungsträger partizipatorische Interventionen nicht nur sorgfältig entwerfen müssen, um das für die Stärkung und Aufrechterhaltung kollektiven Handelns erforderliche Vertrauen wirksam aufzubauen, sondern dass partizipatorische Interventionen auch angemessen in den breiteren (sozial-ökologischen und Regierungsführung) Kontext eingebettet sein müssen, wobei für Folge-, Durchsetzungs-, Überwachungs- und Konfliktlösungsmechanismen zu sorgen ist.

Von Kapitel 3 bis Kapitel 5 fokussiert sich die Dissertation auf den direkten Kanal und untersucht das Potenzial der partizipativen Interventionen, das Verhalten innerhalb der relevanten wirtschaftlichen Aktio, wie bspw. in sozialen Dilemmata oder bei Verteilungsfragen. Innerhalb eines gegebenen Umfelds und institutionellen Kontexts stellen die Studien Prozesse nach, die üblicherweise im Rahmen partizipatorischer Interventionen stattfinden. In Kapitel 3 werden die Auswirkungen von extern strukturierten und durchgeführten Prozessen des Informationsaustauschs bewertet; in den Kapiteln 4 und 5 werden die Auswirkungen der Perspektivnahme durch Rollentauschetechniken (Kapitel 4) und

Anweisungen (Kapitel 5) untersucht. Durch diesen experimentellen Ansatz ist es möglich, die Wirkungen dieser Art von Prozessen auf das Verhalten von Akteuren sowie die zugrundeliegenden Mechanismen systematisch zu bewerten.

Kapitel 3, mit dem Titel „*Structuring communication effectively for environmental cooperation*“, beginnt mit einem Rückblick auf frühere experimentelle Studien über die Auswirkungen der Zwei-Wege-Kommunikation in sozialen Dilemmata, um jene Elemente zu identifizieren, die üblicherweise Teil von effektiven Kommunikationsprozessen sind. Dieser Überblick stellt vier kooperationsfördernde Komponenten von Kommunikation fest: (i) Problembewusstsein, (ii) das Überlegen von Strategien zur Bewältigung des anstehenden Problems, (iii) die Einigung auf wünschenswerte gemeinsame Strategien und (iv) die Ratifizierung vereinbarter Strategien. Insgesamt 560 Studierende der Universität Osnabrück nahmen an einem Spiel um öffentliche Güter teil, das in einem Labor umgesetzt wurde und bei dem ein freiwilliger Beitragsmechanismus getestet wurde. Während des Experiments wurden eine Reihe von Interventionen getätigt, die die vier kooperationsfördernden Komponenten von Kommunikation repräsentierten. Der aus den Experimenten resultierende Grad an Kooperation der Teilnehmenden wurde den durchschnittlichen Ergebnissen von Kontrollgruppen gegenübergestellt, die entweder unter freier (unstrukturierter) Kommunikation oder gar keiner Kommunikation interagiert hatten. Die Intervention, die die Einigung auf eine gemeinsame Strategie, d.h. die Kombination von (ii) und (iii), erleichterte, war für die Förderung von Kooperation besonders wirksam. Darüber hinaus führte diese Intervention in Kombination mit Interventionen, die das Problembewusstsein und die Ratifizierung förderten, zu einem Kooperationsniveau, das dem durchschnittlichen Kooperationsniveau in Gruppen mit freier Kommunikation entsprach. Die Ergebnisse dieses Experiments erweitern das Verständnis über die Rolle von Kommunikation in sozialen Dilemmata und geben Aufschluss über das Potenzial strukturierter und unterstützter Prozesse des Informationsaustauschs und der sozialen Interaktion für die Förderung kollektiven Handelns im Kontext von Umweltmanagement.

Kapitel 4, „*The effects of inducing perspective-taking through role reversal in a give-and-take a dictator game on pro-social behaviour*“, und Kapitel 5, „*Perspective-taking for pro-social behaviour in watershed management*“, befassen sich mit den Auswirkungen der Perspektivnahme auf unilaterales pro-soziales Verhalten. Die in Kapitel 4 dargestellten Ergebnisse deuten darauf hin, dass das durch einen Rollentausch hervorgerufene Perspektiv-Einnehmen mit signifikanten durchschnittlichen Veränderungen des Gefühlszustands der Teilnehmenden (sowohl in Bezug auf empathische und positive als auch auf belastende und negative Emotionen) verbunden sein kann. Die emotionalen Reaktionen, die der Rollentausch zu beeinflussen scheint, scheinen jedoch nicht zu einem signifikant mehr (oder weniger) prosozialem Verhalten zu führen. Das Kapitel untersucht und diskutiert zwei plausible Erklärungen für diese Ergebnisse, nämlich die vorübergehenden Auswirkungen der emotionalen Reaktionen und die gegensätzlichen Auswirkungen divergierender emotionaler Reaktionen auf prosoziales Verhalten. Diese Ergebnisse stammen aus der Analyse von Daten von 144 Studierenden der Universität Osnabrück, die in der Rolle von Diktator*innen an einer Laborimplementierung eines „Give-and-Take“ Diktatorenspiels teilgenommen haben. Das

Design des Experiments erlaubt es den Effekt auf pro-soziales Verhalten zu identifizieren, , wenn Entscheidungsträger*innen durch eine einseitige Rollenumkehr dazu gebracht werden, die Position der anderen Person einzunehmen oder zu erfahren. Während der Simulationsrunde erlebten die Diktator*innen in den Treatmentgruppen wie es sich anfühlen würde in der Rolle des Empfängers zu sein. Die Diktator*innen in den Kontrollgruppen erlebten nur die Auswirkungen ihrer Zuteilungsentscheidungen auf die Empfänger. So konnten durch einen Vergleich der beiden Gruppen die Effekte identifiziert werden, die sich aus der vorübergehenden Einnahme der Position des anderen Teilnehmers ergaben. Um die zugrunde liegenden Einflussfaktoren einer möglichen Verhaltensänderung zu verstehen, wurden sowohl vor als auch nach der Simulationsrunde die emotionalen Zustände der Teilnehmendenerfasst.

Die Ergebnisse in Kapitel 5 deuten darauf hin, dass das Herbeiführen einer Perspektivnahme mit einem relativ stärkeren pro-sozialem Verhalten verbunden sein kann. Dies wurde durch eine experimentelle Untersuchung des Verhaltens von flussabwärts wirtschaftenden Landwirt*innen im Kontext des Managements eines Wassereinzugsgebiets in Peru untersucht. Die Bereitstellung von Informationen über den sozial-ökologischen Kontext während der Perspektivnahme kann die unterschiedlichen Verhaltensmuster in den Treatment- und Kontrollgruppen nicht erklären. Diese Ergebnisse stammen aus einem Feldlaborversuch, der mit 177 Landwirtinnen und Landwirten durchgeführt wurde, deren Felder flussabwärts in einem peruanischen Wassereinzugsgebiet liegen. In dem Experiment wurden die Landwirtinnen und Landwirten in den Treatmentgruppen dazu motiviert, sich die Perspektive der stromaufwärts lebenden Landwirtinnen und Landwirten vorzustellen (d.h. über ihre Gedanken und Gefühle nachzudenken) bevor sie sich entscheiden, ob sie zu einer Initiative im oberen Wassereinzugsgebiet beitragen wollen oder nicht. Die Initiative soll den flussaufwärts gelegenen Landwirtinnen und Landwirten helfen, ihr Wohlbefinden zu verbessern ohne die Wasserversorgung flussabwärts zu beeinträchtigen. Das Verhalten der Landwirtinnen und Landwirten in den Treatmentgruppen wurde mit dem Verhalten der Landwirtinnen und Landwirten in den Kontrollgruppen verglichen, in welchen keine Perspektivnahme stattfand.

Zusammengenommen veranschaulichen die Ergebnisse von Kapitel 4 und Kapitel 5 das Potenzial, das eine in partizipatorischen Prozessen durchgeführte Perspektivnahme zu einem prosozialem Verhalten in wirtschaftlichen Situationen führen kann. Sie kann relevante Verhaltensvariablen verändern und pro-soziales Verhalten in Situationen von Verteilungs- und Sozialdilemmatas auslösen. Dennoch hängen, wie die Literatur zur Perspektivnahme bereits früher angedeutet hat, die endgültigen Auswirkungen von den spezifischen Verfahren und den Situationen und Kontexten ab, durch die und in denen die Perspektivnahme stattfindet.

Auf der Grundlage dieser Erkenntnisse lässt sich festhalten, dass partizipatorische Interventionen das Potenzial haben Veränderungen im pro-sozialem und kooperativen Verhalten sowohl auf kollektiver als auch auf individueller Ebene zu bewirken. Ob diese Wirkung realisiert oder behindert wird, hängt von den Verfahren und Kontexten partizipatorischer Interventionen ab. Sie hängt zudem auch von den Mechanismen ab, die zur

Verfügung gestellt werden, um die eingeleiteten Prozesse weiterzuverfolgen und die ersten Erfolge zu erhalten und auf diesen aufzubauen.

Die Beiträge dieser Arbeit sind dreierlei Art. Erstens bringt die Arbeit Erkenntnisse aus der Literatur der Institutionenanalyse und der Verhaltensanalyse von pro-sozialem und kollektivem Handeln und aus der Literatur der partizipativen „Governance“ für die Bewirtschaftung natürlicher Ressourcen zusammen. Zweitens liefert sie auf der Grundlage experimenteller Methoden neue Erkenntnisse hinsichtlich des Potenzials partizipatorischer Interventionen zur Förderung prosozialen und kollektiven Handelns und hinsichtlich der Mechanismen, durch die partizipatorische Methoden und Prozesse prosoziales und kooperatives Verhalten wirksam beeinflussen (oder behindern) können. Die Dissertation trägt damit dazu bei, die Wissenslücke, auf welche Weise partizipatorische Interventionen effektiv Verhalten ändern und in der Folge sozial-ökologisch erwünschte Ergebnisse fördern können, zu schließen. Auf diese Weise trägt sie auch zum Verständnis von pro-sozialem und kooperativem menschlichem Verhalten bei und erläutert die Art und Weise, wie die Prozesse des Informationsaustauschs und der Perspektivnahme, die häufig durch partizipative Prozesse erleichtert werden, dieses Verhalten fördern können (oder auch nicht). Die Forschung zur Partizipation ist jedoch noch nicht abgeschlossen und hinsichtlich weiterer Forschung in diesem Bereich leistet die These einen dritten, methodischen Beitrag. Sie zeigt auf, wie sich experimentelle Forschung sowohl im Labor als auch im Feld gegenseitig ergänzen, wenn sie innerhalb eines kohärenten konzeptionellen und methodischen Rahmens durchgeführt wird. Diese Kombination aus experimenteller Forschung im Feld und im Labor zeigt auf, inwieweit und mit welchen Mitteln partizipatorische Interventionen Verhaltensänderungen bewirken können. Diese experimentelle, Feld- und Laborexperimente kombinierende Methode kann daher die Reihe von Methoden ergänzen, die traditionell zur Analyse partizipatorischer Prozesse eingesetzt werden.

Die Ergebnisse der Studien dieser Dissertation unterstreichen die Bedeutung einer sorgfältigen Analyse des politischen Prozesses. Wie Beiträge aus der verhaltenswissenschaftlichen Literatur wiederholt gezeigt haben, wird das menschliche Verhalten von einer Kombination aus Selbstachtung, sozialen und prozeduralen Präferenzen bestimmt. Die Bewältigung drängender Umweltprobleme, die mit Externalitäten und sozialen Dilemmata verbunden sind, bedeutet daher nicht nur, dass die richtige Politikgestaltung gefunden werden muss, um diese verschiedenen Arten von Präferenzen synergetisch zu koordinieren und zu orchestrieren. Es erfordert auch eine sorgfältige Planung, Analyse und Umsetzung der Aktivitäten und Methoden, die die Interaktionen der Interessengruppen im gesamten politischen Prozess strukturieren und erleichtern.

[Page intentionally left blank.]

Resumen

Uno de los principales desafíos de la política ambiental es convencer a individuos y organizaciones que adopten cursos de acción socialmente deseables; es decir, que internalicen las consecuencias de sus decisiones. Como han indicado las contribuciones de la economía institucional y del comportamiento, políticas encaminadas a fomentar la acción pro-social pueden ser ineficaces e incluso contraproducentes si no se tienen debidamente en cuenta los intereses y las preocupaciones de las partes afectadas o interesadas a lo largo del proceso político. De hecho, convenciones internacionales y no pocas leyes nacionales alrededor del mundo recomiendan la participación de los actores pertinentes a lo largo del proceso político a fin de abordar adecuadamente problemas ambientales apremiantes. Sin embargo, la evidencia que sustenta e informa esta recomendación sigue siendo insuficiente y se encuentra dispersa en diferentes ramas de la literatura.

Por una parte, investigaciones sobre gobernanza participativa han documentado no pocos casos en los que ha sido posible obtener, a través de procesos participativos, insumos legítimos, bien contextualizados y de calidad para la formulación e implementación de la política ambiental. Por otra parte, existen también estudios que han puesto en duda el potencial de procesos participativos para producir cambios efectivos de comportamiento. En general, el éxito de estos procesos depende en última instancia de su diseño, aplicación y contexto. La mayoría de estas conclusiones, sin embargo, se derivan de estudios y análisis comparados de casos, y de revisiones sistemáticas de los casos documentados y de la literatura disponible. Con este tipo de evidencia, rica en descripciones detalladas sobre la complejidad de los casos estudiados, resulta difícil identificar y evaluar, de manera sistemática, el impacto de intervenciones participativas sobre el comportamiento pro-social y cooperativo, así como los mecanismos subyacentes. La presente tesis aborda estos vacíos de conocimiento.

Esta tesis investiga la medida en que (y los mecanismos mediante los cuales) intervenciones de tipo participativo podrían fomentar (o dificultar) la acción pro-social y colectiva para la gestión de los recursos naturales y la protección del medio ambiente. Comprende cuatro capítulos, cada uno de los cuales constituye un artículo académico independiente y autónomo. A lo largo de los diferentes capítulos, la tesis revisa e integra contribuciones de la literatura sobre gobernanza participativa y del análisis institucional y conductual de la acción pro-social y colectiva. Además, mediante dos experimentos económicos de laboratorio (capítulos 3 y 4) y un experimento de campo (capítulo 5), la tesis evalúa sistemáticamente hipótesis específicas relativas al posible impacto de intervenciones participativas en el comportamiento pro-social y cooperativo, así como a los mecanismos subyacentes a estos posibles impactos. El capítulo introductorio de la tesis recoge y discute los principales aportes de cada uno de estos cuatro capítulos. También, en él se exponen las motivaciones de la tesis, los vacíos de conocimiento y las preguntas de investigación que esta aborda y los fundamentos conceptuales, teóricos y metodológicos en los que esta se sustenta.

En el capítulo 2 (titulado *Participatory interventions for collective action in environmental and natural resource management*) se revisa de manera extensiva la literatura sobre gobernanza participativa junto con la literatura sobre la acción colectiva en la gestión del ambiente y los recursos naturales. El objetivo principal de esta revisión es contribuir a integrar las principales ideas de ambas vertientes de la literatura con respecto (a) al potencial de intervenciones de tipo participativo para fomentar la acción colectiva y (b) a los canales a través de los cuales estos impactos se producirían. Por lo tanto, busca integrar las ideas de estas diferentes ramas de la literatura que, aunque relacionadas, por lo general han estado desconectadas. Para ubicarlas, compararlas y analizarlas dentro de un marco coherente y unificado, las ideas recogidas se organizan dentro del marco conceptual para el análisis y desarrollo institucional (IAD, por sus siglas en inglés). Como indican los resultados de esta revisión, las intervenciones participativas tienen el potencial de fomentar la acción colectiva a través de dos canales. En primer lugar, pueden coadyuvar a que los usuarios de los recursos mejoren las reglas, normas y estrategias que guían su comportamiento (el canal indirecto) y, en segundo lugar, pueden influir directamente en los factores de comportamiento de los que depende la acción colectiva (el canal directo) (p.ej. el conocimiento, la confianza, las preferencias, las percepciones y las expectativas de cada actor). Sin embargo, para sostener la acción colectiva, en la literatura pertinente se ha insistido en que es necesario cultivar y sostener continuamente la confianza entre los actores involucrados en la gestión del ambiente y de los recursos naturales. Por consiguiente, en consonancia con estudios previos sobre gobernanza participativa, los resultados de esta revisión de la literatura indican que para crear eficazmente la confianza necesaria para intensificar y sostener la acción colectiva no basta con diseñar y estructurar intervenciones participativas cuidadosamente. Estas deben también integrarse adecuadamente en el contexto más amplio (social, ecológico y de gobernanza) en el que se llevan a cabo, así como también deben prever (y proveer) mecanismos de seguimiento, monitoreo y resolución de conflictos.

Del capítulo 3 al capítulo 5, la tesis se centra en el canal directo y estudia el potencial de las intervenciones participativas para influir directamente en el comportamiento en situaciones de acción económica relevantes (i.e. dilemas sociales y situaciones de tipo distributivo). Dentro de un ambiente y un contexto institucional determinados, los estudios recrean procesos que comúnmente se promueven y facilitan dentro de procesos participativos. En el capítulo 3 se evalúan los efectos de procesos de intercambio de información estructurados y facilitados externamente, y en los capítulos 4 y 5 se examinan las repercusiones de inducir activamente la toma de perspectiva mediante instrucciones (capítulo 5) y técnicas de intercambio de roles (capítulo 4). A través de estos experimentos, es posible evaluar sistemáticamente los impactos en el comportamiento de este tipo de procesos, así como los mecanismos subyacentes.

El capítulo 3 (titulado *Structuring communication effectively for environmental cooperation*) comienza con una revisión de los estudios experimentales previos sobre los efectos de la comunicación en la solución de dilemas sociales, a fin de identificar aquellos elementos que comúnmente se asocian con procesos de comunicación eficaces. En este examen se señalan cuatro componentes básicos de la comunicación que efectivamente

favorecen la cooperación: (i) diagnóstico y toma de conciencia sobre el problema; (ii) exploración de estrategias para abordar el problema en cuestión; (iii) construcción de acuerdos sobre estrategias conjuntas deseables para resolverlo; (iv) ratificación de las estrategias acordadas. Un total de 560 estudiantes de la Universidad de Osnabrück participaron en un experimento de bienes públicos en el laboratorio. En los grupos de tratamiento se implementaron una serie de intervenciones que representaban los componentes básicos de comunicación efectiva identificados y se contrastaron los niveles de cooperación resultantes con los resultados promedio de los grupos de control que, o bien tuvieron la oportunidad de comunicarse de manera libre, no estructurada externamente, o bien no pudieron comunicarse en absoluto. La intervención que facilitó el acuerdo sobre una estrategia común (es decir, la combinación de (ii) y (iii)) fue particularmente eficaz para impulsar la cooperación. Además, combinada con intervenciones que promovían la sensibilización sobre el problema (i) y la ratificación de los acuerdos alcanzados (iv), esta intervención produjo niveles de cooperación similares a los niveles promedios de cooperación observados en grupos con comunicación libre. Los resultados de este experimento amplían la comprensión que se tiene sobre el papel de la comunicación en los dilemas sociales y permiten comprender el potencial de procesos de intercambio de información e interacción social externamente estructurados y facilitados para fomentar la acción colectiva, la cooperación, en la gestión del ambiente.

El capítulo 4 (*The effects of inducing perspective-taking through role reversal in a give-and-take a dictator game on pro-social behaviour*) y el capítulo 5 (*Perspective-taking for pro-social behaviour in watershed management*) tratan de los efectos de considerar la perspectiva de la(s) otra(s) persona(s) involucrada(s) en una situación particular sobre el comportamiento pro-social de quien de manera unilateral toma las decisiones en esa situación. Los resultados esbozados en el capítulo 4 indican que este ejercicio de toma de perspectiva puede asociarse con un cambio promedio significativo en las emociones reportadas en el grupo de tratamiento; en particular, en emociones de empatía, así como en emociones positivas y negativas. Sin embargo, este cambio parece no influir de manera significativa en el comportamiento pro-social promedio. Los posibles efectos efímeros de las reacciones emocionales y los efectos opuestos que pueden tener sobre el comportamiento reacciones emocionales divergentes son algunas de las posibles explicaciones de estos resultados que se examinan y discuten en el capítulo. Estos resultados proceden del análisis de los datos de 144 estudiantes de la Universidad de Osnabrück que participaron en un experimento económico de laboratorio. En el experimento, participaron en una versión del juego del dictador en el que a quien ocupa la posición de dictador le es permitido tomar parte de la dotación inicial de quien participa como recipiente. El diseño del experimento permite identificar el efecto de ocupar temporalmente la posición de recipiente sobre el comportamiento pro-social de quienes fueron asignadas(os) a la posición de dictador desde el inicio del experimento. Durante una ronda de simulación, estas(os) experimentaron cómo se sentiría estar en la posición de recipiente. Dictadores(as) en los grupos de control no cambiaron de posición durante esta ronda; solo se les resaltó sobre las posibles consecuencias distributivas de sus decisiones. Así, al comparar los patrones de comportamiento entre grupos de tratamiento y de control se aísla el efecto de inducir esta toma

de perspectiva por intercambio de roles. Para comprender los mecanismos subyacentes, el estudio midió, a través de auto-reportes, los estados emocionales de las y los participantes tanto antes como después de la ronda de simulación.

Los resultados del capítulo 5, por su parte, indican que inducir a agricultores(as) de la parte baja de una cuenca andina a considerar la perspectiva de los(as) agricultores(as) de la parte alta de esa misma cuenca puede asociarse con un comportamiento relativamente más pro-social en los(as) agricultores(as) de la parte baja. El suministro de información sobre el contexto socio-ecológico de la cuenca durante el ejercicio de toma de perspectiva no da cuenta de las diferencias entre los patrones de comportamiento observados en los grupos de tratamiento y control. Estos resultados proceden de un experimento económico en campo realizado con 177 agricultores de la parte baja de la cuenca del río Cañete (región de Lima, en Perú). En el experimento, se motivó a los(as) agricultores(as) de los grupos de tratamiento a imaginar la perspectiva de los(as) agricultores(as) de la parte alta, a considerar sus pensamientos y sentimientos, antes de decidir si contribuirían o no a una iniciativa en la cuenca alta. La iniciativa tiene por objeto ayudar a los(as) agricultores(as) de la parte alta de la cuenca a mejorar su bienestar sin comprometer el suministro de agua aguas abajo. Para aislar el efecto de este ejercicio de toma de perspectiva, se comparó el comportamiento de los(as) agricultores(as) de los grupos de tratamiento con el de los grupos de control en los que no se llevó a cabo este ejercicio.

Comúnmente, dentro de procesos participativos se tiende a inducir a los actores participantes a conocer y considerar las diferentes perspectivas de los actores involucrados. En conjunto, los resultados de los capítulos 4 y 5 ilustran que, en efecto, inducir esta toma de perspectiva tiene el potencial de desencadenar patrones de comportamiento pro-social en dilemas sociales y situaciones de tipo distributivo. No obstante, como se ha indicado previamente en la literatura correspondiente, los efectos finales de cualquier ejercicio de toma de perspectiva dependen de los procedimientos específicos a través de los cuales este se lleva a cabo, así como de las características de las situaciones y de los contextos en los que este se implementa.

Sobre la base de los resultados de estos estudios, es posible sostener que las intervenciones participativas tienen el potencial de producir cambios en el comportamiento pro-social y cooperativo tanto a nivel colectivo como individual. El hecho de que este impacto en efecto se materialice (o se obstaculice) depende de los procedimientos que se emplean y de los contextos en que se llevan a cabo intervenciones de tipo participativo. Depende también de los mecanismos previstos para dar seguimiento a los procesos iniciados y los resultados iniciales.

Las contribuciones de esta tesis son tres fundamentalmente. En primer lugar, integra contribuciones de la literatura sobre el análisis institucional y conductual de la acción pro-social y colectiva con contribuciones de la literatura sobre la gobernanza participativa en la gestión del ambiente y de los recursos naturales. En segundo lugar, aporta nueva evidencia, obtenida a través de experimentos económicos llevados a cabo en el laboratorio y en campo,

en cuanto a las posibilidades de que las intervenciones participativas fomenten efectivamente la acción pro-social y colectiva, y en cuanto a los mecanismos mediante los cuales los métodos y procesos participativos producen sus resultados. De esta manera, la tesis contribuye a llenar un vacío de conocimiento sobre el impacto que intervenciones participativas pueden tener en el comportamiento, individual y colectivo, y, de ahí, en resultados deseables desde un punto de vista social y ecológico. Así, también contribuye a la comprensión del comportamiento humano pro-social y cooperativo y de la medida en que los procesos de intercambio de información y toma de perspectiva que a menudo se facilitan mediante procesos participativos pueden (o no) promoverlo. Por último, la tesis ilustra cómo métodos experimentales, empleados dentro en un mismo marco conceptual y metodológico, pueden complementarse entre sí y arrojar luz sobre los efectos, procesos y mecanismos de intervenciones de tipo participativo. Por consiguiente, el método experimental (tanto en laboratorio como en campo) puede complementar el conjunto de métodos tradicionalmente empleados para analizar procesos participativos.

Los resultados de las investigaciones que integran esta tesis llevan a subrayar la importancia de tomarse en serio el estudio y análisis del proceso político. Como se ha indicado repetidamente en las contribuciones de la literatura conductual, el comportamiento humano está impulsado por una combinación de preferencias egoístas, sociales y procedimentales. Por lo tanto, abordar los apremiantes problemas ambientales causados por externalidades no internalizadas y dilemas sociales irresueltos no solo implica lograr que el diseño de la política sea adecuado para articular y coordinar de manera sinérgica estos diferentes tipos de preferencias. También requiere un análisis, diseño y aplicación cuidadosa de las actividades y métodos que estructuran el proceso político y facilitan las interacciones de los actores involucrados a lo largo del proceso de elaboración, implementación y reforma de políticas ambientales y de recursos naturales.

[Page intentionally left blank.]

CONTENTS

Chapter 1: Introduction	1
1.1 Background, related literature, research gaps and questions	2
1.1.1 The case for participation in environmental policy-making	2
1.1.2 Two relevant strands of literature	5
1.1.3 Research gaps and questions addressed in this thesis.....	6
1.2 Conceptual and theoretical foundations.....	10
1.3 Methods and data	12
1.3.1 Inductive stage: hypothesis formation through literature review and exploratory fieldwork	12
1.3.2 Deductive stage: hypothesis testing through economic experiments	13
1.4 Summary and general discussion of main findings.....	20
1.4.1 Structuring and facilitating two-way communication for collective action	21
1.4.2 Participatory interventions, perspective-taking and pro-social behaviour.....	23
1.4.3 Designing and carrying out participatory interventions	26
1.5 Contributions of the thesis	27
Chapter 1 references	30
Chapter 2: Participatory interventions for collective action in environmental and natural resource management.....	39
2.1 Introduction.....	40
2.2 Framework	43
2.3 The indirect effect on collective action: changes to rules and strategies	48
2.4 Direct effect on collective action: impact on (cooperative) behaviour	50
2.4.1 Perceptions: Perceived legitimacy, self-determination and sense of ownership	51
2.4.2 Information and knowledge.....	52
2.4.3 Trust-building	56
2.5 Challenges to participatory interventions.....	58
2.6 Summary and conclusions	62
Chapter 2 references	64
Chapter 3: Structuring communication effectively for environmental cooperation	73
3.1 Introduction.....	74
3.2 Four elements of effective communication	76
3.2.1 Problem Awareness	76
3.2.2 Strategies	77
3.2.3 Agreement	78
3.2.4 Ratification	79
3.3 Experimental design and implementation.....	80
3.3.1 Problem Awareness	81
3.3.2 Strategies	82
3.3.3 Agreement	82
3.3.4 Ratification	83

3.3.5 Identification strategy	84
3.4 Results	85
3.4.1 Average treatment effects.....	85
3.4.2 Dynamic development of cooperation over time.....	90
3.4.3 Achievement of social optimum.....	91
3.4.4 Explorative analysis of chats in free text and the uncovered element: social chit-chat	92
3.5 Discussion and conclusions	94
Chapter 3 references	95
Chapter 3 appendixes	98
Appendix 3A – Data and summary statistics.....	98
Appendix 3B – Experiment Material.....	102
Chapter 4: The effects of inducing perspective-taking through role reversal in a give-and-take a dictator game on pro-social behaviour	105
4.1 Introduction	106
4.2 Inducing perspective-taking and pro-social behaviour: a brief literature review	110
4.3 Experiment design and implementation	113
4.4 Hypotheses	117
4.5 Data analysis and results	118
4.6 Discussion and conclusions	127
Chapter 4 references	132
Chapter 4 appendixes	137
Appendix 4A – Experiment procedures, instructions and material.....	137
Appendix 4B – Statistical appendix	145
Chapter 5: Perspective-taking for pro-social behaviour in watershed management	157
5.1 Introduction	158
5.2 The case: an Andean watershed	162
5.3 Data and methods: experimental design and procedures	164
5.3.1 The choice task	164
5.3.2 Information on the social and ecological conditions of the watershed.....	165
5.3.3 The treatment condition: Perspective-taking procedures.....	165
5.3.4 Control conditions	166
5.3.5 Variables measured	166
5.3.6 General procedures	167
5.3.7 Sampling.....	169
5.4 Hypotheses	169
5.5 Data analysis and results	170
5.6 Discussion and conclusions	176
Chapter 5 references	179
Chapter 5 appendixes	185
Appendix 5A – Experiment’s procedures and instructions	185
Appendix 5B – Sampling and plan of sessions	197
Appendix 5C – Statistical appendix	200

“Designing institutions to force (or nudge) entirely self-interested individuals to achieve better outcomes has been the major goal posited by policy analysts for governments to accomplish (...) instead, a core goal of public policy should be to facilitate the development of institutions that bring out the best in humans. We need to ask how diverse polycentric institutions help or hinder the innovativeness, learning, adapting, trustworthiness, levels of cooperation of participants (...)” (665, italics added)

Ostrom, Elinor. 2010. “Beyond Markets and States: Polycentric Governance of Complex Economic Systems.” *American Economic Review* 100: 641 – 672

“Calling resource users to a single meeting and asking them ‘to participate’ while telling them what a project will do, is just an exogenous change...unlikely to create a setting in which reciprocity and trust can be achieved.” (61)

Ostrom, Elinor. 2006. “The value-added of laboratory experiments for the study of institutions and common-pool resources.” *Journal of Economic Behavior & Organization* 61: 149 – 163

[Page intentionally left blank.]

Chapter 1: Introduction¹

Providing access to clean water, protecting biodiversity, accelerating carbon sequestration and guaranteeing sustainable use of the available natural resources are all critical in terms of maintaining the quality of life on earth both in the present and in the future. However, when state and non-state actors (individuals and/or organisations) only consider their limited short-term interests without sufficiently considering the costs and benefits that their actions impose on others, they end up pursuing courses of action that either fail to contribute to or actively hinder the realisation of these socially desirable goals. Therefore, meeting humanity's most pressing environmental challenges requires these actors to address the tensions between particular goals/interests and societal ends; it entails addressing externalities and collective action problems (Field and Field 2007; Engel and Schaefer; Muradian and Cardenas 2015).

For environmental and natural resource policies to deliver socially desirable outcomes, scholarship on the management of shared natural resources (Ostrom 1990, 2006, 2010; Baland and Platteau 1996; Dietz et al. 2003; Berkes 2007) and legislation around the world² have deemed it critical to involve all relevant parties in the policy process. In other words, from this perspective, meeting environmental challenges may require policy to be designed, adopted and implemented through participatory means. Principle 10 of the 1992 Rio Declaration on Environment and Development illustrates this perspective well by declaring that *“environmental issues are best handled with the participation of all concerned citizens, at the*

¹ Ann-Kathrin Koessler and Stefanie Engel provided helpful comments and feedback on previous drafts of this chapter. I gratefully acknowledge their valuable input and bear full responsibility for any remaining mistake.

² The 1992 Rio Declaration on Environment and Development and the 2015 Paris Agreement provide for stakeholder participation, considering it to be a tenet of environmental decision-making. In the United States, “[s]ince the passage of the National Environmental Policy Act (NEPA) in 1969, public participation in environmental decision-making [...] has become gradually institutionalised at [different governmental levels]” (Depoe, Delicath and Elsenbeer 2004, 1). In Colombia, where exploratory fieldwork was conducted for this thesis, stakeholder participation has been required by the National Constitution and the National Environmental Law since the beginning of the 1990s (National Constituent Assembly of Colombia 1991; Congress of Colombia 1993). Similar provisions can be found in the legislation on water resources and payments for environmental services in Peru, where the experiment covered in Chapter 5 of this thesis took place. As in Europe, where the Aarhus Convention (UNECE 1998) states the right of concerned parties to participate in environmental decision-making, Latin American countries have been developing regional instruments and mechanisms to coordinate the formal implementation of Principle 10 of the 1992 Rio Declaration (UNCED 1992) since 2012.

relevant level. At the national level, each individual shall have appropriate access to ... the opportunity to participate in decision-making processes." (UNCED 1992)

In this thesis, I investigate whether and how participatory interventions could foster pro-social and collective action for environmental protection and sustainable natural resource management (**General research question**). When referring to 'participatory interventions', I am specifically referring to policy interventions that involve the concerned, affected, and/or interested parties in one or more stages of the policy or management processes through consulting, informing or actively engaging them (Beierle and Cayford 2002; Fung 2006; Newig et al. 2018). The results of this research are presented in the next four chapters of this thesis.

This first chapter introduces the thesis; it presents its research questions, hypotheses, methods, main findings, central contributions and possible future avenues of research. In Section 1.1 of this introduction, I elaborate on the background and the research questions, and I narrow down the specific research questions that each chapter of the thesis addresses. I then present and describe the general framework that guided the research conducted in the context of this thesis (Section 1.2) and the methods used to collect and analyse the data to provide systematic answers to the research questions put forth (Section 1.3). The main findings of the thesis are briefly presented and discussed in Section 1.4. Finally, I elaborate and reflect upon the contributions and limitations of the thesis as well as directions for future research in Section 1.5.

1.1 Background, related literature, research gaps and questions

1.1.1 The case for participation in environmental policy-making

Individual and group decision-making processes generate externalities which then create broader social and collective action dilemmas. Unaddressed externalities and unresolved social dilemmas, in turn, are responsible for inefficient outcomes observed at local, regional and global levels regarding the provision of nature-related services (e.g. water-related services) and the maintenance of shared natural resources (e.g. fisheries, forests). State or non-state actors (individuals and/or organizations) making decisions on how to use natural resources tend not to consider the full consequences that their actions impose on others not involved in the decision-making process. Consequently, for instance, unsustainable land management practices are adopted and polluting means of production are put in place. Advancing particular interests in the short-term ends up compromising the realisation of socially desirable outcomes

in both the short- and the long-term. (Baland and Platteau 1996; Kollock 1998; Ostrom 1998; Field and Field 2007; Muradian and Cardenas 2015)

The realisation of socially desirable outcomes in environmental and natural resource management therefore requires the internalisation of externalities and the solution of collective action problems (Field and Field 2007; Carlsson and Johansson-Stenman 2012; Muradian and Cardenas 2015). In practice, this requires people to care about or act as if they care about the external consequences of their actions and the realisation of socially desirable outcomes. It requires policy to induce or motivate people to act pro-socially and collectively, whether out of their own self-regard or out of their social preferences (Bowles 2016; Bueno de Mesquita 2017).

Traditional tools in environmental policy to promote pro-social and collective action in natural resource management include command-and-control regulation, economic incentives and decentralised approaches (e.g. the definition and allocation of property rights, provision of relevant information) (Santos et al. 2006; Field and Field 2007). These tools aim to command (or control) the extent to which an externality-generating activity is carried out, induce decision-makers to internalise the costs and benefits their actions impose on others, or facilitate decentralised negotiations or voluntary decisions regarding the internalisation of positive and/or negative externalities, respectively. Within these approaches, the main challenge for the policymaker or the resource manager is design the policy correctly in order to resolve the corresponding externality and collective action problem.

Conventionally, these policy tools presume that users of natural resources and the environment will behave as *homo economicus*, i.e. actors are presumed to be unboundedly rational, strategically optimising each course of action to attain the most profitable outcome for themselves (Shogren and Taylor 2008; Carlsson and Johansson-Stenman 2012). Under these assumptions, the outcomes, preferences, expectations or intentions of others do not influence each actor's decision-making. Individual actors define their preferences solely based upon the structure of costs and benefits determined by the specific action situation they face at a given time.

In any action situation, in addition to the physical and economic environment, a given set of external rules defines the possible actions and outcomes that can be realised and the costs and benefits associated with each possible course of action and each potential outcome (Smith

1982; Kiser and Ostrom 1982, 1987). Assuming that users of natural resources behave as *homo economicus* implies, in practice, that the only way to realise socially optimal outcomes in situations populated with these type of participants is by externally supplying rules that harness self-interested actions towards the realisation of socially optimal outcomes (as suggested by Hardin 1968 and critically discussed by Ostrom 1990; Baland and Platteau 1996; Poteete Janssen and Ostrom 2010).³ It is not in the interest of these types of actors to invest time in crafting and adopting policies that constrain their behaviour in favour of societal ends. In contrast, the external regulator that imposes the required efficiency-enhancing rules is presumed to be interested in optimising a function of social welfare, to have the knowledge required to solve this optimisation problem for society as a whole and to possess the required capabilities to monitor and enforce the policies that come out this optimisation exercise (as reviewed and discussed by Baland and Platteau 1996; Ostrom 1990, 2000, 2010; Poteete et al. 2010; Carlsson and Johansson-Stenman 2012).

The assumptions on which the effectiveness of these policy tools hinge, however, do not match the actual features of actors' behaviour and context. In practice, the behaviour of actors in resource management situations rather resemble the behaviour of actors who are boundedly rational and who do care about the well-being of others as well as about procedural fairness (Baland and Platteau 1996; Ostrom 1998, 2005, 2010; Poteete et al. 2010). Actors are not homogeneous; they have different perceptions and norms that guide their behaviour and, as a result, conflicts over values, perceptions and property rights may arise. They are also heterogeneous regarding the resources (e.g. assets, skills) that they have access to and draw on when making a decision and taking specific courses of action in a given situation. These features of actors compromise the possibilities for standard policy tools such as taxes, subsidies and the definition of private property rights to effectively deliver efficient outcomes (e.g. Baland and Platteau 1996, 1998, 1999; Ostrom 1998; Bowles and Polanía-Reyes 2012). Furthermore, the existence of private information that the regulator does not have access to, of transaction costs and of limited enforcement and monitoring capabilities limit the potential of standard tools to realise efficient outcomes (Baland and Platteau 1996; Field and Field 2007; Engel and Schaefer 2013).

³ A more general discussion on the implications and limitations of the *homo economicus* assumptions for the design of economic incentives and policy can be found in Bowles (2008, 2014 and 2016) and Bowles and Polanía-Reyes (2012).

In reality, actors are willing to and capable of developing tools in the form of institutions; that is, in the form of rules, norms and strategies that prescribe, constrain and guide their individual and collective behaviour towards socially desirable outcomes (Ostrom 2005, 2006 and 2010; Dal Bó et al 2014; Ménard and Shirley 2018). Both the content of these institutions and the processes whereby they are created and modified may influence actors' preferences and behaviour (e.g. Ostrom 2000; Frey et al. 2004 Vollan 2008; Dal Bó 2014). Therefore, the challenge for actors involved in the processes of supplying, enforcing and monitoring institutions is thus to design their policy correctly and ensure that the process whereby policies are designed, adopted, monitored and enforced is also correct.

The scope, breadth and set of tools that environmental policy draws on should therefore be complemented with, for instance, participatory approaches to policy-making. As we review in Chapter 2 of this thesis, participatory interventions not only contribute to adopting efficiency-enhancing policies but also facilitate patterns of interactions among actors and influence the behavioural aspects (e.g. preferences, perceptions) of the actors involved which may underpin the pro-social and collective action needed for socially optimal outcomes to be realised and sustained.

1.1.2 Two relevant strands of literature

Experimental social science research in both the lab and in the field has made strides in documenting and analysing the factors upon which pro-social and collective action in natural resource management hinge (Poteete et al. 2010; Carlsson and Johansson-Stenman 2012; Cárdenas 2018). The research has gleaned insights into the contextual, situational and behavioural determinants of collective action for the provision of public goods and services and the maintenance of shared natural resources (e.g. Ostrom 1990, 2006; Cox, Arnold and Villamayor-Tomás 2010; Poteete et al. 2010). As a result, the participation of resource users in the process of crafting, monitoring and enforcing rules and strategies for natural resource management has been deemed critical for policy interventions to effectively deliver socially desirable outcomes (Ostrom 1990, 2005, 2010; Baland and Platteau 1996; Berkes 2007; Poteete et al. 2010; Cox et al. 2010). Despite emphasising the importance of participatory decision-making in enabling and bolstering collective action for shared resource management (Ostrom, Gardner and Walker 1994; Cardenas, Stranlund and Willis 2000; Ostrom 2006; Heikkila and Anderson 2018), the research in this literature has not examined the impacts, methods and processes of participatory interventions in depth. Within this literature, the ways in which

participatory interventions could affect pro-social behaviour in natural resource management are yet to be systematically investigated.

In parallel, through case studies (e.g. Pahl-Wostl and Hare 2004; Gurung, Bousquet and Trébuil 2006), qualitative comparative analyses (e.g. Kallis et al. 2006; Kochskämper, Newig, Challies and Jager 2016), extensive reviews of the literature (e.g. Reed 2008; Newig et al. 2018; Reed et al. 2018), and surveys of cases (e.g. Beierle and Cayford 2002; Newig and Fritsch 2009; Newig, Jager, Kochskämper and Challies 2019), the literature on participatory governance has made strides in documenting and analysing participatory methods and processes and the contexts that arguably determine and shape the impacts of participatory interventions. Research in this strand of literature has delved into the specific features of participatory interventions and the impacts they yield in terms of collective decisions for environmental and natural resource management. It has not, however, systematically analysed the potential of participatory interventions in terms of effectively promoting individual and collective action in favour of socially desirable social-ecological outcomes.

1.1.3 Research gaps and questions addressed in this thesis

In sum, research in the social sciences has established and highlighted the importance of enhancing pro-social and collective action to attain efficient, sustainable and equitable social-ecological outcomes (Ostrom 1990, 1998, 2010; Cárdenas 2009, 2018; Muradian and Cardenas 2015.). Contrary to the vision laid down by theories based on a constrained vision of human behaviour, this research has shown how resource users are willing to and capable of participating in the creation, monitoring, and enforcement of rules, norms, and strategies to sustainably manage natural resources and the environment (Ostrom 1990, 1998; Poteete et al. 2010). The scholarship has also made strides in investigating and collecting evidence on what collective action for resource management hinges on (e.g. Baland and Platteau 1996; Ostrom 2009; Cárdenas 2018) in particular, and on the (behavioural, situational, and contextual) determinants of pro-social and collective action more generally (e.g. Ledyard 1995; Fehr and Schmidt 2006; Henrich et al. 2004, 2006; Levitt and List 2007; Chaudhuri 2011; Engel 2011; Dhami 2016). Subsequently, the policy implications of these findings for environmental protection and natural resource management have been laid down and discussed extensively (e.g. Gsottbauer and van den Bergh 2011; Carlsson and Johansson-Stenman 2012; Cárdenas 2018). Likewise, findings in the participatory governance literature have produced detailed accounts of the processes that comprise participatory interventions, the types of interactions

they facilitate and the types of (intermediate and final) outcomes they can deliver (Beierle and Cayford 2002; Fung 2006; Reed 2008; Newig, et al. 2018; Reed et al. 2018).

These advances notwithstanding, *we still do not know whether and how participatory interventions could effectively influence pro-social and collective action for environmental and natural resource management (Research gap 1, the general research gap)*. More concretely, this means that there is still a gap in the knowledge in terms of the way that specific features of participatory methods and processes, given a particular context, would affect pro-social and collective action⁴ for natural resource management. In other words, the behavioural effects of participatory methods and processes have not yet been systematically assessed. This constitutes the general research gap that this thesis seeks to help bridge.

To that end, in Chapter 2⁵ of this thesis, our aim was to help integrate insights from the literature on the institutional and behavioural analysis of collective action and the literature on participatory governance for environmental and natural resource management. *Up to now, both strands of literature have been largely disconnected, without sufficiently communicating with one another, which has prevented the scholarship from providing more complete and exhaustive accounts of the processes and impacts of participatory interventions (Research gap 2)*. Two specific research questions guided this integrative review of these two strands of literature: *To what extent could participatory interventions contribute to strengthening collective action for environmental protection and natural resource management? (Research*

⁴ In the studies presented in the following chapters of this thesis, there is a distinction made between pro-social and collective action and between pro-social and cooperative behaviour. An action is considered to be pro-social if it primarily favours the others at a cost (in terms of immediate expenses or foregone profits) for the doer of the action (Lindenberg 2006; Bénabou and Tirole 2006; Bowles and Polanía-Reyes 2012). Pro-social behaviour manifests itself through pro-social actions which may stem from self-regarding concerns or from other-regarding considerations or social preferences (Andreoni, Harbaugh and Vesterlund 2007; Batson 2011; Bowles and Polanía-Reyes 2012; Bosworth, Singer and Snower 2016; Böckler, Tusche and Singer 2016). To act cooperatively, in favour of the collective, is therefore one type of pro-social behaviour. Cooperative behaviour is observed in interdependent settings like social dilemma or collective action situations in the form of conditional or unconditional cooperation (e.g. Fehr and Schmidt 2006; Dhami 2016; Cárdenas 2018). In social or collective action situation (defined in depth in Chapter 2 of this thesis), actors may decide to cooperate unconditionally (i.e. regardless what others do in that situation) or conditionally (i.e. inasmuch as others are expected to cooperate as well). For this reason, unilateral pro-social behaviour is captured and measured in a better manner when anonymity is guaranteed and strategic social interactions are not involved (e.g. in dictator games with double-anonymity; Smith 1998; Levitt and List 2007; Engel 2011; Vorlauffer 2019). Therefore, whereas cooperative behaviour is usually measured in actions in favour of the collective within social or collective action dilemmas (e.g. in public goods or common pool resource games), unilateral pro-social behaviour can be measured in distributive situations (e.g. dictator games) that guarantee conditions of (double-) anonymity. With these consideration in mind, we focus on cooperative behaviour in Chapters 2 and 3 of this thesis and on unilateral pro-social behaviour on Chapters 4 and 5 of the thesis.

⁵ Chapter 2 was co-authored by Ann-Kathrin Koessler and Stefanie Engel.

question 2.1), and *What are the channels whereby these participatory interventions can contribute to realising better social-ecological outcomes?* (**Research question 2.2**).

Secondly, with the economic experiments whose results we report in Chapters 3 – 5⁶ of this thesis, we sought to contribute with new evidence to bridging the general gap of knowledge that exists in regard to the effects of participatory methods and processes on (pro-social and cooperative) behaviour. We focus on the effects of facilitated and structured provision and exchange of meaningful information on collective action (Chapter 3) and on the effects of inducing perspective-taking on pro-social action (Chapter 4 and Chapter 5). Scholars of participatory governance have primarily predicated their conclusions upon rich qualitative data collected through extensive fieldwork. The features of this data and the fact that all relevant determinants of pro-social and collective action cannot be measured and tracked down in these studies, make it difficult to establish clear connections between the processes participatory intervention facilitate and subsequent pro-social and cooperative behaviour. With the experimental data we generate, we aim to help bridge this gap.

Research on participatory governance has highlighted the benefits of two-way communication (e.g. in the form of face-to-face interactions taking place in negotiation or deliberation exercises) to produce positive impacts in terms of robust and high-quality collective decisions, individual and collective learning, and trust building (Beierle and Cayford 2002; Newig and Fritsch 2009; Fritsch and Newig 2012; Newig et al. 2019; Dryzek et al. 2019). Similarly, the experimental literature on social dilemmas has extensively documented the benefits of two-way communication in terms of promoting and sustaining cooperation (Dawes 1980; Ledyard 1995; Sally 1995; Kollock 1998; Cardenas, Ahn and Ostrom 2004; Balliet 2010). *However, none of these strands of literature have systematically studied, in a controlled manner, the types of information that, when exchanged, make two-way communication effective at increasing and sustaining collective action* (**Research gap 3**). This is the gap we address in Chapter 3 of this thesis. In a laboratory implementation of a voluntary contribution mechanism (i.e. a public good game), we ask: *What type of information, when unilaterally provided by the experimenter or multilaterally exchanged via two-way communication amongst participants, effectively contributes to increasing cooperation?* (**Research question 3.1**) *Can externally*

⁶ Chapter 3 was first-authored by Ann-Kathrin Koessler and co-authored by Mathias Janke (third author), Stefanie Engel (fourth author), and myself (second author). Chapters 4 and 5 were first-authored by myself and co-authored by Stefanie Engel and Ann-Kathrin Koessler.

facilitated and externally structured exercises of two-way information exchange effectively contribute to increasing cooperation? (**Research question 3.2**)

One of the mechanisms whereby two-way communication facilitates cooperation in natural resource management is knowing about other participants' perspectives and, in particular, their willingness to cooperate (Baland and Platteau 1996; Ostrom 1998). Upon the realisation that it may be in the other person's interest to cooperate, and that they indeed would likely cooperate, actors in social dilemmas consequently tend to cooperate (Ostrom 1998; Cardenas et al. 2004; Epley, Caruso and Bazerman 2006; Chaudhuri 2011). On a more general level, it has been argued that knowing about, considering and taking on the other person's perspective could contribute to the realisation of better governance outcomes in general (Fung 2006; Ansell and Gash 2008), and of socially desirable outcomes in the management of resource systems such as, for instance, water resource systems (Ostrom and Gardner 1993; Pahl-Wostl and Hare 2004; Gurung et al. 2006; Czap, Czap, Lynne and Burbach 2015; Wald, Segal, Johnston and Vinze 2017).

In fact, laboratory research in experimental economics suggests that when participants are indirectly or directly made to consider the other person's perspectives in one way or another (e.g. Dana, Cain and Dawes 2006; Dana, Weber and Kuang 2007; Andreoni and Rao 2011; Czap et al. 2015; Andreoni, Rao and Trachtman 2017), they may be effectively induced to take pro-social actions. The empirical evidence, however, is less conclusive regarding the impacts that experiencing the other person's position—as promoted in role-taking exercises carried out in participatory interventions (Pahl-Wostl and Hare 2004; Gurung et al. 2006; Cárdenas and Ortiz-Riomalo 2018)—has on pro-social behaviour. Some studies report positive effects (e.g. Fehr and Schmidt 2006; Andreoni and Rao 2011), some report negative effects (Zhan, Eckel and Grossman 2017), and some report no significant average effects at all (as reviewed by Brandts and Charness 2011). Furthermore, in all these studies, the effects associated with the inducement of perspective-taking by role reversal or role change are likely to be confounded with the effects of raising awareness on the consequences of one's actions on others, role uncertainty and one-way communication. Chapter 4 addresses this *lack of systematic analysis of the effects of experiencing another person's perspective (or position) on pro-social behaviour* (**Research gap 4**). In turn, *the impacts that inducing perspective-taking may have on pro-social behaviour of actual resource users within a particular natural resource*

*management setting have not yet be systematically assessed (Research gap 5).*⁷ The latter is the gap addressed in Chapter 5 of this thesis in which we investigate the potential of inducing perspective-taking to foster pro-social behaviour on actual resource users (downstream farmers) within their social-ecological context (an Andean watershed, the Cañete River Watershed).

In Chapter 4, using a laboratory recreation of a give-and-take dictator game (List 2007; Bardsley 2008), we ask *whether induced perspective-taking through unilateral role reversal alters pro-social behaviour (Research question 4.1) and examine the mechanisms whereby a change in behaviour may be produced (Research question 4.2)*. In Chapter 5, using a lab-in-the-field experiment, we investigate *whether inducing perspective-taking can effectively promote pro-social behaviour in watershed management (Research question 5.1)*.

1.2 Conceptual and theoretical foundations

I tackle the research questions of this thesis from an institutional (North 1994; Ostrom 1990, 2005; Ménard and Shirley 2018) and behavioural perspective (Mullainathan and Thaler 2015; Thaler 2016; Dhimi 2016). To incorporate insights from these two perspectives within a single and coherent framework, I draw on the Institutional Analysis and Development (IAD) framework (Ostrom 2005, 2010, 2011; Schlager and Cox 2018), which I present in more detail in Chapter 2 of this thesis. The specific conceptual foundations and theoretical assumptions guiding each study are presented in the respective chapters. In this section, I succinctly highlight the basic overarching conceptual elements and theoretical assumptions that guide the research that was conducted for this thesis.

Within the IAD framework, an actor's behaviour is situationally⁸ determined, meaning that state and non-state actors, be they individuals or organisations, make their decisions based on the available information, possible actions, the outcomes individual actions can lead to and the costs and benefits associated with each possible action and potential outcome in a given action situation. Analysts using this framework usually assume actors (i) to have limited information-processing capabilities, (ii) to not only care about their material outcomes and (iii) to not always follow optimising strategies (Kiser and Ostrom 1987; Ostrom 2005; Poteete et

⁷ Czap et al. (2015) and Wald et al. (2017) follow an experimental approach to investigate the effects of perspective-taking on pro-social behaviour in natural resource management situations. The subjects of their studies are college and university students in the US.

⁸ Other works that follow a similar situational approach to analysing human behaviour include Lindenberg (2006); Levitt and List (2007); Bowles and Polanía-Reyes (2012); Bosworth et al. (2016).

al. 2010). Actors are presumed to value their own well-being as well as the well-being of others, to care about the fairness and legitimacy of the process through which the outcomes and rules are produced and to comply with maximising, satisfying, or norm-following rules of behaviour when deciding between different possible courses of action (Sen 1977; Kiser and Ostrom 1987; Sen 1997; Ostrom 2005; Poteete et al. 2010; Bowles 2016).

In sum, based on this framework and incorporating recent developments in the field of behavioural economics (Dhami 2016), we assume actors to be boundedly rational and boundedly self-interested (Mullainathan and Thaler 2015). Their actions, as well as the preferences, expectations and norms that drive their choices, are determined by the features of the situation they face and by their experiences from previous action situations (Bowles and Polanía-Reyes 2012; Bosworth et al. 2016). The action situation, in turn, is structured by the broader (institutional, socio-cultural, economic, political and ecological) context (Poteete et al. 2010). Albeit boundedly rational, actors have and pursue goals and can gain further information about the action situation they are in and learn based on the outcomes they observe and the feedback they receive (Ostrom 2005; Poteete et al. 2010). Provided they have the opportunity, actors can design and thereby adopt efficiency-enhancing, behaviour-constraining rules, norms and strategies to attain socially desirable outcomes (Ostrom, Walker and Gardner 1992; Ostrom 2006, 2010; Dal Bó 2014)

Within this framework, participatory interventions can then promote pro-social and cooperative behaviour both directly and indirectly. Indirectly, by providing the actors involved in a social dilemma situation with the opportunities and tools to craft and adopt rules, norms and joint strategies to solve the dilemma in question. Directly, by creating situations (or carrying out situational manipulations in existing situations) in which actors reflect upon their (past and upcoming) individual and collective actions, influencing individual decision factors (e.g. expectations, emotions, norms) and thereby inducing (or hindering) pro-social and collective action. Chapter 2 synthesises the insights in the literature on the impacts (and underlying mechanisms) of participatory interventions on collective action with regard to these two channels. New evidence on the second channel, generated through three novel experimental designs, is presented in Chapters 3 through 5 of this thesis. Whereas Chapter 3 focuses on cooperative behaviour, Chapters 4 and 5 focus on unilateral pro-social behaviour.

1.3 Methods and data

1.3.1 Inductive stage: hypothesis formation through literature review and exploratory fieldwork

Research for this thesis was conducted in two general stages. In one stage, an inductive, rather exploratory approach was chosen in order to gain first insight into the mechanisms and impacts of participatory interventions. Here, I extensively reviewed the literature on participatory governance. This literature contains detailed descriptions of the participatory methods and processes that usually comprise participatory interventions (e.g. van Asselt Marjolein and Rijkens-Klomp 2002; Rowe and Frewer 2005; Voinov and Bousquet 2010) as well as of the outcomes that can be associated with these types of interventions (e.g. Beierle and Cayford 2002; Fung 2006, 2015; Newig, et al. 2019). Based on these descriptions and qualitative accounts of the impacts of participatory interventions and their underlying mechanisms, the literature review was complemented with research from the fields of experimental and behavioural economics, political science, public administration, social psychology, and social neuroscience. The purpose of this extensive and integrative review of the literature was to form hypotheses regarding the mechanisms by which the processes generated and the interactions facilitated by participatory interventions could indeed induce participants to act pro-socially and/or collectively.⁹ Afterwards, these hypotheses were tested through economic experiments, the results of which are covered in Chapters 3 through 5 of this thesis.

The literature review was guided by the IAD framework and the insights collected were organised within this framework as well. In order to organise and incorporate the data collected regarding the specific design features of participatory processes and methods and the impacts these could lead to, the IAD framework was enriched with insights from the frameworks used in research on participatory governance (e.g. Beierle and Cayford 2002; Fung 2006; Ansell and Gash 2008; Emerson et al. 2012; Newig et al. 2013). Similarly, closely related frameworks for

⁹ The formation of the research questions, in general, and of these hypotheses, in particular, was also inspired and motivated by exploratory fieldwork conducted in Colombia between April and May 2016. Over the course of this fieldwork, I interviewed 35 key experts (practitioners, policy makers and resource users with experience conducting and being involved in participatory processes for local sustainable development and natural resource management). These interviews yielded insights from these experts into common features of participatory interventions, the outcomes they usually deliver, and the contextual factors that arguably mould the impacts that these types of interventions can ultimately have on pro-social and cooperative behaviour. Although the results of this fieldwork are not presented and discussed in this thesis, they did inspire and motivate the questions tackled as well as the hypotheses tested in the experiments presented in Chapters 3 through 5 of the thesis.

the study of social-ecological systems (SES) enrich the characterisation of the broader context in which participatory interventions for natural resource management typically take place (McGinnis and Ostrom 2014; Pahl-Wostl 2015). Chapter 2 presents the framework with a little more detail together with the insights gained through the literature reviewed and synthesised with the help of this framework.

1.3.2 Deductive stage: hypothesis testing through economic experiments

In a second stage, the hypotheses formed were tested with help of three economic experiments, two in the laboratory (Chapter 3 and Chapter 4) and one in the field (Chapter 5). We drew on economic experiments because one of our main objectives was to assess the effect that specific situational manipulations that are usually part of participatory methods have on subsequent behaviour. In economic experiments, the analyst gains control over participant's preferences and can obtain accurate measurements of (intermediate and final) behavioural outcomes (Smith 1982). This is achieved by associating each possible action and outcome in a given situation to salient monetary rewards for participants (Smith 1976; Wilde 1980 in Smith 1982; Smith 1982). The observed decisions correspond, therefore, to the participants' revealed preferences given the structure of incentives defined by the action situation designed by the analyst. In addition to a basic action situation, alternative situations can be designed in which one key aspect in the action situation is altered. These modification(s) correspond to the treatment condition(s) whose behavioural effects the analyst aims to sort out, and the basic action situation(s) therefore serves as control condition(s). Through methods of (quasi-) randomisation, the analyst can assign the subjects participating in the experiment to treatment and control conditions independently of the observed and non-observed characteristics of the subjects. This allows to control for additional factors that could explain the variance of the outcome variable and indeed attribute the differences observed in the behavioural outcomes between control and treatment conditions to the treatment intervention.¹⁰

Therefore, through economic experiments, we gain control not only of the features of the action situation (Ostrom et al. 1994; Poteete et al. 2010), but also of the participants' behaviour and preferences (Smith 1976, 1982). For the experiments we present in Chapters 3 through 5 of this thesis, we chose specific situation manipulations that are usually carried out as part of participatory methods and processes (specifically, the provision and exchange of information

¹⁰ Succinct and clear explanations of the basic elements of the experimental method can be found in, amongst other sources, Friedman and Sunder (1994) and Poteete et al. (2010, Ch.6).

and the inducement of perspective-taking), and we mimic them in the experiments. By controlling for other relevant situational (e.g. the information displayed) and contextual factors (e.g. participants' attributes, the environment), we manage to single out the effect that these manipulations have on subsequent behaviour.

This is a task that could not be easily undertaken with naturally occurring data generated during and after actual participatory interventions. Several methods and processes are arranged within the same intervention and several intermediate and final outcomes are affected at different geographic locations, on different time scales. It is therefore difficult to measure and track even a few of these outcomes and processes, sort out possible confounding effects and discard among various possible explanations (as acknowledged, among others, by Beierle and Cayford 2002 and Newig et al. 2018). By generating experimental evidence, we seek to contribute to the understanding of the potential impacts and underlying mechanisms of that participatory interventions. In the following subsections, I present the main design features of the experiments and explain the central design choices in light of the specific research questions. Each experimental design is explained in detail in the respective chapter and the corresponding instructions and materials are listed in the respective appendixes. The data collected was analysed with the help of descriptive statistics, non-parametric statistics (Siegel 1957; Siegel and Castellan 1988), and further statistical models available to study data in (experimental) economics (Bernal y Peña 2011; Greene 2012; Moffat 2015; StataCorp 2017).

Laboratory economic experiments

Research gaps 3 and 4 were addressed through laboratory economic experiments. Both experiments recreated a basic type of resource management situation. The chosen treatment interventions intended to mimic situational manipulations commonly carried out as part of participatory interventions: the information participants are presented with (Chapters 3 and 4), the channels participants have available to communicate with each other (Chapter 3) and/or the position that each participant occupies (Chapter 4). It should be noted that none of the treatment interventions were intended to facilitate changes in the rules structuring the action situation; therefore, the payoff structure remained the same in all situations. This allowed us to generate evidence on the potential of manipulations that are usually carried out as part of participatory interventions to directly influence (pro-social and cooperative) behaviour.

In both experiments, participants were randomly allocated into groups (groups of four in the experiment in Chapter 3; groups of two in the experiment in Chapter 4) and the configuration of these groups was not modified during the entire experiment (i.e. a partner design was followed). Each experiment consisted of two parts. Groups interacted in several iterations of the basic action situation in both parts of the experiment, developing a certain trajectory of interactions as it is the case in natural resource management situations in which participatory interventions usually take place. Groups of participants were randomly assigned to treatment and control conditions, and one single round of all rounds played was randomly picked to determine the participants' final payments.

The treatment intervention took place before the second part of the experiment. We could then evaluate whether behaviour in the second part of the experiment, after the treatment, differed in comparison to the behaviour in the first part of the experiment and whether this difference varied across treatment and control groups (that is, we had a mixed within- and between-subject design).

Each of the two parts of the experiment in Chapter 3 consisted of 10 identical and independent rounds during which groups of subjects participated in a voluntary contribution mechanism (VCM) (Ledyard 1995). The VCM recreates a public good provision problem in which each member faces incentives to keep all of their endowment for themselves even though it would be in the group's best interest to allocate all funds to the group project. Provision of public goods and services, in particular, and social dilemmas like this, in general, pervade the natural resource management situations in which participatory interventions take place (e.g. Ostrom et al. 1994; Muradian and Rival 2012; Engel and Schaefer 2013). It is in these types of settings that scholars have systematically analysed the effects and mechanisms of two-way communication (for a review see Ledyard 1995; Poteete et al. 2010, Chapter 9; Chaudhuri 2011).

The treatments we chose to assess in this experiment represent the specific elements that, according to the literature, make two-way communication so effective with regard to increasing cooperation in social dilemmas. Before the second part of the experiment groups received, depending upon the treatment condition, information from the experimenter about the situation they faced (i.e. the problem, its dynamics and/or the possible strategies to solve it) or were allowed to exchange information in a structured manner about their willingness to agree on a joint strategy and abide by it. In the control conditions, (a) no communication whatsoever was

allowed, or (b) participants had the opportunity to freely exchange messages via a chat box before the second part of the experiment began. Against these opposites, we assessed the individual and combined effect of the treatments that structured the process of information exchange.

We collected data from 560 subjects (university students in Osnabrück, Germany) split up into 140 groups. We assessed the impact of the treatment interventions by comparing changes in the total group contributions between the treatment groups. In a post-experimental survey we additionally elicited participants' basic socio-demographic characteristics and control for these characteristics in the analysis of the data.

The laboratory experiment in Chapter 4 was designed to systematically assess the effects of inducing perspective-taking through role reversal. In particular, we examine whether experiencing another person's position encourages or deters pro-social actions. A give-and-take dictator game (List 2007; Bardsley 2008) defined the basic situation subjects participated in each of the two parts of the experiment. Each part comprised four identical rounds. In this experiment, one participant (the decision-maker or dictator) had to decide whether to give (or take) a certain amount to (or from) another participant (the recipient). In our implementation, participants kept their roles throughout the experiment session.

This version of the dictator game involves an asymmetrical, distributive situation wherein a decision-maker can unilaterally impose costs or benefits to another person, and thereby determine the final distribution of outcomes unilaterally. It therefore allowed us to obtain a clear measure of unilateral pro-social behaviour devoid of strategic considerations from the perspective of the decision-maker (Forsythe, Horowitz, Savin and Sefton 1994; Smith 1998; Engel 2011). Furthermore, it defines a basic situation with two clearly differentiated positions to allow for the role reversal.

This is a simplified representation of a resource management situation in which asymmetries in the available action space of resource users exist and where costs and benefits associated with the maintenance of a resource or the provision of a service-can be unilaterally determined and (re-)distributed. For instance, it reflects upstream-downstream dynamics in a watershed wherein (a)upstream water users have the power to unilaterally impose negative and/or positive externalities (e.g. pollution or over-appropriation of water, provision of clean water) to downstream users, and/or(b) downstream water users have the power to unilaterally

contribute to redistributing the benefits associated with water provision downstream (e.g. by paying or rewarding upstream users for adopting sustainable practices).

In general, the dictator game has proven useful for analysing the effects of situational manipulations¹¹ on pro-social behaviour and for determining and isolating underlying mechanisms (Smith 1998; Fehr and Schmidt 2006; Levitt and List 2007; Engel 2011; Cooper and Kagel 2016; Dhimi 2016). Although, in reality, resource management situations are more complicated than this, our rather simple setting let us isolate the effect of experiencing another actor's perspective, our goal with this experiment. Furthermore, it let us produce results that contribute to expanding our understanding on the determinants of unilateral pro-social behaviour in distributive situations.

To assess the effect of taking on the other person's perspective by means of role reversal, decision-makers assigned to treatment groups participated in a simulation round before the second part of the experiment started. In this simulation round they experienced how it would be to be in the recipient's role. Decision-makers in the control group, on contrast, did not change their roles during this simulation round. To assess the underlying mechanisms, we designed the experiment to control for the effects of raising awareness that may accompany the role-reversal experience. Also, for this purpose, we obtained self-reported measures of the decision-makers' emotional states as well as of their perceptions and beliefs before and after the simulation round. In the analysis we focused on the role of emotional reactions as variables that could potentially mediate the effects of the role-reversal experience on pro-social behaviour.¹²

Finally, using a post-experimental survey, we elicited information on the participants' socio-demographic characteristics and controlled for these characteristics in the analysis of the data. To assess the impact of the role reversal we use the average change in the (positive or negative) average amount transferred as outcome variable. Chapter 4 reports the results of the

¹¹ For instance: the display of distributive outcomes, one-way or two-way communication, conditions of anonymity, modifications to the action space.

¹² We elaborate on the reasons for this in Chapter 4. In general, given that roles were defined and groups were formed from the outset and maintained throughout; that anonymity was guaranteed; that communication was not allowed; and that decision-makers did not receive information about other decision-makers' decisions or expectations, we assume that other relevant variables, like for example perceptions and beliefs, did not change in this setting. For this reason, we focus on the emotional states of the individual as the key mediating variable.

analysis of the data of the 144 dictators assigned to the treatment and control groups that are relevant for us to tackle the specific research questions that this chapter addresses.

Lab-in-the-field economic experiment

After analysing the effects of perspective-taking on pro-social behaviour in a laboratory setting, we took the lab into the field to assess whether inducing perspective-taking might provoke pro-social actions in actual resource users making their decisions in an environment they are familiar with. Participants in this experiment were 181 downstream farmers of an Andean watershed (the Cañete River Watershed in Peru).

In this experiment, the basic action situation recreated a framed dictator game wherein the downstream farmers decided how much of their endowment to give to an initiative taking place in the upper watershed. The objective of the initiative is to help upstream farmers to secure their livelihoods and improve their levels of income without compromising water provision downstream. Therefore, a donation to the initiative represents a pro-social action that contributes to the realisation of socially desirable social-ecological outcomes in this watershed.

Before making their decision, downstream farmers in the treatment group were induced to imagine upstream farmers' perspectives. In the control group, farmers only received general information about the watershed, the upstream farmers and the initiative to support the upstream farmers. The farmers in the control groups were not asked to imagine the upstream farmers' perspectives. Hence, through a between-subject comparison between the treatment and control groups, we singled out the effect of imagining the other person's perspective on pro-social actions in this specific social-ecological context.

In the Cañete River Watershed, sustained and sufficient provision of water has underpinned the dynamic agricultural activity downstream in the Cañete Valley (Quintero, Tapasco and Pareja 2013; Francesconi et al. 2016). In contrast, in the upper watershed, where the costs of securing water provision downstream are borne, farmers face hardships in terms of access to markets, water, and public services. Their land management practices, however, have largely contributed to the conservation of those upstream nature areas upon which water provision and water regulation in the watershed hinge.

This is therefore an appropriate setting to assess the potential of perspective-taking to promote actions that favour socially desirable outcomes in a complex social-ecological system.

In this setting, there are two clearly differentiated positions in which the involved actors can unilaterally impose a cost or a benefit on the other actors. We focus on the benefits that downstream farmers can unilaterally contribute to generate for the upstream farmers. In the experiment, through their actions, the downstream farmers could support the upstream farmers by helping to improve their incomes and livelihoods without compromising the availability of water downstream; in other words, they could contribute to evening out the allocation of costs and benefits associated with water provision in the watershed.

Inducing perspective-taking in experiments

As the literature has highlighted, the effects of inducing perspective-taking largely depend on the way it is induced and the situation and context in which it takes place (e.g. Batson, Early and Salvarany 1997; Epley et al. 2006; Epley and Caruso 2009; Ku, Wang and Galinsky 2015). In Chapters 4 and 5 of this thesis, we assessed the effect of inducing perspective-taking through a particular set of procedures within a given action situation and context.

Whereas in Chapter 4 we focussed on *imagine-self* procedures, in Chapter 5 we focussed on *imagine-other* procedures¹³ (Davis 1996; Batson et al. 1997). In both cases, we focussed on distributive situations that introduced asymmetries between the positions occupied by the participants and thereby created differences in perspectives. In Chapter 4, the base situation is defined by a neutrally framed give-and-take dictator game. In Chapter 5, to assess the relevance of perspective-taking in the field, we embedded this distributive situation in a watershed management context, i.e. we assign a ‘watershed frame’ to the classic dictator game.¹⁴

¹³ There are basically two general modes of inducing perspective-taking. Firstly, decision-makers could be instructed to imagine how they would feel if they were experiencing the other person’s position (i.e. through an *imagine-self* set of instructions). Secondly, they can be instructed to imagine how the other feels in a given situation (i.e. through *imagine-other* procedures). (Davis 1996; Batson et al. 1997). Whereas in the laboratory experiment that is discussed in Chapter 4 decision-makers were made to experience how it would be to be in the other’s position, in the lab-in-the-field experiment in Chapter 5 decision-makers were induced to imagine the other’s position and to think of the other’s expectations about the decision they, as decision-makers, are about to make (for a detailed description of perspective-taking procedures, see Chapter 5). In other words, it could be said that, whereas in the laboratory experiment we follow an *imagine-self* protocol to inducing perspective-taking, in the lab-in-the-field experiment we follow an *imagine-other* protocol to induce perspective-taking.

¹⁴ Although it was our initial intention to assess the same set of perspective-taking-inducing procedures in a situation with the same action space in the field, this was not possible. Firstly, it was not possible to find a clean, controlled and efficient way to implement role reversal procedures in this watershed setting given the time, logistical and budgetary restrictions we faced. Given these restrictions and the expected positive effects of inducing perspective-taking through *imagine-other* procedures, it seems natural to assess, in a field setting, the most promising way of inducing perspective-taking. Lastly, due to the features of the context wherein downstream farmers cannot unilaterally impose a negative externality on upstream farmers, we dispensed with the take option in the field implementation of the dictator game.

Given the procedure-specificity and context-dependency of the effects of perspective-taking, it is therefore important to bear in mind these specific characteristics of the perspective-taking procedures that we assess and the situation and contexts wherein we examine them when drawing conclusions and implications for policy and scholarship. We bear these considerations in mind when presenting and briefly discussing the main findings of the experiments in the next sections.

1.4 Summary and general discussion of main findings

As shown in Chapter 2, both the research on the institutional and behavioural analysis of collective action and the research on participatory governance, when reviewed together in an integrative manner, lead to a similar conclusion: When the actors involved are provided with the opportunities and the adequate means, they may be willing to and capable of producing high-quality collective decisions (e.g. in the form of policy recommendations, drafts of legislation, and management plans; Beierle and Cayford 2002; Reed 2008) that would induce them to act cooperatively for the sustainable use of natural resources and the protection of the environment. In other words, participatory interventions do have the potential to facilitate and support the adoption of efficiency-enhancing rules and strategies that would contribute to solving collective action dilemmas in natural resource and environmental management.¹⁵ Moreover, these rules and strategies crafted by the same participants can even match or outperform rules that are imposed externally to also attain socially desirable outcomes (e.g. Ostrom et al. 1994; Cardenas et al. 2000; Cardenas 2004; Dal Bó 2014)

Participatory interventions can also influence cooperative behaviour directly.¹⁶ Research on participatory governance has documented changes in knowledge, trust and perceptions in the actors that are involved in participatory interventions (Koontz and Thomas 2006; Carr, Blöschl and Loucks 2012; Fritsch and Newig 2012). In theory, these aspects could subsequently affect whether or not and the extent to which resource users and the other actors

¹⁵ This is a conclusion that echoes one of the central conclusions from decades of field and laboratory research on the management of the commons: when provided with sufficient information and the required opportunity and autonomy, users of the commons are willing and able to create and enforce rules, norms and strategies that would take them out the collective action dilemma they often face (Ostrom et al. 1992; Ostrom 2006; Poteete et al. 2010; Heikkila and Anderson 2018).

¹⁶ As noted in Chapter 2, this distinction between a direct and indirect channel by which participatory interventions may affect pro-social and cooperative behaviour is similar to the one made by Dal Bó (2014) on the mechanisms by which democratic processes can affect behaviour in social dilemmas. Democracy, he argues, facilitates the solution of social dilemmas by allowing participants within a social dilemma situation to adopt efficiency-enhancing rules and directly influencing cooperative behaviour (e.g. by facilitating the creation and enforcement of norms and the coordination of actions around the social optimal).

involved cooperate for the sustainable use of natural resources and the protection of the environment. It has been more difficult for research in this literature to establish this connection empirically, however (Koontz and Thomas 2006; Newig et al. 2018). The experimental research reviewed in Chapter 2 provides, notwithstanding, evidence suggesting that the types of processes participatory intervention facilitate (e.g. two-way communication, provision of information, conflict resolution) can indeed alter the individual factors upon which collective action depends (i.e. perceptions, expectations, norms, preferences, trust). As also reviewed in the same chapter of this thesis, experimental research also indicates that these changes could subsequently have concrete implications for the way that public goods are provided (Ledyard 1995; Chaudhuri 2011), common resources are managed (Ostrom 2006; Poteete et al. 2010) and, in general, social dilemmas are solved (Dal Bó 2014). In this line, to patently contribute to expanding our understanding of the behavioural impacts of participatory interventions, as well as that of the underlying mechanisms, we designed the experiments discussed in Chapters 3 through 5, the main findings of which I will now briefly review.

1.4.1 Structuring and facilitating two-way communication for collective action

Research on participatory governance has highlighted the importance of high-quality deliberation and two-way interactions to produce high-quality collective decisions and build trust for environmental and natural resource management (e.g. Beierle and Cayford 2002; Newig et al. 2018; Dryzek et al. 2019). In turn, research on cooperative behaviour in social dilemmas has highlighted the effectiveness of communication (i.e. a two-way exchange of information) in increasing cooperation by facilitating collective agreements and trust-building (Dawes 1980; Ledyard 1995; Sally 1995; Ostrom 1998; Balliet 2010). This research has also shed light on the types of information usually exchanged by participants to develop agreements on joint strategies in order to solve their social dilemmas. It has also suggested that for communication to be effective, certain steps must be taken (Cardenas et al. 2004; Cardenas Rodriguez and Johnson 2011) and some basic information must be provided (Ostrom et al. 1992; Schill; Wijermans; Schlüter and Lindahl 2016).

Based on this previous literature, in Chapter 3 we hypothesised that *the treatment interventions mimicking effective elements of two-way communication have a positive effect on cooperation in our laboratory implementation of a public good game (Hypothesis 3.1)*. Furthermore, we expected that *these interventions have a stronger effect combined than uncombined (Hypothesis 3.2)*.

We found that, *when equipped with the information on possible strategies including their associated costs and benefits, and provided with an opportunity to explicitly agree on a joint strategy, groups of participants manage to significantly increase, on average, their levels of cooperation (Result 3.1)*. On the one hand, groups that only received information on the collective action problem or on possible courses of action (i.e. strategies) to tackle this problem did not manage to significantly increase their contributions to the public good. On the other hand, *groups of participants that went through all the stages of two-way information exchange, did manage to produce a significant increase in average contributions (Result 3.2)*.¹⁷ And this increment is statistically higher than the mere re-starting effect observed in groups in the control condition without communication, and is statistically indistinguishable from the average increase accomplished by groups in the *Free communication* condition. Notwithstanding, further exploration of the data reveals that groups that communicated freely managed to reach socially optimal outcomes more frequently and could sustain cooperation for longer periods.

The exploratory analysis of the messages exchanged by participants suggests that there is more to communication than just the exchange of information. In addition to exchanging messages to build common understandings on the social dilemma they face, as well as to develop, agree upon and ratify joint courses of action, participants also engaged in social chit-chat and social bonding. Presumably, this would have been effective in generating the amount of trust needed not only to increase but also to sustain collective action for longer periods. This is, however, a hypothesis that warrants further investigation.

As previously suggested in the literature (Cardenas et al. 2004, 2011), these results show that structured exchanges of information, such as the ones that participatory interventions may facilitate, can, in fact, foster collective action. More concretely, they suggest that the provision of technical information regarding the problem and its solutions is, in and of itself, not sufficient and should rather be directed towards ratified collective agreements. Arguably, complementing these processes with opportunities for social bonding and social exchange would help to sustain cooperation for longer periods.

¹⁷ These are groups that, in addition to receiving information on the general problem and possible strategies, were given the opportunity to agree upon and ratify their willingness to abide by an agreed-upon joint strategy.

1.4.2 Participatory interventions, perspective-taking and pro-social behaviour

Although highlighted as critical for participatory governance (e.g. Ansell and Gash 2008) of natural resources (Ostrom and Gardner 1993; Pahl-Wostl and Hare 2004; Medema et al. 2016; Wald et al. 2017), to the best of our knowledge, the effects of inducing perspective-taking in economic situations have not been yet systematically assessed. Experiments in Chapters 4 and 5 were designed to help bridge this gap.

Previous research indicates that inducing perspective-taking can contribute to pro-social behaviour (e.g. Toi and Batson 1982; Davis 1983; Batson 1987; Batson and Moran 1999) or be counterproductive (see Epley et al. 2006; Epley and Caruso 2009; Batson et al. 1997; Ku et al. 2015). The final effect would depend on the changes in perception it produces (e.g. Carlson-Sabelli and Sabelli 1984; Epley et al. 2006; Erle and Topolinski 2017) and the emotional reactions it provokes (Davis 1983; Batson 1987; Batson et al. 1997). In turn, these depend on the way that perspective-taking is induced (Carlson-Sabelli 1989; Batson et al. 1997; Epley et al. 2006; Erle and Topolinski 2017) and the specific situations and broader contexts in which it takes place (Epley et al. 2006; Ku et al. 2015). As noted in the previous section, experiments reported in Chapters 4 and 5 of this thesis induced perspective-taking through different procedures, each expected to have different effects on behaviour (Davis 1996; Batson et al. 1997; Ku et al. 2015).

Experiencing the other's perspective in a give-and-take dictator game

Based on this previous research, we hypothesised that *experiencing how it would be to be in the other person's position alters pro-social behaviour (Hypothesis 4.1)*, either increasing or decreasing it. *Whether experiencing the other person's position through unilateral role reversal promotes or hinders pro-social behaviour depends on the emotional reactions it provokes (Hypothesis 4.2).*¹⁸ That is, *unilateral role reversal triggers emotional reactions (Hypothesis 4.2.1) that subsequently affect pro-social behaviour (Hypothesis 4.2.2)* either positively or negatively.

We found, however, that *the sole experience of being in the other person's position cannot be associated with a significant change in either the average or the distribution of pro-social*

¹⁸ Specifically, it has been found that inducing decision-makers to imagine themselves in the position of another person would likely be associated with emotions inducing empathic concern and thereby pro-social behaviour, or distressing emotions inducing withdrawal from the situation for decision-maker's relief and thereby reducing pro-social action (as found in Batson et al. 1997 and reviewed by Ku et al. 2015).

action in a give-and-take dictator game (**Result 4.1**, regarding Hypothesis 4.1). *The role reversal experience can indeed be associated with a significant average treatment effect on emotional reactions* (**Result 4.2**, regarding Hypothesis 4.2.1). Although these significant changes in the state of emotions are arguably correlated either positively or negatively with pro-social behaviour, *they cannot be associated, in turn, with significant changes in pro-social behaviour* (**Result 4.3**, regarding Hypothesis 4.2.2). All in all, these results indicate that once possible confounding effects are controlled for and accounted for, the act of experiencing another person's position cannot be associated with significant changes on either the average or the distribution of pro-social behaviour in a give-and-take dictator game. Contrary to what we had expected based on what in the previous literature has been indicated, *emotional reactions seem not to consistently mediate and account for the relationship between inducing perspective-taking through role reversal and pro-social behaviour* (**Result 4.4**, regarding Hypothesis 4.2).

These results are not to suggest that inducing perspective-taking through role reversal is altogether irrelevant. A significant change in the self-reported state of emotions can indeed be associated with this intervention, suggesting that it has the potential to influence behaviour¹⁹ and that it has welfare effects.²⁰ The suppressing effects of conflicting emotional reactions, the short-lasting effects of emotions, the characteristics of our sample, and the characteristics of the action situation are all plausible explanations for the observed results we cover in greater detail in Chapter 4.

Imagining the other's perspective in a watershed management context

Previous research (Batson 1987; Davis 1996; Batson et al. 1997) led us to hypothesise that inducing decision-makers to consider the others' perspectives (i.e. to imagine their perspectives) is associated with an increase in pro-social behaviour. Specifically, in the context of the Cañete River Watershed near Lima, Peru, we hypothesised that *inducing downstream farmers to consider the perspective of upstream farmers would prompt the downstream farmers to take pro-social actions in favour of the upstream farmers* (**Hypothesis 5.1**).²¹ Moreover, we

¹⁹ The relevance of emotions in economic situations has been shown through empirical research by Bosman and van Winden (2002) and Reuben and van Winden (2010), and discussed elsewhere by Elster (1998), Loewenstein (2000) and van Winden (2015).

²⁰ I would like to thank Katharina Hembach for drawing our attention to this particular dimension of the analysis.

²¹ Although analysing the mechanisms by which this positive effect is produced goes beyond the scope of this thesis, at least two mechanisms could come into play here, both acting in favour of pro-social behaviour: Firstly,

hypothesised that the *effect of inducing perspective-taking goes beyond the (positive) effect that providing information about the social-ecological features of the watershed would arguably have on pro-social behaviour (Hypothesis 5.2).*²²

In line with these hypotheses and contrary to the results of Chapter 4, results from this lab-in-the-field experiment indicate that *inducing natural resource users to consider the other person's perspective does trigger pro-social actions in favour of the other person whose perspective is taken on (Result 5.1)*. Furthermore, *this effect cannot be accounted for by the provision of specific information on who that other person is, on his or her characteristics and on the social-ecological context that embeds the interactions between the perspective-taker and the target of the perspective-taking (Result 5.2)*. Statistically, it can be established that the procedures implemented in this experiment to induce perspective-taking can be associated with a significant positive effect on both the average donation and the distribution of donations (**Result 5.1**). And it is not the provision of information about the upstream farmers, the social-ecological characteristics of the watershed, or the farmers' socioeconomic characteristics that account for the observed results (**Result 5.2**).

Inducing perspective-taking

Together, the results from these experiments on perspective-taking complement previous findings that suggest that the effects of inducing perspective-taking depend on the way and the context in which perspective-taking is induced (Batson et al. 1997; Epley et al. 2006; Epley and Caruso 2009; Ku et al. 2015; Erle and Topolinski 2017). They illustrate, in addition, the advantage of using experimental methods in a complementary way to expand our understanding of the impacts that participatory interventions may trigger and their underlying mechanisms.

On the one hand, as discussed in Chapter 4, we found that experiencing another person's position (i.e. similar to *imagine-self* procedures for inducing perspective-taking) is strongly

inducing decision-makers to consider the other persons' perspective could trigger empathic concern for the well-being of others (e.g. Batson et al. 1997). Secondly, it could induce a positive update in the decision-maker's expectations about the receiver's expectations (i.e. the second-order expectations) regarding the decision-maker's donations. In terms of the desire not to fall short of the other's expectations, i.e. guilt aversion, these second-order expectations are positively correlated to pro-social behaviour (Charness and Dufwenberg 2006).

²² In principle, broader awareness of the situation and possible social identification with the target of the pro-social action would increase pro-social behaviour (Bohnet and Frey 1999; Small and Lowenstein 2003; Dana et al. 2006, 2007; Jordan et al. 2016). However, we posit that the effect of considering the other perspective, based on the mechanisms discussed in the previous footnote, goes beyond this effect.

associated with contradictory emotional reactions that could subsequently induce more or less pro-social behaviour. These emotional reactions notwithstanding, we did not observe significant average effects of role reversal on pro-social behaviour in our laboratory recreation of the give-and-take dictator game—an artificial setting without specific framing. In the field, it is perhaps the joint implementation of role-taking and two-way communication exercises that help to clarify misunderstandings, build shared understandings, and facilitate collective action (as qualitative research may suggest: Carlson-Sabelli and Sabelli 1984; Pahl-Wost and Hare 2004; Gurung et al. 2006; Medema et al. 2016). This is, however, a hypothesis worth exploring systematically in future research.

In Chapter 5, on the other hand, we show that inducing decision-makers to imagine the position of another actor, who is in a position of need and can directly benefit from the decision-maker's actions, was associated with more pro-social behaviour. These results indicate that, through these procedures (i.e. *imagine-other* procedures), inducing perspective-taking could have the potential to trigger pro-social behaviour in similar situations and contexts.²³ This type of inducing of perspective-taking may have also induced concern for others and/or guilt aversion (i.e. the desire not to fall short to others' expectations), both positively influencing pro-social behaviour. Although they are discussed in Chapter 5, the mechanisms underlying the observed effects are a topic that should be systematically investigated in future research.

1.4.3 Designing and carrying out participatory interventions

In line with the literature on collective action and the literature on participatory governance, the results coming from these economic experiments are illustrative of the importance of taking seriously the design of participatory interventions (e.g. Ostrom 2006; Reed 2008; von Korff et al. 2010). The processes that these interventions facilitate and the way they are facilitated have implications on the outcomes they can deliver and the effects on behaviour they can ultimately produce.

Furthermore, as suggested by the literature reviewed in Chapter 2, the way that participatory interventions are designed must be adequate for the relevant social-ecological

²³ And, as we briefly touch on in Chapter 5, this includes the broader governance system implicitly established in the experiment setup, whereby the downstream farmers' donations were effectively transferred to the upstream initiative by the experimenters. Illustrative of the importance of the governance context is the fact that various farmers reported that they were interested in contributing to funding sustainable development and conservation practices upstream insofar as it is guaranteed that the resources will be properly handled and invested by the corresponding organisations and/or authorities.

context. Context-sensitive interventions factor in the existing asymmetries amongst the involved state and non-state actors (e.g. in terms of resources and knowledge), handle them adequately and allow for meaningful two-way interactions and exchanges of information. They also embed their processes and their outcomes in the broader context, meaning that (a) relevant uninvolved actors support or at least acknowledge the processes and outcomes of these interventions, and (b) processes and outcomes of other relevant uncovered action situations (e.g. other formal or informal decision-making processes) do not collide with the participatory intervention or send noisy signals to the involved participants. This literature also suggest that participants require the appropriate mechanisms to follow up on, monitor, enforce, or solve misunderstandings about the processes and outcomes of participatory interventions.

In the end, the trust that underpins collective action must be continually reinforced; participants need to be reassured that the others will co-operate and that it is both safe and convenient for them to cooperate as well (Ostrom 1998, 2010; Poteete et al. 2010). Participation is required not only in terms of supplying the appropriate rules and strategies, but also in terms of monitoring and enforcing them (Ostrom 1990).

1.5 Contributions of the thesis

To what extent and how could participatory interventions promote the pro-social and collective action required to successfully meet most of pressing environmental challenges that environmental policy is intended to address? This is the question this thesis was designed to answer. And, in tackling this question, through the findings summarised in the previous sections, this thesis makes at least three broad contributions.

Firstly, it helps to integrate the different strands of literature and organise the available evidence on the impacts of participatory interventions and the mechanisms by which these may heighten (or hinder) pro-social and collective action for natural resource management. It also helps to integrate these insights into a common, coherent (conceptual and methodological) framework.

Secondly, through novel experimental designs, this thesis generates additional evidence on the potential of participatory interventions to directly produce changes in behaviour. Specifically, by exploiting the controlled nature of experiments, we can show that the types of processes participatory methods facilitate (i.e. structured provision of information, facilitation of structured processes of information exchange and perspective-taking) can indeed foster

cooperative and pro-social behaviour. Moreover, in addition to providing further support to the general conclusion that participatory processes can have a direct impact on behaviour and that the design of the process matters, the experiments carried out for this thesis shed light on the specific design features and situation manipulations that may (or may not) yield results in terms of promoting pro-social and collective action. In doing so, each separate study additionally contributes to the research on collective action and pro-social behaviour and the mechanisms by which communication and perspective-taking can promote each type of behaviour.

Finally, the thesis makes a methodological contribution to the research on participatory governance. It demonstrates the usefulness of designing economic experiments to test propositions of relevance for the understanding and the design of participatory interventions. Recently, scholars have further elaborated on the mechanisms by which and the contexts in which participatory mechanisms and processes contribute to attaining better management and governance outcomes (e.g. Beierle and Cayford 2002; Fung 2006, 2015; Reed 2008; von Korff, et al. 2010; Bodin 2017; Newig, et al. 2018; Reed, et al. 2018). Economic experiments may prove to be a useful tool to test the propositions put forth in the literature. By complementing field- and laboratory-based, qualitative and quantitative methods, a more comprehensive analysis could be obtained on the impacts and mechanisms of participatory interventions.

Experiments in Chapters 4 and 5 of this thesis indicate how laboratory and field methods could complement one another. The laboratory experiment discussed in Chapter 4 served well as an initial test of the mechanisms involved in the process of perspective-taking. In turn, the design of the lab-in-the-field experiment benefited from the lessons learned during the implementation of laboratory experiment. The experience accumulated allowed us to make the critical design decisions for the lab-in-the-field experiment on a sounder basis and under a richer set of criteria. Furthermore, together with the results of previous research, the results of both experiments allowed us to make nuanced statements on the impacts and mechanisms of inducing perspective-taking, making clearer its implication for policy and the scholarship.

There are questions that this thesis does not fully resolve, conclusions we have reached that may be expanded on and emerging research questions worth tackling through further research. The study of the mechanisms by which two-way communication produces and sustains collective action and perspective-taking induces or does not induce pro-social behaviour could be expanded through further controlled experiments both in the lab and the field. Research with larger samples involving higher stakes (i.e. more salient rewards to

participants) could underpin a more powerful statistical analysis and could yield more generalizable results. Moreover, the review of literature we carried out in Chapter 2 could be systematically extended, incorporating other strands of literature²⁴ and additional individual small-N and large-N field studies as well as single field and laboratory experimental studies. Such an effort could yield even more comprehensive and fine-grained accounts on the impacts of participatory interventions on pro-social and collective action as well as on the underlying mechanisms. The synthesis presented in Chapter 2 could then be seen as the starting point of a future wide-ranging effort.

Much like previous research on collective action for shared resources management, research on participatory governance has shown that the concerned, affected and interested actors, when provided with the appropriate means, are willing to and capable of adopting efficiency-enhancing rules and strategies. These strategies may well consist of command-and-control measures, economic incentives, and/or voluntary approaches (e.g. Santos et al. 2006). Therefore, participatory interventions may contribute to providing actors with the means to craft, monitor and enforce context-specific rules and strategies in favour of socially desirable outcomes. Participatory interventions may therefore complement the set of tools environmental policy has traditionally drawn upon (as recently illustrated for the design of PES schemes by Lliso et al. 2020a, 2020b).

The quality of the rules and strategies adopted, however, depend not only on how a participatory intervention is designed. The methods employed and the processes facilitated through participatory interventions may have a direct effect on the types of actions the actors undertake. For this reason, it is both warranted and necessary to further investigate the (combination of) methods through which and contexts wherein participatory interventions may effectively contribute to attaining socially desirable social-ecological outcomes. This includes the systematic research of how participatory interventions may complement and enhance the design and implementation of traditional policy instruments.

Based on this general interest, as well as on the results of this thesis and the aspects of participatory interventions that this thesis did not address, various possible avenues of research unfold. For instance, in contexts characterised by heightened inequalities in terms of preferences, but also in terms of the skills, resources, and opportunities that the actors can draw

²⁴ For example the literature on social learning for natural resources management (e.g. Scholz, Dewulf and Pahl-Wostl 2014; Pahl-Wostl 2015).

on to move their preferences forward, what methods or combinations of methods can guarantee a balanced representation and influence of these heterogeneous parties in the decision-making process? How would techniques aimed at inducing perspective-taking perform with actors that may face high opportunity costs (or low expected benefits) to participate in, for instance, multi-stakeholder workshops? (How) could techniques aimed at facilitating perspective-taking and perspective-getting²⁵ be combined to effectively promote understanding and collective action amongst these heterogeneous parties? And, lastly, how could and should participatory interventions specifically link and fit into the broader context in order to realise and sustain socially desirable outcomes? All of these questions point to the necessity of continually fine-tuning the features of the policy process. Ultimately, meeting the pressing environmental challenges with which humanity is currently confronted is not only about getting the rules, norms and strategies that are intended to guide individual and collective behaviour right. It is also about getting right the processes by which these rules, norms, and strategies are created and put into practice.

Chapter 1 references

- Andreoni, James, and Justin M. Rao. 2011. "The power of asking: How communication affects selfishness, empathy, and altruism." *Journal of Public Economics* 95: 513-520. doi:10.1016/j.jpubeco.2010.12.008.
- Andreoni, James, Justin M Rao, and Hannah Trachtman. 2017. "Avoiding the Ask: A Field Experiment on Altruism, Empathy, and Charitable Giving." *Journal of Political Economy* 125 (3).
- Andreoni, James, William Harbaugh, and Lise Vesterlund. 2007. "Altruism in Experiments." In *Behavioural and Experimental Economics. The New Palgrave Economics Collection.*, edited by Steven Durlauf and Lawrence Blume. London: Palgrave Macmillan.
- Ansell, Chris, and Alison Gash. 2008. "Collaborative Governance in Theory and Practice." *Journal of Public Administration Research and Theory* 18 (4): 543-571.
- Baland, Jean-Marie, and Jean-Philippe Platteau. 1999. "The Ambiguous Impact of Inequality on Local Resource Management." *World Development* 27 (5): 773-788. doi:10.1016/S0305-750X(99)00026-1.
- Baland, Jean-Marie, and Jean-Philippe Platteau. 1998. "Wealth inequality and efficiency in the Commons, part II: the regulated case." *Oxford Economic Papers* 50: 1-22. doi:10.1093/oxfordjournals.oep.a028631.
- Baland, Jean-Marie, and Jean-Phillipe Platteau. 1996. *Halting degradation of natural resources. Is there a Role for Rural Communities?* Rome: Food and Agriculture Organization of the United Nations.
- Balliet, Daniel. 2010. "Communication and Cooperation in Social Dilemmas: A Meta-Analytic Review." *Journal of Conflict Resolution* 54 (1): 39-57.
- Bardsley, Nicholas. 2008. "Dictator game giving: altruism or artefact." *Experimental Economics* 11: 122-133. doi:10.1007/s10683-007-9172-2.
- Batson, C. Daniel. 2011. *Altruism in Humans*. Oxford: Oxford University Press.
- Batson, C. Daniel. 1987. "Prosocial motivation: is it ever truly altruistic?" *Advances in Experimental Social Psychology* 20: 65-122. doi:10.1016/S0065-2601(08)60412-8.

²⁵ This refers to the fact of gaining another person's perspective through communication instead of imagining another person's perspective or imagining oneself in another person's perspective (Epley 2014).

- Batson, C. Daniel, and Tecia Moran. 1999. "Empathy-induced altruism in a prisoner's dilemma." *European Journal of Social Psychology* 29: 909-924. doi:10.1002/(SICI)1099-0992(199911)29:7<909::AID-EJSP965>3.0.CO;2-L.
- Batson, C. Daniel, Shannon Early, and Giovanni Salvarani. 1997. "Perspective Taking: Imagining How Another Feels Versus Imagining How You Would Feel." *Personality and Social Psychology Bulletin* 23 (7): 751-758. doi:10.1177/0146167297237008.
- Beierle, Thomas C., and Jerry Cayford. 2002. *Democracy in Practice: Public Participation in Environmental Decisions*. Washington DC: Resources for the Future.
- Bénabou, Roland, and Jean Tirole. 2006. "Incentives and Prosocial Behavior." *The American Economic Review* 96 (5): 1652-1678.
- Berkes, Friket. 2007. "Community-based conservation in a globalized world." *PNAS* 104 (39): 15188 - 15193 .
- Bernal, Raquel, and Ximena Peña. 2011. *Guía práctica para la evaluación de impacto*. Bogotá: Ediciones Uniandes.
- Böckler, Anne, Anita Tusche, and Tania Singer. 2016. "The Structure of Human Prosociality: Differentiating Altruistically Motivated, Norm Motivated, Strategically Motivated, and Self-Reported Prosocial Behavior." *Social Psychological and Personality Science* 7 (6): 530-541. doi:10.1177/1948550616639650.
- Bodin, Örjan. 2017. "Collaborative environmental governance: Achieving collective action in social-ecological systems." *Science* 357 (eean1114).
- Bohnet, Iris, and Bruno S. Frey. 1999. "The sound of silence in prisoner's dilemma and dictator games." *Journal of Economic Behavior & Organization* 38: 43-57. doi:10.1007/978-1-4615-5187-4_11.
- Bosman, Ronald, and Frans van Winden. 2002. "Emotional Hazard in a Power-to-Take Experiment." *The Economic Journal* 112 (472): 147-169.
- Bosworth, Steven J., Tania Singer, and Dannis J. Snower. 2016. "Cooperation, motivation and social balance." *Journal of Economic Behavior and Organization* 196: 72-94. doi:10.1016/j.jebo.2015.12.005.
- Bowles, Samuel. 2014. "Nicolò Machiavelli and the Origins of Mechanism Design." *Journal of Economic Issues* XLVIII (2): 1-11.
- Bowles, Samuel. 2008. "Policies designed for Self-Interested Citizens may Undermine "The Moral Sentiments": Evidence from Economic Experiments." *Science* 320 (5883): 1605-1609. doi:10.1126/science.1152110.
- . 2016. *The Moral Economy. Why Good Incentives are no Substitutes for Good Citizens*. Connecticut: Yale University Press.
- Bowles, Samuel, and Sandra Polanía-Reyes. 2012. "Economic Incentives and Social Preferences: Substitutes or Complements?" *Journal of Economic Literature* 50 (2): 368-425. doi:10.1257/jel.50.2.368.
- Brandts, Jordi, and Gary Charness. 2011. "The strategy versus the direct-response method: a first." *Experimental Economics* 14: 375-398.
- Bueno de Mesquita, Ethan. 2017. *Political Economy for Public Policy*. Princeton: Princeton University Press.
- Cardenas, Juan Camilo. 2004. "Norms from outside and from inside: an experimental analysis on the governance of local ecosystems." *Forest Policy and Economics* 6: 229-241.
- Cárdenas, Juan Camilo. 2018. "(Real) behavior meets (real) institutions: towards a research agenda on the study of the commons." In *A Research Agenda for New Institutional Economics*, edited by Claude Ménard and Mary M. Shirley, 119–126. Elgar. doi:10.4337/9781788112512.00022.
- . 2009. *Dilemas de lo colectivo. Instituciones pobreza y cooperación en el manejo local de los recursos de us común*. Bogotá D.C.: Ediciones Uniandes, CEDE.
- Cárdenas, Juan Camilo, and Juan Felipe Ortiz-Riomalo. 2018. "Acción colectiva para abordar conflicto socio-ambientales. El caso de Santurbán." In *Modos de gobernanza del agua y sostenibilidad. Aportes conceptuales y análisis de experiencias en Colombia*, edited by Andrés Hernández Quiñones. Bogotá D.C.: Centro Interdisciplinario de Estudios sobre Desarrollo (CIDER), Ediciones Uniandes, Universidad de los Andes.

- Cardenas, Juan Camilo, Luz Angela Rodriguez, and Nancy Johnson. 2011. "Collective action for watershed management: field experiments in Colombia and Kenya." *Environmental and Development Economics* 16 (3): 275-303. doi:10.1017/S1355770X10000392.
- Cardenas, Juan Camilo, T. K. Ahn, and Elinor Ostrom. 2004. "Communication and Co-operation in a Common-Pool Resource Dilemma: A Field Experiment." In *Advances in Understanding Strategic Behaviour: Game Theory, Experiments and Bounded Rationality*, edited by Steffen Huck, 258-286. Palgrave Macmillian.
- Cardenas, Juan-Camilo, John Stranlund, and Cleve Willis. 2000. "Local Environmental Control and Institutional Crowding-Out." *World Development* 28 (10): 1719-1733. doi:10.1016/S0305-750X(00)00055-3.
- Carlson-Sabelli, Linnea. 1989. "Role reversal: A concept analysis and reinterpretation of the research literature." *Journal of Group Psychotherapy, Psychodrama and Sociometry* 42: 139-152.
- Carlson-Sabelli, Linnea, and Hector Sabelli. 1984. "Reality, perception, and the role reversal." *Journal of Group Psychotherapy, Psychodrama and Sociometry* 36: 162-174.
- Carlsson, Fredrik, and Olof Johansson-Stenman. 2012. "Behavioral Economics and Environmental Policy." *Annual Review of Resource Economics* 4: 75-99.
- Carr, G., G. Blöschl, and D.P. Loucks. 2012. "Evaluating participation in water resource management: A review." *Water resources research* 48 (11).
- Charness, Gary, and Martin Dufwenberg. 2006. "Promises and Partnership." *Econometrica* 74 (6): 1579-1601. doi:10.1111/j.1468-0262.2006.00719.x.
- Chaudhuri, Ananish. 2011. "Sustaining cooperation in laboratory public goods experiments: a selective survey of the literature." *Experimental Economics* 14: 47-83.
- Congress of Colombia. 1993. "Ley General Ambiental de Colombia, Ley 99 de 1993." *Diario Oficial* (no. 41,146), National Printing Office of Colombia, 22 December.
- Cooper, David J., and John H. Kagel. 2016. "Other-Regarding Preferences: A Selective Survey of Experimental Results." In *Handbook of Experimental Economics, Vol 2*, edited by John H Kagel and Alvin E. Roth, 217-289. Princeton University Press.
- Cox, Michael, Gwen Arnold, and Sergio Villamayor Tomás. 2010. "A Review of Design Principles for Community-based Natural Resource Management." *Ecology and Society* 15 (4): 38 [online]: <http://www.ecologyandsociety.org/vol15/iss4/art38/>.
- Czap, Natalia V., Hans J. Czap, Gary Lynne, and Mark E. Burbach. 2015. "Walk in my shoes: Nudging for empathy conservation." *Ecological Economics* 118: 147-158. doi:10.1016/j.ecolecon.2015.07.010.
- Dal Bó, Pedro. 2014. "Experimental Evidence on the Workings of Democratic Institutions." In *Institutions, Property Rights, and Economic Growth: The Legacy of Douglas North*, edited by Sebastián Galiani and Itai Sened, 266-288. New York: Cambridge University Press.
- Dana, Jason, Daylian M. Cain, and Robyn M. Dawes. 2006. "What you don't know won't hurt me: Costly (but quiet) exit in dictator games." *Organizational Behavior and Human Decision Processes* 100: 193-201. doi:10.1016/j.obhdp.2005.10.001.
- Dana, Jason, Roberto A. Weber, and Jason Xi Kuang. 2007. "Exploiting moral wiggle room: experiments demonstrating an illusory preference for fairness." *Economic Theory* 33: 67-80. doi:10.1007/s00199-006-0153-z.
- Davis, Mark H. 1996. *Empathy. A Social Psychological Approach*. New York: Routledge.
- Davis, Mark H. 1983. "Measuring Individual Differences in Empathy: Evidence for a Multidimensional Approach." *Journal of Personality and Social Psychology* 44 (1): 113-126.
- Dawes, Robyn M. 1980. "Social Dilemmas." *Annual Review of Psychology* 31: 169-193. doi:https://doi.org/10.1146/annurev.ps.31.020180.001125.
- Depoe, Stephen P., John W Delicath, and Marie-France Aepli Elsenbeer, . 2004. *Communication and Public Participation in Environmental Decision Making*. Suny press.
- Dhami, Sanjit. 2016. *The Foundations of Behavioural Economic Analysis*. New York: Oxford University Press.
- Dietz, Thomas, Elinor Ostrom, and Paul C. Stern. 2003. "The Struggle to Govern the Commons." *Science* 302 (5652): 1907-1912.

- Dryzek, John S., André Bächtiger, Simone Chambers, Joshuea Cohen, James N. Druckman, Andrea Felicetti, James S. Fishkin, et al. 2019. "The crisis of democracy and the science of deliberation." *Science* 363 (6432): 1144-1146.
- Elster, Jon. 1998. "Emotions and Economic Theory." *Journal of Economic Literature* 36 (1): 47-74.
- Emerson, Kirk, Tina Nabatchi, and Stephen Balogh. 2012. "An Integrative Framework for Collaborative Governance." *Journal of Public Administration Research and Theory* 22 (1): 1-29.
- Engel, Christoph. 2011. "Dictator games: a meta study." *Experimental Economics* 14: 583-610. doi:10.1007/s10683-011-9283-7.
- Engel, Stefanie, and Marleen Schaefer. 2013. "Ecosystem services — a useful concept for addressing water?" *Current Opinion in Environmental Sustainability* 5: 696–707. doi:10.1016/j.cosust.2013.11.010.
- Epley, Nicholas. 2014. *Mindwise. Why we misunderstand what others think, believe, feel, and want.* Penguin Random House.
- Epley, Nicholas, and Eugene Caruso. 2009. "Perspective Taking: Misstepping Into Others' Shoes." Chap. 20 in *Handbook of imagination and mental simulation*, edited by William M.P. Klein, Julie A. Suhr and Keith D. Markman, 297-311. New York: Psychology Press.
- Epley, Nicholas, Eugene M. Caruso, and Max H. Bazerman. 2006. "When Perspective Taking Increases Taking: Reactive Egoism in Social Interaction." *Journal of Personality and Social Psychology* 91 (5): 872-889. doi:10.1037/0022-3514.91.5.872.
- Erle, Thorsten M., and Sascha Topolinski. 2017. "The Grounded Nature of Psychological Perspective-Taking." *Journal of Personality and Social Psychology* 112 (5): 683-695. doi:10.1037/pspa0000081.
- Fehr, Ernst, and Klaus M. Schmidt. 2006. *The Economics of Fairness, Reciprocity and Altruism - Experimental Evidence and New Theories.* Vol. 1, chap. 8 in *Handbook of the Economics of Giving, Altruism and Reciprocity*, edited by Serge-Christophe Kolm and Jean Mercier Ythier, 615-691. Amsterdam: Elsevier B.V. doi:10.1016/S1574-0714(06)01008-6.
- Field, Barry C., and Martha K. Field. 2007. *Environmental Economics: An Introduction.* New York: McGraw-Hill.
- Forsythe, Robert, Joel L. Horowitz, N. E. Savin, and Martin Sefton. 1994. "Fairness in Simple Bargaining Experiments." *Games and Economic Behavior* 6: 347-369. doi:10.1006/game.1994.1021.
- Francesconi, Wendy, Raghavan Srinivasan, Elena Pérez-Miñana, Simon P Willcock, and Marcela Quintero. 2016. "Using the Soil and Water Assessment Tool (SWAT) to model ecosystem services: A systematic review." *Journal of Hydrology* 535: 625-636. doi:10.1016/j.jhydrol.2016.01.034.
- Frey, Bruno S., Matthias Benz, and Alois Stutzer. 2004. "Introducing Procedural Utility: Not only What, but also How Matters." *Journal of Institutional and Theoretical Economics* 160 (3): 377-401. doi:10.1007/978-1-4615-5187-4_11.
- Friedman, Daniel, and Shyam Sunder. 1994. *Experimental Methods: A Primer for Economists.* Cambridge University Press.
- Fritsch, Oliver, and Jens Newig. 2012. "Participatory Governance and Sustainability: Findings of a Meta-Analysis of Stakeholder Involvement in Environmental Decision Making." In *Reflexive Governance for Global Public Goods*, edited by Eric Brousseau, Tom Dedeurwaerdere and Bernd Siebenhüner, 181-203. MIT Press.
- Fung, Archon. 2015. "Putting the Public Back into Governance: The Challenges of Citizen Participation and Its Future." *Public Administration Review*, 75 (4): 513-522. doi:10.1111/puar.12361.
- Fung, Archon. 2006. "Varieties of Participation in Complex Governance." *Public Administration Review* 66 (Special Issue: Collaborative Public Management): 66-75.
- Greene, William H. 2012. *Econometric Analysis.* Prentice Hall.
- Gsottbauer, Elisabeth, and Jeroen C.J.M. van den Bergh. 2011. "Environmental Policy Theory Given Bounded Rationality and Other-regarding Preferences." *Environmental Resource Economics* 49: 263–304. doi:10.1007/s10640-010-9433-y.
- Gurung, Tayan Raj, Francois Bousquet, and Guy Trébuil. 2006. "Companion Modeling, Conflict Resolution, and Institution Building: Sharing Irrigation Water in the Lingmuteychu Watershed,

- Bhutan." *Ecology and Society* 11 (2): 36 [online] URL: <http://www.ecologyandsociety.org/vol11/iss2/art36/>.
- Hardin, Garret. 1968. "The Tragedy of the Commons." *Science* 162 (3859): 1243-1248.
- Heikkila, Tanya, and Krister Andersson. 2018. "Policy design and the added-value of the institutional analysis and development framework." *Policy & Politics* 46 (2): 309-324.
- Henrich, Joseph, Richard McElreath, Abigail Barr, Jean Ensminger, Clark Barrett, Alexander Bolyanatz, Juan Camilo Cardenas, et al. 2006. "Costly Punishment Across Human Societies." *Science* 312: 1767.
- Henrich, Joseph, Robert Boyd, Samuel Bowles, Colin Camerer, Ernst Fehr, and Herbert Gintis. 2004. *Foundations of Human Sociality: Economic Experiments and Ethnographic Evidence from Fifteen Small-Scale Societies*. Oxford: Oxford University Press.
- Jordan, Matthew, Dorsa Amir, and Paul Bloom. 2016. "Are Empathy and Concern Psychologically Distinct?" *Emotion* 16 (8): 1107-1116. doi:10.1037/emo0000228.
- Kallis, Giorgos, Nuno Videira, Paula Antunes, Angela Guimaraes Pereira, Clive Spash, Harry Coccossis, Serafin Corral Quintana, et al. 2006. "Participatory methods for water resources planning." *Environment and Planning C: Government and Policy* 24: 215-234.
- Kiser, Larry L, and E Ostrom. 1982. "The Three Worlds of Action: A Metatheoretical Synthesis of Institutional Approaches." In *Strategies of Political Inquiry*, edited by Elinor Ostrom, 179-222. Beverly Hills, CA: SAGE.
- Kiser, Larry L, and Elinor Ostrom. 1987. *Reflections on the Elements of Institutional Analysis. Workshop in Political Theory and Policy Analysis*, Indiana University. Paper prepared for the Conference on "Advances in Comparative Institutional Analysis" at the Inter-University Center of Post-Graduate Studies, Dubrovnik, Yugoslavia, October 19-23.
- Kochskämper, Elisa, Edward Challies, Jens Newig, and Nicolas W, Jager. 2016. "Participation for effective environmental governance? Evidence from Water Framework Directive implementation in Germany, Spain and the United Kingdom." *Journal of Environmental Management* 181: 737-748.
- Kollock, Peter. 1998. "Social dilemmas: The Anatomy of Cooperation." *Annual Review of Sociology* 24: 183-214.
- Koontz, Tomas M., and Craig Thomas. 2006. "What Do We Know and Need to Know about the Environmental Outcomes of Collaborative Management?" *Public Administration Review* 66 (s1): 111-121.
- Ku, Gilian, Cynthia S. Wang, and Adam D. Galinsky. 2015. "The promise and perversity of perspective-taking in organizations." *Research in Organizational Behavior* 35: 79-102. doi:10.1016/j.riob.2015.07.003.
- Ledyard, John O. 1995. "Public Goods: A Survey of Experimental Research." In *Handbook of Experimental Economics*, edited by John Kagel and A Roth. Princeton of University Press.
- Levitt, Steven D., and John A. List. 2007. "What Do Laboratory Experiments Measuring Social Preferences Reveal about the Real World?" *Journal of Economic Perspectives* 21 (2): 153-174. doi:10.1257/jep.21.2.153.
- Lindenberg, Siegwart. 2006. "Prosocial Behavior, Solidarity, and Framing Processes. An Integration of Sociological and Psychological Perspectives." In *Solidarity and Prosocial Behavior*, edited by D Fetchenhauer, A Flache, A. P. Buunk and S. M. Lindenberg, 23-44. Springer US.
- List, John A. 2007. "On the Interpretation of Giving in Dictator Games." *Journal of Political Economy* 115 (3): 482-493. doi:10.1086/519249.
- Lliso, Bosco, Petr Mariel, Unai Pascual, and Stefanie Engel. 2020a. "Increasing the credibility and salience of valuation through deliberation: Lessons from the Global South." *Global Environmental Change* 62: 102065. doi:<https://doi.org/10.1016/j.gloenvcha.2020.102065>.
- Lliso, Bosco, Unai Pascual, Stefanie Engel, and Petr Mariel. 2020b. "Payments for ecosystem services or collective stewardship of Mother Earth? Applying deliberative valuation in an indigenous community in Colombia." *Ecological Economics* 169: 106499. doi:<https://doi.org/10.1016/j.ecolecon.2019.106499>.
- Loewenstein, George. 2000. "Emotions in Economic Theory and Economic Behavior." *American Economic review* 90 (2): 426-432.

- McGinnis, Michael, and Elinor Ostrom. 2014. "Social-ecological system framework: initial changes and continuing challenges." *Ecology and Society* 19 (2): 30.
- Medema, Wietske, Alison Furber, Jan Adamowski, Qiqi Zhou, and Igor Mayer. 2016. "Exploring the Potential Impact of Serious Games on Social Learning and Stakeholder Collaborations for Transboundary Watershed Management of the St. Lawrence River Basin." *Water* 8 (5): 175. doi:10.3390/w8050175.
- Ménard, Claude, and Mary M. Shirley, . 2018. *A Research Agenda for New Institutional Economics*. Elgar.
- Moffat, Peter. 2015. *Experimentics. Econometrics for Experimental Economics*. New York: Macmillan Publishers.
- Mullainathan, Sendhil, and Richard H. Thaler. 2015. "Behavioral Economics." In *International Encyclopedia of the Social & Behavioral Sciences (Second Edition)*, edited by James D. Wright, 437-442. doi:https://doi.org/10.1016/B978-0-08-097086-8.71007-5.
- Muradian, Roldan, and Juan Camilo Cardenas . 2015. "From market failures to collective action dilemmas: Reframing environmental governance challenges in Latin America and beyond (Editorial to special section)." *Ecological Economics* 120: 358-3665.
- Muradian, Roldan, and Laura Rival. 2012. "Between markets and hierarchies: The challenge of governing." *Ecosystem Services* 1: 93-100.
- National Constituent Assembly of Colombia. 1991. "Constitución Política de Colombia 1991."
- Newig, Jens, Ana Adzersen, Edward Challies, Oliver Fritsch, and Nicolas Jager. 2013. *Comparative analysis of public environmental decision-making processes – a variable-based analytical scheme*. Lüneburg: Discussion Paper No. 37 / 13. Institute for Environmental and Sustainability Communication, Leuphana University.
- Newig, Jens, and Oliver Fritsch. 2009. "Environmental Governance: Participatory, Multi-level -and Effective?" *Environmental Policy and Governance* 19: 197-214.
- Newig, Jens, Edward Challies, Nicolas W. Jager, Elisa Kochskaemper, and Ana Adzersen. 2018. "The Environmental Performance of Participatory and Collaborative Governance: A Framework of Causal Mechanisms." *Policy Studies Journal* 46 (2): 269-297. doi:https://doi.org/10.1111/psj.12209.
- Newig, Jens, Nicolas W. Jager, Elisa Kochskämper, and Edward Challies. 2019. "Learning in participatory environmental governance – its antecedents and effects. Findings from a case survey meta-analysis." *Journal of Environmental Policy & Planning* 21 (3): 213-227. doi:https://doi.org/10.1080/1523908X.2019.1623663.
- North, Douglas. 1994. "Economic Performance Through Time." *The American Economic Review* 84 (3): 359-368.
- Ostrom , Elinor, and Roy Gardner. 1993. "Coping with Asymmetries in the Commons: Self-Governing Irrigation Systems Can Work." *Journal of Economic Perspectives* 7 (4): 93-112. doi:10.1257/jep.7.4.93.
- Ostrom, Elinor. 1998. "A Behavioral Approach to the Rational Choice Theory of Collective Action. Presidential Address, American Political Science Association, 1997." *American Political Science Review* 92 (1): 1-22.
- Ostrom, Elinor. 2009. "A General Framework for Analyzing Sustainability of Social-Ecological Systems." *Science* 325 (5939): 419-422.
- Ostrom, Elinor. 2011. "Background on the Institutional Analysis and Development Framework." *Policy Studies Journal* 39 (1): 7-27.
- Ostrom, Elinor. 2010. "Beyond Markets and States: Polycentric Governance of Complex Economic Systems." *American Economic Review* 100: 641-672.
- Ostrom, Elinor. 2000. "Crowding out citizenship." *Scandinavian Political Studies* 23 (1): 3-16. doi:10.1111/1467-9477.00028.
- . 1990. *Governing the commons: The evolution of institutions for collective action*. Cambridge University Press.
- Ostrom, Elinor. 2006. "The value-added of laboratory experiments for the study of institutions and common-pool resources." *Journal of Economic Behavior & Organization* 61: 149-163. doi:10.1016/j.jebo.2005.02.008.
- . 2005. *Understanding Institutional Diversity*. Princeton: Princeton University Press.

- Ostrom, Elinor, James Walker, and Roy Gardner. 1992. "Covenants with and without a Sword: Self-Governance is Possible." *American Political Science Review* 86 (2): 404.
- Ostrom, Elinor, Roy Gardner, and James Walker. 1994. *Rules, Games and Common-Pool Resources*. The University of Michigan Press.
- Pahl-Wostl, Claudia. 2015. *Water Governance in the Face of Global Change. From Understanding to Transformation*. Berlin: Springer International Publishing.
- Pahl-Wostl, Claudia, and Matt Hare. 2004. "Processes of Social Learning in Integrated Resources Management." *Journal of Community & Applied Social Psychology* 14: 193-206. doi:10.1002/casp.774.
- Poteete, Amy R., Marco Janseen, and Elinor Ostrom. 2010. *Working Together: Collective Action, the Commons, and Multiple Methods in Practice*. Princeton: Princeton University Press.
- Quintero, Marcela, Jeimar Tapasco, and Piedad Pareja. 2013. *Diseño e Implementación de un Esquema de Retribución por Servicios Ecosistémicos Hidrológicos en la Cuenca del Río Cañete*. Lima: Ministerio del Ambiente (MINAM), Centro Internacional de Agricultura Tropical (CIAT).
- Reed, Mark S., Steven Vella, Edward Challies, Joris de Vente, Lynne Frewer, Daniela Hohenwallner-Ries, Tobias Huber, et al. 2018. "A theory of participation: what makes stakeholder and public engagement in environmental management work?" *Restoration Ecology* 26 (S1): S7-S17.
- Reed, Mark. 2008. "Stakeholder participation for environmental management: A literature review." *Biological conservation* 141: 2417-2431.
- Reuben, Ernesto, and Frans van Winden. 2010. "Fairness perceptions and prosocial emotions in the power to take." *Journal of Economic Psychology* 31: 908-922.
- Rowe, Gene, and Lynn Frewer. 2005. "A Typology of Public Engagement Mechanisms." *Science, Technology, & Human Values* 30 (2): 251-290.
- Sally, David. 1995. "Conversation and Cooperation in Social Dilemmas. A Meta-Analysis of Experiments from 1958 to 1992." *Rationality and Society* 7: 58-92.
- Santos, Rui, Paula Antunes, Gualter Baptista, Pedro Mateus, and Luisa Madruga. 2006. "Stakeholder participation in the design of environmental policy mixes." *Ecological Economics* 60: 100 - 110. doi:10.1016/j.ecolecon.2005.11.025.
- Schill, Caroline, Nanda Wijermans, Maja Schlüter, and Therese Lindahl. 2016. "Cooperation Is Not Enough—Exploring Social-Ecological Micro-Foundations for Sustainable Common-Pool Resource Use." *PLoS ONE* 11 (8): e0157796. doi:10.1371/journal.pone.0157796.
- Schlager, Edela, and Michael Cox. 2018. "The IAD Framework and the SES Framework: An Introduction and Assessment of the Ostrom Workshop Frameworks." In *Theories of the Policy Process*, edited by Christopher M. Weible and Paul Sabatier, 215-252. Westview Press.
- Scholz, Geeske, Art Dewulf, and Claudia Pahl-Wostl. 2014. "An Analytical Framework of Social Learning Facilitated by Participatory Methods." *Systemic Practice and Action Research* 27 (6): 575-591.
- Sen, Amartya. 1997. "Maximization and the Act of Choice." *Econometrica* 65 (4): 745-779. doi:10.2307/2171939.
- Sen, Amartya. 1977. "Rational Fools: A Critique of the Behavioral Foundations of Economic Theory." *Philosophy and Public Affairs* 6 (4): 317-344. <https://www.jstor.org/stable/2264946>.
- Shogren, Jason F., and Laura O. Taylor. 2008. "On Behavioral-Environmental Economics." *Review of Environmental Economics and Policy* 2 (1): 26-44. doi:10.1093/reep/rem027.
- Siegel, Sidney. 1957. "Nonparametric Statistics." *The American Statistician* 11 (3): 13-19.
- Siegel, Sidney, and John Castellan. 1988. *Nonparametric statistics for the behavioral sciences*. McGraw-Hill Book Company.
- Small, Deborah A., and George Loewenstein. 2003. "Helping a Victim or Helping the Victim: Altruism and Identifiability." *Journal of Risk and Uncertainty* 26: 5-16. doi:10.1023/A:1022299422219.
- Smith, Vernon. 1976. "Experimental Economics: Induced Value Theory." *The American Economic Review* 66 (2): 274-279.
- Smith, Vernon. 1982. "Microeconomic Systems as an Experimental Science." *The American Economic Review* 72 (5): 923-955.
- Smith, Vernon. 1998. "The Two Faces of Adam Smith." *Southern Economic Journal* 65 (1): 1-19. doi:10.2307/1061349.
- StataCorp. 2017. *Stata Statistical Software: Release 15*. College Station: StataCorp LLC.

- Thaler, Richard. 2016. "Behavioral Economics: Past, Present, and Future." *American Economic Review* 106 (7): 1577–1600. doi:<http://dx.doi.org/10.1257/aer.106.7.1577>.
- The United Nations Economic Commission for Europe (UNECE). 1998. *Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters*. Aarhus.
- Toi, Miho, and C. Daniel Batson. 1982. "More Evidence that Empathy Is a Source of Altruistic Motivation." *Journal of Personality and Social Psychology* 43 (2): 281 - 292.
- United Nations Conference on Environment and Development (UNCED). 1992. *Rio Declaration on Environment and Development*. Rio de Janeiro: United Nations, General Assembly. https://www.un.org/en/development/desa/population/migration/generalassembly/docs/globalcompact/A_CONF.151_26_Vol.I_Declaration.pdf.
- van Asselt Marjolein, B.A., and Nicole Rijkens-Klomp. 2002. "A look in the mirror: reflection on participation in Integrated Assessment from a methodological perspective." *Global Environmental Change* 12: 167-184.
- van Winden, Frans. 2015. "Political economy with affect: On the role of emotions and relationships in political economics." *European Journal of Political Economy* 40: 298-311.
- Voinov, Alexey, and Francois Bousquet. 2010. "Modelling with Stakeholders." *Environmental Modelling and Software* 25: 1268-1281.
- Vollan, Bjørn. 2008. "Socio-Ecological Explanations for Crowding-Out Effects." *Ecological Economics* 67 (4): 560–73.
- von Korff, Yorck, Patrick d'Aquino, Katherine Daniell, and Rianne Bijlsma. 2010. "Designing Participation Processes for Water Management and Beyond." *Ecology and Society* 15 (3): 1 [Online]. <http://www.ecologyandsociety.org/vol15/iss3/art1/>.
- Vorlauffer, Tobias. 2019. "Effects of double-anonymity on pro- and anti-social behavior: Experimental evidence from a lab in the field." *Journal of Behavioral and Experimental Economics* 81: 216-225. doi:10.1016/j.socec.2019.07.001.
- Wald, Dara M., Elizabeth A. Segal, Erik W. Johnston, and Ajay Vinze. 2017. "Understanding the influence of power and empathic perspective-taking on collaborative natural resource management." *Journal of Environmental Management* 199: 201-210. doi:10.1016/j.jenvman.2017.05.030.
- Wilde, Louis. 1980. "On the Use of Laboratory Experiments in Economics." In *The Philosophy of Economics*, edited by Joseph Pitt. Reidel.
- Zhan, Wei, Catherine Eckel, and Philip J. Grossman. 2017. *Does How We Measure Altruism Matter? Playing Both Roles in Dictator Games*. Working paper.

[Page intentionally left blank.]

Chapter 2: Participatory interventions for collective action in environmental and natural resource management

Juan Felipe Ortiz-Riomalo, Ann-Kathrin Koessler, and Stefanie Engel

Abstract: Meeting environmental challenges and sustainably managing shared natural resources entail fostering collective action across multiple government levels, geographic scales and time periods. To adequately face these challenges, the involvement of the relevant stakeholders (i.e. concerned, affected and interested non-state and state actors) has been deemed both critical and promising. To what extent and in what way could participatory interventions effectively foster collective action for environmental protection and sustainable natural resource management? While the literature on collective action offers insight into the behavioural, situational and contextual factors that collective action hinges upon, the literature on participatory governance has shed light on the impacts and mechanisms of participatory interventions; however, up to now, both strands of research have moved forward without sufficiently communicating or interacting with one another. Consequently, the question of whether and how participatory interventions may promote (or hinder) collective action has yet to be studied systematically. To help bridge the gap between these two areas, this chapter synthesises the main insights from both strands of literature, organising them within a common conceptual framework: the Institutional Analysis and Development (IAD) framework. We find that by helping resource users to change the rules, norms and strategies that constrain and guide their behaviour, and by directly influencing the attributes and decision factors of actors which cooperative behaviour depends upon, participatory interventions have the potential to foster collective action. As well noted in previous research, for collective action to be sustained, however, trust needs to be permanently cultivated and ensured. Therefore, the literature indicates that participatory interventions must not only be carefully designed, but also must be adequately embedded in the broader social-ecological context and governance system in order to effectively heighten and sustain collective action.

Keywords: collective action dilemmas, participatory governance, collaborative governance, public participation, stakeholder participation, commons, common pool resources, public goods, shared natural resource management.

JEL: D72, D79, P32, P48

2.1 Introduction

Collective action is required to meet pressing environmental challenges at the local, regional and global level (Keohane and Ostrom 1995; Ostrom 2010a; Muradian and Cardenas 2015). Particular interests, perspectives and courses of action need be coordinated at all these levels to attain socially desirable goals regarding, amongst other issues, biodiversity conservation, water provision, food security and carbon sequestration. To adequately meet these challenges, participatory interventions have become an important element of modern environmental governance. When discussing participatory interventions, we are referring to policy interventions that involve—by consulting, informing or actively engaging—the concerned, affected and/or interested parties in one or more stages of the policy or management processes (Beierle and Cayford 2002; Fung 2006). To what extent could participatory interventions help strengthen collective action for environmental protection and natural resource management? What are the channels by which these participatory interventions can contribute to foster collective action and thereby to realising better social-ecological outcomes? These are the questions that we aim to provide insights into with this chapter by reviewing the literature on participatory governance and the experimental research on collective action for natural resource management.

The two strands of literature we review have largely developed in parallel without sufficiently communicating and interacting with one another. On the one hand, the scholarship on participatory governance has made strides in terms of documenting, analysing and conceptualising the mechanisms and impacts of participatory interventions, both in general (e.g. Fung 2006, 2015; Ansell and Gash 2008; Emerson, Nabatchi and Balogh 2012; Gerlak, Heikkila and Lubell 2013) and in the context of environmental and natural resource management (e.g. Beierle and Cayford 2002; Koontz and Thomas 2006; Reed 2008; Newig and Fritsch 2009; Newig et al. 2018, 2019; Bodin 2017; Reed et al. 2018). Scholars in this field have gleaned their insights into the topic from single- and multiple-case studies, surveys of cases (e.g. Beierle and Cayford 2002; Newig and Fritsch 2009; Newig et al. 2019), and extensive reviews of the literature (e.g. Reed 2008; Carr, Blöschl and Loucks 2012).

On the other hand, the scholarship on collective action for (common/shared) resource management has extensively contributed to identifying the behavioural, situational and contextual variables that collective action rests on (e.g. Baland and Platteau 1996; Dietz, Ostrom and Stern 2003; Poteete, Janssen and Ostrom 2010; Cox, Arnold and Villamayor-

Tomás 2010). Experimental studies in the laboratory and the field, informed by and complemented with small- and large-N case studies, have made possible to isolate the variables (or configurations of variables) that promote or hinder resource users to act collectively (Poteete et al. 2010). Furthermore, the focus on collective action has made it possible for this literature to embrace contributions from experimental research on collective action dilemmas in the social sciences (e.g. Dawes 1980; Ledyard 1995; Kollock 1998; Chaudhuri 2011, 2016).

Research on participatory governance has hinted at (e.g. Reed 2008; Newig et al. 2018) and delved into (Ansell and Gash 2008; Bodin 2017) the importance of collective action²⁶ for natural resource management. Yet, whether and how participatory interventions might effectively foster and increase collective action have not yet been systematically investigated.²⁷ Furthermore, the research on the effects of participatory interventions is largely based on single-case and comparative case studies which makes it difficult to isolate the specific variables (or configuration of variables) that are actually promoting or hindering collective action. In turn, the literature on collective action for shared resource management has emphasized the importance of participatory decision-making (Ostrom 1990; Ostrom, Walker and Gardner 1992; Cox et al. 2010; Heikkila and Anderson 2018). Yet, the features whereby participatory interventions could promote or hinder collective action have not yet been systematically analysed.

The different levels, geographical scales, and periods in which (a) the participatory interventions take place, (b) the actual resource use occurs and (c) the final ecological outcomes are realised make it difficult to determine through short term field research whether participation indeed affects social-ecological outcomes. Here, the experimental approach can help to systematically assess the impacts and processes that participatory interventions generate and facilitate in natural resource management.

With this chapter, we aim to thus help bridge the gap between the two strands of literature. Specifically, we synthesise the main insights regarding the impacts participatory interventions may have on collective action. We also delve into the mechanisms that could produce and

²⁶ Of collaborative governance, specifically. In line with Newig et al. (2018), we understand collaborative governance as a mode of participatory governance; as a mode of arranging participatory interventions. In turn, we understand collaboration as a type of collective action.

²⁷ For a recent exception, see Bodin (2017). He reviews the literature on collaborative governance and hints at those aspects that would increase the effectiveness of collaborative arrangements for addressing pressing environmental challenges.

sustain such impacts. To make this feasible despite the large number of individual studies, we primarily focus on the main surveys of cases and survey articles available in both strands of literature. Furthermore, with regards to the collective action literature, we focus on the evidence collected through economic experiments in both the laboratory and the field. In this way, we are able to gain rather fine-grained insights into the specific variables (or configuration of variables) through which participatory interventions can influence cooperative behaviour.²⁸

To collect and organise insights from the literature, we draw on the Institutional Analysis and Development (IAD) framework (Kiser and Ostrom 1982, 1987; Ostrom 2005, 2011; McGinnis 2011a; Schlager and Cox 2018). In the next section, we will summarise the elements of this framework that help us to organise the insights gathered from our integrative review of the literature. Based on the framework, we posit that participatory interventions could impact collective action both directly and indirectly: directly by affecting the individual decision factors that cooperative behaviour hinges on, and indirectly by influencing the development of rules and strategies that constrain and guide cooperative behaviour. We review insights on each of these channels in the third and fourth sections of this chapter, respectively. That is, we review in these sections the ways in which participatory interventions may effectively foster collective action. The research reviewed also sheds insights into the challenges that policymakers, practitioners and even resource users may encounter when trying to deliver socially desirable outcomes through participatory means. The fifth section of this chapter reviews these insights and synthesises some of the main challenges for participatory interventions to effectively foster collective action. The last section of the chapter summarises the main findings and concludes the chapter.

Based on our review of the literature, we posit that participatory interventions do have the potential to promote collective action. They can effectively facilitate and support the creation and adoption of context-specific rules and strategies that prescribe, and indeed produce, cooperative behaviour. Participatory interventions can also promote direct changes to the actor-

²⁸ The literature on participation is vast, reaches a varied range of research and policy domains and provides rich insight into the impacts and mechanisms of participatory interventions (e.g. Arnstein 1969, 1975; Fals-Borda 1987; de Sousa Santos 1998; Sen 1999; Stiglitz 2002; Wagle and Shah 2003; Nylén 2011; Mansuri and Rao 2013a, 2013b). Notwithstanding, systematically reviewing all this literature is well beyond the scope of this chapter. For this being a first attempt to integrate two already extensive and rich strands of literature, we primarily focus on the insights yielded by the papers that review several of the studies available in each strand of literature. For the case of the literature on participatory governance, we focus on the reviews of studies and cases that have gleaned insights into participatory governance for natural resource management. Regarding the literature on collective action, we focus on the experimental evidence.

specific factors upon which cooperative behaviour hinges (e.g. perceptions, knowledge, expectations, preferences, personal norms, and trust).

Although participatory interventions have the potential to strengthen the trust needed to act collectively, trust-building hinges on the way participatory interventions are designed and carried out (e.g. Beierle and Cayford 2002; Ostrom 2006; Reed 2008). Furthermore, trust must be permanently nurtured by the broader governance system in order to sustain collective action (Ostrom 2010b; Poteete et al. 2010). In sum, in line with what previous papers have recommended (Beierle and Cayford 2002; Fung 2006, 2015; von Korff et al. 2010; Voinov and Bousquet 2010; Ostrom 2006; Poteete et al. 2010; Bodin 2017; Newig et al. 2018; Reed et al. 2018), we highlight that participatory interventions not only need to be carefully designed. They also require to be adequately embedded in the governance system and, in general, in the broader (biophysical, cultural, social and economic) context.

2.2 Framework

The IAD framework presupposes that actor behaviour in particular, and collective action in general, is situationally defined (Ostrom 1990, 2005).²⁹ In an (operational) action situation, boundedly rational state and non-state actors (individuals and/or organisations) meet, interact and make decisions regarding the use of natural resources and the environment. Due to the structure of incentives they face in most resource management situations, they tend not to make decisions in favour of socially desirable outcomes (like the optimal provision or sustainable appropriation of water quality in a watershed). A social dilemma or collective action problem then emerges.³⁰

This framework recognises that actors, however, are willing to and capable of extricating themselves from the dilemma by learning about the situation they are in; learning about the reputations and intentions of other actors involved in the same situation; and by crafting, learning and adopting rules, norms and strategies that constrain their behaviour and align it to

²⁹ Works that follow a situational analysis approach to understand and explain behaviour include Farr (1985), Smith (1998), Lindenberg (2006), Levitt and List (2007), Bowles and Polanía-Reyes (2012), Bosworth, Singer and Snower (2016).

³⁰ In Ostrom's (1998) words: "social dilemmas occur whenever individuals in interdependent situations face choices in which the maximization of short-term self-interest yields outcomes leaving all participants worse off than feasible alternatives...the term social dilemma refers to...situations in which individuals make independent choices in an interdependent situation (Dawes 1975, Hardin 1971)" (1 – 3). In his definition, Kollock (1998) explicitly relates social dilemmas with the concept of externality. As he puts it, "the study of social dilemmas is the study of the tension between individual and collective rationality. It is the study of tragic (deficient) equilibria caused by externalities, that is, uncompensated interdependencies." (206 – 207)

socially optimal outcomes (Ostrom 1998, 2005; Poteete et al. 2010). Caring about others' outcomes, expectations and preferences—i.e. having social preferences—also helps them devise strategies to solve collective action problems (Fehr and Schmidt 2006; Cárdenas 2018).

The use of the IAD framework helps us use a common language to examine and organise the insights provided by the two separate strands of literature we are reviewing, which usually draw on their respective conceptual approaches. Since it is a framework for policy analysis of collective action (Polski and Ostrom 1999; Ostrom 2011; Heikkila and Anderson 2018), it comprises the variables deemed as relevant in the literature to understand and explain the behavioural, situational and contextual aspects that enable or hinder collective action in a given setting. Furthermore, having the action situation as the focal unit of analysis makes the framework suitable for incorporating insights from experimental economics (as highlighted by Ostrom, Gardner and Walker 1994; Ostrom 2005, 2010b, 2011).

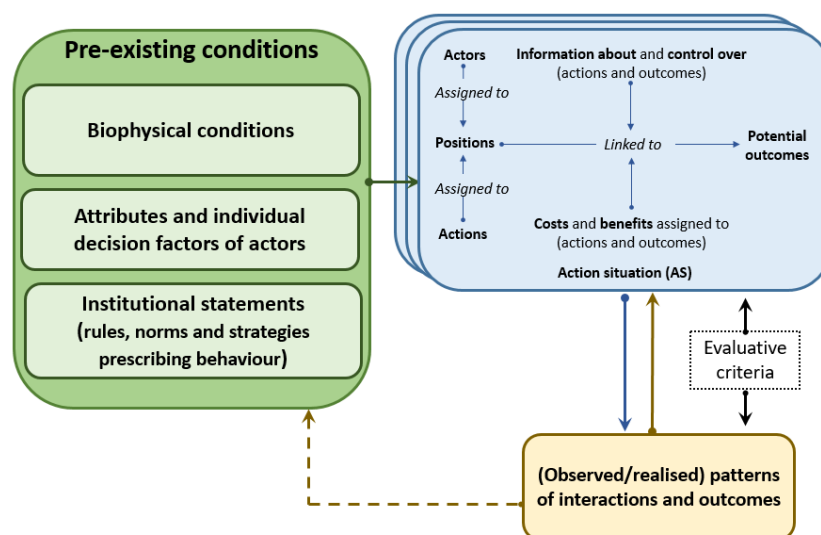


Figure 2.1: Standard representation of the IAD framework. The elements included in the AS box are the working components of any AS. These are influenced and/or determined by the pre-existing conditions into which the AS is embedded. Layers behind the focal AS represent adjacent AS.

Source: Adapted from E. Ostrom (2005, 2010b and 2011) and Cole, Epstein, and McGinnis (2019)

Figure 2.1 summarises the basic elements of the IAD framework. A specific type of activity (e.g. production, consumption, provisioning, appropriating, rulemaking, monitoring) defines an action situation and the types of interactions that take place therein. The structure of the situation determines the course of action that is most convenient for each actor given their (a) information-processing capabilities, (b) patterns of valuation of action and outcomes (i.e. their preferences), (c) internal decision-making processes (e.g. maximising, satisficing, using

heuristics) and (d) other attributes (e.g. assets, wealth, skills, knowledge) (Kiser and Ostrom 1987; Ostrom 2005, 2011). These actor's attributes, together with the institutional context³¹ and the biophysical conditions constitute the set of pre-existing (or starting) conditions that structure the action situation. That is, together they define the actions that each actor can take within a particular role/position, the possible outcomes of these actions, the positions available in a given situation, the costs and benefits associated with all possible action-outcome linkages, the information that participants possess about the situation and the degree of control they have to influence and/or determine an outcome by taking a particular course of action. Elements of the action situation are also defined by the outcomes of other adjacent action situations (e.g. production activities regulated by rules crafted in decision-making action situations) (McGinnis 2011b; Cole, Epstein and McGinnis 2019).

The framework distinguishes between two broad types of action situations (Ostrom 1990). In *operational-choice situations*, resource users make day-to-day operational decisions regarding the use of natural resources. In *institutional-choice situations*, state and non-state actors meet to decide on a set of institutional statements (i.e. rules, norms and strategies) that are to govern the operational activities in terms of the use of a natural resource (see Figure 2.2). Institutional-choice situations may be formal or informal (Ostrom et al. 1994; Ostrom 2005; Pahl-Wostl 2015). Formal institutional-choice situations are recognised by formal dispositions (e.g. constitutions or other pieces of legislation), while informal ones may be informally established by state or non-state actors interested in starting activities and interactions related to rule-making (e.g. deliberation or non-binding consultations) (Ostrom 2005; Pahl-Wostl 2009, 2015). Both types of situations are structured by a given set of pre-existing conditions (i.e. their context) and connected by the outcomes they produce and the influence they have on

³¹ The institutional context comprises the rules, norms, and strategies that constrain and prescribe the behaviour of actors in a given situation. We follow the definition of rules, norms, and strategies laid out by Crawford and Ostrom (1995; further developed in Ostrom 2005). Rules, norms, and strategies all fall under the umbrella of *institutional statements*, a broader term that “refers to a shared linguistic constraint or opportunity that prescribes, permits, or advises actions or outcomes for actors (both individual and corporate)” (Crawford and Ostrom 1995, 583). According to these authors' definitions, a strategy specifies which actions can be performed by whom and under which set of conditions. A norm goes one step further by stating whether those actions may, must, or must not be performed by the relevant actor(s). Here, the individual attaches an internal value (i.e. a delta parameter, Crawford and Ostrom 1995), either negative or positive, “to taking particular types of action in specific situations (...). [The internal value] is added to or subtracted from the objective costs of an action or an outcomes (...) [The size of this value reflects] the strength of the commitment (Sen 1977) made by an individual to take particular types of future actions” (Poteete et al. 2010, 224). Finally, a rule defines the consequences of not following the institutional statement and the “actor or actors to whom is given the responsibility of imposing sanctions on those who fail to implement the statement as intended” (McGinnis 2011a, 177).

one another (e.g. rules and strategies influencing operational decision-making and operational outcomes triggering processes of collective institutional choice).

We combine the IAD framework with the SES framework (Ostrom 2009; McGinnis and Ostrom 2014) to enrich the set of variables describing the pre-existing conditions that configure a given situation—very much in line with what Cole et al. (2019) have recently suggested. To characterise participatory interventions, we also inform our analysis with the conceptual insights and frameworks from the literature on public and stakeholder participation and collaborative governance (Rowe and Frewer 2000, 2005; van Asselt Marjolein and Rijkens-Klomp 2002; Beierle and Cayford 2002; Koontz and Thomas 2006; Fung 2006; Ansell and Gash 2008; Reed 2008; Emerson et al. 2012; Newig et al. 2013; Pahl-Wostl 2015). Figure 2.2 shows the extended framework we draw on for our analysis.

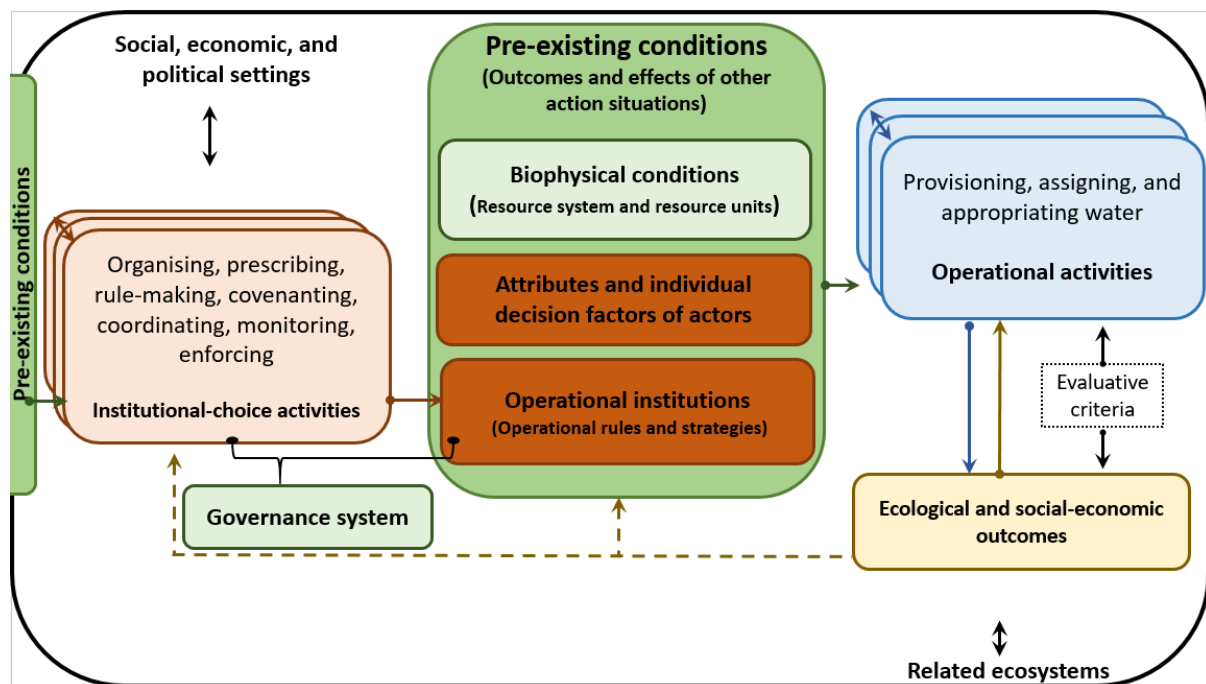


Figure 2.2: Extended representation of the IAD framework. The layers behind the action situations represent adjacent action situations, which are constituted by the instances of activities listed in first layer. The tiers of variables a participatory intervention may affect to trigger collective action are highlighted in dark orange. **Source:** Adapted from Ostrom (1990, 2005, 2010b, and 2011), Ostrom et al. (1994), McGinnis (2011a), McGinnis and Ostrom (2014) and Cole, Epstein and McGinnis (2019)

Participatory interventions are characterised in terms of their general goals and specific objectives, the activities needed to achieve these objectives, and the participatory methods (e.g. public hearings, participatory modelling, citizens juries) used to carry out these activities (in formal or informal action situations). In IAD language, participatory interventions can, therefore, be characterised in terms of the situations they create or intervene (e.g. for

covenanting or conflict resolution), the methods they use to structure these situations (e.g. in terms of who participates and how information is exchanged and aggregated), as well as the linkages among these situations and between these situations and existing action situations at the operational- and institutional-choice level (e.g. between situations for crafting informal agreements and situations for formal rule-making). Participation is defined by the activities that concerned parties are involved in (e.g. diagnosing, consultation, rule-making, assessment, modelling, monitoring), the types of interaction taking place in a given situation (e.g. one-way or two-way communication), and the outcomes participants can effectively influence—which depend, amongst other factors, on the situations and actors (within or outside the participatory intervention) that can also exert influence on a given outcome (see also Fung 2006; Newig et al. 2018; Reed et al. 2018).

There are two main channels whereby participatory interventions may influence collective action (marked by the boxes in dark orange in Figure 2.2). Through the first channel, participatory interventions indirectly influence the behaviour of resource users by influencing the content and attributes of the rules and strategies that prescribe their behaviour in a particular operational situation. For that purpose, participatory interventions must intervene in the governance system, i.e. in existing or new, formal or informal, institutional-choice action situations to discuss and decide on rules, norms and strategies. Through the second channel, participatory interventions directly influence those attributes of actors that individual decision-making depends upon (e.g. knowledge, perceptions, beliefs, preferences, norms, trust and personal rules of decision-making). Participatory interventions can influence these attributes by having resource users participate in institutional-choice activities (e.g. rule-making and strategy-development processes); thereby, participants may, for instance, adjust and update their information and perceptions about the others, the situation and the broader context. Also, participatory interventions can influence these attributes by providing resource users and/or resource managers with, for instance, training or with new information regarding the day-to-day operational activities they carry out.

In summary, participatory interventions can influence behaviour indirectly, by influencing the institutional context, or directly, by influencing actors' attributes and the ways they

perceive, read and assess the situation they are in.³² (See Figure 2.) In the next two sections, we summarise the insights that the literature on participatory governance and the literature on collective action offer regarding these two channels.

2.3 The indirect effect on collective action: changes to rules and strategies

The literature on participatory governance reports how, through participatory interventions, state and non-state actors are willing to and capable of reaching collective decisions in the form of rules and strategies (e.g. binding regulations, management plans, policy/management recommendations) that would contribute to the protection of the environment and the sustainable use of natural resources (Beierle and Cayford 2002; Koontz and Thomas 2006; Reed 2008). For instance, deliberative exercises have proven to be effective in terms of producing smart and sustainable environmental management solutions, moving decision-making processes beyond an impasse (Dryzek et al. 2019).

In practice, participatory interventions convene different state and non-state actors in safe, often informal, arenas for them to communicate their goals, perspectives, knowledge and intentions. Different mechanisms (e.g. participatory modelling, participatory planning, vision-building exercises, games) are used to facilitate the exchange of this information and aggregate the information exchanged (e.g. Pahl-Wostl and Hare 2004; Kallis et al. 2006; Voinov and Bousquet 2010; Medema et al. 2016). Hence, participatory interventions can yield high-quality decisions (Beierle 2002; Beierle and Cayford 2002) by drawing on the available scientific facts and technical expertise and by incorporating creative ideas as well as different perspectives and sources of knowledge and information (Beierle and Cayford 2002; Newig and Fritsch 2009; Fritsch and Newig 2012). The resulting agreed-upon collective decisions are then context-specific, based on a richer informational foundation; they mirror information exchanged about participants' perspectives and goals as well as about the situation and broader context they are in.

In experimental recreations of social dilemma situations, participants are often provided with the opportunity to choose the rules governing their behaviour (e.g. Ostrom et al. 1992; Rodríguez-Sickert, Guzmán and Cárdenas 2008; Dal Bó 2014). When provided with this

³² Incidentally, these are similar to the two channels around which Dal Bó (2014) organises his review of the experimental literature on the effects of democracy. Democracy, he maintains, affects behaviour, indirectly, through the institutions that individuals can adopt in democratic environments and, directly, through the effects that participating in democratic processes have on behaviour.

opportunity to express their preferences on rules through voting mechanisms, participants vote in favour of the adoption of rules that constrain their behaviour and thereby contribute to the realisation of socially optimal outcomes (as reviewed by Ostrom 2006 and Dal Bó 2014). The rules adopted usually come in the form of penalties and/or rewards to be externally enforced (i.e. by the experimenter; e.g. Vyrastekova and van Soest 2003; Volla 2008; Kosfeld, Okada and Riedl 2009; Dal Bó, Foster and Putterman 2010; Abatayo and Lynham 2016; Handberg 2018) or sanctioning schemes to be implemented in a decentralised manner (i.e. by participants themselves; e.g. Gülerk, Irlenbusch and Rockenbach 2006; Ertan, Page and Putterman 2009; Ostrom et al. 1992). Thus, in line with the findings of the literature on participatory governance, experimental studies show that, when provided with the opportunities to choose, people are indeed willing to and capable of adopting efficiency-enhancing measures that constrain their behaviour and make it more compatible with socially optimal outcomes.

Likewise, experimental research has systematically and recurrently shown how two-way communication is effective in strengthening cooperation (Dawes 1980; Sally 1995; Ledyard 1995; Kollock 1998; Ostrom 1998, 2006; Balliet 2010; Chaudhuri 2011). Provided with the required basic information and an arena to discuss, participants manage to extricate themselves from the dilemma they are in (Ostrom et al. 1992; Poteete et al. 2010). For this purpose, they usually follow a set of basic stages (as reviewed and shown by e.g. Cardenas, Ahn and Ostrom 2004; see also Chapter 3 of this thesis). After creating a basic understanding of their situation, they explore alternative strategies, outcomes and associated costs and benefits (Ostrom et al. 1992, 1994; Cardenas et al. 2004). As the process continues, participants gradually identify the most convenient strategies and, at last, agree on the joint strategies that everyone is to undertake to realise the desired outcomes. They often back this agreement with expressions of mutual and public commitments to abide by the agreed-upon joint strategy (Ostrom 1998, 2006).

These joint strategies, crafted and agreed upon by participants, are effective means to heighten cooperation (Ostrom et al. 1994; Cardenas, Stranlund and Willis 2000) even without external enforcement and without changing the formal rules of the situation. Further, these strategies may well match (Cardenas 2004; Handberg 2018) or outperform (Cardenas et al. 2000; Vyrastekova and van Soest 2003; Tyran and Feld 2006; Dal Bó et al. 2010; Dal Bó 2014; Abatayo and Lynham 2016) efficiency-enhancing rules that are externally devised and (weakly) enforced by the rule-maker.

These results resonate with findings in the literature of participatory governance in which decisions produced by participatory means tend to present higher rates of uptake and compliance. Participatory interventions that give a voice to the concerned parties result in decisions that are more legitimate (e.g. Newig and Fritsch 2009) and therefore less contested (e.g. Fritsch and Newig 2012). In general, resource users are more willing to abide by and enforce the rules and strategies that they have helped craft (Ostrom and Nagendra 2006; Reed 2008; Cavalcanti, Engel and Leibbrandt 2013). Moreover, if the relevant parties are involved in the decision-making process (e.g. government agencies in charge of monitoring and enforcement), critical aspects for adequate implementation can be addressed upfront (Newig and Fritsch 2009). As a consequence, decisions (i.e. rules and strategies) produced by participatory means would be more effective in delivering the desired outcomes. They also have the potential to make better use of the resources available (e.g. knowledge, time, personnel) to produce the intended outcomes of these collective decisions (e.g. through co-production; see Ostrom 1996, 2000; Fung 2015).

2.4 Direct effect on collective action: impact on (cooperative) behaviour

In the previous section we showed how participatory interventions can influence behaviour by facilitating a change in the rules and strategies that prescribe and/or guide behaviour. In this section we will show how participatory interventions can influence behaviour directly by influencing the attributes and decision factors of actors which their decision-making depends upon (e.g. levels of knowledge, expectations, preferences, /perceptions, personal norms). Firstly, participatory interventions can influence the participants' *perceptions* of the institutions (rules and strategies) that prescribe and guide their behaviour in a given operational action situation. Secondly, these interventions can influence resource users' *knowledge* and understanding of the situation to be acted upon and the broader context. Through the *information* provided and exchanged and the processes facilitated by participatory interventions, participants adapt the way that they internally assess the costs and benefits of certain actions and outcomes. Lastly, participatory processes can contribute to *trust-building*. In summary, by influencing participants' *perceptions, knowledge and information* and *trust*, participatory interventions have the potential to directly induce collective action for shared resource management as well. We will review the insights from the literature that we can synthesise around these three sub-channels.

2.4.1 Perceptions: Perceived legitimacy, self-determination and sense of ownership

The involvement of non-state actors and appropriate representatives (of state and non-state actors) in the decision-making process has been previously associated with increments in the participants' perceived legitimacy of the resulting decisions and perceived credibility of the process and its outcomes (Newig and Fritsch 2009; Fritsch and Newig 2012). These perceptions are influenced by the clarity with which the need for participation and the goals of this participation have been established (Beierle and Cayford 2002; Reed 2008), the actors that are effectively involved (Newig and Fritsch 2009; Fritsch and Newig 2012), and the degree of control the participants have over the process (Beierle and Cayford 2002; Fung 2006). Two main features determine the type and degree of participants' involvement (Arnstein 1969; Fung 2006; Newig et al. 2018; Reed, et al 2018): (a) the flows and patterns of information exchange that are promoted and facilitated within the process, and (b) the types of outcomes that the participants (and other relevant actors not participating in the process) can effectively exert influence over. Hence, the legitimacy and credibility of the process is negatively affected when participants feel that there is no sufficient expertise and scientific knowledge informing the decision-making process (Reed 2008; Fritsch and Newig 2012) or when only a reduced set of actors (including non-participant actors) ends up having a major influence on the outcomes of the process (Reed 2008).

An increased sense of self-determination (Ostrom 2000; Vollan 2008) and sense of ownership (Cavalcanti et al. 2013; Handberg 2018) are some of the additional reasons put forth to explain why people tend to be more cooperative under rules and strategies crafted through participatory means. In general, according to this line of reasoning, actors not only consider the costs and benefits associated with actions and outcomes when deciding on a particular course of action. They also value the process used to formulate the given set of rules and strategies that determine the available actions and define the scope of outcomes that can be affected as well as the costs and benefits associated to linkages of actions and outcomes. Consequently, they also weigh in the features of the process, e.g. whether it was procedurally fair or not, when deciding on the course of action to follow (e.g. Tyler 1990; Ostrom 2000; Frey, Benz and Stutzer 2004; Dhimi 2016). In sum, prescriptions that are perceived by the affected parties as legitimate and fair, as their own, contributing to their self-determination,

have been shown to be more effective in making the concerning parties contribute to realising the outcomes that these rules and strategies aim to achieve.³³

2.4.2 Information and knowledge

Throughout participatory interventions, resource users in particular, and the state and non-state actors involved in general, receive information about their situation, about the policy or management issue, about the problems and challenges they face, about their possible solutions and about the broader context (Beierle and Cayford 2002). Participants can thus gain new knowledge about environmental problems and increase their environmental awareness (Beierle and Cayford 2002; Fung 2006; Fritsch and Newig 2012). Thanks to the information gained, participants may become more knowledgeable, competent and capable of effectively participating and influencing the outcomes of the participatory process. They would also be more capable of carrying out resource-use and resource-management actions in favour of better social-ecological outcomes (e.g. Beierle 1999; Beierle and Cayford 2002; Newig et al. 2018).

Information can be provided, for example, through technical reports, informative handouts, policy and technical briefs, expert presentations, and testimonies from other resource users. It can be exchanged through two-way communication mechanisms such as workshops, focus groups, deliberation exercises and video conferences. The information participants gather and share depends on the information and knowledge already available and the methods employed to complement, aggregate and exchange the available information and knowledge during the course of the process (Beierle and Cayford 2002; Fung 2006; Fritsch and Newig 2012).

The experimental evidence suggests that both the specific content of the information shared and the way it is conveyed determine its ultimate impacts on behaviour. The provision of information in the form of external, technical advice on what the problem is and how it can be effectively avoided may not be sufficient to encourage cooperation (as reviewed by Ostrom 1998 and highlighted by Brosig, Weimann and Ockenfels 2003; Lopez, Murphy, Spraggon and Stranlund 2012; Brandts, Rott and Solà 2016; see also Chapter 3 in this thesis). Furthermore, only providing information about other participants' actions may negatively impact cooperative behaviour (Ledyard 1995; Kollock 1998; Janssen 2013). One reason is that

³³ Lliso et al. (2020a, 2020b) realise a recent contribution on this subject in the case of payments for environmental services.

participants who cooperate provided others do (i.e. conditional co-operators) reduce cooperative behaviour when they learn about others' non-cooperative behaviour (Fischbacher, Gächter and Fehr 2001; Fischbacher and Gächter 2010; Chaudhuri, Paichayontvijit and Smith 2017).

This is not to suggest that information on the problem or others' past actions is altogether irrelevant or necessarily detrimental to collective action. On the contrary, when provided with an arena where participants can meet and discuss the collective action problem they face, participants require, as a precondition, some basic information on the action situation to discuss and develop joint strategies to solve it (Ostrom et al. 1992; Ostrom 2006; Janssen 2013; Poteete et al. 2010). In the first place, lacking the knowledge about the problem at stake, or having it without effectively sharing and building common understandings around it, may complicate the possibilities of participants to identify optimal solutions and deliver socially desirable outcomes (Schill, Wijermans, Schlüter and Lindahl 2016).³⁴ In addition, having information about the past behaviour and reputation of other fellow participants—and about the general composition of the group of participants, thereby—has also proven useful for participants to be able to work out appropriate strategies to increase and sustain cooperation (Ostrom 1998, 2010b; Poteete et al. 2010; Chaudhuri 2011; Janssen 2013)

Moreover, the experimental literature has accumulated evidence on the types of information that, when provided by the experimenter and/or unilaterally sent by other participants, may have the potential to effectively induce participants to act collectively. Information provided by the experimenter about the presence (or absence) of conditional co-operators (Chaudhuri 2011); advice from previous participants (i.e. peers who are empirical experts on the situation that the current participants are facing) (as reviewed by Chaudhuri 2011); unilateral, free messages from single group members (Koukoumelis, Levati and Weisser 2012; Brandts et al. 2016); moralising messages from the experimenter that directly induce participants to abide by a moral rule—e.g. the Golden Rule (Dal Bó and Dal Bó 2014)—or that are aimed at provoking shame and guilt for a lack of cooperative behaviour (Lopez et al. 2012) have all proven effective in terms of encouraging cooperative behaviour in social dilemma settings.

³⁴ The importance of knowledge and information, as well as of building shared understandings around it, is also stressed, amongst others, by Baland and Platteau (1996), Ostrom (2009) and Poteete et al. (2010). See also Adams, Brockington, Dyson and Vira (2003) for a reflection upon the importance of building shared understandings of the problem as precondition to successfully manage common pool resources.

This experimental research has also shed light on the likely reasons why these types of unilateral provision of information may be effective. Messages sent by fellow participants tend to be generally people-oriented (instead of problem-oriented), encouraging norm-following behaviour (Chaudhuri 2011; Koukoulis et al. 2012; Brandts et al. 2016). These types of messages tend also to appeal to participants' emotions, seek to create a group identity, and instil social norms (e.g. the reciprocity norm) (Brandts et al. 2016). As with moralising messages (Dal Bó and Dal Bó 2014), these types of messages are then arguably more effective at creating optimistic beliefs about other participants' willingness to cooperate (as reviewed by Chaudhuri 2011). They may also contribute to activating social preferences (Dal Bó and Dal Bó 2014) which is known to be important for collective action (Fehr and Fischbacher 2002; Fehr and Schmidt 2006; Cárdenas 2018). In these unilateral messages by fellow participants unilateral pledges seem to be rather scant (Koukoulis et al. 2012) and, when used, rather ineffective (Dannenbergh 2015).

In sum, unilateral provision of information seems to work when it helps create optimistic beliefs about others' likely cooperative behaviour, instil and/or reinforce social norms and activate social preferences. Information about others' reputation, knowledge exchanged by fellow participants³⁵ and moralising messages seem to be effective for that purpose.

Two-way communication allows for the exchange of all these different types of information and knowledge among peers of resource users, experts, and other types of state and non-state actors (Ostrom 1998; Ansell and Gash 2008; Emerson et al 2012; Newig et al. 2018). It unleashes a series of processes that reinforce one another and, together, contribute to effectively and considerably encouraging and even sustaining cooperation (Dawes 1980; Sally 1995; Ledyard 1995; Cardenas et al. 2004; Ostrom 2006; Balliet 2010; Chaudhuri 2011; see Chapter 3 of this thesis). In two-way communication processes, participants exchange knowledge and learn about the situation and the collective action problem they face (Ostrom et al. 1992; Poteete et al. 2010; Schill et al. 2016). They clarify possible misunderstandings and build shared understandings about the problem and its possible solutions, i.e. social learning takes place (Scholz, Dewulf and Pahl-Woslt 2014; Schill et al. 2016). In turn, they share specific information about possible strategies (Lopez and Villamayor-Tomás 2017; Chapter 3

³⁵ In this regard, Chetty and Saez 2013 (cited in Brandts et al. 2016) have also highlighted that knowledge communicated through peer networks could have a major impact on behaviour.

of this thesis), the outcomes these courses of action would lead to and their associated costs and benefits.³⁶ Ultimately, participants develop and agree upon a shared course of action based on their common understanding of the problem and its potential solutions. They decide to cooperate or not (e.g. to abide by the agreed upon joint strategy) upon the information they gather about the intentions, expectations and preferences of fellow participants (Ostrom 1998; Kollock 1998; Cardenas et al. 2004; Poteete et al. 2010).³⁷

Nevertheless, there is more to two-way communication than just the exchange of information about the situation, possible optimal strategies and others' intentions to cooperate. Participants exchange normative statements on what fellow participants should do (Cardenas et al. 2004; Janssen et al 2014; Lopez and Villamayor-Tomás 2017), arguably creating and reinforcing norms, activating social preferences and influencing expectations (Ostrom 1998; Kollock 1998; Cardenas et al. 2004). These practices of moralisation and norm-enforcement may be particularly relevant when the institutional context allows for repeated opportunities for communication to address and solve emerging disagreements (e.g. Ostrom et al. 1992; 1994; Cardenas et al. 2004; Janssen et al. 2014). As can be seen in Chapter 3 of this thesis, participants also share apparently innocuous pieces of information (e.g. social chit-chat, small talk). By contributing to social bonding and reducing self-other distances (Sally 1995), these could potentially activate social preferences (e.g. Dawes, van de Kragt and Orbell 1988; Orbell, van de Kragt and Dawes 1988) and, in general, arguably help participants to increase and sustain higher levels of cooperation with even just one single opportunity to communicate (see Chapter 3).

Recapitulating, systematic analysis of two-way communication processes in experimental social dilemma situations reveals that statements containing clear information on strategies for solving the collective dilemma together with the associated costs and benefits (Lopez and

³⁶ In general, to effectively generate collective action, the exchange of information in terms of both specific strategies and in terms of the intentions of the participants to develop and support a collective agreement seems to be particularly critical (Ostrom 1998; Cardenas et al. 2004; López and Villamayor-Tomás 2017). It is arguably more important than exchanging general statements on what the problem is and what its solutions are (Janssen, Tyson and Lee 2014; López and Villamayor-Tomás 2017; Chapter 3 of this thesis).

³⁷ When compared, two-way communication seems to be relative more effective to increase and sustain cooperation than one-way communication or unilateral provision of information (e.g. Brosig et al. 2003; see also Chapter 3 of this thesis). Based on the processes each facilitates, two-way communication would be more effective in clarifying misunderstandings and in building optimistic beliefs about others willingness to coordinate around desirable outcomes for the collective (Ostrom et al. 1992; Kollock 1998; Cardenas et al. 2004; Fehr and Schmidt 2006)

Villamayor-Tomás 2017; Chapter 3 of the thesis), statements containing information on the intentions of the others to act collectively (Brosig et al. 2003; Cardenas et al. 2004; Chapter 3 of the thesis) and statements conveying normative and moralising stances (Brosig et al. 2003, Janssen et al. 2014; Lopez and Villamayor-Tomás 2017) are particularly critical in increasing and sustaining cooperation. They appear to be highly effective in terms of inducing participants to update their expectations about others' behaviour and coordinate their actions around socially optimal outcomes.³⁸

2.4.3 Trust-building

In the literature on participatory governance, participatory interventions have largely been associated with trust-building among the involved state and non-state actors (e.g. Beierle and Cayford 2002; Koontz and Thomas 2006; Reed 2008; Carr et al. 2012; Fritsch and Newig 2012; Newig et al. 2018; Reed et al. 2018). Processes with clear aims and rationales that also manage to involve the relevant parties and facilitate face-to-face, two-way communication processes amongst these parties are indeed associated with effective trust-building (Chess and Purcell 1999 in Reed 2008; Beierle and Cayford 2002; Reed 2008; Fritsch and Newig 2012). The chances of building trust successfully increase in situations where relatively clear solutions to the social dilemma exist, where these solutions have previously been identified, and where these solutions can yield joint gains for the involved parties (Fritsch and Newig 2012). All in all, well-designed and well-run processes that are clear, transparent and capable of facilitating productive two-way exchanges of information are often capable of overcoming the most challenging contexts, such as those characterised by entrenched disagreements and high levels of mistrust (Beierle and Cayford 2002; Reed 2008; Fritsch and Newig 2012).

Trust is developed when participants expect others to reciprocate cooperative actions (Ostrom 1998). Knowing who the others are and whether they intend to commit to and follow an agreed-upon course of action is fundamental for establishing trust (Ostrom 1998). This development of mutual trust is arguably what two-way communication primarily contributes to (Ostrom 1998, 2010b). It lets participants update their prior perceptions about the intentions, expectations, t preferences and likely future behaviours of other fellow participants (Cardenas

³⁸ It is arguably for similar reasons—i.e. by facilitating this type of coordination in behaviour and by strengthening norms of reciprocity and conditional cooperation—that participation in rule-making processes via voting mechanisms could also be effective in promoting cooperation in social dilemmas (Vyrastekova and van Soest 2003; Tyran and Feld 2006; Rodríguez-Sickert et al. 2008; Dal Bó 2014).

et al. 2004; Poteete et al. 2010). In other words, it lets participants adjust their initial assessments of others' trustworthiness and therefore update their trust on others (Ostrom 1998; Poteete et al. 2010). The exchange of normative statements and moralisation processes that take place in two-way communication processes (Kollock 1998; Cardenas et al. 2004; Janssen et al. 2014; Lopez and Villamayor-Tomás 2017) also contributes to the adjustment of prior beliefs and coordination based on the expectations that others will cooperate and follow norms (e.g. of reciprocity and conditional cooperation)

By allowing participants to coordinate their expectations that others will cooperate and will likely follow norms of reciprocity and (conditional) cooperative behaviour, trust-building enhances aggregate cooperation in shared resource management (Ostrom 1998, 2000; Poteete et al. 2010). As suggested by the literature on participatory governance (e.g. Reed 2008; Newig et al. 2018; Reed et al. 2018), however, trust-building depends on the way participatory interventions are arranged and carried out; it depends on how different goals, interests and expectations are dealt with.

According to the insights surveyed in this subsection, there are, in sum, three major ways by which participatory interventions have the potential to directly influence actors' attributes and individual decision factors and promote collective action thereby. Firstly, operational rules and strategies that are developed through participatory interventions which are deftly designed and carried out are likely to be *perceived* by resource users as something legitimate, as their own, and as something that will contribute to their self-determination. This will in turn motivate these resource users to constrain their behaviour and act in favour of socially desirable outcomes. Secondly, participatory interventions have the potential to facilitate processes whereby relevant *knowledge and information* is provided and exchanged, norms are instilled into and reinforced by participants, and joint strategies for resource management are developed. Finally, participatory interventions may also have the potential to contribute to building the necessary *trust* to support collective action.

All these processes imply that carrying out rule-crafting and joint-strategy-development processes through participatory means may have the potential to directly impact the way resource users assess the costs and benefits of the actions prescribed and the outcomes intended by the produced rules and strategies. Whether participatory interventions realise this potential or not largely—if not totally—depends on the way participatory processes are designed and implemented. Both strands of literature contribute to identifying both the challenges faced to

adequately design and carry out participatory interventions and the ways these challenges could be faced. We synthesise the main insights on this regard in the next section.

2.5 Challenges to participatory interventions

In this section, we will review the main aspects that may keep participatory interventions from effectively inducing participants to act collectively. Thereupon, we glean additional insight into the design features to consider for participatory interventions to be able to overcome these challenges. From the previous sections it is possible to sustain that participants of participatory processes might be willing to and capable of adopting efficiency-enhancing measures in favour of socially optimal outcomes. Both the literature on participatory governance and the literature on collective action show, however, that participants do not necessarily craft and/or adopt these measures when provided with the arena, the mechanisms and the information required to do so. Furthermore, cooperation is feeble and, in order to be sustained, requires trust to be permanently nurtured and reassured (Ostrom 1998, 2010; Poteete et al. 2010). As shown above, in a population composed of both participants that cooperate provided that others do and by participants that free-ride on others' cooperation regardless what others do, as soon as one participant deviates from the agreed upon or expected behaviour, cooperation is likely to unravel rapidly (Fischbacher et al. 2001; Rodríguez-Sickert et al. 2008; Fischbacher and Gächter 2010; Chaudhuri et al. 2017) provided no rule-enforcing mechanisms are available (Fehr and Gächter 2002; Kroll, Cherry and Shogren 2007).

In the literature on participatory governance, there seems to be no solid evidence indicating that participatory interventions will necessarily improve the ecological standards of the outcomes of participatory interventions (Newig and Fritsch 2009; Fritsch and Newig 2012). In experimental settings, research shows that participants do not necessarily vote, at first, for the set of rules that would allow them to implement socially desirable outcomes (e.g. Ostrom et al. 1992; Vyrastekova and van Soest 2003; Cardenas 2005; Gürer et al. 2006; Volla 2008; Rodríguez-Sickert et al. 2008; Dal Bó et al. 2010; Dal Bó 2014). Also, in two-way communication exercises, participants may not seize the opportunities they are provided with to devise joint strategies (i.e. they do not communicate even if they are allowed to) or, if seized, they may struggle to exchange the relevant information to identify the optimal solution to the problem and the effective strategies to solve it (e.g. Ostrom et al. 1992; Cardenas, Rodriguez and Johnson 2011; Janssen et al. 2014; Schill et al. 2016; López and Villamayor-Tomás 2017).

The degree to which decisions benefit the environment depends on the knowledge and expertise of those involved (Fritsch and Newig 2012). Also, by involving state and non-state actors who do not necessarily favour strict conservation measures and instead favour local, specific economic interests, the environmental protection standards of the resulting decisions may be watered down (Newig and Fritsch 2009; Fritsch and Newig 2012). Participatory interventions may end up being dominated by a narrow set of actors. As a result, the resulting decisions may not be sensitive to the interests of minorities and/or less influential groups (Behera and Engel 2007; Koontz and Thomas 2006; Reed 2008) as well as to the interests of the wider public (Beierle and Cayford 2002; Koontz and Thomas 2006). As discussed in the previous section, this may diminish trust and affect the legitimacy of the process and its outcomes.

Experimental research adds to this evidence and contributes to identifying some additional aspects that may keep participants from coordinating around efficiency-enhancing rules and/or strategies. The attributes of participants in terms of skills, knowledge and abilities (Dal Bó et al. 2010; Janssen et al. 2014; Schill et al. 2016) not only define the distribution of the available knowledge, but also the ability of participants to understand it adequately and share it in statements that effectively facilitate coordination around the optimal solution (Schill et al. 2016). Concerns and uncertainty regarding the distributive impacts of various possible rules and strategies may make it difficult for participants to identify the most efficient solution and coordinate around it in voting (e.g. Kosfeld et al. 2009; Dal Bó et al. 2014) or two-way communication (Poteete et al. 2010) mechanisms. Arguably, the need to have the relevant knowledge, specific expertise and appropriate skills increases *pari passu* with the complexity and ambiguity of the collective action problem that the participants face (Ostrom et al. 1992; Ostrom et al. 1994; Vyrastekova and van Soest, 2003; Dal Bó et al. 2010; Poteete et al. 2010; Schill et al. 2016). Furthermore, heterogeneities in perceptions and attributes among participants may increase the difficulty of crafting joint strategies and coordinating around efficiency-enhancing solutions (Margreite, Sutter and Dittrich 2005; Ostrom 2006; Cardenas 2003; Cardenas et al. 2011; Poteete et al. 2010).³⁹ In such settings with heterogeneous actors,

³⁹ Heterogeneities with regard to the participants' understanding of the situations and contexts they are involved in (both within and outside of the participatory intervention) (Poteete et al. 2010; Dal Bó 2014); their perceptions of how a given set of possible rules and strategies will affect their own and the others' incentives (Vyrastekova and van Soest 2003; Dal Bó 2014); their perceptions of others' preferences regarding the available policy options

not involving representatives of all relevant parties in the participatory process (e.g. in two-way communication exercises) would arguably make coordination around joint strategies even more cumbersome (Schmitt, Swope and Walker 2000 in Ostrom 2006⁴⁰).

In the end, the final impact of participatory interventions on the content and attributes of rules and strategies as well as on resource users' operational decisions depends on the actors involved and the extent to which and way in which they are involved in participatory interventions. Through careful actor/stakeholder analysis, all relevant actors who hold a stake and influence in the management of a shared resource should be involved in the decision-making process (Ostrom 2006; Kosfeld et al. 2009; Reed 2008; Poteete et al. 2010; Newig et al. 2018; Heikkila and Anderson 2018). Exclusion of the relevant actors may also affect the subsequent implementation of the agreed-upon decisions (Beierle and Cayford 2002; Newig et al. 2018). Skilled external facilitation may therefore contribute to identifying and involving the relevant parties and handling group dynamics in a way that ensures that different perspectives are effectively considered, involved in the process and adequately mapped into collective outcomes (Chess and Purcell 1999 in Reed 2008; Dryzek et al 2019).⁴¹

When they are provided with (and instructed on how to understand and effectively communicate) adequate information, participants can make sound contributions to the production of sounder collective decisions (Ostrom et al. 1992; Beierle and Cayford 2002; Fung 2006; Poteete et al. 2010; Dal Bó 2014; Heikkila and Anderson 2018). As noted in the previous section, certain types of information and modes and sequences of conveying and exchanging it influence cooperative behaviour. Here as well, external facilitation could help participants to receive and exchange the relevant information and content required to effectively encourage cooperation (as highlighted by Reed 2008 and Dryzek et al. 2019; see

(Dal Bó 2014); and the distribution of skills, wealth, and assets amongst the participants (e.g. Cardenas 2003; Ostrom 2006; Schill et al. 2016; Dal Bó 2014).

⁴⁰ When all group members are not included, any agreement resulting from a two-way communication exercise would be difficult to monitor and enforce. Observed deviations in outcomes from what was agreed upon may originate from the actions of those who were not involved, while those involved can use these outsider actions as scapegoats for their own failure to abide by the terms of the agreement. These are the results of the experiment carried out by Schmitt et al. (2000) as reviewed by Ostrom (2006).

⁴¹ Participatory interventions may reveal the presence of participants and nonparticipants who are not interested in cooperating. This would limit the extent to which joint strategies for collective action could be developed and would instead lead to the rejection of efficiency- and sustainability-enhancing rules, or even the adoption of sub-optimal collective decisions. In turn, the rejection of these rules by a majority of participants may negatively affect ensuing levels of cooperation (as seen in Vyrastekova and van Soest 2003; Tyran and Feld 2006; Volland 2008). Likewise, the rejection of rules that have been agreed upon or voted for by external authorities may also cause cooperation to deteriorate (as visual inspection of the data reported in Dal Bó et al. 2010 may suggest). Accordingly, clear strategies to deal with and address (involved and non-involved) free riders are warranted.

Chapter 3 of the thesis). For instance, expert advice combined with opportunities for two-way exchanges of information amongst participants has proven effective to encourage cooperation in complex common resource management problems. Field experiments have shown that, after receiving information from an expert on the problem they face, participants are more successful at discussing and developing joint management strategies than groups that went into deliberations without this expert advice (Moreno-Sánchez and Maldonado 2010; Saldarria-Isaza, Villegas-Palacio and Arango 2015). In general, as suggested by Vollan (2008), policymakers and practitioners providing context-specific advice could help resource users and managers adopt the appropriate rules and strategies to strengthen collective action.

In sum, participatory interventions can only promote and contribute to sustaining collective action if the processes they facilitate are context-specific, carefully arranged and designed and adequately linked to and embedded in the broader governance system (Beierle and Cayford 2002; Ostrom 2007; Reed 2008; Bodin 2017; Newig et al. 2018, Heikkila and Anderson 2018). The way that participatory interventions are designed and carried out defines who is involved as well as how the information or knowledge and preferences of those involved are exchanged, aggregated, and mapped onto collective decisions on the use of natural resources and the environment. Even if no new rules are established and no new joint strategies are agreed upon, participatory interventions have the potential to influence behaviour.

Trust, on which collective action hinges (Ostrom 2010b), must have a strong foundation and be continually nurtured, however (Ostrom 2006; Poteete et al. 2010). In order to sustain cooperation, monitoring, enforcing, and conflict-resolution mechanisms such as repeated communication (e.g. for detection and moralisation of defectors as well as for reassessment of joint strategies; Cárdenas et al. 2004; Bochet, Page and Putterman.2006) and sanctioning schemes (Fehr and Gächter 2002) must be in place and could complement one another (e.g. Ostrom et al. 1992; Kroll et al. 2006; DeCaro, Janssen and Lee 2015). Without these mechanisms, cooperation can easily unravel at the slightest deviation from the expected cooperative behaviour (Brosig et al. 2003; Ostrom 2006; Rodríguez-Sickert et al. 2008). If implemented properly, these mechanisms can be effective at clarifying misunderstandings, correcting deviations from agreed-upon and expected courses of action, nurturing trust, and sustaining collective action (Ostrom 1990; Ostrom 2006; Cox et al. 2010).

2.6 Summary and conclusions

As decades of research have shown (Ostrom 1998, 2010; Poteete et al. 2010), although they pervade most natural resource management situations, collective action problems are not unavoidable tragedies (Ostrom 1990; Ostrom et al. 1994). Natural resource users can successfully cooperate for the common good when they are provided with opportunities to (i) learn about the problem(s) they face and the other actors involved in the same situation (including their perspectives, intentions, expectations, and trustworthiness), (ii) to communicate and exchange the available information (or even generate new information and knowledge), and (iii) to develop rules, norms and strategies (Ostrom 1998, Poteete et al. 2010). They can adopt efficiency-enhancing collective decisions (in the form of rules and strategies) and they can also adopt efficiency-enhancing courses of actions without even necessarily making an explicit agreement on joint strategies provided they sufficiently trust one another.

Our integrative review of the literature on participatory governance and experimental research on collective action shows that there are two main channels through which participatory interventions can promote collective action. First, participatory interventions can provide groups of resource users with opportunities to change the rules that govern their situation or to coordinate on joint courses of action. By creating situations in which users can meet, interact, get to know one another and exchange and/or receive the relevant information, these types of interventions help participants make the collective choices needed to solve collective action problems in shared resource management. Second, participatory interventions can also more directly influence cooperative behaviour by influencing the knowledge, skills, expectations, norms and preferences of the involved resource users. Both indirectly (via a change in rules and strategies) and directly (via a change in individual factors and attributes underpinning individual decision-making), participatory interventions have the potential to build trust and foster collective action.

The literature we have reviewed in this chapter indicates that participatory interventions indeed have the potential to help resource users develop rules and strategies that could potentially lead to sustainable resource management and protection of the environment. It also indicates that these interventions have the potential to create or exchange the knowledge and information, update the beliefs, create and reinforce the norms, and nurture the trust needed for collective action to take place. The experimental research, in particular, provides evidence that

these latter direct changes in behaviour can be sustained and effectively move resource management towards socially desirable outcomes. Yet, these results are far from automatic.

Providing adequate information and/or allowing the concerned parties to meet, share their knowledge and voice their preferences does not necessarily translate to the adoption and implementation of rules and strategies that would help realise socially desirable social-ecological outcomes. Nor does it necessarily translate into increased trust. On the contrary, misunderstandings could remain uncorrected and prior cynical perceptions about others could be confirmed or even enhanced.⁴² In that case, no cooperation-enhancing outcome would emerge; trust could be damaged, and the prospects of cooperation compromised. Even if joint strategies are agreed upon, beliefs positively updated and social preferences and social norms instilled, mistrust and lack of cooperation may re-emerge if (apparent) deviations from cooperative behaviour are not clarified and/or properly corrected. Trust is feeble and require suitable governance mechanisms in order to be continually nurtured and reassured (Ostrom and Walker 2003; Ostrom 2006; Poteete et al. 2010).

The actual outcomes of participatory interventions in terms of promoting and sustaining collective action depends on how participatory interventions are designed. That is, it depends on the actors involved and the way that knowledge and information are exchanged and aggregated, as well as on the types of interactions and processes that are facilitated. Also, critically, it depends on how participatory interventions are embedded into the broader context to nurture and sustain high levels of trust and collective action. Particularly, it depends on (a) how the processes and outcomes of participatory interventions are linked to other relevant action situations (e.g. other relevant rule-making situations), (b) how uninvolved actors are dealt with, and (c) what mechanisms are created or provided for monitoring, enforcing and fostering cooperative behaviour.

On a final, methodological note, this review illustrates the potential of (economic) experiments in both the laboratory and the field in terms of tackling research questions on participatory governance. Scholars from the literature on participatory governance have put

⁴² For instance, experimental research has indicated that perspective-taking and empathy-enhancing manipulations, like the ones usually carried out to broaden mutual understanding in participatory processes for natural resource management (e.g. Pahl-Wostl and Hare 2004, Gurung et al. 2006, Ansell and Gash 2008, Cárdenas and Ortiz-Riomalo 2018), may end up negatively affecting the realisation of desirable outcomes for the collective (e.g. Batson et al. 1995; Epley, Caruso and Bazerman 2006; Ku et al. 2015; Wald et al. 2017). The final result would depend on how these interventions are designed, embedded in the broader context and implemented.

forth specific empirically-grounded propositions (Newig et al. 2018; Reed et al. 2018) on the mechanisms whereby participatory interventions could improve environmental outcomes. Carefully designed laboratory and field experiments could help test these propositions and systematically assess the behavioural impacts of specific participatory methods and processes. (Application in this sense are illustrated in Handberg 2018 and in Chapters 3 through 5 of this thesis)

Chapter 2 references

- Abatayo, Anna Lou, and John Lynham. 2016. "Endogenous vs. exogenous regulations in the commons." *Journal of Environmental Economics and Management* 76: 51 - 66.
- Adams, William M., Dan Brockington, Jane Dyson, and Bhaskar Vira. 2003. "Managing Tragedies: Understanding Conflict over Common Pool Resources." *Science* 302: 1915-1916.
- Ansell, Chris, and Alison Gash. 2008. "Collaborative Governance in Theory and Practice." *Journal of Public Administration Research and Theory* 18 (4): 543-571.
- Arnstein, Sherry. 1969. "A ladder of citizen participation." *JAIP* 35 (4): 216-224.
- Arnstein, Sherry. 1975. "A Working Model for Public Participation." *Public Administration Review* 35 (1): 70-73.
- Baland, Jean-Marie, and Jean-Phillipe Platteau. 1996. *Halting degradation of natural resources. Is there a Role for Rural Communities?* Rome: Food and Agriculture Organization of the United Nations.
- Balliet, Daniel. 2010. "Communication and Cooperation in Social Dilemmas: A Meta-Analytic Review." *Journal of Conflict Resolution* 54 (1): 39-57.
- Batson, C. Daniel, Judy G. Batson, Matthew R. Todd, Beverly H. Brummett, Laura L. Shaw, and Carlo M.R. Aldeguer. 1995. "Empathy and the Collective Good: Caring for One of the Others in a Social Dilemma." *Journal of Personality and Social Psychology* 68 (4): 619-631.
- Behera, Bhagirath, and Stefanie Engel. 2007. "Participation and Joint Forest Management in Andhra Pradesh, India." In *Political institutions and development: failed expectations and renewed hopes*, edited by Natalia E Dinello and Vladimir Popov. Elgar.
- Beierle, Thomas C. 2002. "The Quality of Stakeholder-Based Decisions." *Risk Analysis* 22 (4): 739-749.
- Beierle, Thomas C. 1999. "Using Social Goals to Evaluate Public Participation in Environmental Decisions." *Policy Studies Review* 16 (3/4): 75-103.
- Beierle, Thomas C., and Jerry Cayford. 2002. *Democracy in Practice: Public Participation in Environmental Decisions*. Washington DC: Resources for the Future.
- Bochet, Olivier, Talbot Page, and Louis Putterman. 2006. "Communication and punishment in voluntary contribution experiments." *Journal of Economic Behavior & Organization* 60: 11-26. doi:10.1016/j.jebo.2003.06.006.
- Bodin, Örjan. 2017. "Collaborative environmental governance: Achieving collective action in social-ecological systems." *Science* 357 (6401): 1114.
- Bosworth, Steven J., Tania Singer, and Dannis J. Snower. 2016. "Cooperation, motivation and social balance." *Journal of Economic Behavior and Organization* 196: 72-94. doi:10.1016/j.jebo.2015.12.005.
- Bowles, Samuel, and Sandra Polanía-Reyes. 2012. "Economic Incentives and Social Preferences: Substitutes or Complements?" *Journal of Economic Literature* 50 (2): 368-425. doi:10.1257/jel.50.2.368.

- Brandts, Jordi, Christina Rott, and Carles Solà. 2016. "Not just like starting over - Leadership and revivification of cooperation in groups." *Experimental Economics* 19: 792-818.
- Brosig, Jeannette, Joachim Weimann, and Axel Ockenfels. 2003. "The Effect of Communication Media on Cooperation." *German Economic Review* 4 (2): 217-241.
- Cardenas, Juan Camilo. 2004. "Norms from outside and from inside: an experimental analysis on the governance of local ecosystems." *Forest Policy and Economics* 6: 229-241.
- Cárdenas, Juan Camilo. 2018. "(Real) behavior meets (real) institutions: towards a research agenda on the study of the commons." In *A Research Agenda for New Institutional Economics*, edited by Claude Ménard and Mary M. Shirley, 119–126. Elgar. doi:10.4337/9781788112512.00022.
- Cardenas, Juan Camilo. 2005. "Groups, Commons and Regulations: Experiments with Villagers and Students in Colombia." In *Psychology, Rationality and Economic Behavior: Challenging Standard Assumptions*, edited by B. Agrawal and A. Vercelli. New York: Palgrave Mcmillan.
- Cárdenas, Juan Camilo, and Juan Felipe Ortiz-Riomalo. 2018. "Acción colectiva para abordar conflicto socio-ambientales. El caso de Santurbán." In *Modos de gobernanza del agua y sostenibilidad. Aportes conceptuales y análisis de experiencias en Colombia*, edited by Andrés Hernández Quiñones. Bogotá D.C.: Centro Interdisciplinario de Estudios sobre Desarrollo (CIDER), Ediciones Uniandes, Universidad de los Andes.
- Cardenas, Juan Camilo, John Stranlund, and Cleve Willis. 2000. "Local Environmental Control and Institutional Crowding-Out." *World Development* 28 (10): 1719-1733.
- Cardenas, Juan Camilo, Luz Angela Rodriguez, and Nancy Johnson. 2011. "Collective action for watershed management: field experiments in Colombia and Kenya." *Environmental and Development Economics* 16 (3): 275-303. doi:10.1017/S1355770X10000392.
- Cardenas, Juan Camilo, T. K. Ahn, and Elinor Ostrom. 2004. "Communication and Co-operation in a Common-Pool Resource Dilemma: A Field Experiment." In *Advances in Understanding Strategic Behaviour: Game Theory, Experiments and Bounded Rationality*, edited by Steffen Huck, 258-286. Palgrave Macmillian.
- Cardenas, Juan-Camilo. 2003. "Real wealth and experimental cooperation: experiments in the field lab." *Journal of Development Economics* 70: 263-289.
- Carr, G., G. Blöschl, and D.P. Loucks. 2012. "Evaluating participation in water resource management: A review." *Water resources research* 48 (11).
- Cavalcanti, Carina, Stefanie Engel, and Andreas Leibbrandt. 2013. "Social integration, participation, and community resource management." *Journal of Environmental Economics and Management* 65: 262-276.
- Chaudhuri, Ananish. 2016. "Recent Advances in Experimental Studies of Social Dilemma Games." *Games* 7 (1).
- Chaudhuri, Ananish. 2011. "Sustaining cooperation in laboratory public goods experiments: a selective survey of the literature." *Experimental Economics* 14: 47-83.
- Chaudhuri, Ananish, Tirnud Paichayontvijit, and Alexander Smith. 2017. "Belief heterogeneity and contributions decay among conditional cooperators in public goods games." *Journal of Economic Psychology* 58: 15-30. doi:http://dx.doi.org/10.1016/j.joep.2016.11.004.
- Chess, Caron, and Kirsten Purcell. 1999. "Public Participation and the Environment: Do We Know What Works?" *Environmental Science & Technology* 33 (16): 2685-2692. doi:10.1021/es980500g.
- Chetty, Raj, and Emmanuel Saez. 2013. "Teaching the tax code: Earnings responses to an experiment with EITC recipients." *American Economic Journal: Applied Economics* 5: 1–31.
- Cole, Daniel H., Graham Epstein, and Michael McGinnis. 2019. "Combining the IAD and SES frameworks." *International Journal of the Commons* 13 (1): 244-275. doi:10.18352/ijc.864.

- Cox, Michael, Gwen Arnold, and Sergio Villamayor Tomás. 2010. "A Review of Design Principles for Community-based Natural Resource Management." *Ecology and Society* 15 (4): 38 [online]: <http://www.ecologyandsociety.org/vol15/iss4/art38/>.
- Crawford, Sue, and Elinor Ostrom. 1995. "A Grammar of Institutions." *The American Political Science Review* 89 (3): 582-600.
- Dal Bó, Ernesto, and Pedro Dal Bó. 2014. "'Do the right thing:' The effects of moral suasion on cooperation." *Journal of Public Economics* 117: 28-38. doi:<http://dx.doi.org/10.1016/j.jpubeco.2014.05.002>.
- Dal Bó, Pedro. 2014. "Experimental Evidence on the Workings of Democratic Institutions." In *Institutions, Property Rights, and Economic Growth: The Legacy of Douglas North*, edited by Sebastián Galiani and Itai Sened, 266-288. New York: Cambridge University Press.
- Dal Bó, Pedro, Andrew Foster, and Louis Putterman. 2010. "Institutions and Behavior: Experimental Evidence on the Effects of Democracy." *American Economic Review* 100: 2205-2229.
- Dannenberg, Astrid. 2015. "Leading by example versus leading by words in voluntary contribution experiments." *Social Choice and Welfare* 44: 71-85.
- Dawes, Robyn M. 1975. "Formal Models of Dilemmas in Social Decision Making." In *Human Judgement and Decision Processes: Formal and Mathematical Approaches*, edited by Martin F. Kaplan and Steven Schwartz, 87-108. New York: Academic Press.
- Dawes, Robyn M. 1980. "Social Dilemmas." *Annual Review of Psychology* 31: 169-193. doi:<https://doi.org/10.1146/annurev.ps.31.020180.001125>.
- Dawes, Robyn M., Alphons J. Van de Kragt, and John M. Orbell. 1988. "Not me or thee but we: The importance of group identity in eliciting cooperation in dilemma situations: Experimental manipulations." *Acta Psychologica* 68 (1-3): 83-97. doi:[https://doi.org/10.1016/0001-6918\(88\)90047-9](https://doi.org/10.1016/0001-6918(88)90047-9).
- de Sousa Santos, Boaventura. 1998. "Participatory Budgeting in Porto Alegre: Toward a Redistributive Democracy." *Politics and Society* 26 (4): 461-510.
- DeCaro, Daniel A., Marco A. Janssen, and Allen Lee. 2015. "Synergistic effects of voting and enforcement on internalized motivation to cooperate in a resource dilemma." *Judgment and Decision Making*, 10 (6): 511-537.
- Dhami, Sanjit. 2016. *The Foundations of Behavioural Economic Analysis*. New York: Oxford University Press.
- Dietz, Thomas, Elinor Ostrom, and Paul C. Stern. 2003. "The Struggle to Govern the Commons." *Science* 302 (5652): 1907-1912.
- Dryzek, John S., André Bächtiger, Simone Chambers, Joshuea Cohen, James N. Druckman, Andrea Felicetti, James S. Fishkin, et al. 2019. "The crisis of democracy and the science of deliberation." *Science* 363 (6432): 1144-1146.
- Emerson, Kirk, Tina Nabatchi, and Stephen Balogh. 2012. "An Integrative Framework for Collaborative Governance." *Journal of Public Administration Research and Theory* 22 (1): 1-29.
- Epley, Nicholas, Eugene M. Caruso, and Max H. Bazerman. 2006. "When Perspective Taking Increases Taking: Reactive Egoism in Social Interaction." *Journal of Personality and Social Psychology* 91 (5): 872-889. doi:[10.1037/0022-3514.91.5.872](https://doi.org/10.1037/0022-3514.91.5.872).
- Ertan, Arhan, Talbot Page, and Louis Putterman. 2009. "Who to punish? Individual decisions and majority rule in mitigating the free rider problem." *European Economic Review* 53: 495-511.
- Fals-Borda, Orlando. 1987. "The Application of Participatory Action-Research in Latin America." *International Sociology* 2 (4): 329-347.
- Farr, James. 1985. "Situational Analysis: Explanation in Political Science." *The Journal of Politics* 47 (4): 1085-1107.

- Fehr, Ernst, and Klaus M. Schmidt. 2006. The Economics of Fairness, Reciprocity and Altruism - Experimental Evidence and New Theories. Vol. 1, chap. 8 in *Handbook of the Economics of Giving, Altruism and Reciprocity*, edited by Serge-Christophe Kolm and Jean Mercier Ythier, 615-691. Amsterdam: Elsevier B.V. doi:10.1016/S1574-0714(06)01008-6.
- Fehr, Ernst, and Simon Gächter. 2002. "Altruistic punishment in humans." *Nature* 415: 137-140.
- Fehr, Ernst, and Urs Fischbacher. 2002. "Why social preferences matter - The impact of non-selfish motives on competition, cooperation and incentives." *The Economic Journal* 112: C1-C33.
- Fischbacher, Urs, and Simon Gächter. 2010. "Social Preferences, Beliefs, and the Dynamics of Free Riding in Public Goods Experiments." *The American Economic Review* 100 (1): 541-556. doi:10.1257/aer.100.1.541.
- Fischbacher, Urs, Simon Gächter, and Ernst Fehr. 2001. "Are people conditionally cooperative? Evidence from a public goods experiment." *Economic Letters* 71: 397-404.
- Frey, Bruno S., Matthias Benz, and Alois Stutzer. 2004. "Introducing Procedural Utility: Not only What, but also How Matters." *Journal of Institutional and Theoretical Economics* 160 (3): 377-401. doi:10.1007/978-1-4615-5187-4_11.
- Fritsch, Oliver, and Jens Newig. 2012. "Participatory Governance and Sustainability: Findings of a Meta-Analysis of Stakeholder Involvement in Environmental Decision Making." In *Reflexive Governance for Global Public Goods*, edited by Eric Brousseau, Tom Dedeurwaerdere and Bernd Siebenhüner, 181-203. MIT Press.
- Fung, Archon. 2015. "Putting the Public Back into Governance: The Challenges of Citizen Participation and Its Future." *Public Administration Review*, 75 (4): 513-522. doi:10.1111/puar.12361.
- Fung, Archon. 2006. "Varieties of Participation in Complex Governance." *Public Administration Review* 66 (Special Issue: Collaborative Public Management): 66-75.
- Gerlak, Andrea K., Tanya Heikkila, and Mark Lubell. 2013. "The Promise and Performance of Collaborative Governance." In *The Oxford Handbook of U.S. Environmental Policy*, edited by Michael E. Kraft and Sheldon Kamieniecki. doi:10.1093/oxfordhb/9780199744671.013.0019.
- Gürerk, Özgür, Bernd Irlenbusch, and Bettina Rockenbach. 2006. "The Competitive Advantage of Sanctioning Institutions." *Science* 312: 108-111.
- Handberg, Øyvind Nystad. 2018. "No sense of ownership in weak participation: a forest conservation experiment in Tanzania." *Environment and Development Economics* 23 (4): 434-451.
- Hardin, Russell. 1971. "Collective Action as an Agreeable n-Prisoners Dilemma." *Science* 16: 472-81.
- Heikkila, Tanya, and Krister Andersson. 2018. "Policy design and the added-value of the institutional analysis and development framework." *Policy & Politics* 46 (2): 309-324.
- Janssen, Marco A. 2013. "The role of information in governing the commons: Experimental results." *Ecology and Society* 18 (4): 4. doi:http://dx.doi.org/10.5751/ES-05664-180404.
- Janssen, Marco, Madeline Tyson, and Allen Lee. 2014. "The effect of constrained communication and limited." *International Journal of the Commons* 8 (2): 617-635.
- Kallis, Giorgos, Nuno Videira, Paula Antunes, Angela Guimaraes Pereira, Clive Spash, Harry Coccossis, Serafin Corral Quintana, et al. 2006. "Participatory methods for water resources planning." *Environment and Planning C: Government and Policy* 24: 215-234.
- Keohane, Robert O., and Elinor Ostrom. 1995. *Local Commons and Global Interdependence: Heterogeneity and Cooperation in Two Domains*. SAGE. doi:http://dx.doi.org/10.4135/9781446222010.
- Kiser, Larry L, and E Ostrom. 1982. "The Three Worlds of Action: A Metatheoretical Synthesis of Institutional Approaches." In *Strategies of Political Inquiry*, edited by Elinor Ostrom, 179-222. Beverly Hills, CA: SAGE.
- Kiser, Larry L, and Elinor Ostrom. 1987. *Reflections on the Elements of Institutional Analysis*. Workshop in Political Theory and Policy Analysis, Indiana University. Paper prepared for the

- Conference on "Advances in Comparative Institutional Analysis" at the Inter-University Center of Post-Graduate Studies, Dubrovnik, Yugoslavia, October 19-23.
- Kollock, Peter. 1998. "Social dilemmas: The Anatomy of Cooperation." *Annual Review of Sociology* 24: 183-214.
- Koontz, Tomas M., and Craig Thomas. 2006. "What Do We Know and Need to Know about the Environmental Outcomes of Collaborative Management?" *Public Administration Review* 66 (s1): 111-121.
- Kosfeld, Michael, Akira Okada, and Arno Riedl. 2009. "Institution Formation in Public Goods Games." *American Economic Review* 99 (4): 1335-1355.
- Koukouvelis, Anastasios, M. Vittoria Levati, and Johannes Weisser. 2012. "Leading by words: A voluntary contribution experiment with one-way." *Journal of Economic Behavior & Organization* 81: 379-390.
- Kroll, Stephan, Todd L. Cherry, and Jason F. Shogren. 2007. "Voting, Punishment, and Public Goods." *Economic Inquiry* 45 (3): 557-570.
- Ku, Gilian, Cynthia S. Wang, and Adam D. Galinsky. 2015. "The promise and perversity of perspective-taking in organizations." *Research in Organizational Behavior* 35: 79-102. doi:10.1016/j.riob.2015.07.003.
- Ledyard, John O. 1995. "Public Goods: A Survey of Experimental Research." In *Handbook of Experimental Economics*, edited by John Kagel and A Roth. Princeton of University Press.
- Levitt, Steven D., and John A. List. 2007. "What Do Laboratory Experiments Measuring Social Preferences Reveal about the Real World?" *Journal of Economic Perspectives* 21 (2): 153-174. doi:10.1257/jep.21.2.153.
- Lindenberg, Siegwart. 2006. "Prosocial Behavior, Solidarity, and Framing Processes. An Integration of Sociological and Psychological Perspectives." In *Solidarity and Prosocial Behavior*, edited by D Fetchenhauer, A Flache, A. P. Buunk and S. M. Lindenberg, 23-44. Springer US.
- Lliso, Bosco, Petr Mariel, Unai Pascual, and Stefanie Engel. 2020a. "Increasing the credibility and salience of valuation through deliberation: Lessons from the Global South." *Global Environmental Change* 62: 102065. doi:https://doi.org/10.1016/j.gloenvcha.2020.102065.
- Lliso, Bosco, Unai Pascual, Stefanie Engel, and Petr Mariel. 2020b. "Payments for ecosystem services or collective stewardship of Mother Earth? Applying deliberative valuation in an indigenous community in Colombia." *Ecological Economics* 169: 106499. doi:https://doi.org/10.1016/j.ecolecon.2019.106499.
- Lopez, Maria Claudia, and Sergio Villamayor-Tomas. 2017. "Understanding the black box of communication in a common-pool resource field experiment." *Environmental Science & Policy* 68: 69-79. doi:10.1016/j.envsci.2016.12.002.
- Lopez, María Claudia, James Murphy, John M. Spraggon, and John Stranlund. 2012. "Comparing the effectiveness of Regulation and Pro-Social Emotions to Enhance Cooperation: Experimental Evidence from Fishing Communities in Colombia." *Economic Inquiry* 50 (1): 131-142.
- Mansuri, Ghazala, and Vijayendra Rao. 2013b. "Can participation be induced? Some evidence from developing countries." *Critical Review of International Social and Political Philosophy* 16 (2): 284-304.
- . 2013a. *Localizing Development. Does participation work?* Washington D.C.: The World Bank.
- Margreiter, Magdalena, Matthias Sutter, and Dennis Dittrich. 2005. "Individual and Collective Choice and Voting in Common Pool Resource Problem with Heterogeneous Actors." *Environmental & Resource Economics* 32: 241-271.
- McGinnis, Michael D. 2011a. "An Introduction to IAD and the Language of the Ostrom Workshop: A Simple Guide to a Complex Framework." *The Policy Studies Journal* 39 (1): 169 - 183.

- McGinnis, Michael D. 2011b. "Networks of Adjacent Action Situations in Polycentric Governance." *Policy Studies Journal* 39 (1): 51-78.
- McGinnis, Michael, and Elinor Ostrom. 2014. "Social-ecological system framework: initial changes and continuing challenges." *Ecology and Society* 19 (2): 30.
- Medema, Wietske, Alison Furber, Jan Adamowski, Qiqi Zhou, and Igor Mayer. 2016. "Exploring the Potential Impact of Serious Games on Social Learning and Stakeholder Collaborations for Transboundary Watershed Management of the St. Lawrence River Basin." *Water* 8 (5): 175. doi:10.3390/w8050175.
- Moreno-Sánchez, Rocío del Pilar, and Jorge Higinio Maldonado. 2010. "Evaluating the role of co-management in improving governance of marine protected areas: An experimental approach in the Colombian Caribbean." *Ecological Economics* 69: 2557-2567.
- Muradian, Roldan, and Juan Camilo Cardenas . 2015. "From market failures to collective action dilemmas: Reframing environmental governance challenges in Latin America and beyond (Editorial to special section)." *Ecological Economics* 120: 358-3665.
- Newig, Jens, Ana Adzersen, Edward Challies, Oliver Fritsch, and Nicolas Jager. 2013. Comparative analysis of public environmental decision-making processes – a variable-based analytical scheme. Lüneburg: Discussion Paper No. 37 / 13. Institute for Environmental and Sustainability Communication, Leuphana University.
- Newig, Jens, and Oliver Fritsch. 2009. "Environmental Governance: Participatory, Multi-level -and Effective?" *Environmental Policy and Governance* 19: 197-214.
- Newig, Jens, Edward Challies, Nicolas W. Jager, Elisa Kochskaemper, and Ana Adzersen. 2018. "The Environmental Performance of Participatory and Collaborative Governance: A Framework of Causal Mechanisms." *Policy Studies Journal* 46 (2): 269-297. doi:https://doi.org/10.1111/psj.12209.
- Newig, Jens, Nicolas W. Jager, Elisa Kochskämper, and Edward Challies. 2019. "Learning in participatory environmental governance – its antecedents and effects. Findings from a case survey meta-analysis." *Journal of Environmental Policy & Planning* 21 (3): 213-227. doi:https://doi.org/10.1080/1523908X.2019.1623663.
- Nylen, William R. 2011. "Participatory Institutions in Latin America: The Next Generation of Scholarship." *Comparative Politics* 43 (4): 479-500.
- Orbell, John M., Alphons J. Van de Kragt, and Robyn M. Dawes. 1988. "Explaining discussion-induced cooperation." *Journal of Personality and Social Psychology* 54 (5): 811-819. doi:https://doi.org/10.1037/0022-3514.54.5.811.
- Ostrom, Elinor. 1998. "A Behavioral Approach to the Rational Choice Theory of Collective Action. Presidential Address, American Political Science Association, 1997." *American Political Science Review* 92 (1): 1-22.
- Ostrom, Elinor. 2007. "A diagnostic approach for going beyond panaceas." *PNAS* 104 (39): 15181-15187.
- Ostrom, Elinor. 2009. "A General Framework for Analyzing Sustainability of Social-Ecological Systems." *Science* 325 (5939): 419-422.
- Ostrom, Elinor. 2011. "Background on the Institutional Analysis and Development Framework." *Policy Studies Journal* 39 (1): 7-27.
- Ostrom, Elinor. 2010b. "Beyond Markets and States: Polycentric Governance of Complex Economic Systems." *American Economic Review* 100: 641-672.
- Ostrom, Elinor. 1996. "Crossing the Great Divide: Coproduction, Synergy, and Development." *World Development* 24 (6): 1073 - 1087.
- Ostrom, Elinor. 2000. "Crowding out citizenship." *Scandinavian Political Studies* 23 (1): 3-16. doi:10.1111/1467-9477.00028.

- . 1990. *Governing the commons: The evolution of institutions for collective action*. Cambridge University Press.
- Ostrom, Elinor. 2010a. "Polycentric systems for coping with collective action and global environmental change." *Global Environmental Change* 20: 550-557.
- Ostrom, Elinor. 2006. "The value-added of laboratory experiments for the study of institutions and common-pool resources." *Journal of Economic Behavior & Organization* 61: 149-163. doi:10.1016/j.jebo.2005.02.008.
- . 2005. *Understanding Institutional Diversity*. Princeton: Princeton University Press.
- Ostrom, Elinor, and Harini Nagendra. 2006. "Insights on linking forests, trees, and people from the air, on the ground, and in the laboratory." *PNAS* 103 (51): 19224 - 19231. doi:10.1073/pnas.0607962103.
- Ostrom, Elinor, and James Walker, . 2003. *Trust and Reciprocity: Interdisciplinary Lessons from Experimental Research*. Russell Sage Foundation.
- Ostrom, Elinor, James Walker, and Roy Gardner. 1992. "Covenants with and without a Sword: Self-Governance is Possible." *American Political Science Review* 86 (2): 404.
- Ostrom, Elinor, Roy Gardner, and James Walker. 1994. *Rules, Games and Common-Pool Resources*. The University of Michigan Press.
- Pahl-Wostl, Claudia. 2009. "A conceptual framework for analysing adaptive capacity and multi-level learning processes in resource governance regimes." *Global Environmental Change* 19: 354-365.
- . 2015. *Water Governance in the Face of Global Change. From Understanding to Transformation*. Berlin: Springer International Publishing.
- Pahl-Wostl, Claudia, and Matt Hare. 2004. "Processes of Social Learning in Integrated Resources Management." *Journal of Community & Applied Social Psychology* 14: 193-206. doi:10.1002/casp.774.
- Poliski, Margaret M., and Elinor Ostrom. 1999. *An Institutional Framework for Policy Analysis and Design*. Workshop in Political Theory and Policy Analysis, Indiana University.
- Poteete, Amy R., Marco Janseen, and Elinor Ostrom. 2010. *Working Together: Collective Action, the Commons, and Multiple Methods in Practice*. Princeton: Princeton University Press.
- Reed, Mark S., Steven Vella, Edward Challies, Joris de Vente, Lynne Frewer, Daniela Hohenwallner-Ries, Tobias Huber , et al. 2018. "A theory of participation: what makes stakeholder and public engagement in environmental management work?" *Restoration Ecology* 26 (S1): S7-S17.
- Reed, Mark. 2008. "Stakeholder participation for environmental management: A literature review." *Biological conservation* 141: 2417-2431.
- Rodríguez-Sickert, Carlos, Ricardo Andrés Guzmán, and Juan Camilo Cárdenas. 2008. "Institutions influence preferences: Evidence from a common pool resource experiment." *Journal of Economic Behavior & Organization* 67: 215–227. doi:10.1016/j.jebo.2007.06.004.
- Rowe, Gene, and Lynn Frewer. 2005. "A Typology of Public Engagement Mechanisms." *Science, Technology, & Human Values* 30 (2): 251-290.
- Rowe, Gene, and Lynn Frewer. 2000. "Public Participation Methods: A Framework for Evaluation." *Science, Technology, & Human Values* 25 (1): 3-29.
- Saldarriaga-Isaza, Adrián, Clara Villegas-Palacio, and Santiago Arango. 2015. "Phasing out mercury through collective action in artisanal gold mining: Evidence from a framed field experiment." *Ecological Economics* 120: 406-415.
- Sally, David. 1995. "Conversation and Cooperation in Social Dilemmas. A Meta-Analysis of Experiments from 1958 to 1992." *Rationality and Society* 7: 58-92.
- Schill, Caroline, Nanda Wijermans, Maja Schlüter, and Therese Lindahl. 2016. "Cooperation Is Not Enough—Exploring Social-Ecological Micro-Foundations for Sustainable Common-Pool Resource Use." *PLoS ONE* 11 (8): e0157796. doi:10.1371/journal.pone.0157796.

- Schlager, Edela, and Michael Cox. 2018. "The IAD Framework and the SES Framework: An Introduction and Assessment of the Ostrom Workshop Frameworks." In *Theories of the Policy Process*, edited by Christopher M. Weible and Paul Sabatier, 215-252. Westview Press.
- Schmitt, Pamela, Kurtis Swope, and James Walker. 2000. "Collective action with incomplete commitment: experimental evidence." *Southern Economic Journal* 66 (4): 829-854.
- Scholz, Geeske, Art Dewulf, and Claudia Pahl-Wostl. 2014. "An Analytical Framework of Social Learning Facilitated by Participatory Methods." *Systemic Practice and Action Research* 27 (6): 575-591.
- Sen, Amartya. 1999. *Development as Freedom*. Penguin Random House.
- Sen, Amartya. 1977. "Rational Fools: A Critique of the Behavioral Foundations of Economic Theory." *Philosophy and Public Affairs* 6 (4): 317-344. <https://www.jstor.org/stable/2264946>.
- Smith, Vernon. 1998. "The Two Faces of Adam Smith." *Southern Economic Journal* 65 (1): 1-19. doi:10.2307/1061349.
- Stiglitz, Joseph E. 2002. "Participation and Development: Perspectives from the Comprehensive Development Paradigm." *Review of Development Economics* 6 (2): 163-182.
- Tyler, Tom R. 1990. *Why People Obey the Law*. New Haven and London: Yale University Press.
- Tyran, Jean-Robert, and Lars P. Feld. 2006. "Achieving Compliance when Legal Sanctions are Non-deterrent." *Scandinavian Journal of Economics* 108 (1): 135-156.
- van Asselt Marjolein, B.A., and Nicole Rijkens-Klomp. 2002. "A look in the mirror: reflection on participation in Integrated Assessment from a methodological perspective." *Global Environmental Change* 12: 167-184.
- Voinov, Alexey, and Francois Bousquet. 2010. "Modelling with Stakeholders." *Environmental Modelling and Software* 25: 1268-1281.
- Vollan, Bjørn. 2008. "Socio-Ecological Explanations for Crowding-Out Effects." *Ecological Economics* 67 (4): 560-73.
- von Korff, Yorck, Patrick d'Aquino, Katherine Daniell, and Rianne Bijlsma. 2010. "Designing Participation Processes for Water Management and Beyond." *Ecology and Society* 15 (3): 1 [Online]. <http://www.ecologyandsociety.org/vol15/iss3/art1/>.
- Vyrastekova, Jana, and Daan van Soest. 2003. "Centralized Common-Pool Management and Local Community Participation." *Land Economics* 79 (4): 500-514.
- Wagle, Swarnim, and Shah Parmesh. 2003. Participation in public expenditure systems. *Social Development Notes*, note No. 69. World Bank. <http://documents.worldbank.org/curated/en/326741468763759070/pdf/316210snd6901public1.pdf>.
- Wald, Dara M., Elizabeth A. Segal, Erik W. Johnston, and Ajay Vinze. 2017. "Understanding the influence of power and empathic perspective-taking on collaborative natural resource management." *Journal of Environmental Management* 199: 201-210. doi:10.1016/j.jenvman.2017.05.030.

[Page intentionally left blank.]

Chapter 3: Structuring communication effectively for environmental cooperation⁴³

Ann-Kathrin Koessler, Juan Felipe Ortiz-Riomalo, Mathias Janke and Stefanie Engel

Abstract: Many environmental problems represent social dilemma situations where individually rational behaviour leads to collectively suboptimal outcomes. Communication has been found to alleviate the dilemma and stimulate cooperation in these situations. Yet, the knowledge of what type of information needs to be shared to ensure the beneficial effect is still incomplete. Previous research relies on *ex post* methods, i.e. after conducting an experiment researchers analyse what information was shared during the communication phase. By nature, this *ex post* categorization is endogenous. In this study, we aim to identify the elements of effective communication *ex ante* and evaluate their impact in a more controlled way. Based on the findings of previous studies, we identify four cooperation-enhancing elements of communication: (i) problem awareness, (ii) identification of strategies, (iii) agreement and (iv) ratification. In a laboratory experiment with 560 participants, we implement interventions representing these components and contrast the resulting levels of cooperation with the outcomes under free (unstructured) or no communication. We find that the intervention facilitating agreement on a common strategy (combination of (ii) and (iii)) is particularly powerful in boosting cooperation. And if this is combined with interventions promoting problem awareness and ratification, similar cooperation levels as in settings with free-form communication can be reached. Our results not only are relevant from an analytical perspective, but also provide insights for effectively structuring communication in participatory processes aimed at improving environmental outcomes.

Keywords: social dilemma, public good, effective communication, cooperation, participatory process, deliberation, deliberative processes

JEL classification: C71, C92, H41, Q48, Q59

⁴³ A version of this chapter was submitted to *Environmental and Resource Economics*, the official journal of the European Association of Environmental and Resource Economists (EAERE), in the end of January 2020. The submitted version is also available as working paper in the following hyperlinks: <https://bit.ly/31Dez1Y>; <https://bit.ly/2xV18SR>

3.1 Introduction

Many environmental problems represent social dilemma situations where individually rational behaviour leads to collectively suboptimal outcomes. A long tradition in social science research examines how cooperation can be facilitated and sustained in such situations. One finding in this stream of literature is that communication between the involved actors can promote cooperation (Balliet 2010; Chaudhuri 2011; Ledyard 1995; Sally 1995). Existing studies examine *why* communication enhances cooperation (Kerr and Kaufman-Gilliland 1994). A first explanation is that communication promotes the emergence of cooperative social norms (which constrain the socially acceptable action space) (Bicchieri 2002). A second explanation is that communication facilitates the emergence of a group identity and the resulting sense of belonging activates social preferences (Dawes, Van De Kragt and Orbell 1988; Orbell, van de Kragt and Dawes 1988). Finally, a third explanation is that communication helps actors to coordinate their beliefs, which is particularly powerful when the majority of actors are conditional co-operators (Cardenas, Ahn and Ostrom 2004; Chaudhuri, Paichayontvijit and Smith 2017).

But *what information*, when exchanged during the communication process, fosters cooperation? This question ties back to the definition of communication. With the origin in the Latin word *communicare* – to share – communication is understood as “a process by which *information* is exchanged between individuals through a common system of symbols, signs, or behaviour” (Merriam Webster n.d.). Typically, in social science experiments on communication, subjects exchange messages face-to-face or through an open text chat. In order to understand why the ‘black box’ of communication improves cooperation, researchers then analyse *ex post* the content of the conversations and categorize the messages exchanged during the communication phase (Pavitt, McFeeters, Towey and Zingerman 2005). By nature, this *ex post* categorization is endogenous (Janssen 2013; Ostrom, Walker and Gardner 1992; Schill, Wijermans, Schlüter and Lindahl 2016). Hence, existing research can only provide hints about what kinds of information promote cooperation when shared.

In this study, we aim to identify the elements of effective communication and evaluate their impact in a more controlled way. We do not focus on which channels —such as group identity, social norms, social preferences, etc.— drive cooperation after communication, but we examine what information when shared during a communication phase promotes cooperation. For this purpose, we take an *ex ante* approach. We start our study with a review

of social dilemma studies which implemented free form communication and analysed *ex post* the content of the messages. Based on these studies, we identify four *information elements of communication* which have been recurrently listed as potentially important to promote cooperation, namely, *problem awareness*, *identification of strategies*, *agreement* and *ratification*. We then develop experimental interventions which represent these four information elements and test their impact on cooperation in a public good game. Through the controlled nature of a laboratory experiment, we can track the changes in individuals' behaviour following the elements implemented. Lastly, we contrast the performance of our interventions against two settings: no communication and free communication. We find that the intervention which facilitates agreement on a common strategy (*identification of strategies* + *agreement*) has the strongest effect on cooperation. Combined with the intervention promoting problem awareness and ratification, high levels of cooperation can be reached which are similar to what we observe under free communication.

Why is it important to identify the elements of effective communication? First, our findings contribute to the understanding of communication in social dilemma situations, especially regarding the question *what information* when shared fosters cooperation. This, in turn, may contribute to the widely discussed question *why* communication enhances cooperation. Second, we show that by offering mechanisms which resemble the basic elements of effective communication the cooperation-enhancing effect can (almost) be replicated. But our mechanisms allow us to control what information is shared and with whom. This structured approach may be advantageous when (i) actors involved in the social dilemma are numerous, (ii) not all actors involved have the courage or power to speak up, (iii) factors concerning the social dilemma are complicated and (iv) meetings are time consuming, because they are poorly structured or organised, or logistically difficult. These conditions are prevalent in many environmental problem situations. In fact, the elements of effective communication we have identified bear a strong resemblance with methods used in *participatory processes*. For example, in the context of natural resource management, the social dilemma structure is highly prevalent and participatory processes are frequently implemented to raise problem awareness, build shared understanding and to promote collaboration and coordination (Bodin 2017; Dietz, Ostrom and Stern 2003; Reed 2008). Less agreement, however, exists on how to best structure the participatory process (e.g. Beierle and Cayford 2002; Reed 2008; Von Korff, D'Aquino, Daniell and Bijlsma 2010). Our study contributes to this discussion by assessing the

effectiveness of different elements of effective communication and their combination in promoting cooperation.

The remainder of this chapter is organized as follows. In Section 3.2 we review the insights from previous studies on communication and derive the cooperation-enhancing elements of effective communication. In Section 3.3 we describe our experimental design and implementation. We present and discuss our experimental results in Section 3.4 and summarize our conclusions in Section 3.5.

3.2 Four elements of effective communication

As stated above, a common way to analyse the content of communication is by examining the protocols of the discussion *ex post*. The aim of this analysis is to identify what information participants shared during the communication phase and hence understand what might drive the cooperation-enhancing effect of communication. Typically, researchers bundle and encode the recorded messages according to different information categories. The following subsections summarize and describe the four information categories we encountered when reviewing the literature. Our review encompasses those social dilemma studies which have analysed the content of free communication, reported the coding results in the paper and were available at the time of our review.

3.2.1 Problem Awareness

At the beginning of a communication phase, it is observed that participants try to find a common understanding as a basis for the following discussion. Brosig, Weimann and Ockenfels (2003) describe problem awareness as the first of three steps in which misunderstandings in a communication phase are clarified to ensure that the “*dilemma structure (is) common knowledge*” (226). Pavitt et al. (2005) assign eight to 13 percent of their recorded information units, depending on the treatment variation, to the category “*Game understanding: Discussion relevant to the rules of the game, with the general intent of increasing game players’ understanding of how the game is played.*” A further four to six percent, depending on the treatment variation, were assigned to the information category “*Past or practice round: Discussion relevant to what occurred during past rounds in the game or during the practice round*” (352). Brandts, Rott and Solà (2016) report that 42 to 50 percent of the group leaders in their experiment sent at least once a message to their group with “*content of comprehension*” like an “[o]bservation of decline” (812) of the cooperation rate or

“[o]bservations of followers undercutting” (812). Finally, Lopez and Villamayor-Tomas (2017) categorise 45 percent of the total of 1,493 messages recorded to the two information categories “*Game dynamics*” and “*Past result and actions*”, with the former taking into account descriptions of free riding or “[s]tatements describing the dilemma between individual appropriation and group gains” (73).

Taken together, messages in these categories describe the situation players found themselves in and aim at creating a common understanding of the game and the consequences of single actions.

3.2.2 Strategies

In order to overcome the identified problem, participants subsequently communicated about how to address the social dilemma, i.e. they identified strategies. Lopez and Villamayor-Tomas (2017) assign 22 percent of their messages to the category “*Collective strategy*” or “*Individualistic strategy [:] Statements pointing to strategies wherein each participant decides what to do independently from other participants’ decisions*” (73). Pavitt et al. (2005) report that six to seven percent of the identified information units fit into the category “*General strategy: Discussion relevant to the general strategy to be used in subsequent rounds.*” (352), while 52 to 57 percent include information on a “[s]pecific strategy: Discussion relevant to specific proposed strategies, i.e. proposals including specific numbers of points to be harvested.” (352) and six to nine percent include “[s]tatements that ask for or are part of calculations relevant to proposals, along with acknowledgments following those statements.” (352). Koukoumelis, Levati and Weisser (2012) formed a very similar category “*Payoff calculation: Calculation of the (period or overall) payoff associated with the proposal.*” (386) and found that 67 to 78 percent of the team leaders in their experiment sent at least once a message containing such a calculation to their fellow team members. Brandts et al. (2016), in turn, adopted the coding scheme of Koukoumelis et al. (2012) and found that payoff calculations occurred less frequently, that is only 42 percent of the team leaders sent at least once a calculation to their team members.⁴⁴ Similar to the calculation category, Pavitt et al. (2005) formed an additional information category describing the results of the individual

⁴⁴ Koukoumelis et al. (2012) and Pavitt et al. (2005) use the term 'proposal' to refer to a strategy that a participant considers appropriate in the given situation.

proposals, “*Elaboration: Non-evaluative statements about previously offered proposals and their consequences*”, which occurred in 28 percent of their information units.⁴⁵

In summary, two major topics are nestled within the categories above. First, strategies are formulated. Second, participants elaborate on the consequences of these strategies, specifically by calculating the resulting payoffs. The high observed frequencies suggest that the formulation and elaboration of strategies is an important element in communication which aims to solve the social dilemma. And it forms the basis for the following step: the agreement.

3.2.3 Agreement

After the strategies are described, participants made proposals to agree about what strategy is most favoured within the group. Here, Lopez and Villamayor-Tomas (2017) consider the following information categories, “*Evaluation*”, “*Proposal: Statements suggesting a strategy to be followed in the subsequent rounds of the experiment*” and two categories describing associated approval or disapproval named “*Positive maintenance*” and “*Negative maintenance*” (74). These four categories were observed in six to 16 percent of all messages, respectively. Pavitt et al. (2005) distinguish between the information category “*Evaluation: Statements that ask for or provide explicit or implicit acceptance or rejection of the proposal under consideration, or asks for an evaluation*” and “*Suggestion: Statements that introduce or ask for a proposal, along with acknowledgments following those statements*” (352), 11 percent of the information were identified to belong to these two categories. Also, Koukoumelis et al. (2012) observed that 94 percent of the leaders in their experiment sent at least once a “[s]uggestion (point or interval) of how much to contribute to the project” and 78 to 83 made at least once an “[e]fficient suggestion: Implicit or explicit suggestion to contribute the whole endowment” (386). Following the coding of Koukoumelis et al (2012), Brandts et al. (2016) find that 83 to 91 percent of the leaders made at least once a suggestion and 36 to 42 percent an efficient suggestion.⁴⁶ Brosig et al. (2003) describe that “*some subjects first observed that*

⁴⁵ Payoff calculations are also mentioned in other papers. Ostrom et al. (1992), for example, conclude that the participants in their experiment focused on two tasks; “*calculat(ing) coordinated yield-improving strategies*” and “*determining the maximal yield available*” (410). Also, Cardenas et al. (2004) find that participants calculate the outcome of different strategies to clarify “*to all group members that a lower level of aggregate extraction can increase individual earnings*” (275). And Brosig et al. (2003) state that a typical communication phase incorporated that “*the payoffs for full cooperation were computed and, qualitatively or quantitatively, compared to payoffs that would follow after no cooperation. In addition, some groups computed the maximal individual payoff from free-riding.*” (225).

⁴⁶ However, they also find that in 50 to 73 percent of all communication phases, depending on the treatment condition, participants demanded to maximize the group payoffs. Thus, it is one thing to call for maximizing group payoff and another to identify the maximizing strategy.

it would be best if all group members contribute their whole endowment in every round.” (225). Finally, Bochet, Page and Putterman (2006) find that *“about a quarter of substantive messages are concerned with discussion of what the best strategy would be”* (21).

Overall, in the component *agreement*, participants *evaluated* the previously defined strategies and made *proposals* about which of the strategies should be implemented in the group. In the discussions, participants tried to *agree* upon the most favoured strategy.

3.2.4 Ratification

Agreeing on the most favoured strategy does not automatically imply also implementing it. The ratification category captures whether communication is used to *“devise verbal agreement [were given] to implement these strategies”* (Ostrom et al. 1992). This communication element is regarded as an important factor in facilitating cooperation (Kerr and Kaufman-Gilliland 1994; Orbell et al. 1988; Sally 1995). Cardenas et al. (2004) state that an *“agreement or ratification of the need for every player to choose a low level of extraction”* is the second of two steps to *“build an effective agreement for co-operation”* (275). In line with this, Bochet et al. (2006) find that beside those messages which were posed to identify the most favourable strategy *“most of the remaining messages [were] statements of commitment to the common strategy”* (21). Brosig et al. (2003) even state that promises were made in *all* groups of their experiment: *“In this group all subjects promised to fully cooperate until round 9; in all other groups all subjects promised to cooperate (either explicitly in all rounds or not).”* (226). But promises were not in all studies so frequent. Pavitt et al. (2005) find that only three to four percent of their information units categorise as *“Confirmation: Statements that either state the decision in its final form or ask for or provide an explicit group acceptance of a proposal.”* (352). In Koukoumelis et al. (2012) a *“Promise: Pledge to contribute some specific amount.”* (386) was made at least once by eleven percent of the leaders, while Brandts et al. (2016) detected that 18 to 25 percent of their leaders made such a promise.

In summary, participants express in this final element their intention to abide by the previously reached agreement. The way in which this public commitment takes place varies from group to group, depending on the specific dynamics of their communication process.

Taken together, all previous studies that examined the communication content *ex post* identified problem awareness, identification of strategies, agreement on a common strategy and ratification as important contributors for the positive impact communication can have on cooperation in social dilemmas. This observation is particularly interesting when one takes into account that the studies employed different designs and framings. Koukoumelis et al. (2012) and Brandts et al. (2016), for example, allowed only one actor, the leader, to communicate via written messages in a public good game, whereas in Pavitt et al. (2005) and in Lopez and Villamayor-Tomas (2017) all group members in the associated common pool resource game could communicate and did so face-to-face. Furthermore, the studies were conducted in culturally different locations and used different categorization and coding schemes. Figure 3.1 summarizes the four elements and indicates their typical chronological sequence in communication protocols.

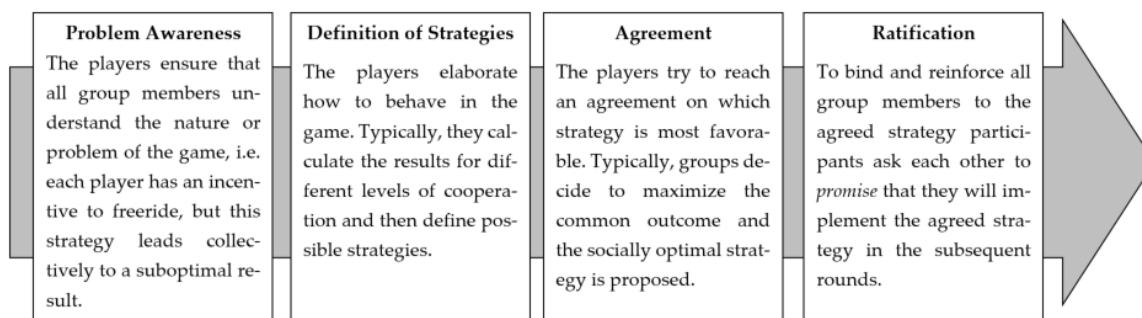


Figure 3.1. The four elements of communication when solving a social dilemma (rectangular fields). The arrow in the background indicates their typical chronological sequence.

3.3 Experimental design and implementation

Our experimental design is built on a two-stage design. In the first stage, participants are randomly assigned to groups of four and play ten rounds of a standard linear public good game (see Ledyard 1995). The payoff structure is $\pi_i = 20 - g_i + 0.4 \sum_{j=1}^4 g_j$. After each round, participants receive feedback on the sum of total contributions to their group project, the average contribution of the other players and their own potential payoff from this round. At the end of the experiment only one round of each stage is randomly selected to determine the actual payment.

After the tenth round, participants learn that the first stage of the experiment is over and that the second stage will employ the same game as before. We have chosen to keep the group composition across the two stages constant. Although this design decision potentially reduces the magnitude of our treatment effects, in all applications for which our results may have

implications, such as participatory processes in natural resource management, actors have a history of interactions. In the analysis we will control for exactly these previous levels of cooperation.

Groups in the control group *No Communication* start directly after this information with the second set of ten rounds of the public good game. Groups assigned to the treatment groups, in contrast, receive the treatment-specific information before starting with the second stage of the game. The treatments consist of a mechanism resembling one or a combination of the identified elements of effective communication: (a) *problem awareness*, (b) *identification of strategies*, (c) *agreement* and (d) *ratification*. We also implement a treatment ‘Free communication’, in which participants could, like in previous studies, communicate through an open text box with their group members. The chat was open for 10 minutes and messages sent were visible to all group members.⁴⁷ In the following, we describe how we implemented each of the four information elements of effective communication in our treatments.

3.3.1 Problem Awareness

In the treatment *Problem Awareness (PA)*, subjects were first confronted with their group’s behaviour in Stage 1: a chart delineated how their groups’ total contribution to the project developed over the first ten rounds (see Figure 3B1 in Appendix 3B1). Afterwards, a stylized curve was displayed showing the typical decay of contributions commonly observed in public goods games (see Figure 3B2 in Appendix 3B1).⁴⁸ This second graph was accompanied by a text explaining why the curve was downward sloping. The explanation highlighted that participants who are not willing to accept free riding commonly decrease their contributions when they detect that there are free-riders among their group members. In consequence, contributions deteriorate over time.

In an actual communication process, one actor may describe how total contributions to a project developed in recent times and explain why this trend is unsustainable. Or, in a participatory process, stakeholders may derive these points themselves under professional facilitation and hence create *problem awareness*.

⁴⁷ In the treatment combining all four elements (*Problem Awareness + Strategy+ Agreement+ Ratification*) participants needed on average 10 minutes to pass through the treatment stage. This is why the chat time in ‘Free Communication’ was 10 minutes.

⁴⁸ We used a graph similar to the one used in Brandts et al. (2016)’s treatment.

3.3.2 Strategies

For the identification of strategies, we presented to the participants three potential ways on how to contribute to the public good: (i) the *socially optimal* strategy, i.e. all group members contribute their entire endowment to the project, (ii) the *self-interested* strategy, i.e. all group members contribute nothing to the project and (iii) a *laissez-faire* strategy, where the group members contribute to the project whatever they want.

In an actual group discussion, actors might name possible strategies and then jointly evaluate each strategy –for instance, by comparing the payoffs resulting from each strategy. In our experiment, we allowed for this evaluation by visualising the individual and group payoffs resulting from each strategy. The participants could look at the visualisation of each strategy as often as they liked to. (Please see Appendix 3B, Section 3B2 for a detailed description of the scenarios and the screenshots; see also Figure 3B3 therein).

3.3.3 Agreement

After participants could make themselves familiar with the potential consequences of the three strategies, they were directed to a voting stage in which participants were asked which strategy they would like to see implemented in their group. Because it is not possible to vote on strategies before first learning about them, we implemented the *Agreement* element always in combination with the *Strategies* element. With help of a multistage voting mechanism, the groups could agree on what strategy was the most favourable. If the four group members agreed unanimously on the socially optimal strategy in the first vote, the group moved on with the experiment. If this was not the case, then the group members learned the voting result and were asked to take a second vote. Thus, the participants are encouraged to rethink any choice that is not socially optimal. We have implemented this weak normative feature due to the similarity of our elements to participatory processes. These processes usually have the aim to facilitate agreements at the socially optimal levels, or at least an improvement of the current situation.

After the second vote, participants received again feedback on the voting result. If the voting behaviour was stable, that means all group members voted exactly the same way as they did before, the group moved on. If, in contrast, at least one group member changed her voting behaviour, the group was asked to vote for a third and last time. Subsequently, the voting result was shown and the group was directed on. (Please see the Figure 3B5 in Appendix 3B3 for an illustration of the voting mechanism.)

In an actual communication phase, the agreement represented by our voting stage may take place in discussions about how to best address the social dilemma. By being confronted either with voting results or others' contribution to the discussion, subjects learn about the preferences of their fellow group members. This information is likely to change actors' expectations about the behaviour of the other actors and this potentially alters the behaviour (due to the principle of conditional cooperation).⁴⁹

3.3.4 Ratification

In our experiment, the *Ratification* element only became active when the majority of the group members voted previously for the socially optimal strategy and naturally could only be implemented in combination with the other three elements. The implementation followed a mechanism developed by Koessler, Page and Dulleck (2018): First, subjects were asked whether they wanted to promise that they will follow the socially optimal strategy in all rounds of the following game. If they agreed, they had to key-in the following statement: "I promise to contribute 20 points in all subsequent rounds." (see Figure 3B6 in Appendix 3B4). Previous research has shown that engaging individuals pro-actively in the act of promise-making induced a higher commitment to the promised behaviour (Kiesler 1971). After all group members made their decision about the promise, feedback was provided on which group members made the promise. Then the second stage of the experiment started. Table 3.1 summarizes all treatments and outlines the respective elements of effective communication we have implemented in each treatment group.

⁴⁹ To illustrate the impacts of learning about others' viewpoints, participants in our experiment were asked to vote again. If the voting behaviour remained the same, the experiment moved on. In an actual participatory process, the participants would stop discussing the topic and move on. On the contrary, if a change in viewpoints is observed, group members would be expected to go on with the discussion and try to reach a stable agreement. In our experiment this corresponds to one more round of voting. For practical reasons, we did not implement further rounds of voting after that, although in reality, there may well be multiple more iterations.

Table 3.1 – Treatment overview

Treatment	Description	Observations	Groups
No Communication	<i>Control</i>	80	20
Problem Awareness (PA)	<i>Understanding the social dilemma</i>	80	20
Strategies	<i>Identification & exploration of strategies</i>	80	20
Strategies + Agreement	<i>Adds agreement via voting</i>	80	20
PA + Strategies + Agreement	<i>Combination of the 3 elements</i>	80	20
Full Set	<i>Combination of all 4 elements</i>	80	20
Free Communication	<i>Open chat</i>	80	20
Total		560	140

The experiment was conducted at the experimental laboratory of the University Osnabrueck using the experimental software SOPHIE (Hendriks 2012). Subjects were students recruited from the local database of potential subjects via ORSEE (Greiner 2015). Average earnings were 9 € and one session lasted about 45 minutes. In total, we conducted 33 sessions with a total of 560 subjects. Appendix 3A1 contains descriptive statistics across treatments.

3.3.5 Identification strategy

Our treatment conditions allow us to evaluate how the four elements change the consequent cooperation behaviour. By their nature, some mechanisms representing the four information elements of effective communication could only be implemented in combination. For example, an agreement by voting on the most favourable strategy requires that the available strategies are previously known, and a common strategy can only be ratified if it has been established in advance.

In the experimental evaluation, we can probe whether the four elements which have been identified by previous studies as cooperation-enhancing are indeed beneficial. The conditions *No communication* and *Free Communication* serve hereby as controls for both ends of the spectrum; that is, no communication and free, unstructured communication. Against the resulting cooperation levels in these conditions, we can assess what impact our structured

elements of effective communication have, individually (for *PA* and *Strategies*) and in combination (*PA + Strategies + Agreement* and *Full Set*).

With our two-stage design, we can assess how groups change their cooperation levels after being treated with one or more structured elements, while controlling for the group's baseline cooperation level. Specifically, we formulate the following hypotheses: Our interventions mimicking effective elements of communication have a positive effect on cooperation (**Hypothesis 3.1**). In combination the interventions have a stronger effect (**Hypothesis 3.2**). As previous studies have indicated, the sequential combination may be needed for a positive effect to unfold: “*while communication is an effective tool for enhancing collective action, it can only work through a series of steps that start from the understanding of the mapping of actions into outcomes in the social dilemma to the crafting of the agreement*” (Cardenas, Rodriguez and Johnson 2011 citing Cardenas et al. 2004).

With comparison to *Free Communication*, we will explore whether our structured interventions perform better or worse in promoting cooperation than free unstructured communication. Finally, the repeated interactions allow us to study (i) how the groups adjust their level of cooperation immediately after treatment and (ii) how the cooperation levels develop over time; that is, how sustainable our treatment effects are.

3.4 Results

In the following, we first analyse the average treatment effects on cooperation based on the total group contributions to the public good. Subsequently, the dynamic development of cooperation is examined.

3.4.1 Average treatment effects

Compared to the first stage of the game, cooperation increased in the second stage in all treatment conditions, except in the *No Communication* group (see Figure 3.2 and first three columns of Table 3.2). It seems that the interventions mimicking the elements of effective communication were successful in increasing cooperation. Specifically, for the *Problem Awareness* and for the *Strategy* intervention, the change in cooperation between Stage 1 and Stage 2 was different from that under *No Communication*, although at 10% significance level only (Wilcoxon rank sum test on Diff avg; $p = 0.09$ and $p = 0.08$, respectively). For the other

treatments the effect was significant at 1% significance level (*No Communication* vs. treatment: $p < 0.01$ for all other treatments).

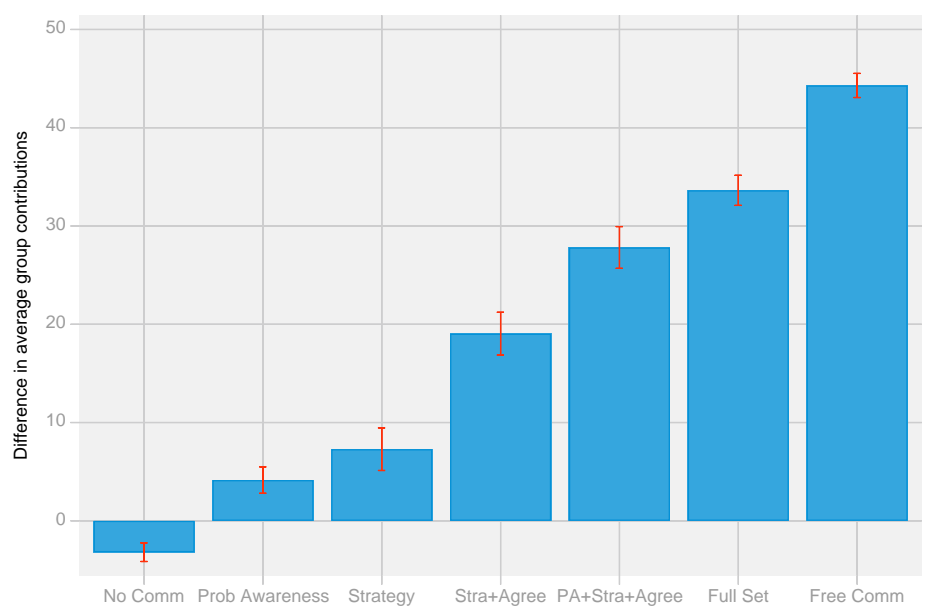


Figure 3.2: Difference in average group contributions before and after treatment.

Table 3.2 – Average treatment effects in average group contributions

Treatment	Average contribution in Stage 1	Average contribution in Stage 2	Diff. btw average contribution in Stage 2 vs Stage 1	First round contribution in Stage 2	Jump from last round in Stage 1 to first round in Stage 2
No Communication	33.39	30.2	-3.19	37.95	16.75
	21.26	21.58	9.55%	20.28	14.6
Problem Awareness	40.66	44.81	4.15	53	28.35
	20.49	23.46	10.21%	13.38	17.67
Strategies	31.37	38.66	7.29	57.75	39.4
	18.4	26.24	23.23%	13.51	19.27
Strategies + Agreement	33.47	52.51	19.05	68.88	46
	19.48	27.35	56.91%	14.13	20.94
PA + Strategies+ Agreement	42.19	70	27.81	76.7	50.05
	23.24	16.72	65.93%	6.49	24.52
Full Set	34.16	67.79	33.63	75.8	53.3
	17.64	22.44	98.44%	12.34	17.51
Free Communication	30.97	75.27	44.3	78.5	58.5
	17.94	12.74	143.04%	4.89	11.71

Note: The socially optimal contribution level is 80. Please note the baseline contributions in Stage 1 differ slightly between the treatment groups due to heterogeneities within single groups. We address this point in the following regression models.

The small effect of *Problem Awareness* is consistent with the findings of Brandts et al. (2016), whose mechanism design we employed in the *Problem Awareness* intervention. Based on the results of their experiment, the authors concluded that advice giving has only a significant positive effect if the advice is given by a peer, but not when it is provided by an expert. In our experiment, the explanation of why contributions deteriorate was given by the experimenter, i.e. an expert.

The identification and exploration of available strategies alone (treatment *Strategies*) also lead only to an incremental improvement in cooperation. However, in combination with the subsequent opportunity to agree on a common strategy (treatment *Strategies+Agreement*), cooperation was facilitated ($p = 0.07$) and an increase of 57% was achieved compared to the before-treatment level of cooperation. Adding *Problem Awareness* to this sequence leads again only to a small incremental improvement (average cooperation increases by 67% compared to 57% under *Strategies+Agreement*, $p = 0.25$). The increase in cooperation becomes then statistically significant when a further element of communication is added to the core element *Strategies+Agreement*, namely the *Ratification* element –in which players reaffirmed with a pledge their intention to contribute (Wilcoxon rank sum test on Diff avg; *Strategies+Agreement* vs. *Full Set* $p = 0.04$).

In sum, going through the full set of our elements resembling effective communication (*Full Set* = *PA+Strategies+Agreement+Ratification*) produced an increase in cooperation by 98% compared to cooperation levels before treatment. Despite this remarkable increase, the treatment *Free Communication*, in which groups could communicate freely for 10 min via a chat box, still achieved significantly higher cooperation levels (Wilcoxon rank sum test: *Full Set* vs. *Free communication*: $p = 0.04$).

Since baseline cooperation levels differed between groups, we will assess the robustness of our observations with help of a multivariate regression analysis. Table 3.3 presents the estimates from a random effects Tobit model, censored at the lower limit (0) and the upper limit of group contributions (80). All models estimate the change in average group contributions in Stage 2 (i.e. *after* the treatment interventions) controlling for the heterogeneity among groups in the baseline contributions. In Stage 1, all groups received the identical instructions and played the baseline, any differences in the contribution levels *before* treatment

are thus to be attributed to varying group compositions and differences in the group dynamics developed during Stage 1.⁵⁰

Model 1 focuses on the average treatment effect and estimates the effect of each intervention on the subsequent contribution behaviour. In addition, we control for the dynamic effects in Model 2 (discussed in the next section) and exclude in Model 3 the last two rounds to preclude end round effects. In this section we focus on the discussion of the average treatment effects, i.e. the coefficients on our treatment dummies, based on Model 1. We use cooperation levels in *No Communication* as reference point.

We find support for our previous findings. In all treatment groups cooperation increases after the interventions, compared to *No Communication*. The effect of *Problem Awareness* and *Strategies* is hereby not statistically significant, while all other interventions lead to a significant increase in cooperation at the 1% significance level ($p < 0.01$ for *Strategies+Agreement*, *PA+Strategies+Agreement* and *Full Set*).⁵¹ We thus find partly support for Hypothesis 3.1, the *Agreement* element is necessary for a significant positive effect to unfold.

Result 3.1: *Structured interventions mimicking the elements of effective communication lead to a significant increase in cooperation if groups are given the possibility to agree on a common strategy.*

When we assess whether the interventions had a stronger effect in combination, we find that the performance of the core element *Strategies+Agreement* is indeed significantly improved when *Strategies+Agreement* vs. *PA+Strategies+Agreement*: $p = 0.008$) and *Ratification* is added (*Strategies+Agreement* vs. *Full Set*: $p < 0.01$).

Result 3.2: *The combined sequence with all interventions leads to a stronger increase in cooperation than the intervention facilitating agreement on a common strategy alone.*

Lastly, the analysis reveals that when heterogeneities in baseline contributions are taken into account, the combined set of our interventions: *Problem Awareness+Strategies+Agreement+Ratification* produces a cooperation-enhancing effect which is no longer

⁵⁰ Baseline contributions in the treatment conditions do not statistically differ from the contributions in the control group *No Communication*. However, among the treatment groups, we have to reject the Null hypothesis of uniformity between *Problem Awareness* and *Strategy* ($p = 0.08$), *Problem Awareness* and *Free Communication* ($p = 0.07$), *Strategy* and *PA+ Strategies+Agreement* ($p = 0.06$), and between *PA+ Strategies+Agreement* and *Free Communication* ($p = 0.05$). Please note that these differences limit the magnitude of our effect rather than increasing it.

⁵¹ For the tests on the average treatment effects we consider Model 1.

statistically different to the effect of *Free Communication* (*Full Set* vs. *Free Communication*: $p = 0.14$).

Table 3.3 - Estimations of cooperation levels after treatment. Tobit Panel, censored

Variables	Average	Dynamic	Dynamic
	Model 1	Model 2	<i>No end rounds</i> Model 3
Problem Awareness	10.916 (7.073)	12.987* (7.772)	9.723 (8.586)
Strategy	8.843 (7.396)	17.718** (8.089)	16.320* (8.927)
Strategy + Agreement	27.305*** (7.075)	43.296*** (7.893)	41.217*** (8.710)
PA + Strategy + Agreement	46.537*** (7.228)	53.144*** (8.125)	47.868*** (9.031)
Full Set	56.972*** (7.314)	86.500*** (9.014)	83.362*** (10.091)
Free Communication	68.912*** (7.721)	109.811*** (10.805)	83.784*** (12.056)
Round		-2.543*** (0.352)	-2.429*** (0.428)
Round × Problem Awareness		-0.408 (0.499)	0.260 (0.605)
Round × Strategy		-1.686*** (0.504)	-1.471** (0.609)
Round × Strategy + Agreement		-2.826*** (0.533)	-2.415*** (0.648)
Round × PA + Strategy + Agreement		-1.401** (0.556)	0.299 (0.695)
Round × Full Set		-4.571*** (0.709)	-3.689*** (0.879)
Round × Free Communication		-5.912*** (0.930)	1.400 (1.266)
Avg. group contribution before treatment	0.636*** (0.123)	0.644*** (0.126)	0.717*** (0.148)
Constant	7.259 (6.951)	20.691*** (7.385)	18.703** (8.344)
Without last two rounds	no	no	yes
Observations	1,400	1,400	1,120
Number of groups	140	140	140

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ Robust standard errors, clustered on the group level, are shown in parentheses. Note: This table presents the results of random-effects Tobit model panel estimations of group contributions *after* the treatment, censored at upper and lower limit of scale. Group contribution in Stage 2 of the control group 'No communication' serve as reference. The 'round' variable accounts for the round iteration in which the contribution was made. All models include experimenter fixed effects.

3.4.2 Dynamic development of cooperation over time

Model 2 and 3 take into account the dynamic of how contributions evolved in the rounds after the treatment. Figure 3.3 shows the corresponding average group contribution per round across all treatment conditions. Individual graphs describing the development for each single group across the treatments can be found in Appendix 3A.

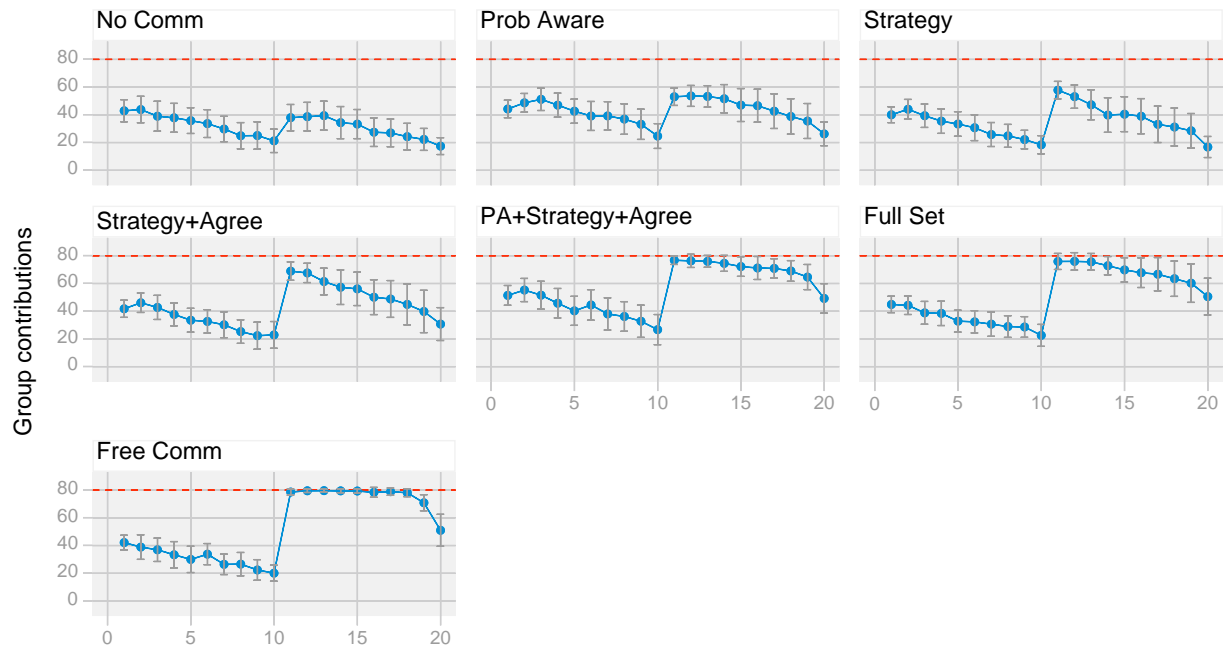


Figure 3.3: Development average group contributions over time (incl. confidence intervals)

A visual inspection of the development over time reveals that cooperation decreased over time in both stages and in all treatment groups; this decline is commonly observed in repeated public good games and occurs because participants are on average imperfect conditional contributors (Fischbacher, Gächter and Fehr 2001; Fischbacher and Gächter 2010). At the end of Stage 1, cooperation levels are similar across all treatment groups. At the first round of Stage 2, cooperation increased in all groups. However, in line with our earlier results, the cooperation levels at which groups started Stage 2 vary greatly across treatments (see also last two columns of Table 3.2). The increase is significantly stronger after our interventions than in the *No Communication* treatment ($p < 0.05$ for *Strategy* and $p < 0.01$ for all combined treatment)⁵²,

⁵² We consider here Model 2. In Model 3, in which the end rounds are not considered, the increase in *Strategy* is only significant at the 10 % level.

suggesting that the interventions lead to an increase additional to the usual restart effect.⁵³ The difference between the increase in cooperation in *Problem Awareness* and *No Communication* is not statistically robust.

Moreover, the maintenance of the achieved contribution levels over time varied among the treatment groups. Looking at Model 2 and Model 3 in Table 3.3 we find the following. The coefficient on *Round*Problem Awareness* indicates that the deterioration rate in *Problem Awareness* is similar to the decline observed in *No Communication*. By contrast, the deterioration in all other treatment groups is steeper than in *No Communication* ($p < 0.05$ in Model 2).

In Model 3 we do not consider the last two rounds in which typically the end-game effect takes place, i.e. cooperation collapses towards the end of the game (Andreoni 1988). Although in our case this should not impact behaviour, since at the end of the experiment only one round is chosen randomly to determine the payoffs, we still observe, like other studies, the end game effect in all treatment groups. When excluding the last two rounds from the analysis, we find that the deterioration of cooperation in *PA+Strategy+Agreement* and in *Free Communication* is no longer steeper than in *No Communication* ($p = 0.67$ and $p = 0.27$, respectively).⁵⁴ In combination with the higher starting level of cooperation in the first round of Stage 2, this indicates that *Free Communication* and *PA+ Strategy+ Agreement* hence manage to sustain the cooperation increase as compared to *No Communication*. The initial increase in cooperation in *Free Communication* was hereby stronger than in *PA+ Strategy+ Agreement* ($p = 0.04$).

3.4.3 Achievement of social optimum

Another dimension of contribution behaviour is how often groups in the respective treatment groups reached the social optimum. We briefly discuss results from inspecting this measure of successful cooperation across treatments. In the first stage, the baseline stage, only four out of the 140 groups managed to reach the social optimum in at least one of the ten rounds.⁵⁵ After the interventions in Stage 2, in *Problem Awareness* and *Strategy*, four out of 20 groups reached the social optimum at least once. In *Strategy+Agreement* half of the groups

⁵³ The restart effect describes the fact that contributions increase simply because participants were told that something new starts (Chaudhuri 2018).

⁵⁴ On contrast, we observe a steeper decay in the Full Set. This decrease may be triggered by disappointment resulting from broken promises.

⁵⁵ One group in *No Communication* and three groups in *PA+ Strategy+ Agreement*.

reached the social optimum at least once, while in *PA+Strategy+Agreement* and in the *Full Set* a clear majority of 18 groups, and in *Free Communication* all 20 groups managed to reach the social optimum in at least one of the ten rounds. This indicates that our interventions helped groups in reaching the social optimum. But could the groups maintain these high levels of cooperation? We find that, on average, groups in *No Communication* and in *Problem Awareness* reached the social optimum in less than 10% of the rounds. In *Strategy* and in *Strategy+Agreement* groups reached the social optimum in 30% of the rounds, while in the treatments comprising the combined sequence of elements (*PA+Strategy+Agreement* and *Full Set*) groups reached the social optimum in 51% and 69% of the ten rounds, respectively. Finally, in *Free Communication*, groups reached the social optimum in an overwhelming 83% of the rounds.⁵⁶ Hence, the analysis on this measure of cooperation supports Result 3.1 and 3.2: the combined interventions (and free communication) lead to a positive effect on cooperation.

3.4.4 Explorative analysis of chats in free text and the uncovered element: social chit-chat

In summary, we find that the combined sequence of interventions representing elements of effective communication promotes a statistically significant increase in cooperation and contributes to the maintenance of relative high cooperation levels which are similar to what we observed under *Free Communication*. However, free communication still somewhat outperforms this structured process of information exchange. Under *Free Communication*, cooperation levels reached the social optimum more often. We speculate that *Free communication* offers something that promotes cooperation in addition and that we do not capture this element in our proposed elements for effective communication. To shed more light on the missing element, we analysed the content of the group chats in a similar way as the studies we reviewed in Section 3.2. To do this, we first asked two research assistants to go through the protocols and suggest categories to codify the messages of the participants. The first two authors of the chapter then reviewed the categories and created a revised list of categories to analyse the content of the messages.

With this revised list at hand, another set of three research assistants codified the total of 893 messages. The purpose of this exercise was to identify which elements the participants

⁵⁶ Average amount of rounds in which the groups in the respective treatment reached the social optimum: *No Communication*: 0.4 rounds, *PA*: 0.65 rounds, *Strategy*: 1.2 rounds, *Strategy+ Agreement*: 2.75 rounds.

exchanged during the chat, i.e. the topics they discussed and the way they did it. The following observations are based on the coding with the highest consensus among our coders. We are able to categorise 42% of the messages to the elements of effective communication we have discussed in this chapter:

1. 4% of the messages relate to *Problem Awareness* and describe either (a) the tension between individual and group interest (3%), (b) the decline and effects of conditional cooperation (6%), (c) former experiences from the baseline stage (79%) or (d) from previous experiments (12%).
2. 19% of the messages link to our *Strategies* element, (a) identifying potential strategies (41%) or (b) arguing for or against them (59%).
3. 10% link to our *Agreement* element and 9% link to our *Ratification* element.

To identify the additional elements that are exchanged in *Free Communication*, which may cause open communication being more effective in maintaining cooperation than our structured process of information exchange, we take a closer look at the remaining 48% of messages which our coders categorised as “Other”.⁵⁷ Within this category the coding team derived the following subcategories: (a) messages related to compliance and consequences (4%), (b) messages about insecurities and previous mistakes (7%), (c) nonsense (2%) and (d) social chit-chat (87%). Thus, the majority of ‘other’ messages included some sort of social chit-chat. Messages in this category aimed to spread good vibes (smileys, good wishes, greetings, whooping, praise), or were classified as small talk (regarding the weather, study majors, jokes, or concerning the experiment: possibility to chat, anonymity of chat, remaining time).

Overall, the content analysis of the free chat shows that about half of the messages exchanged in *Free Communication* are related to our previously identified elements of effective communication. The other half, however, is largely used for social chit-chat. With reference to the aforementioned debate about why communication improves cooperation, this social chit-chat may have a function of its own, such as building a group identity (Dawes et al. 1988; Orbell et al. 1988) and/or allowing “individuals to increase (or decrease) their trust in the reliability of others” (Ostrom 1998, 13). Future research may want to examine how “social chit chat” links to these functions.

⁵⁷ 10% of the messages could be not categorised.

In this chapter, we focused on the *information* content that promotes cooperation when shared. We saw that with the combined sequence of our interventions we reach similar levels as under *Free Communication*. This aspect becomes particularly interesting if we think about settings where the process of free communication may not be as clean and equal as in our small groups of relatively homogenous. We will explore this point further in the discussion.

3.5 Discussion and conclusions

What information promotes cooperation in social dilemmas when it is exchanged in a communication process? In this study, we have designed interventions resembling those elements of communication that have previously been identified as likely drivers of the positive impact of communication on cooperation. In an experimental setup, we tested how these interventions mimicking the potential elements of effective communication work individually and in combination in promoting cooperation in a social dilemma setting.

Our results also suggest that it is not enough to be aware of a problem, one also needs measures at hand to solve the dilemma. We find that the intervention facilitating an understanding of the available strategies and building an agreement upon them has the most positive impact on cooperation. Combined with the interventions promoting problem awareness and ratification, high levels of cooperation were achieved. The observed pro-social behaviour is similar to what we observed when individuals could communicate freely via chat. In our view, there are two interesting ways how to read this result. On the one hand, we find that cooperation in our experiment reached high levels and could be sustained best when the group members could simply chat with each other; our mimicking interventions could not fully reach this combination of boosting and maintaining cooperation. We believe that this result indicates that there is more about communication than simply sharing information; communication also promotes social bonding; social chitchat helps to build trust and a shared group identity (Sally 1995; Ostrom 1998). But we also see that the combined sequence of our interventions reached an increase that is not statistically different to the increase free communication triggered. This finding becomes interesting when we consider the environment in which the result of free communication was generated. In our experiment, a small group of relatively homogenous individuals (university students) interacted anonymously and with financial resources provided by us. In the real world, interacting actors may not have identical options at hand. They may be more heterogeneous in their endowments, action spaces and preferences, and furthermore, the social dilemmas they face may be more complex. Previous

studies, for example, have documented that free communication may not be sufficient to attain socially optimal outcomes when settings are complex (Ostrom, Gardner and Walker 1994; Ostrom et al. 1992; Schill et al. 2016). Cardenas et al. (2011), for example, illustrate this point in their lab-in-the-field experiment in Colombian and Kenyan watersheds. The problem was not that participants did not honour agreements commonly made in the communication phase, but they had difficulties to reach an agreement in the first place. In cases like this, structured and controlled facilitation may help to steer participants towards common agreements and cooperative patterns of interaction (Cardenas et al. 2004; Schill et al. 2016). The elements in our experiment are such *controlled information-sharing mechanisms* with which external institutions can facilitate the process.

Structuring a communication process and/or managing the flow of information can have at least three effects. First, it avoids inefficiencies. For example, our interventions consisted only of the relevant information that was believed to improve cooperation. In an open communication phase, non-topic-related and redundant information may also be exchanged and potentially distract from the issue in question. Second, the risk of incorrect information being disseminated is lower when the flow of information is controlled. In an actual communication phase, incorrect or confusing information may be exchanged. And third, anyone can have a say if the structured communication process is designed accordingly. In an open forum with many actors, usually only dominant and powerful actors dare to speak out. Studies on participatory processes warn that loud and powerful actors may use the platform to pursue their own goals (Hickey and Mohan 2005; Reed 2008) and argue that external facilitation should prevent this.

The interventions in our experiment are similar to the measures that external actors can take to facilitate information exchange, e.g. in a participatory process. Thus, our analysis provides insights into which elements should be considered when structuring and facilitating communication and information exchange in order to promote cooperation between actors.

Chapter 3 references

- Andreoni, James. 1988. "Why Free Ride? Strategies and Learning in Public Goods Experiments." *Journal of Public Economics* 37 (3): 291-304. doi: 10.1016/0047-2727(88)90043-6.
- Balliet, Daniel. 2010. "Communication and Cooperation in Social Dilemmas: A Meta-Analytic Review." *Journal of Conflict Resolution* 54 (1): 39-57.
- Beierle, Thomas C., and Jerry Cayford. 2002. *Democracy in Practice: Public Participation in Environmental Decisions*. Washington DC: Resources for the Future.

- Bicchieri, Cristina. 2002. "Covenants without swords: Group identity, norms, and communication in social dilemmas." *Rationality and Society* 14 (2): 192-228. doi:10.1177/1043463102014002003.
- Bochet, Olivier, Talbot Page, and Louis Putterman. 2006. "Communication and punishment in voluntary contribution experiments." *Journal of Economic Behavior & Organization* 60: 11-26. doi:10.1016/j.jebo.2003.06.006.
- Bodin, Örjan. 2017. "Collaborative environmental governance: Achieving collective action in social-ecological systems." *Science* 357 (eean1114).
- Brandts, Jordi, Christina Rott, and Carles Solà. 2016. "Not just like starting over - Leadership and revivification of cooperation in groups." *Experimental Economics* 19: 792-818.
- Brosig, Jeannette, Joachim Weimann, and Axel Ockenfels. 2003. "The Effect of Communication Media on Cooperation." *German Economic Review* 4 (2): 217-241.
- Cardenas, Juan Camilo, Luz Angela Rodriguez, and Nancy Johnson. 2011. "Collective action for watershed management: field experiments in Colombia and Kenya." *Environmental and Development Economics* 16 (3): 275-303. doi:10.1017/S1355770X10000392.
- Cardenas, Juan Camilo, T. K. Ahn, and Elinor Ostrom. 2004. "Communication and Co-operation in a Common-Pool Resource Dilemma: A Field Experiment." In *Advances in Understanding Strategic Behaviour: Game Theory, Experiments and Bounded Rationality*, edited by Steffen Huck, 258-286. Palgrave Macmillian.
- Chaudhuri, Ananish. 2018. "Belief heterogeneity and the restart effect in a public goods game." *Games* 9 (4): 96. doi:https://doi.org/10.3390/g9040096.
- Chaudhuri, Ananish. 2011. "Sustaining cooperation in laboratory public goods experiments: a selective survey of the literature." *Experimental Economics* 14: 47-83.
- Chaudhuri, Ananish, Tirnud Paichayontvijit, and Alexander Smith. 2017. "Belief heterogeneity and contributions decay among conditional cooperators in public goods games." *Journal of Economic Psychology* 58: 15-30. doi:http://dx.doi.org/10.1016/j.joep.2016.11.004.
- Dawes, Robyn M., Alphons J. Van de Kragt, and John M. Orbell. 1988. "Not me or thee but we: The importance of group identity in eliciting cooperation in dilemma situations: Experimental manipulations." *Acta Psychologica* 68 (1-3): 83-97. doi:https://doi.org/10.1016/0016-6918(88)90047-9.
- Dietz, Thomas, Elinor Ostrom, and Paul C. Stern. 2003. "The Struggle to Govern the Commons." *Science* 302 (5652): 1907-1912.
- Fischbacher, Urs, and Simon Gächter. 2010. "Social Preferences, Beliefs, and the Dynamics of Free Riding in Public Goods Experiments." *The American Economic Review* 100 (1): 541-556. doi:10.1257/aer.100.1.541.
- Fischbacher, Urs, Simon Gächter, and Ernst Fehr. 2001. "Are people conditionally cooperative? Evidence from a public goods experiment." *Economic Letters* 71: 397-404.
- Greiner, Ben. 2015. "Subject pool recruitment procedures: organizing experiments with ORSEE." *Journal of the Economic Science Association* 1: 114-125. doi:https://doi.org/10.1007/s40881-015-0004-4.
- Hendriks, Achim. 2012. SoPHIE-Software platform for human interaction experiments. Osnabrueck: Working Paper, University of Osnabrueck.
- Hickey, Sam, and Giles Mohan. 2005. "Relocating Participation within a Radical Politics of Development." *Development and Change* 36 (2): 237-262. doi:https://doi.org/10.1111/j.0012-155X.2005.00410.x.
- Janssen, Marco A. 2013. "The role of information in governing the commons: Experimental results." *Ecology and Society* 18 (4): 4. doi:http://dx.doi.org/10.5751/ES-05664-180404.

- Kerr, Norbert L, and Cynthia M. Kaufman-Gilliland. 1994. "Communication, commitment, and cooperation in social dilemma." *Journal of Personality and Social Psychology* 66 (3): 513–529. doi: <https://doi.org/10.1037/0022-3514.66.3.513>.
- Kiesler, Charles A. 1971. *The psychology of commitment: Experiments linking behavior to belief*. Academic Press New York.
- Koessler, Ann-Kathrin, Lionel Page, and Uwe Dulleck. 2018. Public Statements of Good Conduct Promote Pro-Social Behavior. Available at SSRN. doi:<http://dx.doi.org/10.2139/ssrn.3184836>.
- Koukouvelis, Anastasios, M. Vittoria Levati, and Johannes Weisser. 2012. "Leading by words: A voluntary contribution experiment with one-way." *Journal of Economic Behavior & Organization* 81: 379-390.
- Ledyard, John O. 1995. "Public Goods: A Survey of Experimental Research." In *Handbook of Experimental Economics*, edited by John Kagel and A Roth. Princeton of University Press.
- Lopez, Maria Claudia, and Sergio Villamayor-Tomas. 2017. "Understanding the black box of communication in a common-pool resource field experiment." *Environmental Science & Policy* 68: 69-79. doi:10.1016/j.envsci.2016.12.002.
- Merriam-Webster. n.d. "Communication." Merriam-Webster.com dictionary. Accessed July 30, 2019. <https://www.merriam-webster.com/dictionary/communication>.
- Orbell, John M., Alphons J. Van de Kragt, and Robyn M. Dawes. 1988. "Explaining discussion-induced cooperation." *Journal of Personality and Social Psychology* 54 (5): 811–819. doi:<https://doi.org/10.1037/0022-3514.54.5.811>.
- Ostrom, Elinor. 1998. "A Behavioral Approach to the Rational Choice Theory of Collective Action. Presidential Address, American Political Science Association, 1997." *American Political Science Review* 92 (1): 1-22.
- Ostrom, Elinor, James Walker, and Roy Gardner. 1992. "Covenants with and without a Sword: Self-Governance is Possible." *American Political Science Review* 86 (2): 404.
- Ostrom, Elinor, Roy Gardner, and James Walker. 1994. *Rules, Games and Common-Pool Resources*. The University of Michigan Press.
- Pavitt, Charles, Courtney McFeeters, Erin Towey, and Vera Zingerman. 2005. "Communication During Resource Dilemmas: 1. Effects of Different Replenishment Rates." *Communication Monographs* 72 (3): 345-363.
- Reed, Mark. 2008. "Stakeholder participation for environmental management: A literature review." *Biological conservation* 141: 2417-2431.
- Sally, David. 1995. "Conversation and Cooperation in Social Dilemmas. A Meta-Analysis of Experiments from 1958 to 1992." *Rationality and Society* 7: 58-92.
- Schill, Caroline, Nanda Wijermans, Maja Schlüter, and Therese Lindahl. 2016. "Cooperation Is Not Enough—Exploring Social-Ecological Micro-Foundations for Sustainable Common-Pool Resource Use." *PLoS ONE* 11 (8): e0157796. doi:10.1371/journal.pone.0157796.
- von Korff, Yorck, Patrick d'Aquino, Katherine Daniell, and Rianne Bijlsma. 2010. "Designing Participation Processes for Water Management and Beyond." *Ecology and Society* 15 (3): 1 [Online]. <http://www.ecologyandsociety.org/vol15/iss3/art1/>.

Chapter 3 appendixes

Appendix 3A – Data and summary statistics

3A1. Sample Statistics

Table 3A1 – Sample statistics

<i>Treatment/ Demographics</i>	Female	Econ major	Observations
Full Sample	0.59	0.23	540
No Communication	0.59	0.26	80
Problem Awareness	0.50	0.26	80
Strategy	0.59	0.21	80
Strategy + Agreement	0.61	0.19	80
PA + Strategy + Agreement	0.65	0.24	80
Full Set	0.60	0.16	80
Free Communication	0.60	0.28	80

3A2. Dynamic development within groups

Figure 3A1: T0 NO COMMUNICATION - Development of Group contributions

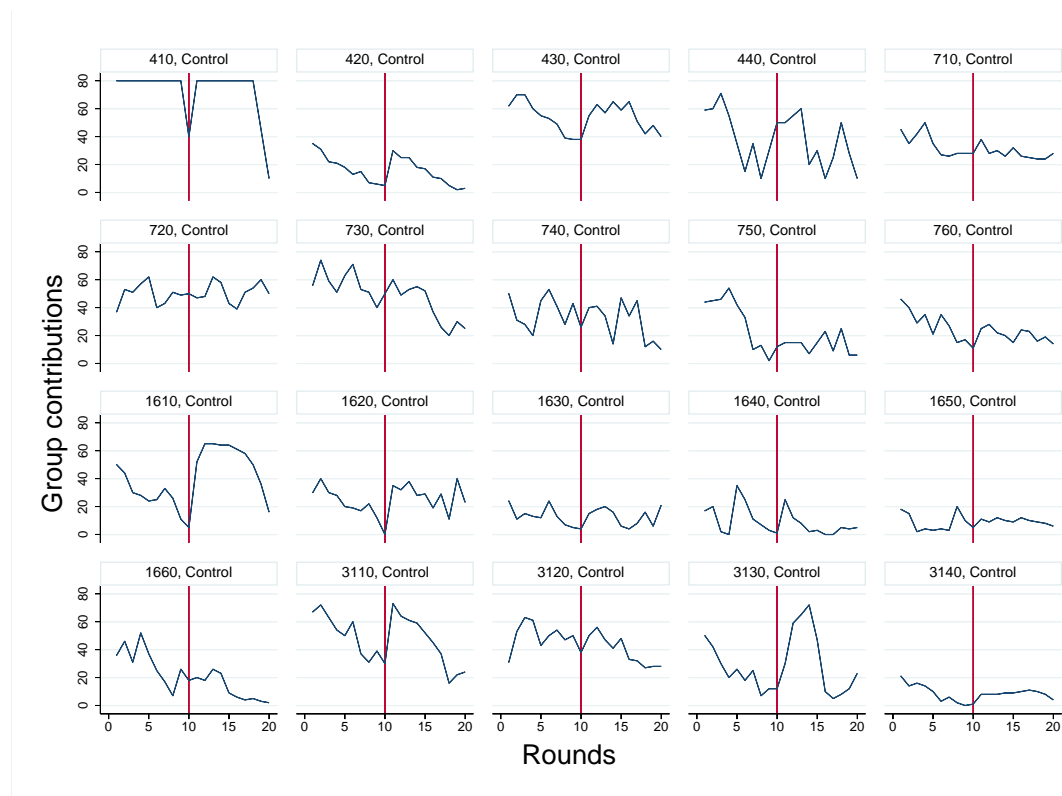


Figure 3A2: T1 PROBLEM AWARENESS - Development of Group contributions

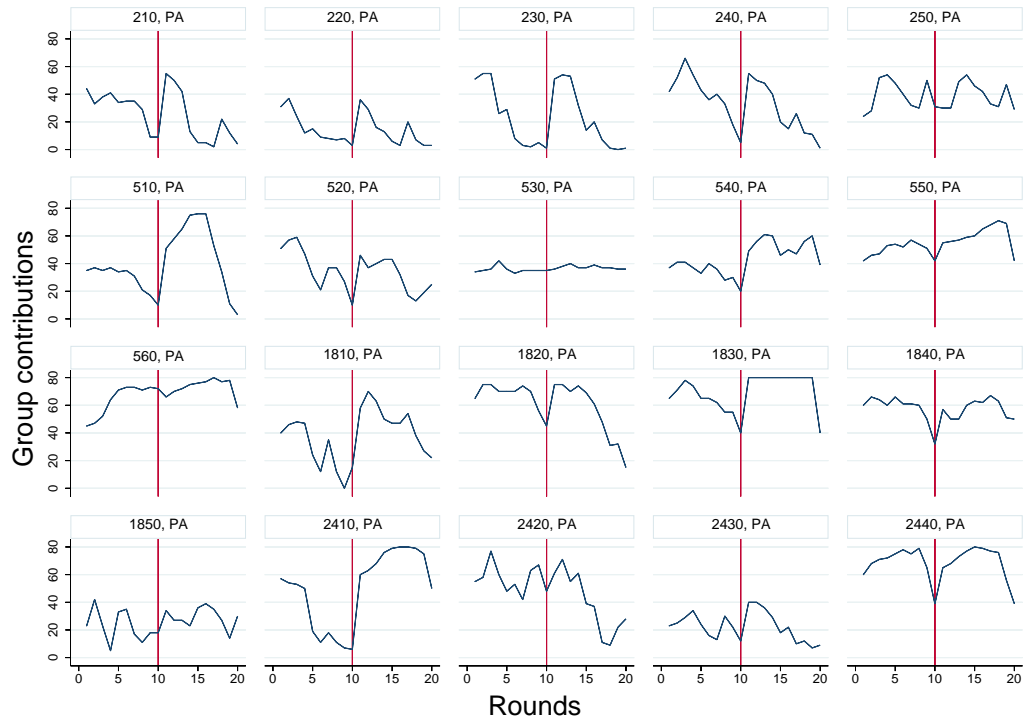


Figure 3A3: T2 STRATEGY- Development of Group contributions

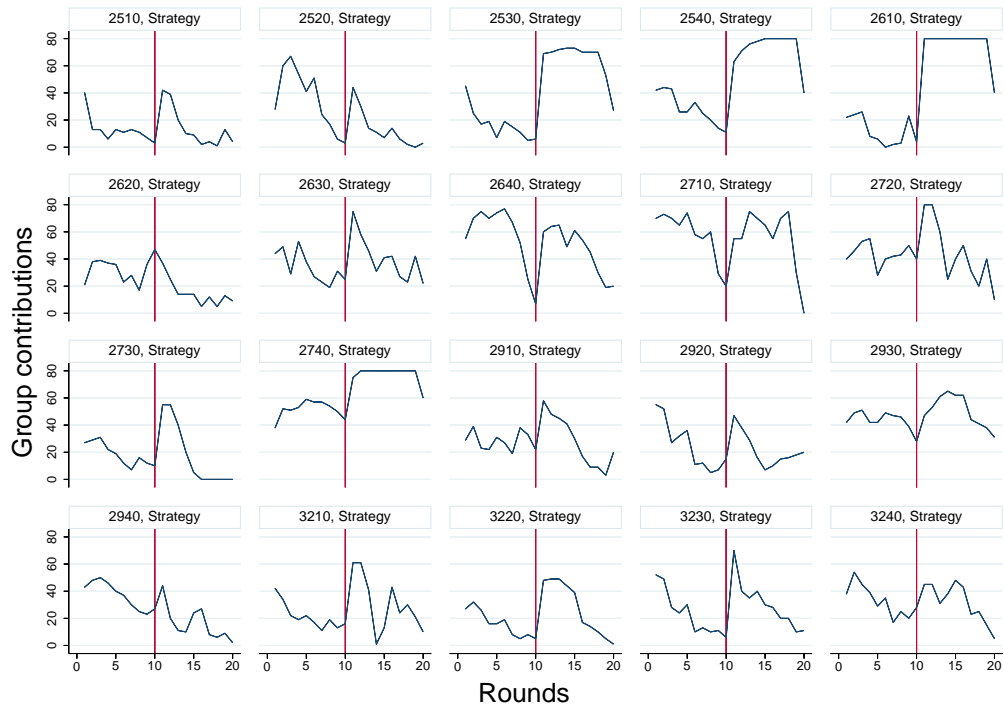


Figure 3A4: T3 STRATEGY+AGREEMENT - Development of Group contributions

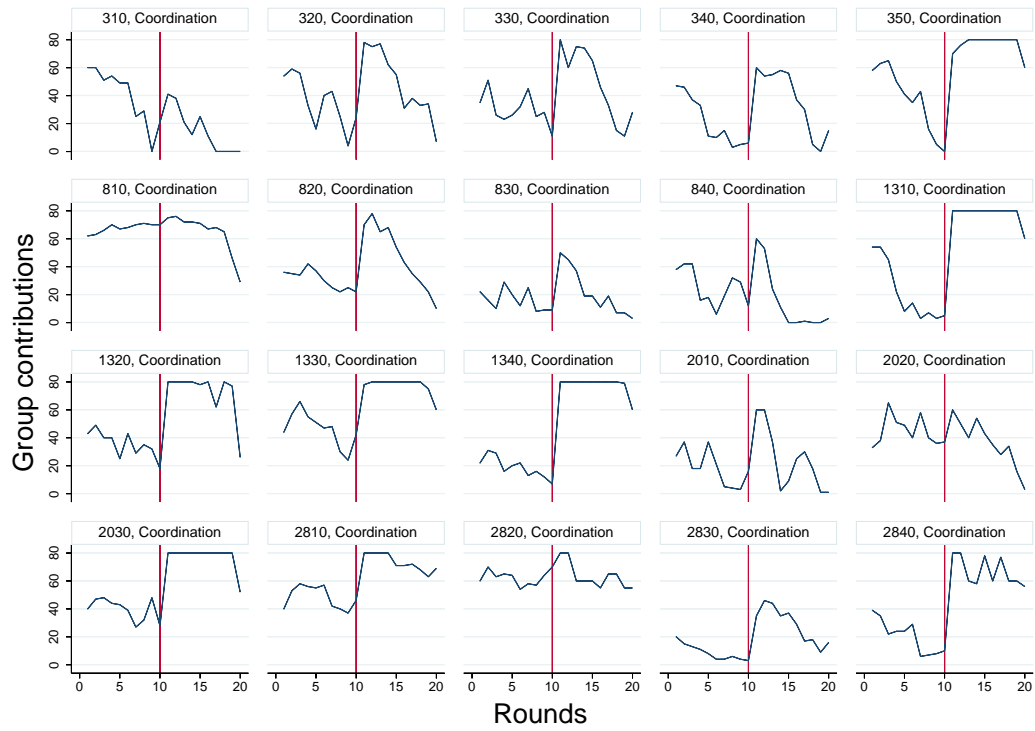


Figure 3A5: T4 PA+STRATEGY+AGREEMENT - Development of Group contributions

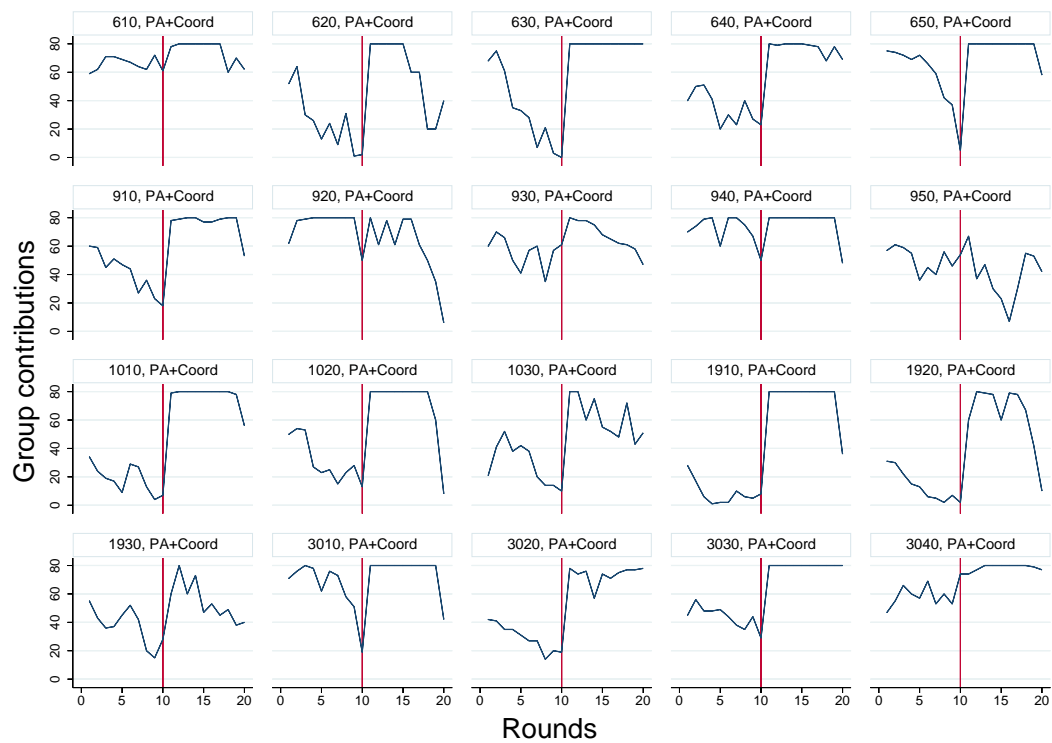


Figure 3A6: T5 FULL SET - Development of Group contributions

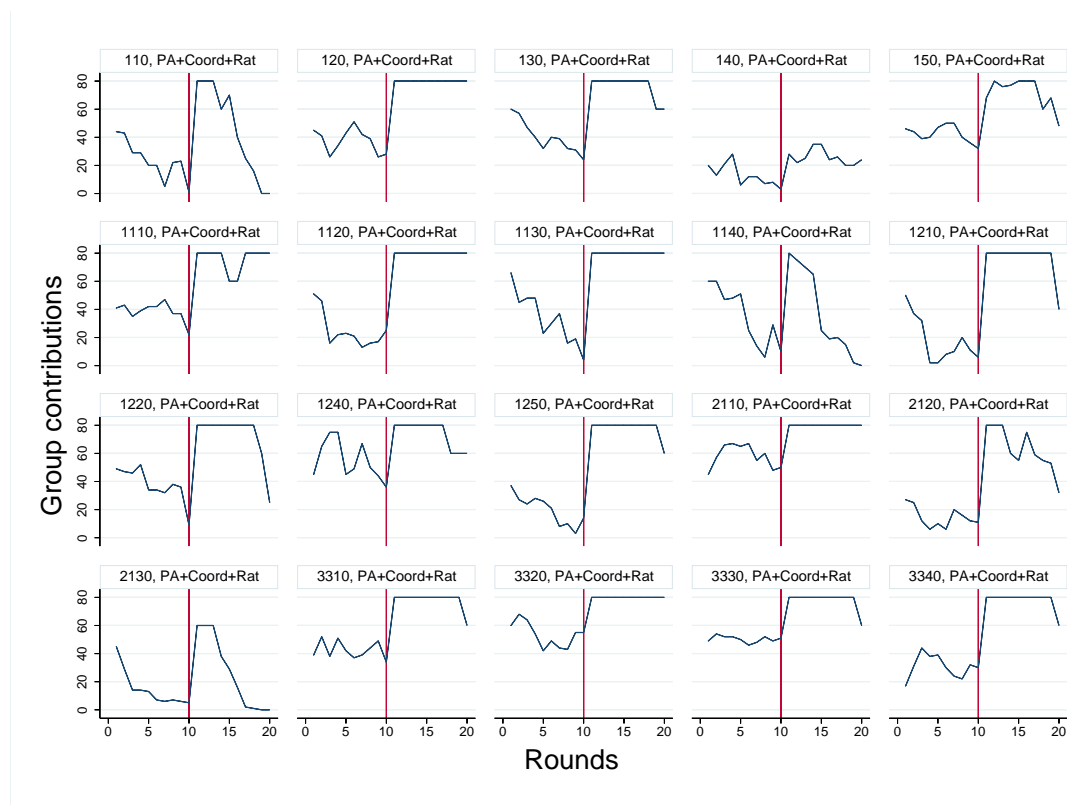
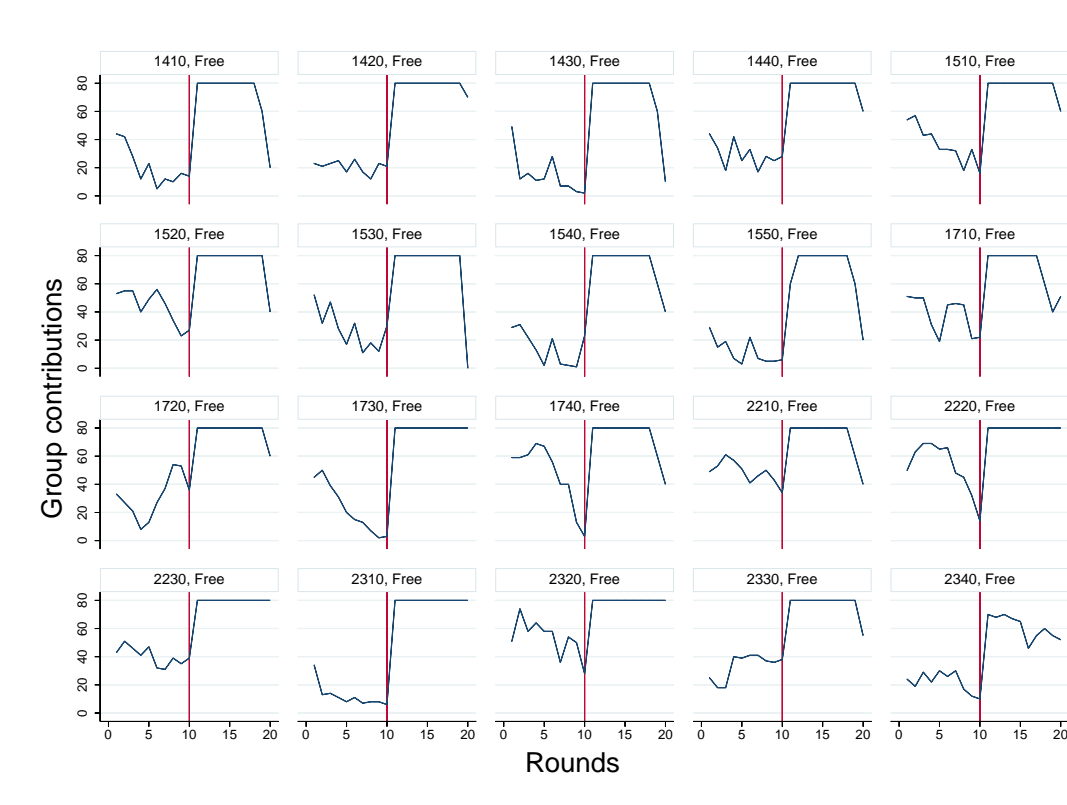


Figure 3A7: T6 FREE COMMUNICATION - Development of Group contributions



Appendix 3B – Experiment Material

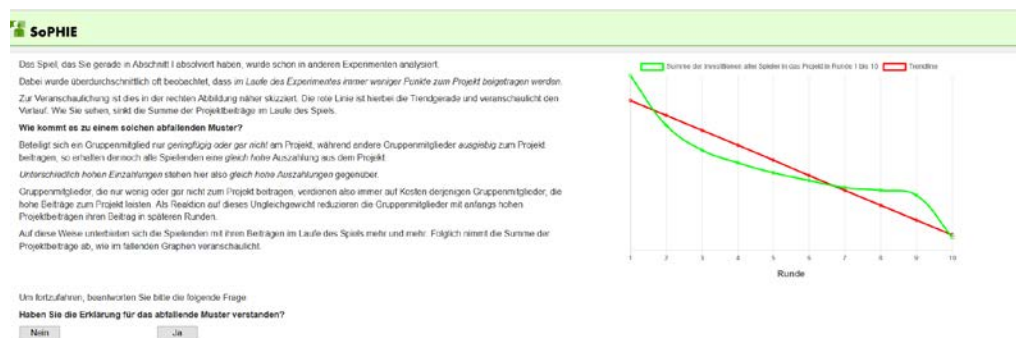
3B1. Problem Awareness

Figure 3B1: First screen of the element ‘Problem Awareness’



Note: As the graph differed between groups the chart is empty in this example.

Figure 3B2: Second screen of the element ‘Problem Awareness’



3B2. Identification of Strategies

In the visualisation of the three strategies, namely the *socially optimal strategy*, the *self-interested strategy* and the *laissez-faire strategy*, we offered corresponding scenarios which illustrated the consequences in terms of individual and group payouts. Scenario A showed that when all group members contributed their entire endowment, a total payout of 128 points could be achieved and the payout for each group member would be 32 points. Scenario B depicted that when all group members contribute nothing, the total payout would be 80 points and the corresponding individual payout 20 points. For the *laissez-faire strategy*, we presented three scenarios. Scenario C.1 elaborated on the incentive to freeride. It showed that if three group members contributed their entire endowment and one group member contributed nothing, the total payout would be 116 points. The group members contributing would receive 24 points while the free rider would receive 44 points. Hence, the scenario also showed that even when a free rider was present, it was still beneficial for the other group members to contribute their entire endowment. Scenario C.2 depicted that a moderate cooperation of all group members would be also still be beneficial compared to no cooperation. It showed that when all group members contributed 10 points, the total payout would be 104 points and each group member would receive 26 points. Lastly, scenario C.3 adopted the same level of contribution to the

public good as C.2, but unequally distributed among the group members. In the scenario, one group member contributed 20, another 13, the third 7 points while the last group member contributes 0 points. Hence, the total payout reached 104 points and the four group members receives 16, 23, 29, 36 points, respectively.

The labels of all three strategies A, B, C and their scenarios A.1, B.1, C.1, C.2, C.3 were randomized among subjects as well as groups. Thus, the same strategy labelled as A for one player, may have been strategy A, B or C for other players. Consistently, the order in which the strategies were presented was randomized as well. For the sake of a better understanding, we however refer to the strategies by A, B and C as presented above.

Figure 3B3: Second screen of the ‘strategy’ element, showing the definition of strategies and the consequences for the laissez-fair strategy (scenario C.1).

SoPHIE

Veranschaulichung der Strategien
Die Strategien lassen sich durch Klick auf die entsprechenden Buttons veranschaulichen.
Bitte nehmen Sie sich genügend Zeit die hier präsentierten Informationen zu verstehen.

Strategie A Jedes Gruppenmitglied trägt in jeder Runde 20 Punkte zu dem Projekt bei. Bei dieser Strategie kommt es zu genau einem Szenario. **Szenario A.1**

Strategie B Jedes Gruppenmitglied trägt in jeder Runde nichts zu dem Projekt bei. Bei dieser Strategie kommt es zu genau einem Szenario. **Szenario B.1**

Strategie C Jedes Gruppenmitglied trägt in jeder Runde so viel, wie es will zu dem Projekt bei. Bei dieser Strategie kann es zu verschiedenen Szenarien kommen. Beispielfall sind hier 3 aufgeführt. **Szenario C.1** **Szenario C.2** **Szenario C.3**

Veranschaulichung von Strategie C - Szenario C.1
Spielerin I bis III tragen in jeder Runde 20 Punkte zum Projekt bei; Spielerin IV hingegen 0 Punkte. Somit erhalten Spielerin I bis III 24 Punkte $[(20+20+20) \cdot 4]$; Spielerin IV erhält 44 Punkte $[(24+20)]$. Dies ergibt zusammen 116 Punkte.

Kategorie	Werte
Gesamt	116
Spielerin I	24
Spielerin II	24
Spielerin III	24
Spielerin IV	44

Summe der Beiträge aller Spielenden in das Projekt in Runde 1 bis 10: 60 Punkte

Wenn Sie sich mit den Strategien auseinandergesetzt haben und fortfahren möchten, klicken Sie bitte auf "Weiter".

Weiter

3B3. Agreement (Voting)

Figure 3B4: Screen of the ‘Agreement’ component in case the first vote had no unanimous outcome

SoPHIE

Da Sie nun die Präferenzen Ihrer Mitspielenden kennen, wird Ihnen und Ihren Mitspielenden die Frage noch einmal gestellt: Von welcher dieser Strategien würden Sie sich wünschen, dass sie von Ihrer Gruppe befolgt wird?

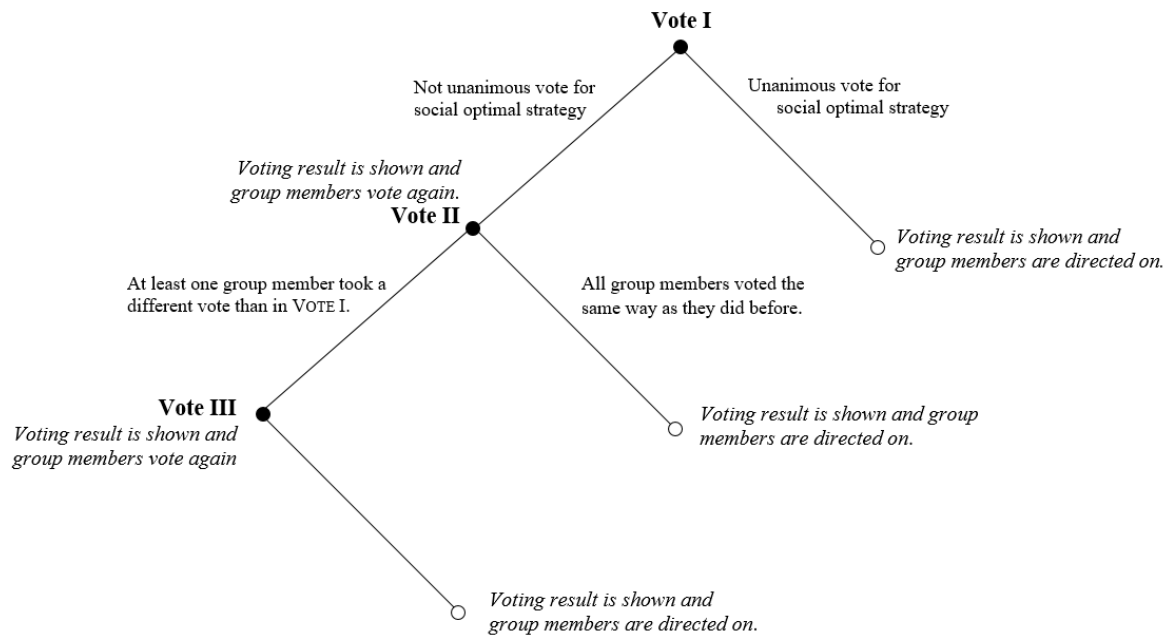
Angaben der Spielenden Bitte wählen Sie die gewünschte Strategie:

Strategie A Jedes Gruppenmitglied trägt in jeder Runde 20 Punkte zu dem Projekt bei. Ihre Wahl: Mitspielerin 1 Mitspielerin 2 **A**

Strategie B Jedes Gruppenmitglied trägt in jeder Runde nichts zu dem Projekt bei. **B**

Strategie C Jedes Gruppenmitglied trägt in jeder Runde so viel, wie es will zu dem Projekt bei. Mitspielerin 3 **C**

Figure 3B5: Illustration of the voting process in the ‘agreement’ element



3B4. Ratification

Figure 3B6: Screen of the ‘Ratification’ element after agreeing to promise social contribution in all following rounds

Figure 3B7: Feedback screen of the Ratification stage

Ihre Aktion	Bereitschaft zu versprechen:	Versprechen:
MitspielerIn 1	Ja	Ich verspreche, in jeder der nachfolgenden Runden 20 Punkte beizutragen
MitspielerIn 2	Ja	Ich verspreche, in jeder der nachfolgenden Runden 20 Punkte beizutragen
MitspielerIn 3	Nein	

Wieder

Note: In this example, one participant (“MitspielerIn 3”) was not willing to make a promise.

Chapter 4: The effects of inducing perspective-taking through role reversal in a give-and-take a dictator game on pro-social behaviour

Juan Felipe Ortiz-Riomalo, Ann-Kathrin Koessler, and Stefanie Engel

Abstract: Earlier experimental research in the behavioural sciences has suggested that pro-social behaviour can be promoted by inducing perspective-taking, i.e. by inducing people to know, understand, and/or feel another person's perspective. Although previous research has suggested that having decision-makers consider others' perspectives in fact results in pro-social behaviour, other confounding factors (e.g. one-way communication, role uncertainty) may confound the effects initially attributed to the inducement of perspective-taking. In the end, the effects depend on the procedures whereby and the context wherein perspective-taking is induced. The sole effect of temporarily experiencing the other person's position on pro-social behaviour in an economic setting is, to the best of our knowledge, yet to be systematically assessed. In this chapter we focus on the sole effect of inducing decision-makers to experience the other person's position through unilateral role reversal on pro-social behaviour. In a give-and-take dictator game (List 2007; Bardsley 2008), dictators play a pay-off-irrelevant simulation round in the role of the recipient. As a control condition, decision-makers only learn about the distributional consequences of their allocation decisions on recipients during the simulation round. Hence, through a treatment comparison, we single out the effect resulting from temporarily standing in another's shoes. To understand the underlying drivers of a potential behavioural change, we analyse the emotional reactions that the unilateral role reversal may have provoked on decision-makers. In general, we find no significant effects on either the average or the distribution of pro-social behaviour. We find that, although role reversal can be associated with significant average changes in emotions, these emotional reactions that are influenced by role reversal do not appear to result in significantly more (or less) pro-social behaviour. Transient effects of emotional reactions and diverging emotional reactions having opposing effects on pro-social behaviour are plausible explanations for our results, and we explore and discuss these explanations further in this chapter.

Keywords: pro-social behaviour, perspective-taking, role reversal, dictator game.

JEL: C91, D91

*“One time he [Atticus] said you never really know a man until you stand in his shoes and walk around in them. **Just standing on the Radley porch was enough.**”*

Harper Lee, To Kill a Mockingbird, 1960. First market mass edition 1982. Grand Central Publishing, 373 – 374; bold added)

4.1 Introduction

Pro-social behaviour—behaviour that primarily benefits the well-being of others at a personal sacrifice (Eisenberg and Miller 1987; Lindenberg 2006; Bénabou and Tirole 2006)—underpins socially desirable outcomes in various types of situations, from social dilemmas to distributive economic situations (e.g. Fehr and Fischbacher 2002; Andreoni, Harbaug and Vesterlund 2007; Fehr and Schmidt 2006; Böckler, Tusche and Singer 2016; Cárdenas 2018). Whether people behave pro-socially depends not only on their individual personality traits, but also on the features of the situation they find themselves in (Smith 1998; Ostrom 2005; Lindenberg 2006; Andreoni et al. 2007; Levitt and List 2007; Engel 2011; Bosworth, Singer and Snower 2016; Bowles 2016; Dhami 2016).

Previous research suggests that pro-social behaviour can be stimulated whenever a decision-maker is induced to consider, know, understand and/or feel the perspective of another person. Such an inducement can occur directly, e.g. through communication (e.g. Sally 1995; 2001; Xiao and Houser 2009; Andreoni and Rao 2011),⁵⁸ perspective-taking instructions (Batson 1987; Davis 1996) and role-playing (or role changing) interventions (Johnson 1971; Carlson-Sabelli 1989; Andreoni and Rao 2011). It can also be induced indirectly by, for instance, inducing decision-makers to learn about the consequences of their own actions on others' outcomes (e.g. Dana, Cain and Dawes 2006; Dana, Weber and Kuang 2007); by letting them identify the individuals who would be impacted by the consequences of their decisions (e.g. Bohnet and Frey 1999; Small and Loewenstein 2003; Jordan, Amir and Bloom 2016); or by reducing the sense of anonymity of the decision they are taking (e.g. Hoffman, McCabe, Shachat and Smith 1994; Hoffmann, McCabe and Smith 1996; Franzen and Pointner 2012). In sum, passively or actively inducing a decision-maker to consider perspectives other than their own could cause them to alter their decisions and often this change benefits the person with whom the decision-maker is interacting.

⁵⁸ Recently, Epley (2014) has termed this perspective-getting. Since we do not study the effects of communication in this study, we do not delve into this distinction and consider communication as another possible way to induce one person to take or consider another person's perspective.

Consequently, the inducement of perspective-taking could be put forth as a tool to promote pro-social behaviour (e.g. Ku, Wang, and Galinsky 2015). We understand perspective-taking as the act of going beyond one's own point of view to consider a given situation from another actor's perspective (Epley and Caruso 2009; Ku et al. 2015). Either by imagining the other person's vantage point or imagining oneself in the other person's shoes perspective-taking leads an individual to think—not necessarily accurately—about the intentions, expectations, emotions and/or circumstances of the other person (Epley and Caruso 2009; Ku et al. 2015). The other person's perspective can be taken cognitively—by trying to infer and understand their mental and emotional states—or emotionally—by sharing the other person's feelings. The act of engaging in perspective-taking may come naturally and some people may be particularly disposed to engage in such automatic perspective-taking (Davis 1983a; Singer and Fehr 2005; Singer and Tusche 2014). Or it can be induced; indirectly through particular social and situational cues or directly through interventions like role reversal or role-playing techniques conducted for that purpose (e.g. Carlson-Sabelli and Sabelli 1984; Pahl-Wostl and Hare 2004; Deutsch 2006).

In general, it has been suggested that perspective-taking is critical for, amongst other outcomes, pro-social behaviour, social coordination and understanding other people (as highlighted by Davis 1983a; Epley and Caruso 2009; and Ku et al. 2015, amongst others). It also appears to be critical for conflict resolution (Johnson 1971; Deutsch 2006; Fisher-Yoshida and Wasserman 2006) and for reaching agreements in negotiation settings (Trötschel, et al 2011; Ku et al. 2015). Nevertheless, perspective-taking does not always trigger pro-social behaviour or a better understanding of the other person's perspective and can even be counterproductive (Epley, Caruso and Bazerman 2006; Batson 2011; Epley 2014; Ku et al. 2015). The final effect depends on the way perspective-taking is induced, on the context and situations it takes place in, and on the psychological and social processes it stimulates (see Batson 1987; Batson, Early and Salvarani 1997; Epley and Caruso 2009; Ku et al. 2015). To study its effects, it is therefore important to single out and systematically assess both the effects produced by a particular set of procedures aimed at inducing perspective-taking and the mechanisms whereby such effects are produced.

Most of the research on the effects of inducing perspective-taking has drawn on instructions that prompt participants to imagine others (i.e. through an *imagine-other* set of instructions) or to imagine themselves in the other person's position (i.e. through an *imagine-*

self set of instructions) (Davis 1996; Batson et al. 1997). It is, however, not clear whether participants actually perform this mental exercise as indicated in the instructions. And, if they do perform this mental exercise as indicated, the actual factors driving their behavioural responses may still be unclear (Davis 1996; Erle and Topolinski 2017). In general, with this approach, it is hard to connect the observed responses solely to the act of taking on the other person's perspective—the effect could, for example, also be attributed to the information conveyed by the specific wording of the instructions (Batson et al. 1997; Epley et al. 2006; Ku et al. 2015).

In contrast, role-playing techniques go one step further and induce perspective-taking by allowing the decision-maker to in fact experience how it feels to be in the other person's shoes (e.g. Pahl-Wostl and Hare 2004; Deutsch 2006). These role-playing techniques, which are used, for instance, for psychotherapy (e.g. Carlsson-Sabelli and Sabelli 1984), conflict resolution (Johnson 1971; Deutsch 2006; Sandy 2006; Fisher-Yoshida and Wasserman 2006) and enhancing collaborative resource management (Pahl-Wostl and Hare 2004; Gurung, Bousquet and Trébuil 2006; Étienne 2014) include bilateral (reciprocal) or unilateral (incomplete) role reversals (Johnson 1971; Carlson-Sabelli and Sabelli 1984; Carlson-Sabelli 1989; Kellermann 1994). In this chapter, we seek to better understand the effects of having decision-makers experience the other person's position. For that purpose, we systematically analyse the effects of inducing perspective-taking through unilateral role reversal on pro-social behaviour.

As noted in the reviews by Johnson (1971) and Carlson-Sabelli (1989), in early studies on the effects of role reversal, the possible effect of experiencing the other person's position is mingled with the potential effect of other confounding factors. These factors include the individual attributes of the actors involved; the way that role reversal is performed; the type of interactions that take place; the information that is exchanged during the role-reversal experience between the perspective-taker, the target of the perspective-taking exercise and the facilitator of the perspective-taking exercise.

From the perspective of experimental economics, researchers have suggested that role-playing (or role changing) might have positive effects (Andreoni and Rao 2011), negative effects (Zhan, Eckel and Grossman 2017) or no effects at all (Brandts and Charness 2011) on pro-social behaviour. In these studies, however, participants often play both roles (dictator and recipient) before knowing which roles they will play in the actual experiment. Therefore, the

observed effects in these studies are arguably shaped by role uncertainty.⁵⁹ Yet, in actual policy situations, roles are exogenously given and remain unaltered.

In sum, to the best of our knowledge, the sole effect of experiencing the other person's position in an economic setting on pro-social behaviour has not yet been systematically assessed. It is the objective of this study to help bridge this gap by systematically assessing this effect and the role of emotions as possible underlying mechanism. To that end, we examine the effects of inducing perspective-taking through unilateral role reversal in a laboratory experiment on pro-social behaviour using a give-and-take dictator game (List 2007; Bardsley 2008). The game depicts a distributive, non-strategic situation wherein a decision-maker (i.e. dictator⁶⁰) is paired with a recipient and has to decide how much, if any, to transfer from their endowment or to take from the recipient's endowment. In the experiment, subjects play one pay-off-irrelevant simulation round in the role of the other player. This experience of being in other person's position is contrasted with conditions wherein only the distributional consequences of each of the dictator's possible choices are highlighted in the dictator's set of possible choices during the simulation round.

Based on findings from previous research, to identify the possible ways in which inducing perspective-taking influences behaviour, we measured the emotions and perceptions of participants before and after the simulation round. Further, to control for the effects of the participants' attributes and the situation's attributes, participants in our experiment interact in the same situation, with the same partner, without communicating with one another and under conditions of anonymity. Finally, to control for the possible effects of role uncertainty, in our experiment roles are randomly determined from the outset and remain unchanged throughout the experiment. Hence, our experimental design allows us to isolate the sole effect of experiencing the other person's position from other possible confounding factors that arguably drive the behavioural change observed in previous studies. This lets us examine the processes whereby, within a given set of conditions, inducing perspective-taking may or may not influence pro-social behaviour.

⁵⁹ Role uncertainty is a factor that Iriberry and Rey-Biel (2011) found changes behaviour, resulting in an increase in pro-social behaviour in the particular setting they study (a two-round dictator game without take option).

⁶⁰ Throughout the text, we use the terms decision-maker and dictator interchangeably. They refer to the role of Person A in the give-and-take dictator game carried out during the experiment (see Section 4.3). Likewise, insofar as we focus on the data collected from participants/subjects assigned to the role of Person A in the game, we refer to dictators and decision-makers when describing the data and results for participants. Unless clearly indicated otherwise, "decision-maker", "dictator" and "Person A" are all terms referring to the same type of actor.

Our results indicate that, in and of itself, experiencing the other person's position in the form of role reversal cannot be associated with significant changes in pro-social behaviour in a give-and-take dictator game. Although it can be associated with significant average effects on emotional reactions, these effects do not feed into aggregate significant changes in pro-social behaviour. We elaborate on and discuss these results in the remainder of the chapter which is structured as follows. In the next section (Section 4.2), we present the conceptual and theoretical elements that serve as the backdrop for Sections 4.3 and 4.4 by briefly extending the review of the literature on the relationship between perspective-taking and pro-social behaviour we referred to in this introduction. We describe the experimental design and procedures in greater detail in Section 4.3, and in Section 4.4 we spell out the main hypotheses we assess. In Section 4.5 we present in detail the results of the experiment and discuss them in Section 4.6. In Section 4.6, we discuss plausible explanations for our results in the context of the broader related literature and suggest avenues for future research.

4.2 Inducing perspective-taking and pro-social behaviour: a brief literature review

Previous literature indicates potential to change the behaviour of decision-makers through induced perspective-taking in general (e.g. Batson 1987; Batson and Moran 1999; Epley and Carusso 2009; Ku et al. 2015), and in particular as the result of some form of role-playing, including role reversal (Johnson 1971; Carlson-Sabelli and Sabelli 1984; Carlson-Sabelli 1989; Kellermann 1994; Deutsch 2006). The experimental literature yields mixed results, including positive as well as negative effects or a lack of effect on pro-social behaviour. It has been argued that whether the effect is positive or negative depends on the processes whereby as well as on the situation and the context within which perspective-taking is induced; these aspects determine which psychological factors are affected and the way in which they are affected (e.g. Batson et al. 1997; Epley et al. 2006; Ku et al. 2015)

In a collective action dilemma situation wherein the immediate interests of the individual may be at odds with the interests of the others and of the group as a whole, inducing individuals to consider the other person's perspective has been shown to induce selfish behaviour (as reviewed and shown by Epley et al 2006). In these settings, perspective-taking increases the expectation that others will behave selfishly and, consequently, egoistic behaviour ends up actually taking place as an anticipated reaction to this expected behaviour (Epley et al. 2006;

Epley and Carusso 2009). These findings are in line with earlier research on interpersonal conflict situations which found that inducing role reversal, provided it is not adequately carried out and/or complemented with other appropriate tools (e.g. personal interviews, debriefings, deliberation exercises), may create or accentuate harmful perceptions, in turn reinforcing diverging positions and complicating conflict resolution (Johnson 1971; Carlson-Sabelli and Sabelli 1984). In contrast, when the potential benefits of cooperating are highlighted to them, instructing participants to consider the perspective of another person would induce pro-social decisions in collective action dilemma situations (experiments 4 and 5 in Epley et al. 2006; Ku et al. 2015).

In situations wherein the target of perspective-taking is in a position of need, instructions to take on the perspective of that person may trigger empathic emotions (e.g. sympathy, compassion, tenderness), which in turn triggers helping behaviour (Toi and Batson 1982; Davis 1983b; Batson 1987, 2011; Batson and Moran 1999). Nonetheless, taking the perspective of someone in need may also trigger distressing emotions, leading to a withdrawal from the situation instead of helping behaviour (Davis 1983b; Batson 1987; Batson et al. 1997; Singer and Klimecki 2014). Whether empathic or distressing emotions are ultimately triggered would largely depend on the specific features of the situation and the participants involved (e.g. Ku et al. 2015), and the way perspective-taking is induced (Davis 1996; Batson et al. 1997). Whereas inducing participants to imagine themselves in the other's position (e.g. through *imagine-self* set of instructions in experiments) has been associated with both empathic and distressing emotions, inducing participants to imagine the other's perspective (e.g. through *imagine-other* set of instruction) would be primarily associated with empathic emotions (Batson et al. 1997).

Experimental research on pro-social behaviour in distributive economic situations, such as dictator games, has not yielded conclusive results regarding the likely effects of experiencing the position of the recipient on dictator's pro-social behaviour. It is possible to find studies that associate role-taking with more generous decisions (as in Andreoni and Rao 2011) or with less generous decisions (as in Zhan et al. 2017) in favour of the recipient. Brandts and Charness (2011) review experimental studies that have conducted role-changing manipulations and do not find clear evidence on the effect that role-changing would have on behaviour. As said in the introduction, however, the effects found in these studies are likely to be confounded with

the effects of role uncertainty, amongst other possible confounding factors, and influenced by the specific features of the action situations recreated in these experiments.⁶¹

In summary, these insights suggest that the effect of inducing perspective-taking is mediated by the emotional reactions it triggers (Davis 1983b; Batson 1987, 2011; Davis et al. 1987; Batson et al. 1997; Batson and Moran 1999) and the way decision-makers adjust their perceptions about the behaviour, expectations and intentions of others (Johnson 1971; Carlson-Sabelli and Sabelli 1984; Kellermann 1994; Epley et al. 2006; Epley and Carusso 2009). The way the perception of closeness or similarity between perspective-taker and the target of perspective-taking is altered may also come into play here (Carlson-Sabelli 1989; Kellermann 1994; Cialdini et al. 1997; Erle and Topolinski 2017). The way perceptions and emotions are altered largely depends, in turn, on the way whereby and the situation and context within which perspective-taking is induced and carried out (Carlson-Sabelli and Sabelli 1984; Batson et al. 1997; Epley et al. 2006; Ku et al. 2015; Erle and Topolinski 2017).

Inducing perspective-taking through unilateral role reversal involves changing the position of only the decision-maker in a simulated situation. Therefore, experiencing the position of the other person may arguably induce decision-makers to (i) experience how it would feel to stand

⁶¹ In Andreoni and Rao's (2011) second experiment, participants made their decisions in both roles without knowing their roles upfront. In each role, participants could write down a message to the other participant. That is, they decided on the amount they would send to recipients in case they were assigned to the dictator role and could accompany this transfer with a message. Also, they could write a message to dictators in case they were assigned to the recipient role. After performing these tasks associated with both roles, their roles were randomly allocated and their decisions implemented correspondingly. In Zhan et al.'s (2017) study, all participants assigned to their dual-role treatment decided on the amount they would allocate to a recipient depending on the varying cost of giving and the size of the endowment. After that, their role as decision-maker or recipient was determined by a random draw. The authors found that pro-social behaviour was weaker in the dual-role treatment than in the other treatment conditions. Based on their reasoning, this result could be attributed to the fact that participants feel less responsible for the other participants' earnings in the other treatment conditions and therefore focus on the efficiency of their own decisions. However, role uncertainty may also have influenced the observed patterns of behaviour, particularly in the dual-role treatment—in the end, all participants faced a similar chance of ending up in either of the two roles, they were aware of this from the outset and they made their decisions before their actual role was determined. Although these studies do yield insights on the effects that experiencing the other's position may have on pro-social behaviour, it can be said that to sort out this effect has not been their main objective. Instead, the main objective of the studies of Brandts and Charness (2011) and Zhan et al. (2017) was to assess the behavioural impacts of role reversal as a method to yield more information in economic experiments (and this, as said, is arguably confounded with role uncertainty). In turn, Andreoni and Rao's (2011) objective is to assess the effect of one-way communication on pro-social behaviour, and they put forth empathy as the mechanism that explain the positive effects of communication on giving in their dictator game. To test this plausible explanation, they carry out the aforementioned additional experiment in which participants play both roles before knowing their actual role. To the best of our knowledge, ours is the first study in experimental economics that has as main objective to assess the effects that experiencing the other's position may have on pro-social behaviour.⁶² For the sake of clarity, when referring to these role reversal techniques, we use the terms bilateral and multilateral. They correspond to what Carlson-Sabelli (1989) and Kellermann (1994) refer to as complete or reciprocal role reversal and incomplete or representational role reversal, respectively.

in the other person's shoes; (ii) to think about other person's behaviour, intentions and expectations; and/or (iii) to reflect on the perceived distance between themselves and the others. Therefore, depending on the emotions triggered and the perceptions created or modified, pro-social behaviour can be either heightened or hindered by role reversal. As said above and further explained and justified below, we focus on the role of emotions as possible underlying mechanism.

4.3 Experiment design and implementation

Our laboratory experiment is designed to identify the sole effect of experiencing the other person's position on pro-social behaviour. For that reason, we chose to work with a give-and-take dictator choice task (List 2007; Bardsley 2008). In this situation, the decision-maker (the dictator) unilaterally imposes a distribution of outcomes for themselves and the recipients. Hence, this situation allows us to obtain a clean measure of unilateral pro-social behaviour under conditions of anonymity. It also let us avoid the influence of strategic considerations on participants' decision-making, serving well to our objective of isolating the effect of experiencing the recipient position on decision-maker's pro-social behaviour.

In this task, participants were referred to as Person A and Person B, and each received EUR €5. Person A (i.e. the dictator or decision-maker) received an additional EUR €5 and was asked to decide whether and how much to transfer to or take from Person B (i.e. the recipient). Specifically, Person A could transfer up to EUR €5 (in EUR €0.50 increments) and could also take up to EUR €5 from Person B. Therefore, they could not transfer (or take) more than the initial endowment of EUR €5. The game involved two stages of four identical pay-off-relevant rounds. In our role reversal treatment conditions, decision-makers (Players A) played one pay-off-irrelevant round, i.e. a simulation round, in the role of the other player in between the two pay-off-relevant stages.

The simulation round was introduced and designed to recreate the main features of role reversal. Role reversal induces perspective-taking by having decision-makers temporarily experience how it feels to be in another person's position. This role-swapping exercise usually takes place in a situation that aims to simulate the actual decision situation as closely as possible. The reversal of roles can be bilateral or multilateral, where all of the actors involved exchange positions (e.g. Johnson 1971; Kellermann 1994; Pahl-Wostl and Hare 2004; Gurung et al. 2006), or unilateral, wherein only one actor takes on the other person's position (e.g.

Carlson-Sabelli and Sabelli 1984; Kellermann 1994).⁶² Thus, a role reversal intervention usually only entails the creation of a temporary situation wherein just one feature of the actual situation is altered; that is, the position each actor occupies. The structure of the actual decision situation remains unaltered. This is the critical feature of role reversal that we recreate in our experiment with this simulation round.

During the simulation round, we worked with two types of role reversal: bilateral and unilateral role reversal. Bilateral role reversal meant that both participants swapped roles. Unilateral role reversal involved the decision-maker taking on the role of the recipient, while the computer took on the dictator role; the recipient did not play a role during this simulation round. To answer the research question of this study, we focus on the data from the unilateral role-reversal treatment.

Adopting the other person's perspective may also cause decision-makers to be more aware of the consequences that their decisions have on others. Based on previous literature (Dana, Cain and Dawes 2006; Dana, Weber and Xi Juang 2007), this increased awareness of the consequences of decision-maker's own decisions may also induce pro-social behaviour. To control for this, we included a condition wherein, instead of the role reversal taking place, only the distributional consequences of decision-makers' decisions were highlighted in the decision-makers' set of choices during the simulation round. Including this control makes it possible to isolate the effect of inducing perspective-taking through role reversal and avoid confounding it with the effect of being more aware of the consequences of decision-maker's own choices on others.

Our treatment and control conditions therefore varied regarding two features of the simulation round: whether or not unilateral role reversal takes place (*Role reversal vs. No role reversal*) and whether or not the distributive consequences of each possible decision were highlighted in the decision-makers' choice set (*Awareness setting vs. Standard setting*). In all conditions the simulation round took place. Table 4.1 summarises the four resulting conditions we focus on in this study. In the *Standard setting*, the decision-maker is shown the standard choice set usually used in give-and-take games (e.g. List 2007). In the *Awareness setting*, the distributive consequences of each possible decision were highlighted in the decision-makers'

⁶² For the sake of clarity, when referring to these role reversal techniques, we use the terms bilateral and multilateral. They correspond to what Carlson-Sabelli (1989) and Kellermann (1994) refer to as complete or reciprocal role reversal and incomplete or representational role reversal, respectively.

choice set during the simulation round. Before and after the simulation round, all rounds are exactly the same in all conditions: participants remain in their initially assigned roles and the decision-makers are presented with the same standard choice set.

The pay-off was determined as follows: participants received a participation fee of EUR €3. During the experiment, once the choice task was concluded, participants were informed that they would receive an additional EUR €3 for responding to the post-experiment survey. One round of the choice task was randomly chosen to determine the final payments for participants and participants were informed about this from the outset. Thus, in addition to the EUR €6 they received for participating and taking the survey as well as the EUR €5 endowment, decision-makers could earn up to EUR €5 more, depending on their decision. Recipients were guaranteed to receive EUR €6 and could additionally earn between EUR €0 and EUR €10, depending on the choice made by the decision-maker in the round chosen to determine the final pay-off.

In the fourth round of each part of the experiment as well as in the simulation round, once participants knew about their results, they were asked about the intensity with which they felt 29 different emotions. The list of emotions was based on Batson et al. (1997) and Reuben and van Winden (2010). The post-experiment survey elicited the basic sociodemographic characteristics of the participants (e.g. age, gender, area of study). Participants were also asked if they were acquainted with any of the other participants attending the same experimental session. Further, participants' predispositions to cognitive perspective-taking, to emotional perspective-taking and to feeling concern for the well-being of others were measured with the German version (Paulus 2016) of the Interpersonal Reactivity Index, IRI (Davis 1980), and with the empathy index put forth by Jordan et al. (2016). Finally, the survey also asked open-ended questions about the participant's decision-making criteria, the possible influence of emotions and beliefs on their decision-making, the influence of the experience in the simulation round, and their reflections on the simulation round and its influence on the decisions made.⁶³

⁶³ Once decision-makers made their choices in the first and fourth rounds of each part of the experiment, as well as during the simulation round, they were also asked about their empirical expectations (their expectations of what other dictators would transfer on average), their second-order expectations (their expectations of what recipients expect dictators to transfer) and the amount that they consider to be the fair amount to transfer (based on the way that Reuben and van Winden 2010 worded this question). The instructions and procedures of the experiment can be found in Appendix A.

Table 4.1 – Experiment setup and sample size

Condition		Part I <i>4 equal rounds</i>	Simulation round		Part II <i>4 equal rounds</i>
			Awareness setting	Role reversal	
Standard setting	No role reversal (<i>N</i> = 30)	<i>Baseline</i> [Standard setting keeping initial roles]			<i>Baseline</i> [Standard setting keeping initial roles]
	Role reversal (<i>N</i> = 32)				
Awareness setting	No role reversal (<i>N</i> = 29)				
	Role reversal (<i>N</i> = 53)				

There was a simulation round in all these conditions. **Awareness setting** identifies whether the distributive consequences of the possible choices decision-makers were presented with (i.e. the action-outcome linkages) were highlighted in the set of choices during the simulation round. In the **Standard setting**, decision-makers were presented with the standard choice set in which all possible choices are displayed together with the outcome each choice would result in for the decision-maker only. **Role reversal** indicates whether unilateral role reversal took place during the simulation round. In the unilateral role reversal the decision-maker takes on the receiver's position and the decision-maker role is taken on by the computer program during the simulation round. **N** indicates the sample size of participants assigned to each condition. In total, 144 subjects participated in the conditions discussed in this study.

The experiment was programmed and run using the SoPHIE platform (Hendriks 2012). The platform ORSEE (Greiner, 2015) was used to recruit participants. The 26 sessions of the experiment were conducted at the Laboratory for Economics Research (LaER), Osnabrück University, with students from Osnabrück University and the University of Applied Sciences in Osnabrück. Upon arrival, participants were randomly allocated to the roles of Person A or Person B and subsequently taken to separate rooms. Next, the instructions were read out loud by the laboratory assistants. Once they were logged in to the computer program, participants learned what their role was and were randomly paired with a participant from the other room. The participants did not change partners throughout the experiment, nor did they change, in any payoff-relevant round, the initial role they were allocated. A total of 518 persons participated in the experiment: 259 of them as decision-makers. 144 of these decision-makers were assigned to the treatment conditions outlined in Table 4.1 (the relevant conditions we

focus on) and their behaviour is the behaviour we analyse in this chapter.⁶⁴ Each experimental session lasted approximately one hour and 45 minutes. On average, each participant received EUR €13.45 as a final payment.

In sum, our experimental setup lets us single out solely the effect of experiencing the other person's position and analyse the factors that may account for the observed behavioural responses. As reviewed in the previous section, the role-reversal experience may influence decision-makers' behaviour by modifying their perceptions of the distance towards the recipients; by modifying their beliefs about other dictators' behaviour and about recipients' expectations; and by provoking emotional reactions. We contend that, in our experiment setup, the behavioural change triggered by unilateral role reversal is primarily accounted for by the emotional reactions it provokes. Throughout the entire experiment—including the simulation round—anonymity is preserved, communication is forbidden and the formed pairs of participants remain unchanged. Furthermore, the recipients do not participate at all in the unilateral role reversal condition during the simulation round and cannot share any input with the decision-makers in any condition during the experiment. Therefore, the decision-makers' beliefs regarding other dictators' actions, their beliefs regarding the recipients' expectations and their perceived closeness to the recipients are not presumed to be influenced by the unilateral role reversal. Hence, we expect the emotional reactions provoked by experiencing the other person's position through unilateral role reversal to be the main driver of change in pro-social behaviour in this give-and-take dictator game. We thus focus our analysis of influencing factors on emotional reactions. In the next section, we detail the results that we expect to find in our experiment.

4.4 Hypotheses

As reviewed in Section 4.2, past research has found that inducing perspective-taking can, in fact, be associated with a change in pro-social behaviour (e.g. Batson 1987; Epley and Carusso 2009; Andreoni and Rao 2011; Zhan et al. 2017; Ku et al. 2015). Therefore, we infer that experiencing the other person's position through unilateral role reversal in a give-and-take dictator game leads to a change in pro-social behaviour that can be either positive or negative.

⁶⁴ Six of the 144 subjects whose data we analyse in this study were not students. In order to include these observations in the subsequent regression analyses, we assume them all to have major in economics. Our main results do not change if we leave out these subjects.

Hypothesis 4.1: *Experiencing the other person’s position induces a change in pro-social behaviour in a give-and-take dictator game.*

We conject that whether this change is positive or negative will depend on the specific way in which each decision-maker reacts emotionally to the unilateral role-reversal experience. Imagining oneself in the position of another person—particularly when this person is in a position of need—has been associated with both empathic and distressing emotions (e.g. Davis 1983b; Davis et al. 1987; Batson et al. 1997; Ku et al. 2015). Whereas pro-social behaviour may be promoted by empathic emotions (Batson 1987, 2011; Eisenberg and Miller 1987), distressing emotions may be a hindrance to pro-social behaviour (Singer and Tusche 2014; Singer and Klimecki 2014). In our experiment, in addition to this empathic and distressing emotions, the temporary experience of the recipient’s position may also trigger positive (pride and joy), praising (gratitude, admiration and surprise), pro-social (shame and guilt) and negative (anger, irritation, confusion and impotence) emotions (Reuben and van Winden 2010).⁶⁵ Based on our reading of van Winden and colleagues’ work (e.g. Bosman and van Winden 2002; Reuben and van Winden 2010; van Winden 2015), we hypothesise that positive, praising and pro-social emotions will have a positive correlation with more pro-social behaviour and that negative emotions will result in less pro-social behaviour.

Hypothesis 4.2: *The effect of unilateral role reversal on pro-social behaviour in a give-and-take dictator game depends upon the emotional reactions it provokes. That is, experiencing the other person’s position triggers emotional reactions (***Hypothesis 4.2.1***) that subsequently affect pro-social behaviour (***Hypothesis 4.2.2***). Whereas the intensity with which negative and distressing emotions are felt negatively relates to pro-social behaviour (***Hypothesis 4.2.2.1***), the intensity with which empathic, positive, praising and/or pro-social emotions are felt positively relates to pro-social behaviour (***Hypothesis 4.2.2.2***).*

4.5 Data analysis and results

We will first analyse the sole effect of inducing perspective-taking through unilateral role reversal on pro-social behaviour (Hypothesis 4.1). Thereafter, we will analyse the role of emotions in mediating the effects of unilateral role reversal on pro-social behaviour (Hypothesis 4.2). The outcome variable we focus on is the change in the average transfer between Part II and Part I of the experiment—i.e. the change in pro-social behaviour. Table 4.2 presents the summary statistics of the average transfer in Part I and Part II and of the change in

⁶⁵ In this paragraph, we have classified these emotions on the basis of Batson et al. (1997) and Reuben and van Winden (2010).

the average transfer from Part I to Part II. For a result to be considered statistically significant, its *p-value* must be below 0.05.

We started by analysing the effect of role reversal in the *Standard setting*—when no information about the pay-off consequences of decision-maker’s decision is provided. As illustrated in Table 4.2, Panel C, although the average amount taken increases in the control and the *Role reversal* condition, the increment is lower in the latter. Further, differences in the mean, minimum and maximum values as well as differences in the 25th percentile of the distribution would initially suggest that behaviour is more pro-social in the *Role reversal* condition. These differences notwithstanding, the median and the 75th percentile of the distribution are fairly the same. Moreover, the entire distribution of the outcome variable does not statistically differ between conditions (*Role reversal vs No role reversal, Standard setting*; Wilcoxon rank-sum test, $z = -0.583$, $p - value = 0.5599$; Kolmogorov Smirnov test, $D = 0.1146$, $p - value = 0.987$).

We then compared the change in the average transfer (i.e. our outcome variable) between the control and the role reversal condition in the *Awareness setting*. Through this comparison, we singled out the sole effect of experiencing the other person’s position. As illustrated in Table 4.2, Panel C, in this *Awareness setting* the mean, minimum and maximum values of the outcome variable in *Role reversal* also suggest, together with the value in the 25th percentile, that behaviour is relatively more pro-social in the *Role reversal* than in the *No role reversal* condition. However, the 50th and 75th percentiles are exactly the same and no significant difference in statistical terms can be established between the distribution of the outcome variable in these two conditions (*Role reversal vs No role reversal, Awareness setting*; Wilcoxon rank-sum test, $z = -0.719$, $p - value = 0.4722$; Kolmogorov Smirnov test, $D = 0.1184$, $p - value = 0.955$).

Table 4.2 – Summary statistics

Panel A - Average amount transferred in Part I of the experiment										
	Condition	Mean	SD	N	p25	p50	p75	Min.	Max.	Range
Standard setting	No role reversal	-0.15	2.39	30	-1.88	0.00	2.50	-5.00	2.88	7.88
	Role reversal	-0.84	3.12	32	-4.69	-0.38	2.50	-5.00	2.88	7.88
Awareness setting	No role reversal	-0.11	2.82	29	-2.38	0.63	2.50	-5.00	2.50	7.50
	Role reversal	-0.92	2.99	53	-5.00	0.00	1.88	-5.00	2.50	7.50
	Total	-0.58	2.87	144	-3.00	0.00	2.50	-5.00	2.88	7.88
Panel B - Average amount transferred in the Part II of the experiment										
Standard setting	No role reversal	-0.64	2.63	30	-2.63	0.00	1.50	-5.00	2.75	7.75
	Role reversal	-0.95	3.16	32	-4.63	-0.50	2.13	-5.00	2.75	7.75
Awareness setting	No role reversal	-0.54	3.16	29	-4.25	0.63	2.50	-5.00	2.50	7.50
	Role Reversal	-1.30	3.30	53	-5.00	-0.50	2.50	-5.00	2.50	7.50
	Total	-0.93	3.09	144	-4.88	0.00	2.50	-5.00	2.75	7.75
Panel C – Change in the average amount transferred										
Standard setting	No role reversal	-0.49	1.66	30	-1.00	0.00	0.00	-7.50	2.50	10.00
	Role reversal	-0.10	1.91	32	-0.50	0.00	0.06	-5.25	7.25	12.50
Awareness setting	No role reversal	-0.43	1.10	29	-1.00	0.00	0.00	-3.75	1.75	5.50
	Role Reversal	-0.37	1.35	53	-0.25	0.00	0.00	-5.00	2.50	7.50
	Total	-0.35	1.51	144	-0.63	0.00	0.00	-7.50	7.25	14.75

Notes: In each round, decision-makers (i.e. dictators) can transfer an amount ranging from -EUR €5 to +EUR €5 to recipient. The **Change in the average amount transferred** (Panel C), the outcome variable, is the difference between the average transfer in Part II (Panel B) and the average transfer in Part I (Panel A). In the *Awareness setting* the distributive consequences of each possible choice were highlighted in the choice set of the decision-makers during the simulation round. The *Standard setting* only displays the standard choice set where decision-makers see all possible choices together with the outcome each possible choice would result in for themselves. *Role reversal* indicates whether unilateral role reversal took place during the simulation round and therefore the *Role reversal* conditions constitute the treatment conditions; the respective *No role reversal* conditions then constitute the control conditions. **SD** stands for standard deviation; **N** for sample size; **p25**, **p50** and **p75** stand for, respectively, the 25th, 50th and 75th percentiles of the distribution.

Likewise, the results from the regression analysis lead us to conclude that, on average, no effect can be attributed to inducing perspective-taking through (unilateral) role reversal. In

Table 4.3, we present the results of econometric estimations of average treatment effects. To estimate these effects, we have taken a differences-in-differences approach in all models and estimated the parameters through ordinary least squares (OLS). This means that we regressed the outcome variable—the change in the average amount transferred—on a dichotomous variable that indicates whether the decision-maker went through the unilateral role reversal during the simulation round. Model 1 and Model 2 are based on the *Standard setting*. In Model 2, we also controlled for individual characteristics which may, according to the literature (Davis 1983b; Engel 2011; Jordan et al. 2016), contribute to explaining the observed variation of the outcome variable in the experiment (see legend of Table 4.3 for details on these control variables). For Models 3 – 5, we took into account the whole sample of this study. By doing so, we were able to estimate the average treatment effects, controlling for the possible effects of raising awareness on the distributive consequences of each possible decision (see Model 4 and Model 5) and at the same time for individual characteristics (see Model 5). Results from the estimation of all models led to the same conclusion: no average treatment effect on decision-makers' behaviour could be attributed to the fact of experiencing the recipient position during the simulation round.

Table 4.3 – Estimation of average treatment effects

Variables	Outcome variable: change in the average transfer (Part II vs. Part I)				
	(1)	(2)	(3)	(4)	(5)
Role reversal	0.390 [-0.519, 1.299]	0.0546 [-0.810, 0.919]	0.189 [-0.306, 0.684]	0.206 [-0.297, 0.709]	0.0274 [-0.498, 0.553]
Awareness				-0.128 [-0.662, 0.405]	-0.190 [-0.715, 0.334]
Control variables	No	Yes	No	No	Yes
Observations	62	62	144	144	144
R-squared	0.012	0.268	0.004	0.006	0.137

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. A differences-in-differences approach was followed and ordinary least squares (OLS) were used to estimate the parameters of the regression models. Confidence intervals (95% level of confidence) are displayed in brackets. **Role reversal** indicates whether the decision-maker went through the role-reversal experience in the simulation round. **Awareness** indicates whether the distributive consequences of decision-maker's possible choices were highlighted during the simulation round. **Control variables included:** age, gender, area of study, predisposition to emotional perspective-taking, predisposition to cognitive perspective-taking, predisposition to feeling concern for the well-being of others, average transfer (Part I), average transfer interacted with *Role reversal* and whether the participants know someone else participating in the same experimental session.

In sum, we found that the evidence collected does not favour Hypothesis 4.1. And these results hold when using other models, other model specification and alternative specifications of Hypothesis 4.1.⁶⁶

Result 4.1 (regarding Hypothesis 4.1): *Inducing perspective-taking through unilateral role reversal cannot be associated with a significant change in either the average or the distribution of (pro-social) behaviour in a give-and-take dictator game.*

Hypothesis 4.2 suggests that the final effects on individual behaviour could be mediated by the emotional reactions that decision-makers felt as a consequence of the unilateral role reversal. The experience of standing in the other person's shoes can provoke different types of emotional reactions, which can then cause either positive or negative changes in the pro-social behaviour. If this is the case, then it would be not surprising that no average effect is observed when these individual responses are aggregated.

To test Hypothesis 4.2, we first assessed whether unilateral role reversal can be associated with a significant change in the emotional states of participants (i.e. we first tested Hypothesis 4.2.1). Then, we assessed whether these changes in emotions could, in turn, be associated with changes in behaviour (i.e. we then tested Hypothesis 4.2.2).

In line with the previous literature (Davis 1983b; Batson et al. 1997; Reuben and van Winden 2010), we started by identifying families of emotional reactions that are correlated in our context. We focussed on the emotional reactions of participants to the results of the simulation round; that is, we calculated the change in the self-reported state of emotions from directly before to after the simulation round. Through principal component analysis (PCA), applying an orthogonal varimax rotation, we identified uncorrelated groups of correlated emotional reactions. Each of these groups was defined by the seven components obtained through the PCA with an eigenvalue higher than 1. These seven components accounted for 69.45% of the total variance in emotional reactions (see Appendix 4B3.2 for details).

⁶⁶ It could be argued that the analysis strategy of the data we have followed thus far is not the most appropriate for assessing Hypothesis 4.1. In the end, the hypothesis refers to a change in behaviour regardless of the direction or the magnitude of the change. More appropriate assessments of this hypothesis could be to examine whether unilateral role reversal can significantly be associated with (or significantly predict) a (positive, null or negative) change in the outcome variable. However, estimating models of discrete choice (e.g. a probit model for the outcome variable indicating whether a change was observed or not; ordered probit for the outcome variable indicating whether the change was negative, null or positive) lead to the same conclusion. See Appendix 4B2, Table 4B4 and 4B5.

We named each component based on the emotional reactions that, according to the loading factors, correlate most closely with that particular component.⁶⁷ When naming the groups of emotions, we also considered the categories that have been previously used in the literature (e.g. Batson et al. 1997; Reuben and van Winden 2010). Hence, we derived the following seven groups of emotional reactions: (i) **annoyance** (anger, disappointment, envy, sadness and annoyance); (ii) **confusion** (irritation and confusion); (iii) **perturbation** (worry and disturbed); (iv) feeling **moved** (moved, touched and surprise); (v) **praising** reactions (admiration, gratitude and compassion); (vi) **positive** reactions (pride, joy and mercy); (vii) **pro-social and empathic** emotional reactions (regret, concern, powerlessness, pity, shame, guilt, discomfort⁶⁸).

After identifying these groups of emotions, we assessed what average effect the unilateral role reversal had on each one of them (to assess Hypothesis 4.2.1). For that purpose, we regressed each of the seven principal components on the treatment variable, controlling for the possible effects of raising awareness on the distributive consequences of each possible choice and of the covariates that were controlled for in previous research (e.g. Davis 1983b) (see Table 4.4 for details). As shown in Table 4.4, the fact of having participated in the unilateral role reversal could be associated with a significantly positive average change in the state of different types of emotions, namely those grouped under *annoyance*, *confusion*, *moved* and *praising* types of emotions. The unilateral role reversal could also be positively related to variations in *perturbation* and negatively related to variations in *positive* and *pro-social and empathic*. The effects on these latter groups of emotions were, however, statistically nonsignificant.⁶⁹

Result 4.2 (regarding Hypothesis 4.2.1): *Inducing perspective-taking through unilateral role reversal can be associated with a significant change, on average, in the emotions of annoyance and confusion, in praising emotions, and in feeling moved.*

As a next step, we regressed the outcome variable on the seven groupings of emotional reactions (see Table 4.5). We also controlled for variables that, based on previous studies (e.g. Engel 2011; Artinger et al. 2014), covary with the outcome variable in a give-and-take dictator game setting like ours (see the results of Model 2 and Model 3 and further details in Table

⁶⁷ In other words, part of a particular group of emotions—defined, in turn, by a specific component—were considered to be emotional reactions with a loading factor greater than 0.3 in the respective component.

⁶⁸ Following Bowles and Gintis (2006), Reuben and van Winden (2010) consider shame and guilt as pro-social emotions.

⁶⁹ The descriptive statistics of the change in each one of the emotions elicited already indicate differences in the emotional reactions provoked across treatments (see Table 4B7 in Appendix 4B, Section 4B3.1).

4.5).^{70, 71} We estimated the parameters of these regression equations using the data of the sub-sample of decision-makers that participated in the role reversal in the simulation round. We proceeded in this way to assess the average effect of the change in the state of emotions that can indeed be associated with the role-reversal experience.

⁷⁰ We do not consider the results of Model 4 for ‘gender’ and ‘average transfer (Part I)’ being significantly associated with at least one of the principal components summarising the variance of the emotional reactions (as can be seen in Appendix 4B, Table 4B2, where we report the full results of the regressions whose main results we summarise in Table 4.4). The results of Model 4, therefore, are likely to suffer from endogeneity problems. Result 3, however, hold even if we consider the results from Model 4; the emotions that the unilateral role reversal affects seem not to have affected pro-social behaviour.

⁷¹ Models 1 through 3 do not include either ‘predisposition to emotional perspective-taking’ or ‘predisposition to feeling concern for the well-being of others’. Previous research (Davis 1983a; Jordan et al. 2016) suggests that these two variables would influence the emotional reactions caused by the perspective-taking experience (and for that reason they are included in the models reported in Table 4.4; see also Table 4B2 in Appendix 4B1), but that they would not be relevant for explaining the variance of our outcome variable in this particular type of setting (Artinger et al. 2014). In contrast, predispositions to cognitive perspective-taking would have a direct influence on pro-social behaviour (Artinger et al. 2014; Cowell, Samek, List and Decety 2015), and for that reason they are included. Predispositions to emotional perspective-taking and feeling concern are included in Model 2 and Model 5 because the regression equations of these models correspond to the reduced-form representation of the effect of the unilateral role reversal on pro-social behaviour. Thus, they capture both the direct effect and the indirect effect (i.e. via emotional reactions) of unilateral role reversal on pro-social behaviour.

Table 4.4 – Estimation of the average effects on groups of emotional reactions

Variables	Annoyance	Confusion	Perturbation	Moved	Praising	Positive	Pro-social and empathic
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Role reversal	1.441*** [0.71, 2.17]	0.687*** [0.20, 1.17]	0.227 [-0.24, 0.69]	0.505** [0.02, 0.99]	1.478*** [1.05, 1.91]	-0.113 [-0.59, 0.37]	-0.272 [-0.85, 0.31]
Awareness	-0.230 [-1.11, 0.65]	-0.423* [-0.88, 0.031]	0.00241 [-0.48, 0.48]	0.252 [-0.25, 0.75]	0.0391 [-0.38, 0.46]	-0.0703 [-0.52, 0.38]	0.546 [-0.11, 1.20]
Control variable	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	144	144	144	144	144	144	144
R-squared	0.081	0.089	0.062	0.083	0.242	0.032	0.222

*** p<0.01, ** p<0.05, * p<0.1. Ordinary least squares (OLS) were used to estimate the parameters of the regression models. Confidence intervals in squared brackets (95%). **Role reversal** indicates whether the decision-maker went through the role-reversal experience in the simulation round. **Awareness** indicates whether the distributive consequences of decision-maker's possible choices were highlighted during the simulation round. **Control variables included:** gender, disposition to emotional perspective-taking, disposition to feeling concern for the well-being of others, average transfer (Part I), average transfer (Part I) interacted with *Role reversal*, whether participants know someone in the same session.

As can be seen in Table 4.5, none of the emotional reactions significantly associated with the role reversal experience (i.e. *annoyance*, *confusion*, *moved* and *praising*) can be significantly associated with our measure of pro-social behaviour.⁷²

Table 4.5 - Average effects of emotion on pro-social behaviour

Variables	Outcome variable			
	Change in the average transfer (Part II vs. Part I)			
	(1)	(2)	(3)	(4)
Annoyance	0.0110 [-0.138, 0.160]	0.0110 [-0.139, 0.161]	0.0173 [-0.139, 0.173]	0.0256 [-0.132, 0.183]
Confusion	0.130 [-0.0777, 0.338]	0.121 [-0.0797, 0.321]	0.104 [-0.0933, 0.301]	0.0846 [-0.111, 0.280]
Perturbation	-0.0294 [-0.262, 0.204]	-0.0283 [-0.263, 0.207]	-0.0620 [-0.322, 0.198]	-0.0436 [-0.303, 0.216]
Moved	-0.307 [-0.682, 0.0673]	-0.303 [-0.673, 0.0681]	-0.348* [-0.712, 0.0150]	-0.327* [-0.675, 0.0199]
Praising	-0.0218 [-0.261, 0.218]	-0.0207 [-0.263, 0.221]	-0.0285 [-0.283, 0.226]	0.0243 [-0.246, 0.294]
Positive	0.184 [-0.113, 0.481]	0.186 [-0.114, 0.486]	0.208 [-0.101, 0.516]	0.185 [-0.124, 0.493]
Pro-social and empathic	0.103 [-0.0558, 0.261]	0.103 [-0.0569, 0.263]	0.153* [-0.0249, 0.332]	0.221** [0.00887, 0.433]
Awareness		-0.0959 [-0.755, 0.563]	-0.0760 [-0.697, 0.545]	-0.0683 [-0.687, 0.551]
Control variables I	No	No	No	Yes
Control variables II	No	No	Yes	No
Observations	85	85	85	85
R-squared	0.124	0.247	0.216	0.247

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. To estimate these models, only the sub-sample of participants assigned to the role reversal condition was considered. Ordinary least squares (OLS) were used to estimate the parameters of the regression models. Confidence intervals (at the 95% level of confidence) are displayed in brackets. Robust standard errors were calculated. **Awareness** indicates whether the distributive consequences of decision-maker's possible choices were highlighted during the simulation round. **Control variables I**: age, gender, area of study, predisposition to cognitive perspective-taking, average transfer (Part I), whether participants know someone else participating in the same experimental session. **Control variables II**: same as **Control variables I** excluding gender and average transfer (Part I), which are significantly associated with a change in *pro-social and empathic* emotions (see Appendix 4B1, Table 4B2)

Result 4.3 (regarding Hypothesis 4.2.2): *The change in emotions from the role-reversal experience did, on average, not significantly influence the change in the average transfer.*

Taken together, Result 4.2 and Result 4.3 indicate that, although role reversal does provoke emotional reactions, on average these do not subsequently result in more or less pro-social behaviour. When we consider Hypothesis 4.2 as a whole, we therefore cannot conclude that

⁷² At the significance threshold we set at the beginning as part of the statistical framework for the data analysis: $p < 0.05$

the emotional reactions are the main factors that consistently mediate the relationship between role reversal and the observed patterns of pro-social behaviour in this implementation of the give-and-take dictator game.

Result 4.4 (regarding Hypothesis 4.2): *It cannot be established that emotional reactions consistently mediate the relationship between the role-reversal experience and pro-social behaviour in a give-and-take dictator game.*

4.6 Discussion and conclusions

Our experimental setup allowed us to single out the sole effect of experiencing the other person's position, through role reversal, on pro-social behaviour. It also allowed us to systematically assess the role that emotions play as possible channel whereby this experience could affect behaviour. To the best of our knowledge, no previous research has attempted to single out and assess the effects of inducing perspective-taking through role reversal (i.e. of experiencing the other's position) on pro-social behaviour in a distributive economic situation.

Taking our results together, we can state that experiencing the other person's role can be associated with changes in emotions that would, in principle, influence pro-social behaviour in both positive and negative directions. However, in our setting—a neutrally framed give-and-take dictator game—those reactions did not result in significant average changes in pro-social behaviour. In other words, the perspective-taking experience induced by the unilateral role reversal seems to have had an effect in a varied state of emotions⁷³ which did not translated in significant average changes in the way decision-makers distributed their endowment in the game.

Therefore, in this implementation of a give-and-take dictator game, we did not find support for the hypothesis that taking on the other person's perspective through unilateral role reversal significantly induces more (or less) pro-social behaviour. We did not find effects on either the average value or the distribution of values of the outcome variable. Although the summary statistics initially suggest that a positive relationship between perspective-taking through role reversal and pro-social behaviour may exist, non-parametric tests and regression analyses of the data do not support this preliminary conclusion (i.e. we did not find support for our

⁷³ This can also be noted in Appendix 4B3.1, Table 4B7, where we report the average values of the 29 state of emotions elicited in Part I and Part II of the experiment. In particular, the intensity with which anger, irritation, surprise, compassion and helplessness is felt after the simulation round is higher in the cases where the role reversal occurred.

Hypothesis 4.1). We did find that taking on the other person's role provokes, on average, significant changes in the self-reported emotional states of decision-makers (i.e. we found evidence in favour of our Hypothesis 4.2.1). In particular, *annoyance*, *confusion*, *moved* and *praising* are the groups of emotions on which the experience of role reversal has a significant average effect. According to the literature, these emotions affect pro-social behaviour both negatively (*annoyance* and *confusion*) and positively (*moved* and *praising*). However, the data we collected in our laboratory experiment and the analyses we conducted do not sustain this causal relationship (i.e. we did not find support for Hypothesis 4.2.2.). Correspondingly, we did not find empirical support for the hypothesis that the emotional reactions (consistently) mediate the impact of role reversal on pro-social behaviour (i.e. no support for Hypothesis 4.2).

We put forth three plausible explanations for the results summarised in the couple of above paragraphs. Firstly, the results may suggest the presence of inconsistent mediation or suppressing effects (MacKinnon, Krull and Lockwood 2000; MacKinnon 2008). As suggested in the literature on mediation analysis, the “*relation between the independent variable (i.e. treatment variable) and the dependent variable may be nonsignificant, yet there can still be substantial mediation.*” (MacKinnon 2008, 68). When multiple mediating variables are considered, “*there are specific mediated effects through each mediator, and there is a total mediated effect composed of all the mediated effects*” (120). In these cases, the sign of the mediated effects may differ from one another and from the direct effect of the treatment variable. As a result, these diverging effects may cancel each other out, resulting in a nonsignificant average (total) effect of the treatment variable. These would then be cases of inconsistent mediation (i.e. suppression models) wherein the mediated effect suppresses the direct effect of the treatment variable (MacKinnon et al. 2000). We consider, in fact, seven possible mediator variables (seven groups of emotional reactions regarding the state of 29 elicited emotional states in total) and four of these groups of emotions (*annoyance*, *confusion*, *moved* and *praising*) are significantly affected, on average, by the role-reversal experience. Although nonsignificant, the estimated average effects of these groups of emotions on behaviour indicate that each type of emotion would influence pro-social behaviour either positively or negatively. Therefore, the individual reaction to the role-reversal experience would depend upon the emotional reactions this experience provokes on each individual. When

these individual experiences are aggregated, nonsignificant average treatment effects are observed.⁷⁴

A second plausible explanation indicates the feeble or short-lasting effect that emotions may have on behaviour (Batson 2011). The change in the decision-makers' emotional states after the simulation round may not be enough to sustain an average change in behaviour for the ensuing four rounds. If this is the case, one may find that emotions significantly impact behaviour in the vicinity of the simulation round. As shown in Appendix 4B, Section 4B5, this is not the case, however. There, to explore this explanation, we considered the change in the amount transferred immediately after the simulation round in comparison with the last round preceding this round as an outcome variable. We regressed this new outcome variable in the *Role reversal* and *Awareness* dummies as well as in the control variables as we did with the original outcome variable. Likewise, we regressed this short-run change in transfer on the emotional reactions and the corresponding control variables. In both cases, no significant effect can be established.⁷⁵

Thirdly and finally, we arguably lack the statistical power required to detect significant average effects given the dispersion of the data (see Figure 4.1 and Table 4.2) and the limited size of our sample. In general, the behaviour of participants is rather stable across conditions and there is a noticeable dispersion of data points in the treatment conditions. It is true that the proportion of decision-makers who do not change their average transfer during the second part of the experiment is higher in the *Role reversal* (48%) conditions than in the *No role reversal* (39%) conditions. Nevertheless, the standard deviation of the outcome variable across

⁷⁴ Two pieces of evidence complementing the evidence we report in this paragraph suggest inconsistent mediation is likely the case in the data we collect. Firstly, when regressing a dummy variable that indicates whether the decision-maker changes the average transfer or not on the groups of emotions we consider, we find that emotions can significantly impact the probability of changing the amount transferred in opposing directions. In particular, *annoyance* and *praising* emotions significantly predict a higher probability of change, whereas *confusion* predicts a reduction in this probability (see Table 4B9 in Appendix 4B, Section 4B4). Secondly and finally, “a situation in which the magnitude of the relationship between an independent variable and a dependent variable becomes larger when a third variable is included would indicate suppression” (MacKinnon et al. 2000, 174). As illustrated in Table 4B10, Appendix 4B, Section 4B4, the size of the coefficient estimating the average effect of the role reversal on pro-social behaviour remains positive and is larger when the groupings of emotions are included in the regression. This suggests that the effect of role reversal on pro-social behaviour due to emotions reduces the effect that it would directly have on pro-social behaviour. In general, however, when multiple mediators are considered, it becomes difficult to statistically test for the presence of mediating or suppressing effects (MacKinnon 2008). This is why we leave this as a plausible explanation only, instead of positing it as conclusive result of our analyses.

⁷⁵ Moreover, we found that the proportion of decision-makers who did not change their transfer after the simulation round (59%) is higher than the proportion of decision-makers who did not change their transfer, in average, during the second part of the experiment (44%). These figures also suggest that participants did not change their behaviour immediately afterwards the simulation round.

conditions (see Table 4.2) as well as visual inspection of the data hint at slightly more dispersed data points in the *Role reversal* conditions (see Figure 4.1). Also, in the *Role reversal* conditions, the number of outlier points is higher. This visual inspection of the data also suggests at least three types of decision-makers: those who do not alter their behaviour, those who increase their pro-social behaviour and those who decrease their pro-social behaviour. Larger sample sizes would support powerful statistical analyses to examine which factors (role reversal being one of them) determine these patterns and account for the dispersion observed in the data.

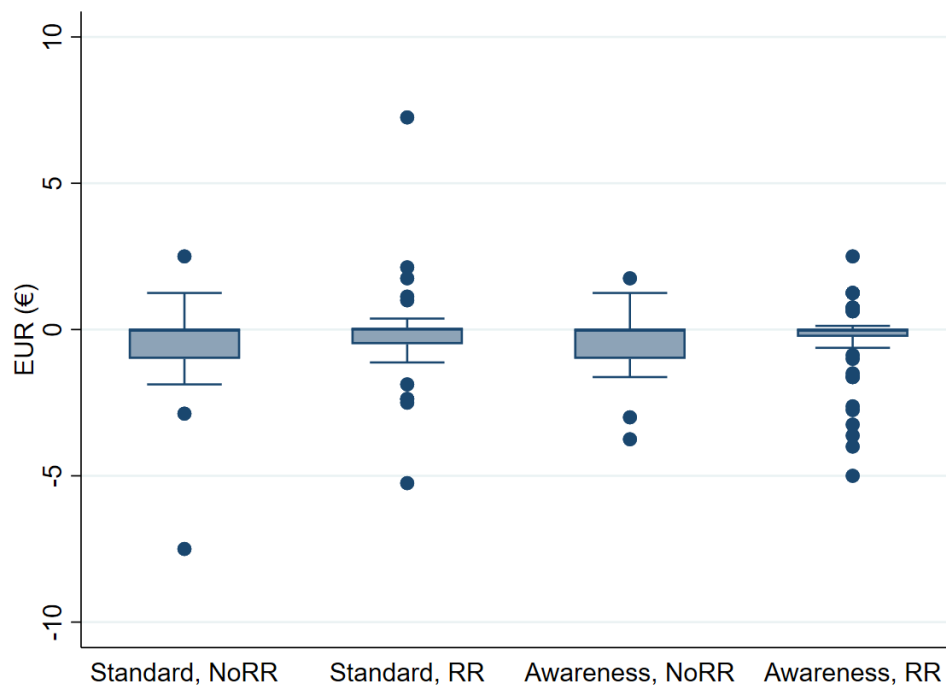


Figure 4.1 Change in the average transfer (*Part II vs Part I*), by condition. Box plot of the outcome variable. *Standard* indicates the conditions wherein decision-makers are presented with the standard choice set and *Awareness* indicates the conditions wherein the distributive consequences of choices were highlighted in the set of choices during the simulation round. *RR* (*NoRR*) indicate the conditions where Role reversal did (not) take place during the simulation round.

Previous research has indicated how sensitive pro-social behaviour tends to be to even the most subtle situational manipulations in dictator games (e.g. Smith 1998; Levitt and List 2007; List 2007; Bardsley 2008; Engel 2011; Dhimi 2016). Having a decision-maker consider another person's perspective would be, in principle, one of those aspects capable of triggering a change in behaviour. From this reasoning, it may be that inducing decision-makers to actively consider the other person's perspective would lead them to behave in a rather pro-social manner towards the person whose perspective is taken on (as indeed suggested by Andreoni and Rao 2011; Czap, Czap, Lynne and Burbach 2015). Adding a caveat to this assertion, previous

research suggests that the effect of inducing perspective-taking on pro-social behaviour depends on the procedures whereby and the context wherein perspective-taking is induced (e.g. Carlson-Sabelli and Sabelli 1984; Epley et al. 2006; Ku et al. 2015). We find that having decision-makers solely experience the other person's position—although enough to trigger a change in emotions and thereby still cause welfare effects⁷⁶—is not enough to significantly induce pro-social behaviour or change aggregate patterns of behaviour in a particular direction in this give-and-take dictator game.

A misreading of our results would be to conclude that solely experiencing—and more generally considering—another person's perspective is altogether irrelevant. It does, in fact, trigger psychological processes that have already been documented in previous literature (e.g. different types of emotional reactions). These processes, however, may vary from one decision-maker to another in terms of who decides to change or not change their behaviour based on their own individual reading of the role-reversal experience and the general situation in which they are embedded.⁷⁷ Moreover, one could posit that the setting we created in our experiment did not provide decision-makers with clear-cut indications of how participants should proceed based upon their role-reversal experience; they experience different emotional reactions none of which straightforwardly indicate in which direction they should adjust their behaviour.⁷⁸ In this case, each individual makes their own interpretation of their particular experience in the specific situation they are in and reacts accordingly. In aggregate, the data would then look dispersed, no average effects would be found and different patterns of behaviour would emerge (as the patten of the data in Figure 4.1 indicates). On the contrary, when communication is allowed (e.g. Czap et al. 2015; Andreoni and Rao 2011), the other person is in a clear situation of need (e.g. Toi and Batson 1982), participants are embedded in competitive or cooperative interactions (Epley et al. 2006), and/or one's own material outcomes are also at stake (e.g. Andreoni and Rao 2011), considering the other person's perspective may provide decision-makers with rather clearer indications regarding the direction in which to adjust their behaviour, if any change is warranted at all. That would not be the case in our setting and the

⁷⁶ We would like to thank Katharina Hembach for drawing our attention to this implication of our results.

⁷⁷ This influences the norms that participants use to guide their behaviour and the perceptions they form to base their decisions on (Smith 1998; Ostrom 2005, 2010; Epley et al. 2006; Levitt and List 2007).

⁷⁸ Furthermore, give-and-take dictator games, in particular, do not provide participants with clear indications on what should be construed as the right thing to do in this situation (List 2007; Dhalmi 2016). Further, interactions within pairs of participants were totally anonymous and silent in our experiment.

possible change, or lack thereof, in other relevant factors may have caused pro-social behaviour to increase, decrease or not to change.

These reflections indicate two directions in which future research endeavours on this topic could be headed. First, replications of this experiment with larger sample sizes could make it possible to identify the factors—one of which being role reversal—explaining the observed diverse behavioural patterns. It may still be the case that standing in the other person's shoes, in and of itself, is not enough to induce a significant average change in pro-social behaviour—or to explain these different patterns of behaviour. Then, future experimental designs could assess, in different settings and contexts, the separate and interactive effects of different manipulations, such as, for instance, role reversal and one-way and/or two-way communication,⁷⁹ aimed at inducing people to consider and weigh the other person's perspective when deciding on particular courses of action. This line of research would account for the fact that role reversal exercises—and perspective-taking exercises, in general—have usually taken place together with debriefing or two-way communication activities within broader processes aimed at promoting understanding (e.g. Carslon-Sabelli and Sabelli 1984), conflict resolution (Deutsch 2006), and social learning and collective action (e.g. Pahl-Wostl and Hare 2004; Gurung et al. 2006).

Chapter 4 references

- Andreoni, James, and Justin M. Rao. 2011. "The power of asking: How communication affects selfishness, empathy, and altruism." *Journal of Public Economics* 95: 513-520. doi:10.1016/j.jpubeco.2010.12.008.
- Andreoni, James, William Harbaugh, and Lise Vesterlund. 2007. "Altruism in Experiments." In *Behavioural and Experimental Economics. The New Palgrave Economics Collection.*, edited by Steven Durlauf and Lawrence Blume. London: Palgrave Macmillan.
- Artinger, Florian, Filippos Exadaktylos, Hannes Koppel, and Lauri Sääksvuori. 2014. "In Others' Shoes: Do Individual Differences in Empathy and Theory of Mind Shape Social Preferences?" *PLOS ONE* 9 (4): e92844.
- Bardsley, Nicholas. 2008. "Dictator game giving: altruism or artefact." *Experimental Economics* 11: 122-133. doi:10.1007/s10683-007-9172-2.
- Batson, C. Daniel. 2011. *Altruism in Humans*. Oxford: Oxford University Press.
- Batson, C. Daniel. 1987. "Prosocial motivation: is it ever truly altruistic?" *Advances in Experimental Social Psychology* 20: 65-122. doi:10.1016/S0065-2601(08)60412-8.
- Batson, C. Daniel, and Tacia Moran. 1999. "Empathy-induced altruism in a prisoner's dilemma." *European Journal of Social Psychology* 29: 909-924. doi:10.1002/(SICI)1099-0992(199911)29:7<909::AID-EJSP965>3.0.CO;2-L.
- Batson, C. Daniel, Shannon Early, and Giovanni Salvarani. 1997. "Perspective Taking: Imagining How Another Feels Versus Imagining How You Would Feel." *Personality and Social Psychology Bulletin* 23 (7): 751-758. doi:10.1177/0146167297237008.

⁷⁹ Or, to borrow again from Epley's (2014) definitions, perspective-taking and perspective-getting.

- Bénabou, Roland, and Jean Tirole. 2006. "Incentives and Prosocial Behavior." *The American Economic Review* 96 (5): 1652-1678.
- Böckler, Anne, Anita Tusche, and Tania Singer. 2016. "The Structure of Human Prosociality: Differentiating Altruistically Motivated, Norm Motivated, Strategically Motivated, and Self-Reported Prosocial Behavior." *Social Psychological and Personality Science* 7 (6): 530-541. doi:10.1177/1948550616639650.
- Bohnet, Iris, and Bruno S. Frey. 1999. "The sound of silence in prisoner's dilemma and dictator games." *Journal of Economic Behavior & Organization* 38: 43-57. doi:10.1007/978-1-4615-5187-4_11.
- Bosman, Ronald, and Frans van Winden. 2002. "Emotional Hazard in a Power-to-Take Experiment." *The Economic Journal* 112 (472): 147-169.
- Bosworth, Steven J., Tania Singer, and Dannis J. Snower. 2016. "Cooperation, motivation and social balance." *Journal of Economic Behavior and Organization* 196: 72-94. doi:10.1016/j.jebo.2015.12.005.
- Bowles, Samuel. 2016. *The Moral Economy. Why Good Incentives are no Substitutes for Good Citizens*. Connecticut: Yale University Press.
- Bowles, Samuel, and Herbert Gintis. 2006. "Pro-social emotions." In *The economy as a complex evolving system III*, edited by Lawrence E. Blume and Steven N. Durlauf, 339-362. Oxford University Press.
- Brandts, Jordi, and Gary Charness. 2011. "The strategy versus the direct-response method: a first." *Experimental Economics* 14: 375-398.
- Cárdenas, Juan Camilo. 2018. "(Real) behavior meets (real) institutions: towards a research agenda on the study of the commons." In *A Research Agenda for New Institutional Economics*, edited by Claude Ménard and Mary M. Shirley, 119-126. Elgar. doi:10.4337/9781788112512.00022.
- Cárdenas, Juan Camilo, and Juan Felipe Ortiz-Riomalo. 2018. "Acción colectiva para abordar conflicto socio-ambientales. El caso de Santurbán." In *Modos de gobernanza del agua y sostenibilidad. Aportes conceptuales y análisis de experiencias en Colombia*, edited by Andrés Hernández Quiñones. Bogotá D.C.: Centro Interdisciplinario de Estudios sobre Desarrollo (CIDER), Ediciones Uniandes, Universidad de los Andes.
- Carlson-Sabelli, Linnea. 1989. "Role reversal: A concept analysis and reinterpretation of the research literature." *Journal of Group Psychotherapy, Psychodrama and Sociometry* 42: 139-152.
- Carlson-Sabelli, Linnea, and Hector Sabelli. 1984. "Reality, perception, and the role reversal." *Journal of Group Psychotherapy, Psychodrama and Sociometry* 36: 162-174.
- Cialdini, Robert B., Stephanie L. Brown, Brian P. Lewis, Carol Luce, and Steven L. Neuberg. 1997. "Reinterpreting the empathy-altruism relationship: When one into one equals oneness." *Journal of Personality and Social Psychology* 73 (3): 481-494. doi:10.1037/0022-3514.73.3.481.
- Cowell, Jason M., Anya Samek, John List, and Jean Decety. 2015. "The Curious Relation between Theory of Mind and Sharing in Preschool Age Children." *PloS ONE* 10 (2): e0117947.
- Czap, Natalia V., Hans J. Czap, Gary Lynne, and Mark E. Burbach. 2015. "Walk in my shoes: Nudging for empathy conservation." *Ecological Economics* 118: 147-158. doi:10.1016/j.ecolecon.2015.07.010.
- Dana, Jason, Daylian M. Cain, and Robyn M. Dawes. 2006. "What you don't know won't hurt me: Costly (but quiet) exit in dictator games." *Organizational Behavior and Human Decision Processes* 100: 193-201. doi:10.1016/j.obhdp.2005.10.001.
- Dana, Jason, Roberto A. Weber, and Jason Xi Kuang. 2007. "Exploiting moral wiggle room: experiments demonstrating an illusory preference for fairness." *Economic Theory* 33: 67-80. doi:10.1007/s00199-006-0153-z.
- Davis, Mark H. 1996. *Empathy. A Social Psychological Approach*. New York: Routledge.
- Davis, Mark H. 1980. *A Multidimensional Approach to Individual Differences in Empathy*. JSAS Catalog of Selected Documents in Psychology, 10.
- Davis, Mark H. 1983a. "Measuring Individual Differences in Empathy: Evidence for a Multidimensional Approach." *Journal of Personality and Social Psychology* 44 (1): 113-126.
- Davis, Mark H. 1983b. "The effects of dispositional empathy on emotional reactions and helping: A multidimensional approach." *Journal of Personality* 51 (2): 167-184.

- Davis, Mark H., Jay G. Hull, Richard D. Young, and Gregory G. Warren. 1987. "Emotional Reactions to Dramatic Film Stimuli: The Influence of Cognitive and Emotional Empathy." *Journal of Personality and Social Psychology* 52 (1): 126-133.
- Deutsch, Morton. 2006. "Justice and Conflict." In *The Handbook of Conflict Resolution: Theory and Practice*, edited by Morton Deutsch, Peter T. Coleman and Eric C. Marcus, 43-68. San Francisco: Jossey-Bass. A Wiley Imprint.
- Dhami, Sanjit. 2016. *The Foundations of Behavioural Economic Analysis*. New York: Oxford University Press.
- Eisenberg, Nancy, and Paul A. Miller. 1987. "The Relation of Empathy to Prosocial and Related Behaviors." *Psychological Bulletin* 101 (1): 91-119. doi:10.1037/0033-2909.101.1.91.
- Engel, Christoph. 2011. "Dictator games: a meta study." *Experimental Economics* 14: 583-610. doi:10.1007/s10683-011-9283-7.
- Epley, Nicholas. 2014. *Mindwise. Why we misunderstand what others think, believe, feel, and want*. Penguin Random House.
- Epley, Nicholas, and Eugene Caruso. 2009. "Perspective Taking: Misstepping Into Others' Shoes." Chap. 20 in *Handbook of imagination and mental simulation*, edited by William M.P. Klein, Julie A. Suhr and Keith D. Markman, 297-311. New York: Psychology Press.
- Epley, Nicholas, Eugene M. Caruso, and Max H. Bazerman. 2006. "When Perspective Taking Increases Taking: Reactive Egoism in Social Interaction." *Journal of Personality and Social Psychology* 91 (5): 872-889. doi:10.1037/0022-3514.91.5.872.
- Erle, Thorsten M., and Sascha Topolinski. 2017. "The Grounded Nature of Psychological Perspective-Taking." *Journal of Personality and Social Psychology* 112 (5): 683-695. doi:10.1037/pspa0000081.
- Étienne, Michel, ed. 2014. *Companion Modelling. A Participatory Approach to Support Sustainable Development*. Éditions Quae, Springer.
- Fehr, Ernst, and Klaus M. Schmidt. 2006. The Economics of Fairness, Reciprocity and Altruism - Experimental Evidence and New Theories. Vol. 1, chap. 8 in *Handbook of the Economics of Giving, Altruism and Reciprocity*, edited by Serge-Christophe Kolm and Jean Mercier Ythier, 615-691. Amsterdam: Elsevier B.V. doi:10.1016/S1574-0714(06)01008-6.
- Fehr, Ernst, and Urs Fischbacher. 2002. "Why social preferences matter - The impact of non-selfish motives on competition, cooperation and incentives." *The Economic Journal* 112: C1-C33.
- Fisher-Yoshida, Beth, and Ilene Wasserman. 2006. "Moral Conflict and Engaging Alternative Perspectives." Edited by Morton Deutsch, Peter T. Coleman and Eric C. Marcus, 560-581. San Francisco: Jossey-Bass. A Wiley Imprint.
- Franzen, Axel, and Sonja Pointner. 2012. "Anonymity in the dictator game revisited." *Journal of Economic Behavior and Organization* 81: 74-81. doi:10.1016/j.jebo.2011.09.005.
- Greiner, Ben. 2015. "Subject pool recruitment procedures: organizing experiments with ORSEE." *Journal of the Economic Science Association* 1: 114-125. doi:https://doi.org/10.1007/s40881-015-0004-4.
- Gurung, Tayan Raj, Francois Bousquet, and Guy Trébuil. 2006. "Companion Modeling, Conflict Resolution, and Institution Building: Sharing Irrigation Water in the Lingmuteychu Watershed, Bhutan." *Ecology and Society* 11 (2): 36 [online] URL: <http://www.ecologyandsociety.org/vol11/iss2/art36/>.
- Hendriks, Achim. 2012. *SoPHIE-Software platform for human interaction experiments*. Osnabrueck: Working Paper, University of Osnabrueck.
- Hoffman, Elizabeth, Kevin McCabe, and Vernon Smith. 1996. "Social Distance and Other-Regarding Behavior in Dictator Games." *The American Economic Review* 86 (3): 653-660.
- Hoffman, Elizabeth, Kevin McCabe, Keith Shachat, and Vernon Smith. 1994. "Preferences, Property Rights, and Anonymity in Bargaining Games." *Games and Economic Behavior* 7: 346-380.
- Iriberry, Nagore, and Pedro Rey-Biel. 2011. "The role of role uncertainty in modified dictator games." *Experimental Economics* 14: 160-180. doi:10.1007/s10683-010-9261-5.
- Johnson, David W. 1971. "Role reversal: A summary and review of the research." *International Journal of Group Tensions* 1 (4): 318-334.
- Jordan, Matthew, Dorsa Amir, and Paul Bloom. 2016. "Are Empathy and Concern Psychologically Distinct?" *Emotion* 16 (8): 1107-1116. doi:10.1037/emo0000228.

- Kellermann, Peter Felix. 1994. "Role reversal in psychodrama." In *Psychodrama since Moreno*, edited by Paul Holmes, Marcia Karp and Michael Watson. London: Routledge.
- Ku, Gilian, Cynthia S. Wang, and Adam D. Galinsky. 2015. "The promise and perversity of perspective-taking in organizations." *Research in Organizational Behavior* 35: 79-102. doi:10.1016/j.riob.2015.07.003.
- Levitt, Steven D., and John A. List. 2007. "What Do Laboratory Experiments Measuring Social Preferences Reveal about the Real World?" *Journal of Economic Perspectives* 21 (2): 153-174. doi:10.1257/jep.21.2.153.
- Lindenberg, Siegwart. 2006. "Prosocial Behavior, Solidarity, and Framing Processes. An Integration of Sociological and Psychological Perspectives." In *Solidarity and Prosocial Behavior*, edited by D Fetchenhauer, A Flache, A. P. Buunk and S. M. Lindenberg, 23-44. Springer US.
- List, John A. 2007. "On the Interpretation of Giving in Dictator Games." *Journal of Political Economy* 115 (3): 482-493. doi:10.1086/519249.
- MacKinnon, David P. 2008. *Introduction to Statistical Mediation Analysis*. New York: Lawrence Erlbaum Associates.
- MacKinnon, David P., Jennifer L. Krull, and Chondra M. Lockwood. 2000. "Equivalence of the Mediation, Confounding and Supression Effect." *Prevention Science* 1: 4.
- Ostrom, Elinor. 2005. *Understanding Institutional Diversity*. Princeton: Princeton University Press.
- Pahl-Wostl, Claudia, and Matt Hare. 2004. "Processes of Social Learning in Integrated Resources Management." *Journal of Community & Applied Social Psychology* 14: 193-206. doi:10.1002/casp.774.
- Paulus, Christoph. 2016. *Der Saarbrücker Persönlichkeitsfragebogen SPF (IRI) zur Messung von Empathie. Psychometrische Evaluation der deutschen Version des Interpersonal Reactivity Index*. <http://psydok.psycharchives.de/jspui/handle/20.500.11780/3343>.
- Reuben, Ernesto, and Frans van Winden. 2010. "Fairness perceptions and prosocial emotions in the power to take." *Journal of Economic Psychology* 31: 908-922.
- Sally, David. 1995. "Conversation and Cooperation in Social Dilemmas. A Meta-Analysis of Experiments from 1958 to 1992." *Rationality and Society* 7: 58-92.
- Sally, David. 2001. "On sympathy and games." *Journal of Economic Behaviour & Organization* 44: 1-30.
- Sandy, Sandra V. 2006. "The Development of Conflict Resolution Skills: Preschool to Adulthood." In *The Handbook of Conflict Resolution Theory and Practice*, edited by Morton Deutsch, Peter T. Coleman and Eric C. Marcus, 356 - 388. Jossey-Bass.
- Simon, C., and M. Étienne. 2010. "A companion modelling approach applied to forest management planning." *Environmental Modelling & Software* 25: 1371-1384.
- Singer, Tania, and Anita Tusche. 2014. "Understanding Others: Brain Mechanisms of Theory of Mind and Empathy." In *Neuroeconomics: Decision Making and the Brain*, edited by Paul W. Glimcher and Ernst Fehr, 513-532. Elsevier.
- Singer, Tania, and Ernst Fehr. 2005. "The Neuroeconomics of Mind Reading and Empathy." *American Economic Review* 95 (2): 340-345.
- Singer, Tania, and Olga M. Klimecki. 2014. "Empathy and Compassion." *Current Biology* 24 (18): R875-R878.
- Small, Deborah A., and George Loewenstein. 2003. "Helping a Victim or Helping the Victim: Altruism and Identifiability." *Journal of Risk and Uncertainty* 26 (1): 5-16.
- Smith, Vernon. 1998. "The Two Faces of Adam Smith." *Southern Economic Journal* 65 (1): 1-19. doi:10.2307/1061349.
- Toi, Miho, and C. Daniel Batson. 1982. "More Evidence that Empathy Is a Source of Altruistic Motivation." *Journal of Personality and Social Psychology* 43 (2): 281 - 292.
- Trötschel, Roman, Joachim Hüffmeier, David D. Loschelder, Katja Schwartz, and Peter M. Gollwitzer. 2011. "Perspective Taking as a Means to Overcome Motivational Barriers in Negotiations: When Putting Oneself Into the Opponent's Shoes Helps to Walk Toward Agreements." *Journal of Personality and Social Psychology* 101 (4): 771-790. doi:10.1037/a0023801.
- van Winden, Frans. 2015. "Political economy with affect: On the role of emotions and relationships in political economics." *European Journal of Political Economy* 40: 298-311.

- Xiao, Erte, and Daniel Houser. 2009. "Avoiding the sharp tongue: Anticipated written messages promote fair economic exchange." *Journal of Economic Psychology* 393-404.
- Zhan, Wei, Catherine Eckel, and Philip J. Grossman. 2017. Does How We Measure Altruism Matter? Playing Both Roles in Dictator Games. Working paper.

Chapter 4 appendixes

Appendix 4A – Experiment procedures, instructions and material

4A1. Procedures and instructions

4A1.1 Procedures (instructions for the research team)

Lab experiment

Getting the experimental sessions started

March and April 2019⁸⁰

Roles

1. The person in charge of the Lab: _____
2. The person in charge of the Mobile Lab and the classroom: _____
3. Person in charge of the experiment: _____

Tasks associated with each role

1. **The person in charge of the lab, during an experimental session:**
 - a. Define the final number of participants (i.e. N)
 - b. Hand out show-up fees to participants not joining the session
 - c. Create the corresponding session in Sophie (the “N/2 Groups” session type)
 - d. Print out participants’ code.
 - e. Separate and organise codes according to the type of player (A or B).
 - f. Distribute Player A codes
 - g. Distribute instructions
 - h. Read instructions
 - i. Solve queries
 - j. Start the experiment (coordinate with the person in charge of the Mobile Lab)

2. **The person in charge of the mobile lab (classroom), during an experimental session:**
 - a. Turn on the tablets (45 – 30 minutes before the beginning of the experiment, preferably)

⁸⁰ The set of instructions employed for these procedures were substantially the same during the implementation of the sessions in 2018; information in Table 4A1 was adjusted accordingly for this experiment. Instructions employed in 2018 are available upon request.

- b. Based on the number of persons participating in the session (N), include in an envelope the (laminated) numbers (from 1 to N)
- c. Mark with masking tape (and a marker) the positions where participants would sit
- d. Distribute the numbers as soon as participants get into the classroom—standing at the entrance of the room, make participants take one number from the envelope.
- e. When it corresponds to, distribute tablets (one by one; see the step-by-step and the general indications on how to use the Mobile Lab, below)
- f. Distribute Player B codes
- g. Distribute instructions
- h. Read instructions
- i. Solve queries

3. Experimenter

a. *Way before an experimental session*

- i. Prepare files for reports (sessions and money)
- ii. Prepare money (organise it and put it in the box, way before the session; it has to be ready to pay the show-up fees for participants not joining the session)

b. *During an experimental session*

- i. Give the person in charge of the Mobile Lab Player B codes.
- ii. Consolidate reports: sessions (initially prepared by the person in charge of the lab), money report, checklist and others.
- iii. Organise and hand out, with the help of one of the lab assistants, the payments at the end of the session.

Lottery

1. The person in charge of the classroom and the Mobile Lab flips a coin to determine whether participants with an even number go to the lab or stay in the room. Table 4A1 defines the outcomes of the lottery for each session (available in a separate printout, as well).

2.

Table 4A1– Lottery outcomes					
Participants with an even number...					
Session	Heads (Kopf)	Tails (Zahl)	Session	Heads (Kopf)	Tails (Zahl)
14	2	1	22	1	2
15	1	2	23	2	1
16	2	1	24	1	2
17	2	1	25	2	1
18	1	2	26	1	2
19	2	1	27	2	1
20	1	2	28	2	1
21	1	2	29	2	1
1	... go to the lab				
2	... stay in the room				

3. Once in their room:

Table 4A2	
Participants in the Lab (Person A):	Participants in the room (Person B):
<ol style="list-style-type: none"> 1. Sit in their cubicle. 2. Receive their codes. 3. Log in to the experiment. 4. Receive and start reading by themselves the general instructions of the experiment. 5. Instructions are read out loud by the person in charge of the lab. 6. Should there not be (further) questions from the side of participants, the experiment is started by the person in charge of the lab. 	<ol style="list-style-type: none"> 1. Sit in the positions marked with masking tape 2. Receive the tablets (which have already been turned on). 3. Receive their codes 4. Log in to the experiment. 5. Receive and start reading by themselves the general instructions of the experiment. 6. Instructions are read out loud by the person in charge of the classroom. 7. Should there not be (further) questions from the side of participants, the experiment is started by the lab assistant in charge of the lab.

Instructions for the lottery to read out loud to participants by the person in charge of the classroom.

*English version*⁸¹

Welcome to the experiment. Before starting, a lottery is going to take place to determine the room where you will participate in the experiment.

*You just have collected a number from 1 to ____ [**Adjust this number according to the total number of participants joining the session**].*

*I will flip a coin to determine the room in which persons holding an even number will participate during the experiment. With _____ [**see Table 4A1 “Lottery outcomes”**], they go to the lab (and participants holding an odd number stay in the room); with ____ [**see Table 4A1 “Lottery outcomes”**], they stay in the room (and participants holding an odd number go to the lab).*

You will receive further instructions as soon as each participant is located in their respective room.

*[The person in charge of the classroom flips the coin] [Option 1:] _____ [**see Table 4A1 “Lottery outcomes”**]! Participants holding an even number, please go to the lab. The rest of the participants, that is, those holding an odd number, please stay in this room.*

*[Option 2:] _____ [**see Table 4A1 “Lottery outcomes”**]! Participants holding an odd number, please go to the lab. The rest of the participants, that is, those holding an even number, please stay in this room.*

[At this point, the persons in charge of the lab and the classroom follow the procedures in Table 4A2]

⁸¹ German version is available upon request.

Notes regarding the tablets

Fabian Heitmann supported the preparation of these notes

General indications participants using the tablets should be reminded of:

- ✓ Explicitly tell participants up front: “Should a problem arise regarding the use of the tablets or during the running of the experiment, please raise your hand and a member of the team will come over your place to help you. If something is not working well and you don’t report it on time, the experiment would be interrupted and its results severely impaired”.
- ✓ Participants should not press the “refresh” (or the back) button. If so, and if for any other reason a participant is logged out of the experiment, they only need to log in with their codes again.
- ✓ The button in the inferior left part of the screen can be used to go back to the previous screen or hide the keyboard if needed. Participants should only use it for the latter purpose. Again, if the back button is pressed they will be logged out of the experiment and will need to log in using their codes.
- ✓ If participants switch the tablets on and no website is showing up after a few minutes, slightly swipe at the screen and click on the circle icon to reload the start page. (Sometimes the University WiFi is too slow and the tablets need some time to connect to it.)
- ✓ There is an admin pin of the Software which will be included in the manual. You only need it for exiting the Kiosk mode. For running the experiment you do **not** need any passwords. Anyhow, if the form for entering the Pin is showing up, press the back button on the bottom left twice.
- ✓ The screens of the tablets will switch off after 5 minutes without user input. To switch them on again, just move them to activate the screen (movement detection sensor)
- ✓ **Do not pile up the tablets** if they are switched on! The touchscreens can be damaged and start not working properly. However, if random things happen on the screen, just totally turn off the tablet and turn it on again.
- ✓ Charge the tablets before the experiment. This needs approximately 6 hours in total (3 hours per tablet and we have loading cables for 24 tablets).

In case one participant’s tablet goes white screen (a problem which, in principle, is currently solved and should not happen again):

- ✓ If a tablet goes into ‘white-screen mode’, the participant using it is provided with another tablet.
- ✓ As soon as there are not additional tablets to replace the disabled ones, the additional group with a tablet going into ‘white-screen mode’ will not be able to continue participating in the experiment.
- ✓ Based on Player B’s code, its pair in the lab is identified, informed of the situation and called out of the room.
- ✓ Participants of these groups will **receive € plus €2,5 (a third of the average earnings) per half an hour spent in the lab since the beginning of the experiment** (considering that the experiment would not last more than 1,5 hours and €7,5 are the average earnings)

4A1.2 Instructions of the experiment⁸²

Thank you for agreeing to participate in this study.

Today you are participating in an economic experiment. For this, you will receive a flat rate of 3 € in cash. In addition to this lump sum, you will receive a further amount of money, depending on the decisions you and the other participants make during today's experiment. You will receive this total payment at the end of the experiment.

All information you give during the experiment is anonymous and will be treated confidentially. It will therefore not be possible for the other participants to attribute the decisions you have made to you. You will receive your payment in a sealed envelope. Accordingly, the persons conducting the study will not be able to assign your decisions to you.

Please note that, in economic experiments like this one, the experimenters are not allowed to deceive the participants. Consequently, you can be sure that all information contained in this handout is true.

During the experiment, communication is forbidden. Therefore, please keep your mobile phones switched off in your pocket. If you have a question, please raise your hand; a member of our team will assist you.

Setup of the experiment:

- Both the other participants in this room and the participants in the other room received the same instructions.
- In this experiment, there are two roles, the role of Person A and the role of Person B.
- When you log in to the program, you will be told which role you will play.
- The participants with whom you are now in the room will have the same role in the experiment as you.
- The participants in the second room will take on the other role.
- Each participant in your room will form a pair with a person from the second room.
- Throughout the experiment, you will only interact with this one person from the second room via the computer terminal or tablets (depending on the room you are in).⁸³

⁸² German version of the instructions is available upon request.

⁸³ As can be noted in the procedures described in the previous section, in all sessions participants assigned to Person A's role make their decisions via computer terminals in the computer room. In turn, participants assigned to Person's B role make their decisions and interacted with their pairs via the tablets of the mobile lab in the classroom.

Procedures of the experiment:

- At the beginning of each round, person A and person B both receive 5 € each.
- Only person A will receive another 5 € in addition.
- Person A must now decide what portion of this additional 5 € they will give to person B. Person A can also transfer a negative amount—i.e. Person A can also take up to 5 € from Person B.
- Consequently, Person A has to choose one of the following amounts between -5 € and +5 € as transfer.

Amount to transfer (€)																				
-5	-4,5	-4	-3,5	-3	-2,5	-2	-1,5	-1	-0,5	0	0,5	1	1,5	2	2,5	3	3,5	4	4,5	5

- For Person A, the result of a round is composed as follows: In addition to the € received at the beginning, there is an extra €, offset against the transfer amount X.
- For Person B, the result of a round is as follows: The result of transfer X is added to the € received at the beginning of the round.
- At the end of each round, both persons will be informed of the result of that round.

At the end of the experiment, one, and only one, of all rounds is randomly selected to determine your payout from the experiment.

4A2. Screenshots – Choice set

4A2.1 Standard setting

Figure 4A1– Set of choices dictators are presented with; *Standard setting*

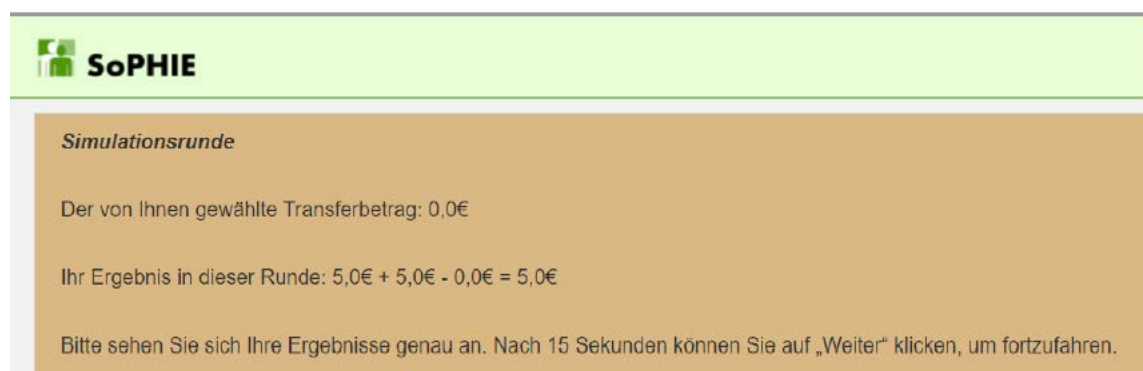
SoPHIE

Simulationsrunde

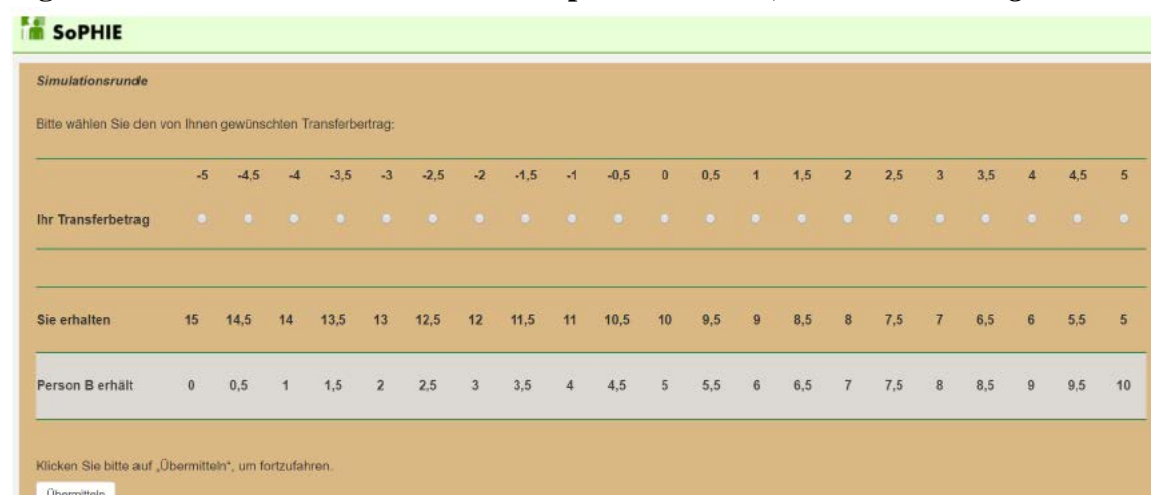
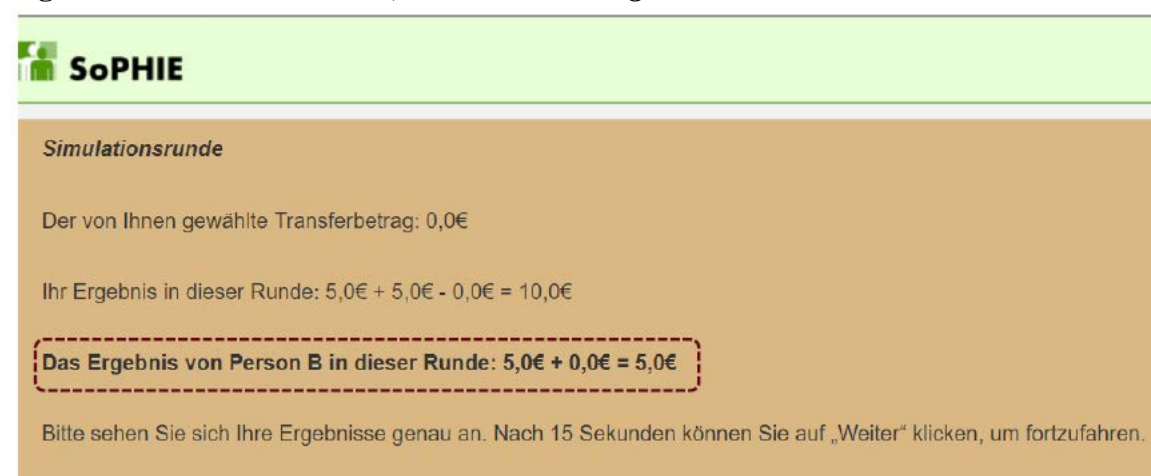
Bitte wählen Sie den von Ihnen gewünschten Transferbetrag:

	-5	-4,5	-4	-3,5	-3	-2,5	-2	-1,5	-1	-0,5	0	0,5	1	1,5	2	2,5	3	3,5	4	4,5	5
Ihr Transferbetrag	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sie erhalten	15	14,5	14	13,5	13	12,5	12	11,5	11	10,5	10	9,5	9	8,5	8	7,5	7	6,5	6	5,5	5

Klicken Sie bitte auf „Übermitteln“, um fortzufahren.

Figure 4A2 – Results screen, *Standard setting*

4A2.2. Awareness setting

Figure 4A3 – Set of choices dictators are presented with; *Awareness setting*Figure 4A4 – Results screen; *Awareness setting*⁸⁴

⁸⁴ Dashed line added in this document to highlight main difference between the awareness setting and the standard setting.

Appendix 4B – Statistical appendix

4B1. Complete results of regression analysis

Table AB1 – Estimation of average treatment effects

<i>Variables</i>	Outcome variable: change in the average transfer (Part II vs. Part I)				
	(1)	(2)	(3)	(4)	(5)
Role Reversal	0.390 [-0.519, 1.299]	0.0546 [-0.810, 0.919]	0.189 [-0.306, 0.684]	0.206 [-0.297, 0.709]	0.0274 [-0.498, 0.553]
Awareness				-0.128 [-0.662, 0.405]	-0.190 [-0.715, 0.334]
<i>Age</i>		-0.0207 [-0.143, 0.101]			-0.0561** [-0.110, -0.00236]
<i>Area of study (econ=1)</i>		-1.293* [-2.654, 0.0683]			-1.098*** [-1.852, -0.344]
<i>Gender (fem=1)</i>		-0.153 [-1.030, 0.724]			-0.169 [-0.659, 0.320]
<i>Dispositions to cognitive perspective-taking</i>		0.579** [0.0536, 1.105]			0.272* [-0.0414, 0.586]
<i>Dispositions to emotional perspective-taking</i>		0.126 [-0.910, 1.163]			0.0913 [-0.561, 0.743]
<i>Dispositions to feeling concern for the well-being of others</i>		-0.126 [-0.733, 0.481]			-0.198 [-0.540, 0.144]
<i>Average transfer (Part I)</i>		-0.190 [-0.461, 0.0817]			-0.0677 [-0.190, 0.0549]
<i>Average transfer (Part I) * Role reversal</i>		-0.0164 [-0.288, 0.255]			-0.0131 [-0.135, 0.109]
<i>Knows someone participating in the same experimental session (Yes=1)</i>		-0.334 [-1.268, 0.600]			-0.193 [-0.820, 0.433]
Constant	-0.492 [-1.099, 0.116]	-0.880 [-4.366, 2.607]	-0.460** [-0.820, -0.0992]	-0.397 [-0.890, 0.0963]	1.027 [-0.754, 2.808]
Control variables included	No	Yes	No	No	Yes
Observations	62	62	144	144	144
R-squared	0.012	0.268	0.004	0.006	0.137

*** p<0.01, ** p<0.05, * p<0.1. A differences-in-differences approach was followed and ordinary least squares (OLS) were used to estimate the parameters of the regression models. Confidence intervals (95% level of confidence) are displayed in brackets. Robust standard errors were calculated. **Role reversal** indicates whether the decision-maker went through the role-reversal experience in the simulation round. **Awareness** indicates whether the distributive consequences of decision-maker's possible choices were highlighted during the simulation round.

Table 4B2 – Estimation of the average effects on groups of emotional reactions

Variables	Annoyance (1)	Confusion (2)	Perturbation (3)	Moved (4)	Praising (5)	Positive (6)	Pro-social and empathic (7)
Role reversal	1.441*** [0.708, 2.173]	0.687*** [0.203, 1.170]	0.227 [-0.240, 0.694]	0.505** [0.0187, 0.992]	1.478*** [1.051, 1.905]	-0.113 [-0.593, 0.367]	-0.272 [-0.855, 0.311]
Information	-0.230 [-1.108, 0.647]	-0.423* [-0.877, 0.0305]	0.00241 [-0.478, 0.483]	0.252 [-0.245, 0.750]	0.0391 [-0.381, 0.459]	-0.0703 [-0.521, 0.381]	0.546 [-0.1111, 2.03]
<i>Gender (Female=1)</i>	-0.154 [-0.977, 0.670]	-0.182 [-0.616, 0.253]	0.153 [-0.279, 0.585]	0.246 [-0.240, 0.732]	0.193 [-0.268, 0.654]	-0.0634 [-0.515, 0.389]	-1.176*** [-1.778, -0.574]
<i>Dispositions to emotional perspective-taking</i>	0.0758 [-1.036, 1.188]	-0.00624 [-0.441, 0.428]	-0.430 [-1.146, 0.286]	0.110 [-0.588, 0.809]	0.296 [-0.159, 0.751]	0.0500 [-0.429, 0.529]	-0.0475 [-0.550, 0.455]
<i>Dispositions to feeling concern for the well- being of others</i>	0.0563 [-0.644, 0.756]	0.0865 [-0.253, 0.426]	0.242 [-0.162, 0.645]	-0.148 [-0.552, 0.257]	-0.108 [-0.462, 0.245]	-0.0215 [-0.350, 0.307]	0.0725 [-0.363, 0.508]
<i>Average transfer (Part I)</i>	0.0105 [-0.0783, 0.0993]	-0.0598 [-0.209, 0.0897]	0.0755 [-0.0224, 0.173]	0.0554 [-0.0668, 0.178]	-0.0259 [-0.0979, 0.0462]	-0.0385 [-0.163, 0.0859]	0.160* [-0.00825, 0.329]
<i>Knows someone in the same experimental session</i>	-0.0604 [-1.122, 1.001]	0.275 [-0.179, 0.728]	-0.271 [-0.935, 0.394]	-0.202 [-0.718, 0.313]	0.169 [-0.342, 0.680]	-0.252 [-0.731, 0.227]	0.225 [-0.477, 0.926]
<i>Average transfer (Part I)*Role reversal</i>	0.00324 [-0.177, 0.184]	0.0880 [-0.0848, 0.261]	-0.0421 [-0.165, 0.0805]	0.0573 [-0.111, 0.225]	0.0611 [-0.0783, 0.200]	-0.0391 [-0.193, 0.115]	0.167 [-0.0620, 0.397]
Constant	-0.865 [-2.168, 0.438]	-0.330 [-1.177, 0.517]	-0.00382 [-0.622, 0.614]	-0.283 [-1.119, 0.553]	-1.258*** [-2.010, -0.505]	0.146 [-0.748, 1.040]	0.536 [-0.734, 1.806]
Control variable included	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	144	144	144	144	144	144	144
R-squared	0.081	0.089	0.062	0.083	0.242	0.032	0.222

*** p<0.01, ** p<0.05, * p<0.1 Ordinary least squares (OLS) were used to estimate the parameters of the regression models. Confidence intervals in squared brackets (95%). Robust standard errors were calculated. **Role reversal** indicates whether the decision-maker went through the role-reversal experience in the simulation round. **Awareness** indicates whether the distributive consequences of decision-maker's possible choices were highlighted during the simulation round.

Table 4B3 – Average effects of emotion on pro-social behaviour

Variables	Outcome variable: Change in the average transfer (Part II vs. Part I)			
	(1)	(2)	(3)	(4)
Annoyance	0.0110 [-0.138, 0.160]	0.0110 [-0.139, 0.161]	0.0173 [-0.139, 0.173]	0.0256 [-0.132, 0.183]
Confusion	0.130 [-0.0777, 0.338]	0.121 [-0.0797, 0.321]	0.104 [-0.0933, 0.301]	0.0846 [-0.111, 0.280]
Perturbation	-0.0294 [-0.262, 0.204]	-0.0283 [-0.263, 0.207]	-0.0620 [-0.322, 0.198]	-0.0436 [-0.303, 0.216]
Moved	-0.307 [-0.682, 0.0673]	-0.303 [-0.673, 0.0681]	-0.348* [-0.712, 0.0150]	-0.327* [-0.675, 0.0199]
Praising	-0.0218 [-0.261, 0.218]	-0.0207 [-0.263, 0.221]	-0.0285 [-0.283, 0.226]	0.0243 [-0.246, 0.294]
Positive	0.184 [-0.113, 0.481]	0.186 [-0.114, 0.486]	0.208 [-0.101, 0.516]	0.185 [-0.124, 0.493]
Pro-social and empathic	0.103 [-0.0558, 0.261]	0.103 [-0.0569, 0.263]	0.153* [-0.0249, 0.332]	0.221** [0.00887, 0.433]
Awareness		-0.0959 [-0.755, 0.563]	-0.0760 [-0.697, 0.545]	-0.0683 [-0.687, 0.551]
<i>Age</i>			-0.0836** [-0.155, -0.0126]	-0.0826** [-0.161, -0.00414]
<i>Area of study (Econ=1)</i>			-0.907* [-1.861, 0.0466]	-1.260** [-2.275, -0.245]
<i>Gender (Female=1)</i>				-0.179 [-0.784, 0.426]
<i>Dispositions to cognitive perspective-taking</i>			0.165 [-0.169, 0.498]	0.188 [-0.154, 0.530]
<i>Know someone participating in the same experimental session</i>			-0.591 [-1.586, 0.403]	-0.477 [-1.455, 0.500]
<i>Average transfer (Part I)</i>				-0.102* [-0.223, 0.0194]
Constant	-0.209 [-0.532, 0.113]	-0.149 [-0.702, 0.404]	1.738* [-0.260, 3.737]	1.661 [-0.674, 3.996]
Observations	85	85	85	85
R-squared	0.124	0.247	0.216	0.247

*** p<0.01, ** p<0.05, * p<0.1. To estimate these models, only the sub-sample of participants assigned to the role reversal condition was considered. Ordinary least squares (OLS) were used to estimate the parameters of the regression models. Confidence intervals (at the 95% level of confidence) are displayed in brackets. Robust standard errors were calculated. **Awareness** indicates whether the distributive consequences of decision-maker's possible choices were highlighted during the simulation round.

4B2. Assessing the effects on the probability of change

Table 4B4 – Ordered probit estimations of marginal effects on type of change in the average transfer (Part II vs. Part I)

Variables	Outcome variable: Type of change in the average transfer	Marginal effects		
	(1)	Probability of decreasing the average transfer (2)	Probability of not changing the average transfer (3)	Probability of changing the average transfer (4)
Role reversal	0.0196 [-0.390, 0.429]	-0.00618 [-0.135, 0.123]	0.00126 [-0.0251, 0.0276]	0.00492 [-0.0980, 0.108]
Awareness	-0.181 [-0.582, 0.219]	0.0572 [-0.0677, 0.182]	-0.0117 [-0.0387, 0.0154]	-0.0456 [-0.146, 0.0546]
Age	-0.120*** [-0.181, -0.0593]	0.0379*** [0.0212, 0.0545]	-0.00771** [-0.0148, -0.000638]	-0.0301*** [-0.0455, -0.0148]
Area of study (Econ=1)	-1.116*** [-1.675, -0.557]	0.352*** [0.199, 0.506]	-0.0718** [-0.138, -0.00506]	-0.280*** [-0.421, -0.140]
Gender (Female=1)	-0.336* [-0.726, 0.0550]	0.106* [-0.0157, 0.227]	-0.0216 [-0.0545, 0.0113]	-0.0843* [-0.180, 0.0116]
Predispositions to cognitive perspective-taking	0.0648 [-0.178, 0.308]	-0.0205 [-0.0972, 0.0563]	0.00417 [-0.0122, 0.0206]	0.0163 [-0.0445, 0.0771]
Predispositions to emotional perspective-taking	0.0675 [-0.279, 0.414]	-0.0213 [-0.130, 0.0878]	0.00434 [-0.0183, 0.0270]	0.0170 [-0.0699, 0.104]
Predispositions to feeling concern for others' well-being	-0.135 [-0.383, 0.113]	0.0427 [-0.0354, 0.121]	-0.00869 [-0.0264, 0.00905]	-0.0340 [-0.0964, 0.0284]
Average transfer (Part I)	0.00502 [-0.0939, 0.104]	-0.00159 [-0.0328, 0.0296]	0.000323 [-0.00607, 0.00671]	0.00126 [-0.0236, 0.0261]
Knows someone participating in the same experimental session	-0.488** [-0.950, -0.0272]	0.154** [0.0140, 0.294]	-0.0314 [-0.0689, 0.00606]	-0.123** [-0.240, -0.00586]
Average transfer (Part I) * Role reversal	-0.0150 [-0.132, 0.102]	0.00473 [-0.0322, 0.0416]	-0.000964 [-0.00865, 0.00672]	-0.00377 [-0.0331, 0.0255]
Observations	144	144	144	144

*** p<0.01, ** p<0.05, * p<0.1. Confidence intervals (at the 95% level of confidence) are displayed in brackets. Robust standard errors were calculated. *Type of change in the average transfer*, the outcome variable, is an ordered categorical variable indicating whether the change in the average transfer from Part I to Part II was negative, zero or positive. Columns 2 – 4 present the results of the estimation of marginal effects on the marginal probabilities of each one of these possible outcomes. **Awareness** indicates whether the distributive consequences of decision-maker's possible choices were highlighted during the simulation round.

Table 4B5 – Probit estimations of marginal effects on the probability of changing the average transfer

Variables	Outcome variable: Whether there was a change in the average transfer or not	Marginal effects
	(1)	(2)
Role reversal	-0.106 [-0.568, 0.356]	-0.0374 [-0.200, 0.125]
Awareness	-0.173 [-0.624, 0.278]	-0.0610 [-0.219, 0.0968]
Age	-0.00681 [-0.0722, 0.0586]	-0.00240 [-0.0254, 0.0206]
Area of study (Econ=1)	0.714** [0.0919, 1.336]	0.252** [0.0442, 0.459]
Gender (Female=1)	0.287 [-0.211, 0.785]	0.101 [-0.0711, 0.273]
Predispositions to cognitive perspective- taking	-0.300** [-0.563, -0.0357]	-0.106** [-0.194, -0.0175]
Predispositions to emotional perspective- taking	0.0654 [-0.330, 0.461]	0.0231 [-0.116, 0.162]
Predispositions to feeling concern for others' well-being	0.116 [-0.205, 0.437]	0.0410 [-0.0714, 0.153]
Average transfer (Part I)	-0.0552 [-0.198, 0.0879]	-0.0195 [-0.0698, 0.0308]
Knows someone participating in the same experimental session	-0.266 [-0.755, 0.222]	-0.0939 [-0.264, 0.0764]
Average transfer (Part I) * Role reversal	0.173** [0.00257, 0.344]	0.0611** [0.00281, 0.119]
Observations	144	144

*** p<0.01, ** p<0.05, * p<0.1. Confidence intervals (at the 95% level of confidence) are displayed in brackets. Robust standard errors were calculated. The outcome variable indicates whether participants changed their average transfer (Part II vs. Part I). **Awareness** indicates whether the distributive consequences of decision-maker's possible choices were highlighted during the simulation round.

4B3. Analysis of emotional reactions**Table 4B6** – List of emotions

No	German	English	Type of emotion
1	<i>Stolz</i>	Pride	Positive
2	<i>Neid</i>	Envy	Negative
3	<i>Aerger</i>	Anger	Negative
4	<i>Schuld</i>	Guilt	Pro-social
5	<i>Freude</i>	Joy	Positive
6	<i>Scham</i>	Shame	Pro-social
7	<i>Irritation</i>	Irritation	Negative
8	<i>Dankbarkeit</i>	Gratitude	Praising
9	<i>Ueberraschung</i>	Surprise	Praising
10	<i>Verachtung</i>	Contempt	Negative
11	<i>Enttaeuschung</i>	Disappointment	Negative
12	<i>Bewunderung</i>	Admiration	Praising
13	<i>Bedauern</i>	Regret	Empathic
14	<i>Mitleid</i>	Pity	Empathic
15	<i>Traurigkeit</i>	Sadness	Negative
16	<i>Mitgefuehl</i>	Sympathy	Empathic
17	<i>Unbehagen</i>	Discomfort	Distressing
18	<i>Hilflosigkeit</i>	Helplessness	Impotence
19	<i>Verzweiflung</i>	Despair	Distressing
20	<i>Beunruhigung</i>	Worry	Distressing
21	<i>Verwirrtheit</i>	Confusion	Negative
22	<i>Barmherzigkeit</i>	Mercy	Empathic
23	<i>Machtlosigkeit</i>	Powerlessness	Impotence
24	<i>Ergriffenheit</i>	Moved	Empathic
25	<i>Beruehrtheit</i>	Touched	Empathic
26	<i>Verstoertheit</i>	Disturbed	Distressing
27	<i>Veraergerung</i>	Annoyance	Distressing
28	<i>Betroffenheit</i>	Concern	Empathic
29	<i>Bekuemmertheit</i>	Sorrow	Empathic

Notes: Emotions listed in the order in which they were presented to participants; order was randomly determined (using Excel's random number generator). Emotions were elicited upon presentation of results in the fourth round of each part of the experiment and in the simulation round. Type of emotion is defined based on the previous literature (i.e. Batson et al. 1997; Reuben and van Winden 2010)

4B3.1 Descriptive statistics

Table 4B7 – Summary statistics of emotional reactions, by treatment condition

Emotion	Standard setting		Awareness setting		Total
	<i>No role reversal</i>	<i>Role reversal</i>	<i>No role reversal</i>	<i>Role reversal</i>	
Anger	-0.2 (1.064)	0.969 (2.321)	-0.207 (0.68)	0.925 (1.76)	0.48 (1.71)
Disappointment	-0.067 (0.254)	0.938 (2.257)	-0.311 (0.61)	0.623 (1.58)	0.37 (1.53)
Envy	-0.1 (0.662)	0.719 (2.052)	-0.207 (0.68)	0.548 (1.8)	0.3 (1.56)
Sadness	-0.067 (0.584)	0.344 (1.383)	-0.069 (0.46)	0.114 (1.33)	0.1 (1.09)
Annoyance	-0.367 (0.89)	0.719 (2.052)	-0.138 (0.7)	0.623 (1.83)	0.29 (1.61)
Irritation	-0.2 (1.92)	1.313 (1.655)	-0.173 (1.52)	-0.076 (1.74)	0.19 (1.81)
Confusion	0.167 (1.744)	0.719 (1.143)	-0.207 (1.3)	0.095 (1.51)	0.19 (1.47)
Worry	-0.467 (1.383)	-0.282 (1.055)	-0.414 (0.95)	-0.284 (1.53)	-0.35 (1.29)
Disturbed	-0.034 (1.13)	0.032 (1.063)	-0.035 (0.5)	0.208 (0.99)	0.07 (0.96)
Touched	-0.034 (0.669)	-0.063 (1.367)	-0.069 (0.97)	0.17 (1.16)	0.03 (1.09)
Moved	-0.234 (0.859)	-0.157 (1.222)	-0.104 (0.73)	0.208 (1.09)	-0.03 (1.02)
Surprise	-0.534 (1.717)	1.032 (2.178)	-0.38 (1.75)	1.453 (2.64)	0.58 (2.35)
Mercy	0.034 (1.474)	-0.844 (1.725)	-0.276 (1.31)	-0.661 (1.77)	-0.48 (1.64)
Joy	-0.634 (1.352)	-1.094 (2.347)	-0.897 (1.27)	-0.717 (2.55)	-0.82 (2.07)
Pride	-0.134 (1.358)	-0.344 (1.004)	-0.621 (1.45)	-0.548 (1.94)	-0.44 (1.55)
Admiration	-0.134 (1.009)	0.688 (1.694)	0 (0.54)	0.774 (1.78)	0.41 (1.48)
Gratitude	-0.667 (1.562)	0.063 (2.501)	-0.483 (1.36)	0.284 (2.53)	-0.12 (2.17)
Compassion	0.067 (1.285)	1.969 (2.251)	-0.138 (0.52)	1.906 (2.29)	1.13 (2.09)
Regret	-0.6 (1.715)	-0.719 (1.871)	-0.138 (1.03)	-0.604 (1.71)	-0.54 (1.63)

Concern	-0.367 (1.13)	-0.219 (1.185)	0.069 (1.14)	-0.189 (1.13)	-0.19 (1.14)
Powerlessness	-1.2 (1.67)	-1.907 (1.907)	-0.966 (1.21)	-1.793 (2.09)	-1.53 (1.84)
Pity	-1.2 (1.955)	-1.5 (2.383)	-0.311 (1.26)	-1.434 (1.97)	-1.18 (1.99)
Shame	-0.934 (1.8)	-1.188 (2.024)	-0.207 (1.38)	-0.736 (1.87)	-0.78 (1.82)
Guilt	-1.167 (1.896)	-1.282 (2.144)	-0.656 (1.15)	-1.397 (2.23)	-1.18 (1.97)
Discomfort	-1.1 (1.517)	-0.813 (1.959)	-0.725 (1.44)	-0.925 (1.95)	-0.9 (1.77)
Sorrow	-0.267 (1.049)	-0.313 (1.12)	-0.138 (0.64)	-0.529 (1.25)	-0.35 (1.08)
Helplessness	-0.2 (1.298)	1.344 (2.089)	-0.138 (0.59)	0.717 (1.87)	0.5 (1.73)
Contempt	-0.334 (1.242)	0.344 (1.335)	-0.104 (0.56)	0.208 (1.27)	0.07 (1.19)
Despair	-0.034 (0.615)	0.25 (1.46)	-0.035 (0.5)	0.114 (0.9)	0.09 (0.95)

Note: The table report the mean and standard deviation (in parenthesis) of each emotional reaction elicited in the experiment. In a 0-6 Likert scale, participants reported the intensity with which they felt each one of the emotions listed after viewing the results of the fourth round in each part of the experiment and the simulation round. Emotional reactions are defined as the change in the self-reported state of emotions from directly before to after the simulation round.

4B3.2 Results of principal component analysis (PCA)

Table 4B8 – Components summarising variance of emotional reactions

Component	1st: Annoyance	2nd: Pro-social and empathic	3rd: Moved	4th: Praising	5th: Confusion	6th: Positive	7th: Perturbation	Unexplained variance
<i>Proportion of variance explained by component</i>	0.24	0.16	0.10	0.06	0.05	0.04	0.041	
<i>Factor loadings, by emotion</i>								
Anger	0.35	0.02	-0.08	0.06	0.07	0.08	0.03	0.22
Disappointment	0.38	-0.01	-0.06	0.02	-0.05	0.10	0.04	0.17
Envy	0.33	-0.13	-0.06	0.05	-0.09	0.02	-0.10	0.23
Sadness	0.35	0.04	0.20	-0.10	0.04	-0.06	-0.28	0.31
Annoyance	0.34	0.04	0.00	0.02	0.04	0.00	0.05	0.23
Irritation	0.05	0.03	-0.01	0.00	0.59	0.03	0.06	0.25
Confusion	-0.04	-0.01	-0.04	0.01	0.63	-0.13	0.04	0.19
Worry	0.03	0.10	-0.01	0.17	-0.13	-0.29	0.39	0.32
Disturbed	-0.01	-0.05	0.03	-0.04	0.14	0.16	0.61	0.27
Touched	-0.01	0.05	0.45	0.08	0.08	0.01	-0.34	0.25
Moved	0.01	-0.07	0.62	-0.05	-0.12	-0.06	0.05	0.25
Surprise	-0.02	0.00	0.36	0.23	0.15	0.02	0.20	0.33
Sympathy	0.00	-0.04	0.04	-0.40	0.23	0.33	-0.10	0.46
Joy	-0.13	0.12	0.11	0.14	0.04	0.36	-0.03	0.31
Pride	0.04	-0.02	-0.08	0.02	-0.12	0.65	0.11	0.24
Admiration	-0.09	0.01	0.18	0.37	0.07	0.13	0.04	0.37
Gratitude	-0.12	0.07	0.17	0.36	-0.03	0.22	0.05	0.32
Mercy	0.21	-0.01	-0.08	0.41	0.14	-0.01	-0.15	0.25
Regret	0.20	0.33	0.00	-0.04	-0.08	0.25	-0.02	0.47
Concern	0.07	0.31	-0.06	0.08	-0.15	-0.05	0.18	0.45
Powerlessness	-0.04	0.31	0.07	-0.23	-0.04	0.04	-0.01	0.32
Pity	-0.09	0.34	0.07	-0.12	-0.08	-0.09	0.05	0.24
Shame	-0.05	0.39	0.07	0.05	-0.02	-0.07	-0.15	0.31
Guilt	-0.01	0.42	-0.09	-0.06	0.16	0.06	-0.08	0.26
Discomfort	0.02	0.42	-0.15	0.16	0.07	-0.08	0.02	0.34
Sorrow	0.06	0.10	0.24	-0.35	0.05	-0.10	0.28	0.32
Helplessness	0.25	0.01	0.03	0.18	0.02	-0.12	0.04	0.40
Contempt	0.30	0.05	0.19	-0.09	0.00	-0.01	0.08	0.40
Despair	0.28	-0.04	0.06	-0.08	-0.03	0.01	0.17	0.38
<i>Overall KMO</i>	0.807							

Notes: Principal component analysis (PCA) of the change in the self-reported state of emotions from directly before to after the simulation round. Reported factors are rotated with orthogonal varimax rotation and account for 64.45% of the variance. Kaiser-Meyer-Olkin (KMO) Test indicates good sample adequacy to conduct PCA ($KMO > 0.8$)

4B4. Evidence of inconsistent mediation or suppressing effects of emotions

Table 4B9 – Probit estimations of marginal effects on the probability of changing the average transfer

Variables	Outcome variable: Whether there was a change in the average transfer or not (Part II vs. Part I)			
	(1)	(2)	(3)	(4)
Annoyance	0.220*** [0.0703, 0.370]	0.0666*** [0.0260, 0.107]	0.186*** [0.0453, 0.328]	0.0626*** [0.0206, 0.105]
Confusion	-0.249** [-0.457, -0.0405]	-0.0753** [-0.136, -0.0149]	-0.231** [-0.446, -0.0169]	-0.0777** [-0.146, -0.00893]
Disturbed	-0.0468 [-0.299, 0.205]	-0.0141 [-0.0900, 0.0617]	-0.0153 [-0.229, 0.198]	-0.00512 [-0.0766, 0.0663]
Moved	0.0214 [-0.187, 0.229]	0.00646 [-0.0565, 0.0694]	0.0475 [-0.137, 0.232]	0.0160 [-0.0458, 0.0777]
Praising	0.199* [-0.0262, 0.425]	0.0603* [-0.00637, 0.127]	0.245** [0.0272, 0.462]	0.0821** [0.0131, 0.151]
Positive	0.329*** [0.0856, 0.573]	0.0996*** [0.0332, 0.166]	0.219* [-0.00535, 0.443]	0.0735** [0.00267, 0.144]
Pro-social	0.216* [-0.000400, 0.433]	0.0655** [0.00273, 0.128]	0.228** [0.0451, 0.411]	0.0766*** [0.0208, 0.132]
Awareness	-0.296 [-0.913, 0.321]	-0.0894 [-0.273, 0.0938]	-0.373 [-0.988, 0.243]	-0.125 [-0.328, 0.0777]
Controls I	Yes	Yes	No	No
Controls II	No	No	Yes	Yes
Observations	85	85	85	85

*** p<0.01, ** p<0.05, * p<0.1. To estimate these models, only the sub-sample of participants assigned to the role reversal condition was considered. Confidence intervals (at the 95% level of confidence) are displayed in brackets. **Awareness** indicates whether the distributive consequences of decision-maker's possible choices were highlighted during the simulation round. Model 1 and Model 3 are the results of estimated probit models. Model 2 and Model 4 present the results of the estimated marginal effects on the probability of changing the average transfer (Part II vs. Part I). **Control variables I:** age, gender, area of study, predisposition to cognitive perspective-taking, average transfer (Part I), whether participants know someone else participating in the same experimental session. **Control variables II:** same as *Control variables I* excluding gender and average transfer (Part I).

Table 4B10 – Regression analysis on the possibility of inconsistent mediation

Variables	Outcome variable: change in the average transfer (Part II vs. Part I)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Role reversal	0.390	0.636	0.748	0.189	0.206	0.304	0.275
	[-0.519, 1.299]	[-0.530, 1.801]	[-0.370, 1.866]	[-0.306, -0.306]	[-0.297, -0.297]	[-0.256, -0.256]	[-0.281, -0.281]
Awareness	No	No	No	No	Yes	Yes	Yes
Emotional reactions	No	Yes	Yes	No	No	Yes	Yes
Controls	No	No	Yes	No	No	No	Yes
Observations	62	62	62	144	144	144	144
R-squared	0.012	0.155	0.368	0.004	0.006	0.070	0.196

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Confidence intervals (at the 95% level of confidence) are displayed in brackets. Robust standard errors were estimated. Size of the coefficient of **Role reversal** increases when the groups of emotional reactions (the mediating variables) are included in the estimations. This would indicate that, together, emotional reactions may be suppressing the average positive effect of role reversal on pro-social behaviour. **Role reversal** indicates whether the decision-maker went through the role-reversal experience in the simulation round. **Awareness** indicates whether the distributive consequences of decision-maker's possible choices were highlighted during the simulation round. **Emotional reactions** include the seven components that summarise 69% of the total variance in the emotional reactions of participants. Models 1 – 3 use the data of participants assigned to the *Standard setting*. Models 4 – 7 use data from the whole sub-sample of participants considered for this study. **Control variables considered:** age, are of study, predispositions to cognitive perspective taking, whether the participant knows someone else participating in the same experimental session

4B5. Evidence on short run effects

Table 4B11 – Estimation of short-run average effects

Variables	Outcome variable: change in the average transfer (first round Part II vs. fourth round Part I)			
	(1)	(2)	(3)	(4)
Annoyance	-0.0131 [-0.330, -0.330]	-0.0131 [-0.332, -0.332]	0.0155 [-0.300, -0.300]	-0.00355 [-0.322, -0.322]
Confusion	-0.309 [-0.765, -0.765]	-0.308 [-0.812, -0.812]	-0.318 [-0.779, -0.779]	-0.292 [-0.743, -0.743]
Disturbed	-0.223 [-0.660, -0.660]	-0.223 [-0.664, -0.664]	-0.299 [-0.770, -0.770]	-0.308 [-0.738, -0.738]
Moved	-0.299 [-0.741, -0.741]	-0.299 [-0.754, -0.754]	-0.371* [-0.809, -0.809]	-0.388* [-0.834, -0.834]
Praising	0.119 [-0.273, -0.273]	0.119 [-0.270, -0.270]	0.206 [-0.250, -0.250]	0.117 [-0.298, -0.298]
Positive	0.0903 [-0.317, -0.317]	0.0901 [-0.320, -0.320]	0.0924 [-0.310, -0.310]	0.116 [-0.295, -0.295]
Pro-social and empathic	0.315* [-0.0107, -0.0107]	0.315* [-0.0127, -0.0127]	0.533** [0.100, 0.100]	0.406** [0.0693, 0.0693]
Awareness		0.0106 [-1.413, -1.413]	0.00697 [-1.347, -1.347]	0.0293 [-1.375, -1.375]
Control variables I	No	No	Yes	No
Control variables II	No	No	No	Yes
Observations	85	85	85	85
R-squared	0.103	0.103	0.208	0.187

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Ordinary least squares (OLS) were used to estimate the parameters of the regression models. Confidence intervals (at the 95% level of confidence) are displayed in brackets. Robust standard errors were estimated. **Awareness** indicates whether the distributive consequences of decision-maker's possible choices were highlighted during the simulation round. **Control variables I**: age, gender, are of study, predispositions to cognitive perspective taking, whether the participant knows someone else participating in the same experimental session, average transfer in the first part of the experiment. **Control variables II** do not include gender and the average transfer in Part I of the experiment

Finally, nonparametric tests indicate that the distribution of the outcome variable does not differ between treatment and control conditions in either the *Standard setting* (outcome variable: short-run change in the average transfer—first round Part II vs. fourth round Part I; *Role reversal vs No role reversal, Standard setting*; Wilcoxon rank-sum test, $z = 0.92$, $p - value = 0.9269$; Kolmogorov Smirnov test, $D = 0.0792$, $p - value = 1.000$) or the *Awareness setting* (outcome variable: change in the average transfer (first round Part II vs. fourth round Part I); *Role reversal vs No role reversal, Awareness setting*; Wilcoxon rank-sum test, $z = 0.174$, $p - value = 0.8617$; Kolmogorov Smirnov test, $= 0.1034$, $p - value = 0.969$)

Chapter 5: Perspective-taking for pro-social behaviour in watershed management⁸⁵

Juan Felipe Ortiz-Riomalo, Ann-Kathrin Koessler, and Stefanie Engel

Abstract: One way to encourage pro-social behaviour is through economic incentives. The environmental effectiveness and political feasibility of these economic incentives, however, may be diminished by the asymmetries and inequalities found in complex socio-ecological systems like watersheds. Complementary approaches are necessary to overcome these constraints and promote pro-social behaviour. In this study, we assess the potential of inducing perspective-taking—a tool commonly used in participatory interventions—to promote pro-social behaviour in watershed management. To isolate the effect of inducing-perspective, we conduct a lab-in-the-field experiment with downstream farmers in a Peruvian watershed. They are induced to take on upstream farmers’ perspectives before deciding on a donation that will help upstream farmers to improve their wellbeing without compromising the water supply downstream. To sort out the effect of inducing-perspective-taking, the behaviour of downstream farmers in the treatment condition is compared with the behaviour of the farmers assigned to control groups in which perspective-taking is not induced. We find that higher pro-social behaviour can be associated with the perspective-taking procedures of the treatment condition and that this effect cannot be accounted for by receiving additional information on the social and ecological characteristics of the watershed during the perspective-taking exercise. The results provide insights into the extent to which and the conditions wherein inducing perspective-taking can in fact promote pro-social behaviour in complex social-ecological contexts where social inequalities may hamper the adoption and effectiveness of conventional policy approaches.

Keywords: perspective-taking, pro-social behaviour, externalities, natural resource management, watershed management, participatory interventions

JEL: D01, D62, D63, D64, D91, C93 H23, Q25, Q57

⁸⁵ On 8 August 2020, an improved version of this chapter was submitted to the *Journal of Environmental Economics and Management* under the title “Inducing perspective-taking for pro-social behaviour in natural resource management”.

5.1 Introduction

Many environmental problems are related to the presence of (negative or positive) externalities. One classic example of paramount externalities is water quantity and water quality in watersheds, where upstream activities affect downstream water services (Ovando and Brouwer 2019). On the one hand, the use of polluting inputs upstream negatively affects water quality downstream. On the other hand, the adoption of environmental-friendly land use practices upstream can positively influence water quantity and quality for downstream users (Cardenas, Rodriguez and Johnson 2011; Engel and Schaefer 2013; Lopes et al. 2019). As a result of these externalities, water-related services are under-provided and water is over-appropriated (Cardenas et al. 2011; Engel and Schaefer 2013). Furthermore, these external effects may also be associated with inequitable costs and benefits associated with water provision and water regulation.

Environmental economics proposes the implementation of economic incentives to address externalities and promote pro-social behaviour. Yet introducing economic incentives often has equity implications. For example, upstream and downstream users of watersheds often differ in wealth and general living conditions; social heterogeneity between upstream and downstream users (e.g. rural vs. urban) often prevails (Reddy 2000; Swallow, Garrity and van Noordwijk 2001). In these challenging conditions, regulation may lose its capacity to effectively deliver optimal outcomes (e.g. Baland and Platteau 1998, 1999; Cardenas 2003). There are at least three barriers to the successful and effective implementation of economic incentives.

First, from a political economic perspective, implementing economic incentives can fuel debates revolving around diverging perspectives upon underlying property rights. For example, the increasingly popular approach of paying upstream users for water services (payments for environmental services or PES) and financing these via a water tariff levied on downstream users implies a steward-rewarded and beneficiary-pays principle (Engel, Pagiola and Wunder 2008), which may not coincide with how downstream users view the situation. This may then lead to strong opposition against the proposed policy. Similarly, a tax on upstream water users implies a polluter-pays approach, which may well be opposed by upstream users who might argue that they should have the right to decide freely about their land use and that adopting

conservation practices to the benefit of downstream users needs to be compensated.⁸⁶ Sharp geographical and social distances among heterogeneous resource users holding different perspectives of the same situation may make the internalisation of externalities via economic incentives even less likely (Cardenas et al. 2011; Muradian and Rival 2012).

Second, economic incentives are primarily predicated upon the assumption that people are unboundedly rational and primarily motivated by their own self-interest (Bowles and Polanía-Reyes 2012; Bowles 2014). However, although people do care about their own outcomes, they also care about norms, values, the wellbeing of others and procedural fairness (Ostrom 2000, 2005; Dal Bó, Foster and Putterman 2010; Carlsson and Johansson-Stenman 2012; Bowles and Polanía-Reyes 2012; Dhimi 2016). Primarily appealing to their self-interested motivation could result in counterproductive outcomes by crowding out intrinsic motivations to reduce environmental damages (Cardenas, Stranlund and Willis 2000; Bowles 2008). Recently, a growing body of research in behavioural economics has demonstrated, for instance, that perceptions of unfairness can reduce the effectiveness of economic incentives by crowding out intrinsic motivations to protect the environment (Rode, Gómez-Baggethun and Krause 2015; Lliso, Mariel, Pascual and Engel 2020a; Lliso, Pascual, Engel and Mariel 2020b), reducing compliance with policies (e.g. the conditionality of PES) or even sabotaging environmental improvements (Pascual, Muradian, Rodríguez and Duraiappah 2010; Corbera and Pascual 2012; Pascual et al. 2014).

Third, the implementation of PES in some cases is left to voluntary, so-called user-financed initiatives (Wunder, Engel and Pagiola 2008). Yet these rely on the willingness of downstream users to voluntarily contribute to financing the corresponding activities (Pfaff et al. 2019). This willingness may again be affected by how equitable downstream users perceive the approach to be as well as by the aforementioned externality problems and property rights concerns.

In all these situations, complementary approaches are needed to increase acceptance and perceived equity to enhance the feasibility and effectiveness of economic incentive approaches. More generally, all these situations warrant complementary approaches that take into

⁸⁶ In-depth discussions of property regimes for natural resource management can be found in Schlager and Ostrom (1992) and Baland and Platteau (1996). Specific to the case of water resources management, different aspects of the discussion around the definition, allocation and exertion of property rights are detailed in Swallow et al. (2001), FAO (2002, 24-32, in particular), Kerr (2007), Meinzen-Dick (2014). Hodgson (2004) delves into the legal dimension of the interaction between and definition of land and water rights.

consideration these diverse perspectives of heterogeneous actors, the complexity of human behaviour and the broader context in which behaviour is embedded.

One of those complementary policy approaches to promote pro-social behaviour for natural resource management is the inducement of perspective-taking (as reviewed by Wald et al. 2017). Inducing resource users to realise, understand and consider others' perspectives and the existence of mutual dependencies would contribute to the realisation of better outcomes in resource management situations like water resources systems characterised by sharp asymmetries among resource users (Ostrom and Gardner 1993; Lubell and Lippert 2011). In this line of reasoning, participatory and collaborative approaches tend to actively induce resource users—as well as resource managers, practitioners and policy makers—to consider each other's perspectives as a way to build shared understandings and collective agreements (Pahl-Wostl and Hare 2004; Gurung, Bousquet and Trébuil 2006; Carr, Blöschl and Loucks 2012; von Korff et al. 2012; Medema et al. 2016; Cárdenas and Ortiz-Riomalo 2018). In principle, this mutual understanding could induce the actors involved to consider the consequences of their actions on others and, by aligning their decisions with collective ends, contribute to realising better social and ecological outcomes.

Yet systematic analyses on the potential for inducing perspective-taking to promote pro-social behaviour—and thereby contribute to delivering socially desirable outcomes in resource management situations—are still warranted. Arguably, various other methods and processes that participatory processes comprise confound the effect of inducing decision-makers to take on the perspectives of others. Often, the perspective-taking exercise is combined with processes of communication and information exchange aimed at building shared and in-depth understandings of complex resource and social systems dynamics (Ansell and Gash 2008; Pahl-Wostl 2002; Voinov and Bousquet 2010). Moreover, the broader context moulds the final effects participatory interventions can ultimately deliver in terms of social and ecological outcomes (Beierle and Cayford 2002; Fritsch and Newig 2012). All these aspects need to be accounted for and controlled for to tease out the effects on pro-social behaviour of inducing perspective-taking.

Experimental research in social psychology (e.g. Batson 1987; Epley, Caruso and Bazerman 2006; Epley and Caruso 2009; Erle and Topolinski 2017), economics (e.g. Andreoni and Rao 2011; Czap, Czap, Lynne and Burbach 2015) and resource management (e.g. Wald et al. 2017) has been able to establish clearer connections between the inducement of perspective-

taking and changes in pro-social behaviour. Results from this research suggest that the final effect on pro-social behaviour would depend on the perspective-taking procedures and context (Epley et al. 2006; Ku, Wang and Galinsky 2015). In simulated environments that closely resemble the contexts wherein resource users make their day-to-day operational decisions, recent experimental studies with US university students have pointed at positive (Czap et al. 2015) and negative (Wald et al 2017) effects of inducing perspective-taking. Notwithstanding these contributions, in these studies the observed average treatment effects are arguably confounded with the effects triggered by other variables. In particular, they are likely to be confounded with the effects of making decisions in strategic settings (e.g. Epley et al. 2006), with the effects of allowing for (controlled) communication between participants (e.g. Andreoni and Rao 2011; Czap et al. 2015) and with the effects of swapping roles in action situations wherein the decisions taken have actual implications in final outcomes (e.g. Andreoni and Rao 2011; Wald et al. 2017).⁸⁷ Hence, the sole effect of inducing perspective-taking on the pro-social actions of actual resource users has yet to be clarified. With our study, we build upon these previous contributions and seek to contribute to bridging this gap.

In a framed lab-in-the-field experiment we induce downstream farmers in an Andean watershed in Peru to take on the perspective of upstream farmers before deciding on their donation to an initiative in the upper watershed. Specifically, downstream farmers in treatment groups are induced to imagine upstream farmers' perspectives while watching a video on the social-ecological characteristics of the watershed and the socioeconomic characteristics of upstream farmers. After the video, these farmers, through a perspective-taking task we detail below (in Section 5.3), were induced to imagine how much of their endowment upstream farmers would like them to transfer to the initiative. The initiative seeks to contribute to securing upstream farmers' livelihoods and expanding their sources of income without compromising the conservation of those natural areas that water provision in the watershed hinges on. To sort out the effect of inducing perspective-taking, we compare the behaviour of downstream farmers in the treatment condition with behaviour of farmers assigned to control conditions wherein no perspective-taking takes place.

⁸⁷ Erle and Topolinski (2017) contribute to identifying specific procedures and mechanisms whereby inducing perspective-taking would trigger behavioural changes. Pro-social behaviour is not amongst their outcome variables, however. These authors assess the impact of visuospatial perspective-taking on perceived closeness and sympathy.

Downstream farmers assigned to the treatment condition demonstrate higher pro-social behaviour than those farmers who were not assigned to the treatment condition. The experiment we designed allows for the association of this observed difference in pro-social behaviour with our perspective-taking procedures. We can also sustain that this effect is not fully explained by the fact of receiving, through a video, additional information on the social and ecological characteristics of the watershed during the perspective-taking exercise. These effects hold when controlling, in addition, for farmers' socioeconomic traits.

Our results contribute to expanding our understanding of the potential of perspective-taking to promote pro-social actions in natural resource management. According to our results, the set of procedures we implemented can be associated with pro-social actions that may subsequently contribute to the realisation of better social and ecological outcomes in a watershed context. They also supply evidence regarding the procedures whereby and the specific context wherein inducing perspective-taking could be associated with positive effects on pro-social behaviour.

The remainder of the chapter is structured as follows. Firstly, the characteristics of the case in which we conducted our experiment are presented in the next section (Section 5.2). In Section 5.3, we describe our experimental design and implementation procedure. In Section 5.4 we present our research hypotheses, and in Section 5.5 we report the results. Section 5.6 discusses possible alternative interpretations as well as the implications and limitations of our results and concludes.

5.2 The case: an Andean watershed

Our study took place in the watershed of the Cañete River, located in the Lima region, southeast of the Peruvian capital. Similar to other places in the Andean region, water rises in high mountain ecosystems and feeds urban population centres and agricultural land irrigation in the lower watershed. Whereas the clean water supply primarily benefits farmers and dwellers downstream, the costs of the provisioning activities are generally borne by low-income communities upstream (particularly, the costs of conservation activities high in the mountains) (Quintero, Tapasco and Pareja 2013; Francesconi et al. 2016, 2018).

The Cañete River Watershed is one of the most stable water sources in Peru. It provides the basis for a flourishing agricultural sector in the lower watershed. These agricultural activities in the lower watershed are mainly carried out by small and medium-sized farms

which consume about 70 percent of the available surface water (Quintero et al. 2013). The stable water supply enables the farmers to transform their land into fertile soil while the proximity to Lima and Cañete as well as access to roads along the Pacific coast facilitate commercialisation of their agricultural products.

Farmers in the upper watershed, on the other hand, face hardships such as limited access to a stable supply of water, as well as limited access to markets and poor infrastructure. In 2009, official figures⁸⁸ indicated that the poverty rate of the ten upstream districts where most of the water flow is sourced (Quintero et al. 2013) averaged 40.1%. In contrast, 28.5% was, on average, the poverty rate of the districts integrating the province of Cañete—i.e. the beneficiaries of a stable and sufficient water supply downstream.⁸⁹ This contrast—in which water supply is sourced and water flow is regulated upstream while the benefits of the stable water supply are harvested downstream—is not uncommon in other watersheds in Peru and in the Andean region.

To contribute to redressing these imbalances between the lower and upper regions of the Cañete River Watershed, the community leaders and the management committee of the *Nor Yauyos Cochas* Landscape Reserve (RPNYC)⁹⁰ in the upper watershed have proposed organising an agroecological fair. The objective of the fair is to help upstream farmers commercialise their products. To that end, the fair is organised during the tourist seasons in the landscape reserve to help upstream farmers market their products. Only farmers using organic methods and following the land management practices prescribed by the regulations of the landscape reserve are eligible to join the fair. These regulations are intended to preserve the key functions of the ecosystem on which the water provision hinges. Therefore, the fair is set

⁸⁸ National census carried out by the *Instituto Nacional de Estadística e Informática* (INEI; Peru's national bureau of statistics) in 2009

⁸⁹ In 2017, according to the Peruvian bureau of statistics (the INEI), the average percentage of households living with at least one unsatisfied basic need was 47.44 percent for these same ten districts located in the upper watershed. Almost the half of that figure (23.3 percent) was the proportion of households living with at least one unsatisfied basic need in Cañete province that same year.

⁹⁰ The RPNYC is a nature protected area belonging to the Peruvian national system of nature protected areas. It was the first protected area on its category created during the first decade of the 2000s. Its main aim is to guarantee the protection and sustainable management of the landscapes on which sociocultural and socioeconomic activities as well as water provision and water regulation in the Cañete River Watershed depend (RPNYC 2016). The managing committee of the RPNYC is integrated by representatives of the authorities of the administrative districts that integrate the reserve, the community organisations and the managing chief of the RPNYC. The managing committee and the community leaders have closely collaborated in the planning and organisation of the agro-ecological fair.

to secure the livelihoods of upstream farmers and possibly expand their incomes without compromising water provision and water regulation downstream.

We investigate whether inducing downstream farmers to consider the perspective of upstream farmers motivates them to support the agroecological fair initiative. Inasmuch as contributing to the fair entails forfeiting personal gains in favour of the wellbeing of upstream farmers, the decision (not) to contribute to the fair gives us a measure of pro-social behaviour. In general, this case lets us assess the potential of inducing perspective-taking to influence pro-social behaviour, in an actual watershed management context, for improving watershed management outcomes.

5.3 Data and methods: experimental design and procedures

To address our research questions, we conducted a lab-in-the-field economic experiment framed within the context of the upstream-downstream dynamics of the Cañete River Watershed. In this section, we briefly present and describe the treatment and control conditions as well as the experimental and sampling procedures used (for detailed descriptions, see Appendices 5A and 5B). Towards the end of this section, Table 5.1 summarises the main features of the treatment and control conditions as well as the steps followed in each stage.

5.3.1 The choice task

Upon arrival to the session, downstream farmers received PEN S/16 (sixteen Peruvian soles ~ €4.50), in PEN S/1 coins. This endowment was presented to farmers as compensation for travelling to the venue and attending a two-hour meeting to share their opinions on and perceptions of agriculture in Cañete with the research team from Osnabrueck University.⁹¹ The sum of PEN S/16 was based on semi-structured interviews and a questionnaire applied in the pilot survey whereby we elicited information about average daily incomes. Hence, the PEN S/16 approximates the average opportunity costs of the farmers from participating.

In each session, the farmers had to decide how much of their endowment to transfer, if any, to the agroecological fair described in the previous section above. They were asked to choose an integer between PEN S/0 and PEN S/16 to donate to the fair. All farmers across

⁹¹ The phrases economic experiment or economic game were neither used in the participant recruitment phase nor during the session. Instead, the noun phrase ‘group dynamic exercise’ (“*ejercicio dinámico*”, in Spanish) was preferred and used.

treatment and control conditions received the same basic information about the purpose, aim, and rules of the fair. Furthermore, farmers were informed that their decision was anonymous and that there was no right or wrong decision. Both the general instructions for this task and the general information on the agroecological fair were presented by the researchers to all farmers—read out loud with slides for visualization (see Appendix 5A; the materials used during the experiment are available upon request).

5.3.2 Information on the social and ecological conditions of the watershed

A short video clip (4'25") was presented to the farmers before their choice task outlined above. The video presented the downstream farmers with the context of the fair and outlined the social-ecological conditions in the watershed. The video introduces and describes the main ecological features and functions of the watershed, highlights that water provision is the main service provided in the watershed and describes the agricultural activities of the lower watershed that are reliant upon this water provision. It includes original footage of the ecosystems in the upper watershed and of the agriculture in the lower and middle watersheds. In the video, upstream farmers describe their activities, the challenges they face and the agroecological fair. In addition to describing the fair, upstream farmers interviewed explain how the fair could contribute to meeting the challenges facing their agriculture activities.⁹²

5.3.3 The treatment condition: Perspective-taking procedures

Before viewing the video, downstream farmers in the treatment condition (*Treatment: Info + Video + Perspective-taking*) were instructed to watch the video from the perspective of the upstream farmers. Specifically, farmers were instructed to imagine the thoughts and feelings of people living upstream in the situation depicted in the video.

After watching the video, downstream farmers were instructed to imagine how much of their PEN S/16 endowment the upstream farmers would like to receive. They were asked to write down, in a half-page format, the amount they think upstream farmers would like to receive and the reasons for their answer. They performed this exercise in a private booth located in a room resembling the upper watershed, different from the room wherein the main

⁹² The video used during the experiment is available upon request.

instructions were received and from the room wherein the choice task was conducted. We labelled this room *parte alta de la cuenca* (“upper watershed”, in Spanish).^{93, 94}

5.3.4 Control conditions

The video may have influenced farmers’ decisions in the choice task purely by the new information it provided. Moreover, simply watching the video may have sufficed to induce downstream farmers to consider upstream farmers’ perspectives. To assess whether the effects of the perspective-taking-inducing manipulations are totally or partially due to the information on the watershed the video conveys, we conducted one control condition (*Info + Video*) in which we only played the video. Instead of the perspective-taking instructions, we instructed farmers to pay attention to all (factual) information provided in the video.

Furthermore, to isolate the effects of the video and the perspective-taking procedures, we conducted a second control condition (*Info only*). In this condition, farmers received only the general information on the fair included in the general instructions on the choice task and the questionnaire read out loud by the experimenter. In *Info only* neither the video was displayed nor were the perspective-taking procedures carried out. Table 5.1 synthesises our procedures and highlights the main differences between the treatment and control conditions.

5.3.5 Variables measured

As in any other studies on dictator games (Engel 2011) and donations to charity (Vesterlund 2016), we used the amount donated to the agroecological fair as a measurement variable for pro-social behaviour. In a complementary pre-and post-experimental survey we additionally elicited data based on variables which are suggested as covariates by the literature on dictator games (Engel 2011) and donations to charity (Vesterlund 2016). The full

⁹³ We implemented all these procedures to ensure that downstream farmers do take on the upstream farmers’ perspectives and that the ensuing observed behaviour can be linked to these perspective-taking procedures.

⁹⁴ In the literature, there have been basically two general modes of inducing perspective-taking (Davis 1996; Batson, Early and Salvarani 1997). Firstly, decision-makers could be instructed to imagine how they would feel if they were experiencing the other’s position in a given situation (i.e. through *imagine-self* instructions). Secondly, they can be instructed to imagine how the other feels in a given situation (i.e. *imagine-other* procedures). As can be noted, the procedures implemented to induce perspective-taking in our experiment followed an *imagine-other* protocol to induce perspective-taking. To give an idea on how it would have looked like in our experiment setup, an *Imagine-self* set of instruction would have instead prompted downstream farmers to imagine themselves in the shoes of upstream farmers, and from that position think of the amount they, if they were in the position of upstream farmers, would like to receive. Instead, in our experiment, downstream farmers were induced to imagining what donations the upstream farmers would like to receive (i.e. to imagine the other’s perspective).

questionnaire is available in the supplementary material. Here we only present the critical variables we consider in our analysis.

In the first part of the survey we asked about the age, gender, and education level of the participants. We also asked about the transportation costs farmers bore to come to (and return from) the venue (as a proxy for opportunity costs) and about the irrigation canal they belonged to. To check for possible peer-contagion effects, we asked farmers about the way they were invited to the experiment. Lastly, we asked whether they were the head of their respective households. Through the second part of the questionnaire we elicited farmers' perception of their socioeconomic distance to and of their closeness with upstream farmers (i.e. the Inclusion of the Other in the Self Scale; Gächter, Starmer and Tufano 2015). In the third part of the survey we asked whether they are the person managing the plot they work on and about the tenure of the land they cultivate.

5.3.6 General procedures

We followed a between-subject design in our experiment. Procedures were the same across conditions, following the steps listed in Table 5.1 and described in detail in Appendix 5A.⁹⁵ All sessions were conducted at the same venue, with the same setup, in San Vicente de Cañete (capital district of Cañete province, where Cañete valley is located; we describe and present pictures of the setup in Appendix 5A4). Treatments were at the session level (see plan of sessions and detail on the assignment-to-treatment procedures in Appendix 5B2).

All materials required for the session were handed out at the beginning of the session. Upon arrival, one member of the research team—not involved in the other procedures—welcomed and registered each farmer. Subsequently, another team member handed out the materials: a white bag containing the PEN S/16 endowment in PEN S/1 coins marked with the words “Suyo” (yours, in Spanish), an empty yellow bag marked with the words “Feria” (fair, in Spanish), a blue envelope containing the half-page form for the perspective-taking task (for those in the *Info + Video + Perspective-taking* condition) and the three-part questionnaire.

⁹⁵ Primarily to assure anonymity, these general procedures follow Vorlauffer's (2019) procedures as closely as possible considering the specific requirements of our treatment condition. Note that the procedures implemented let us make less likely—if not to avoid altogether—the presence of possible ‘experimenter demand effects’ (Zizzo 2010) that would ultimately confound the effect associated with the perspective-taking procedures implemented in the treatment condition. In particular, participants were not informed about the detail of the specific objectives and procedures of the experiment upfront, the anonymity of their decisions was preserved and the experimenters were not involved in reading the instructions of the experiment or in implementing the choice and perspective-taking tasks during the experiment sessions.

Farmers could start to answer the first part of the questionnaire while waiting for the experiment to begin.

Table 5.1 – Experimental setup and timeline of an experimental session

Key steps of the experiment	Conditions		
	Control 1 <i>Info only</i>	Control 2 <i>Info + Video</i>	Treatment <i>Info + Video + Perspective-taking</i>
Downstream farmers register and receive the materials for the session.	X	X	X
Farmers fill in the first part of the survey.	X	X	X
Start of the session and welcome: - General information on the project. - Signature of informed consent and receipt.	X	X	X
Instructions to pay attention to all information about the watershed presented in the video.		X	
Perspective-taking instructions: Instructions to imagine the thoughts and feelings of upstream farmers while watching the video about the watershed.			X
Video about the ecological and socio-economic conditions of the watershed.		X	X
General information on the agroecological fair and instructions for the choice task.	X	X	X
Perspective-taking task: Farmers go to the booth located in the room resembling the upper watershed and write down what they imagine upstream farmers would like them to donate.			X
Choice task: Farmers go to the downstream booth and decide whether to donate to the fair and, if so, how much.	X	X	X
Farmers fill in the second and third parts of the survey	X	X	X

To assure anonymity, each task was simultaneously performed by downstream farmers in private booths located in two different rooms. The booths for the choice task were located downstairs, in a room resembling the lower watershed and labelled accordingly (i.e. in Spanish: *parte baja de la cuenca*). After making their choice, farmers were asked to leave the yellow bag (“Feria”) with their donation in the booth. The booths for the perspective-taking task were located upstairs, in a room resembling the upper watershed and labelled accordingly. After filling in the half-page form of the perspective-taking task, farmers left the blue envelopes with their answers to the question on perspective-taking in these booths.

After receiving the instructions in the main room, downstream farmers assigned to the control groups (i.e. *Info only* and *Info + Video*) moved directly to the room downstairs to perform the choice task. Farmers assigned to the treatment groups (*Info + Video + Perspective-taking*) moved first to the room upstairs to perform the perspective-taking task. Thereafter, they went to the room downstairs to perform the choice task. Farmers were not allowed to talk to each other during the experiment. Each session lasted two hours, on average.

5.3.7 Sampling

For sampling, we visited downstream farmers at their plots/homes inviting them to participate in a research activity. We gave them the basic and general information about the activity—location, duration and date of each session—and the compensation they would receive (for details, see Appendix 5B). We visited small- and medium-scale farmers (3ha – 5ha) from both the head, the middle section, and the tail-end of an irrigation canal. We hoped to thus cover the same canal during the same week before moving on to another canal. As one canal became gradually covered, the next canal was visited until all seven canals had been visited.

678 farmers were registered in total. With a turnout rate of 27%, and after subtracting 3 invalid observations, our dataset comprises responses from 177 farmers.⁹⁶ In total, 38 experimental sessions were carried out between 22 January and 17 February 2019. Assignment to treatment and control conditions took place at the session level. The sampling procedures, the assignment-to-treatment procedures and the full plan of sessions are presented and explained with more detail in Appendix 5B. In Appendix 5C, Section 5C1, we present, by treatment and control conditions, the data on the observables we controlled for.

5.4 Hypotheses

Based on the literature reviewed, we expected that **inducing downstream farmers to consider the perspective of upstream farmers prompts downstream farmers to behave more pro-socially towards upstream farmers (H5.1)**. Based on previous literature (e.g. Davis et al. 1987; Batson, Early and Salvarani 1997; Ku et al. 2015), *imagine-other*

⁹⁶ 182 farmers showed up to the experimental sessions. Of these, two farmers left the venue without leaving any of the choice task bags in their booths and data from the fourth session ($N = 3$) is left out due to a mistake in the implementation of the procedures.

instructions, employed in our experiment, are associated with positive effects on pro-social behaviour.⁹⁷

We also conjecture that **the effect of inducing-perspective-taking on pro-social behaviour is not fully accounted for by the effect of providing information on the social and ecological dynamics of the watershed (H5.2)**. The information provided by the video may in fact induce downstream farmers to identify with the upstream farmers. It may also expand downstream farmers' understanding of the situation and of the context they are embedded in. In the literature, identification with the beneficiaries of the pro-social actions (Bohnet and Frey 1999; Small and Loewenstein 2003; Jordan, Amir and Bloom 2016) has been associated with pro-social behaviour. However, we expect the perspective-taking procedures we implement in the experiment (i.e. the *Info + Video + Perspective-taking* treatment) to have a stronger effect on pro-social behaviour beyond the behavioural effects triggered by merely watching the video.⁹⁸

5.5 Data analysis and results

To test Hypothesis 5.1, we compare the distribution of the outcome variable between the treatment condition (*Info + Video + Perspective-taking*) and the first control condition (*Info only*). To test Hypothesis 5.2, we compare the distribution of the outcome variable between *Info + Video + Perspective-taking* and the second control condition (*Info + Video*). In both cases, we first compare the summary statistics of the outcome variable across conditions and

⁹⁷ *Imagine-self* instructions, on the contrary, could be associated with both an increase in pro-social and selfish behaviour by arguably triggering both empathic and distressing emotions (Batson et al. 1997; Ku et al. 2015).

⁹⁸ Although analysing the specific mechanisms whereby these perspective-taking procedures would be associated with relatively higher pro-social behaviour, we can put forth three possible mechanisms based on the previous literature. Firstly, *imagine-other* instructions would trigger empathic concern for the well-being of the other whose perspective is taken on (e.g. Davis 1983; Batson et al. 1997). Empathic concern, in turn, has been positively associated with pro-social behaviour (Batson 1987, 2011; Eisenberg and Miller 1987). Secondly, the perspective-taking procedures may arguably induce downstream farmers to form expectations or update their initial expectations about the amount of their endowment that upstream farmers would expect to receive as a donation to the fair. Out of guilt aversion (Charness and Dufwenberg 2006); i.e. to not fall short to upstream farmers' expectations, these perspective-taking procedures would induce pro-social behaviour (Davis 1996). Finally, these procedures could also be associated with changes in how close or distant to upstream farmers downstream farmers perceive themselves to be. For example, results of previous research have suggested that the effects of perspective-taking on pro-social behaviour are mediated by changes triggered by perspective-taking on perceived similarities between the perspective-taker and the person whose perspective is taken on (e.g. Cialdini et al. 1997; Ku et al. 2015; Erle and Topolinski 2017). Results of data analysis reported in Appendix C2.1, however, suggest that this need not be the case in our data. In sum, by activating empathic concern and/or guilt aversion, these perspective-taking procedures would have a positive effect on pro-social behaviour that goes beyond the positive effect that the video may have on pro-social behaviour. Again, however, this is just a reasoned speculation based on the previous literature which we do not systematically assess in this study. Further research on these mechanisms is therefore warranted.

complement the descriptive comparisons with non-parametric tests. In a second step, we complement the assessment of both hypotheses with regression analysis. For a result to be considered statistically significant, we set $p < 0.05$ as the critical threshold.

Table 5.2 – Summary statistics of outcome variable (amount donated to the agroecological fair)

Condition	N	Mean	SD	p25	Median	p75	Min	Max
Control 1 <i>Info only</i>	49	5.82	3.24	3	6	8	0	16
Control 2 <i>Info + Video</i>	53	6.17	4.34	4	5	8	0	16
Treatment <i>Info + Video + Perspective-taking</i>	75	8.48	5.25	5	8	16	0	16
Total	177	7.05	4.64	4	6	10	0	16

Notes: our outcome variable is pro-social behaviour measured by the amount donated (in Peruvian soles; PEN, S/) to the agroecological fair. **SD** indicates standard deviation, **N** the number of observations, and **p25** and **p75** indicate the 25th and 75th percentiles, respectively. **Min** and **Max** indicate the minimum and the maximum values of the outcome variable.

Descriptive statistics suggest that farmers in *Info + Video + Perspective-taking* are relatively more pro-social than farmers in *Info only*. As can be seen in Table 5.2, the mean donation of farmers in the Treatment condition is 1.46 times higher than the mean donation of farmers in the control condition. Whereas 75% of the farmers in *Info only* ($N = 37$) donated no more than half of their total endowment (i.e. PEN S/8), 50% of the farmers in *Info + Video + Perspective-taking* donated half of their endowment or more. In fact, as noted in Figure 5.1, whereas in the *Info only* condition only two percent of farmers ($N = 4$) donated their whole endowment, in the treatment condition twenty-four percent ($N = 16$) of farmers did so. These differences in the outcome variable between *Info + Video + Perspective-taking* and *Info only* are statistically significant. Support for this result is, in the first place, provided by non-parametric tests comparing the distributions of the outcome variable (amount donated to the fair) in *Info + Video + Perspective-taking* and *Info only*; these distributions are in fact significantly different from each other (Mann-Whitney test: $z = -2.494, p = 0.0126$; Kolmogorov-Smirnov test: $D = 0.2634, p = 0.026$).

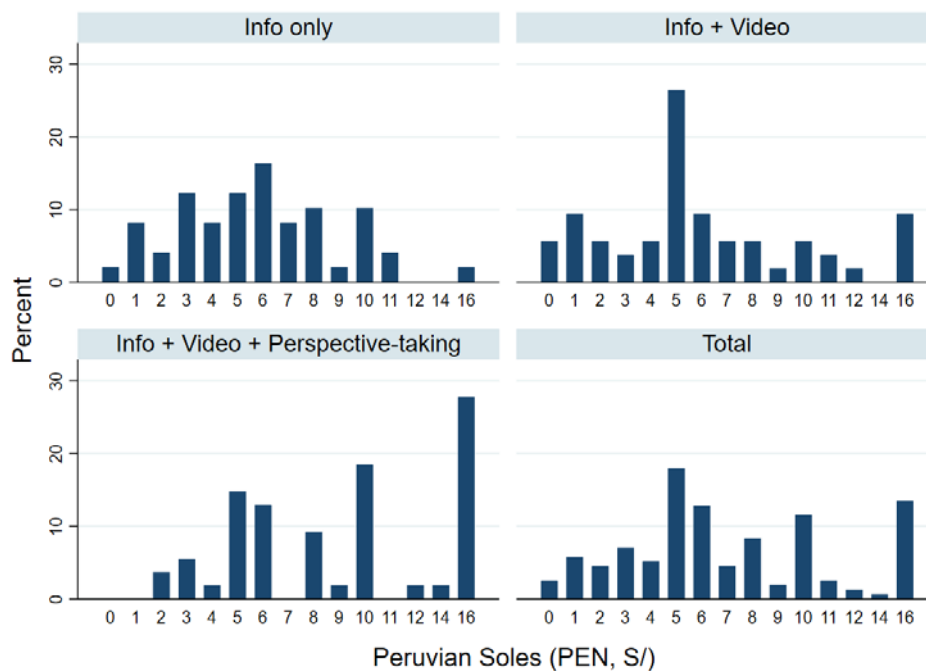


Figure 5.1 Amount donated to the fair, by condition. The figure displays, by condition, relative frequencies of amounts donated to the agroecological fair by the 177 farmers whose data has been considered for this study (49 of these farmers were assigned to Info only, 53 to Info + Video and 75 to Info + Video + Perspective-taking).

As a second step, we probe the robustness of our finding with a regression analysis. Specifically, we regress the amount donated to the fair on a dummy variable indicating whether or not the corresponding farmer was assigned to the treatment condition (i.e. to *Info + Video + Perspective-taking*). We present the results of this regression in Table 5.3 (see Model 1). In an additional regression, we control for the relevant covariates (Model 2 in Table 5.3). For the estimations we employ Tobit models.⁹⁹ In both cases, the results indicate that there are statistically significant average treatment effects. Hence, the procedures we followed to induce perspective-taking in the experiment can be associated with a significant increase in the average amount donated to the agroecological fair.

All in all, the descriptive statistics, the results of the non-parametric tests and the regression estimations let us establish a positive and significant association between our perspective-

⁹⁹ Figure 5.1, *Info + Video + Perspective-taking*, indicates censoring of the data in the upper limit of the outcome variable. Further, evidence on the dictator game indicates that decision-makers are willing to transfer negative amounts when provided with the opportunity to take money from recipients (List 2007; Bardsley 2008). For this reason, we follow a Tobit approach as illustrated by Moffat (2015) with data from a dictator game experiment. However, the statistical significance of the results does not change if we follow an OLS approach. Results of both estimations are included in Appendix 5C.

taking procedures and our outcome variable for pro-social behaviour. The relationship still holds when we take into account those observable variables that might differentiate farmers from one another and contribute to explaining the variance in the amount donated to the agroecological fair.

Result 5.1: *Inducing downstream farmers to consider the perspective of upstream farmers is significantly associated with more pro-social behaviour towards upstream farmers.*

Table 5.3 – Results of Tobit estimations

Independent variables	Outcome variable: amount donated to the agroecological fair			
	Model 1	Model 2	Model 3	Model 4
Perspective-taking	3.224*** [1.335, 5.112]	4.841*** [2.341, 7.341]	2.781*** [0.707, 4.856]	3.095** [0.287, 5.903]
Video			0.417 [-1.295, 2.128]	0.891 [-1.803, 3.585]
Control variables included	No	Yes	No	Yes
No. of observations	124	100	177	136
Pseudo R2	0.01	0.07	0.01	0.04

*** p<0.01, ** p<0.05, * p<0.1. Confidence intervals (95%) in squared brackets. Robust standard errors were calculated. **Tobit** models were estimated assuming lower and upper censoring and calculating robust standard errors. **Perspective-taking** indicates whether or not downstream farmers were induced to perspective-taking and **Video** whether or not downstream farmers watched the video of the watershed. **Control variables** account for downstream farmers' socioeconomic characteristics (i.e. age; transportation costs; daily income; perceived social distance and perceived economic distance with upstream farmers; dummy variables for gender, head of household, plot management, plot ownership, previous visit to the upper watershed, irrigation canal, and way of finding out about the experiment). Model 1 and Model 2 only consider the data of farmers in *Info only* and *Info and video plus perspective-taking*. Model 3 and Model 4 consider the data of all farmers. Model 2 and Model 4 only consider data with no missing observations. Appendix C present the complete results of these estimations and addresses concerns on the possible endogeneity of the variables measuring perceived social distance (in brief, based on our results, they are not to be considered as endogenous variables).

From these results, however, we cannot conclude that it is solely the inducement of perspective-taking that triggers pro-social behaviour. In *Info + Video + Perspective-taking* the effects of inducing perspective-taking are mingled with the possible effects triggered by the watershed video. Through the video, farmers received information on the social-ecological characteristics of the watershed and, within this context, additional information on the fair. Knowing more about the context in which the fair takes place and particularly about the upstream farmers themselves might influence pro-social behaviour for the reasons presented above in Section 5.4.

One way to sort out the sole effect of inducing perspective-taking is by comparing the (distribution of the) outcome variable between the treatment (*Info + Video + Perspective-taking*) and the second control (*Info + Video*) condition. The inducement of perspective taking, which did not take place in *Info + Video*, is the only aspect in which these conditions differed.

Therefore, differences in the outcome variable can be attributed to the inducement of perspective-taking in the treatment condition. Furthermore, we again use regression analysis to control for potential differences in observable characteristics of farmers that might have also influenced the variance of the amount donated to the fair.

The descriptive statistics reported in Table 5.2 suggest that pro-social behaviour among the farmers in *Info + Video + Perspective-taking* is higher than the pro-social behaviour of the farmers assigned to *Info + Video*. The mean donation of farmers in the treatment condition is 1.37 times higher than the mean donation of farmers in this second control condition (*Info + Video*). Further, half of the farmers ($N = 38$) in *Info + Video + Perspective-taking* donated half of their endowment (i.e. an amount equal to or higher than PEN S/8) or more and twenty-four percent ($N = 16$) donated their total endowment. In contrast, only twenty-five percent ($N = 13$) of farmers in *Info + Video* donated half or more of their total endowment and just nine percent ($N = 5$) donated their total endowment.

Figure 5.2 mirrors these patterns, also suggesting sharp differences in pro-social behaviour between the treatment and the second control group. As it stands, a visual inspection of the data indicates that downstream farmers who were actively induced to take on the perspective of upstream farmers acted more generously than farmers who only watched the video with the instruction of paying attention to the information contained in the video.

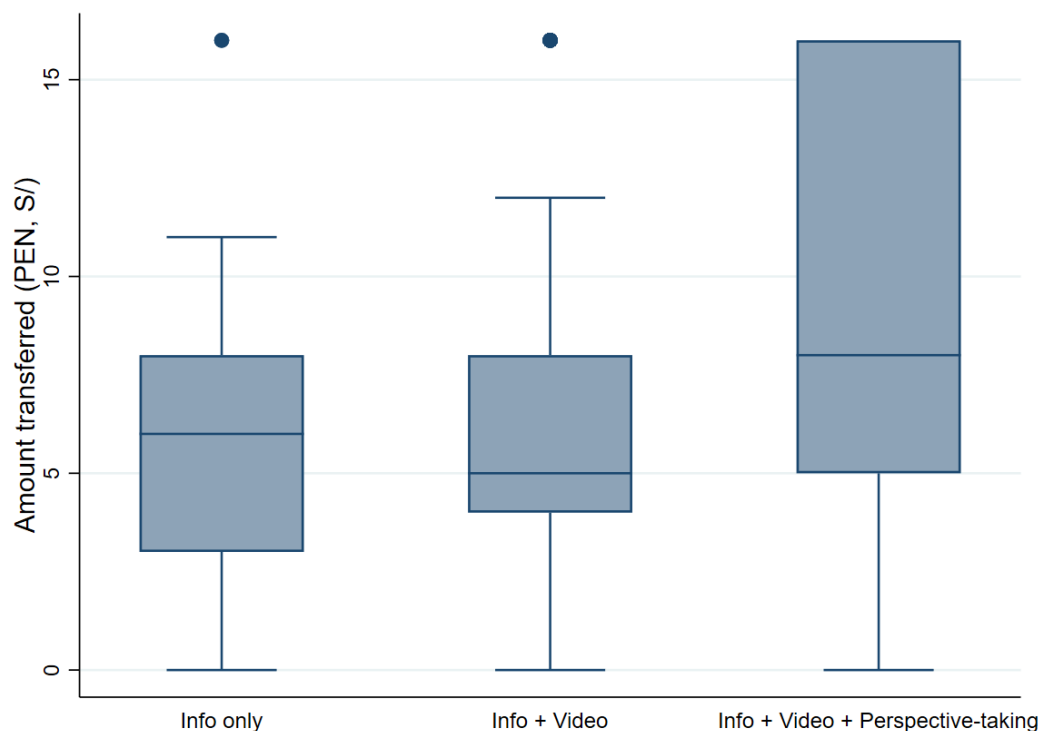


Figure 5.2. Box plot of the amount donated to the agroecological fair, by condition. The figure displays data of donations from 177 farmers whose data has been considered for this study (49 of these farmers were assigned to Info only, 53 to Info + Video and 75 to Info + Video + Perspective-taking).

These differences suggest that there is more to the inducement of perspective-taking than gaining simply new information and acting upon it. Based on the results of non-parametric tests, it is not possible to maintain that the distributions of the outcome variable in *Info + Video + Perspective-taking* are the same as in *Info + Video* (Mann-Whitney test: $z = -2.4384$, $p = 0.0148$; Kolmogorov-Smirnov test: $D = 0.2236$, $p = 0.074$).

To test the robustness of our results we again performed a regression analysis. Specifically, we regress the amount donated to the agroecological fair on the two independent variables of our interest. The first variable (*Perspective-taking*) indicates whether or not the downstream farmer received the perspective-taking procedure before deciding on the donation.¹⁰⁰ The second variable (*Video*) indicates whether the farmer watched the video of the watershed during the experiment. We estimate two models: one in which we only regress the outcome variable on the two central independent variables and a second in which we additionally include farmers' socioeconomic characteristics (see Models 3 and 4 in Table 5.3, respectively). We

¹⁰⁰ It is worth keeping in mind that these farmers also were instructed to take on upstream farmers' perspectives while watching the video of the watershed. (See Section 5.3 and Appendix 5A)

conduct this regression analysis following a Tobit approach and drawing on the data from the whole sample ($N = 177$).

To assess Hypothesis 5.2, we focus on the coefficient accompanying the *Perspective-taking* variable, which is positive and significantly different from zero in both Model 3 and Model 4. These results confirm that our perspective-taking procedure had a significant effect on the average amount donated to the fair. Thus, inducing perspective-taking through these procedures has an average effect on behaviour that goes beyond the possible effect on pro-social behaviour that the information conveyed by the video may have. These effects hold when controlling for farmers' socioeconomic traits. Taken together, these results indicate that neither the *Video* nor the socioeconomic variables completely account for the variance in the outcome variable.

Result 5.2: *The effect of inducing perspective-taking on pro-social behaviour cannot totally be accounted for by the information on the fair and the social-ecological conditions of the watershed conveyed through the video.*

5.6 Discussion and conclusions

In our experimental analysis in a Peruvian watershed, we observed that downstream farmers who were induced to take on upstream farmers' perspectives behaved more pro-socially than farmers who were not. Specifically, they were more willing to contribute to an initiative that would favour upstream farmers' livelihoods without compromising water provisions downstream. Our research design and our analysis allow us to conclude that the observed differences in behaviour can in fact be attributed to the perspective-taking procedures we employed. Neither the information provided during the perspective-taking procedures nor the socioeconomic characteristics of farmers can fully account for the observed behavioural differences. All in all, these results indicate that inducing perspective-taking could in fact promote pro-social behaviour in contexts characterised by the presence of heterogeneous actors and social inequalities that may hamper the adoption and effectiveness of conventional policy approaches.

Based on our results and previous literature, it is plausible that the increase in pro-social behaviour from perspective-taking is predominantly due to strengthened or activated other-regarding preferences. However, in principle, it is feasible that the perspective-taking-inducing procedures employed in our experiment triggered downstream farmers to care for the

environment out of self-interest because they realised that supporting conservation-related measures upstream contributes to securing water provision downstream. Our results do not provide much support for this assertion. Within the treatment condition, the provision of information (on the fair and the watershed) through the video is the main aspect that may induce this self-interested concern for water provision. The rest of the treatment contains the procedures that instruct and induce downstream farmers to consider upstream farmers' perspectives, thus appealing to downstream farmers' other-regarding preferences. The experimental setup we employed allows these effects to be disentangled. The results we obtained indicate that self-regarding preferences cannot totally account for the observed differences in behaviour; in fact, the video alone did not have a significant effect on behaviour (see Table 5.3). Therefore, it is plausible to conclude that the observed pro-social behaviour of farmers assigned to the treatment condition chiefly stems from their strengthened or activated other-regarding preferences.¹⁰¹

Systematically investigating the types of preferences and motivations perspective-taking appeals to is, nevertheless, an effort worth pursuing in future research—as also discussed in Andreoni and Rao (2011) and Batson (2011). Future research could delve into the procedures and mechanisms whereby as well as into the contexts wherein inducing perspective-taking might (not) trigger pro-social behaviour.¹⁰² The scope of our results is restricted to the particular perspective-taking procedures implemented within the given social-ecological context of our experiment. Consequently, the design of our research does not allow for a

¹⁰¹ A similar reasoning help us show that the observed results cannot totally be accounted for or confounded with 'experimenter demand effects' (Zizzo 2010). If our instructions contained any request or hint that participants should contribute to the fair, it was present in both treatment and control groups. The only aspect that treatment and control conditions differed from one another was the explicit request to consider the upstream farmers' perspective that downstream farmers assigned to the treatment groups were presented with. Their favourable respond to this request—mirrored in higher pro-social behaviour—is precisely evidence in favour of Hypothesis 5.1 that conjects that inducing downstream farmers to consider upstream farmers' perspectives induces downstream farmers to behave more pro-socially towards upstream farmers.

¹⁰² Some of the possible mechanisms were already suggested in Section 5.4. Furthermore, there is a rather ample literature to build upon here. For example, Johnson (1971), Carlson-Sabelli (1989), Epley, Caruso and Bazerman (2006), Andreoni and Rao (2011), Ku et al. (2015) and Erle and Topolinski (2017) provide insights on the mechanisms whereby inducing perspective-taking could (not) trigger pro-social behaviour. In general, it has been suggested that the effect of inducing perspective-taking might be moderated (Ku et al. 2015) or mediated (Cialdini et al. 1997; Erle and Topolinski 2017) by social distance; mediated by emotional reactions (e.g. Batson 1987; Batson et al. 1997) and beliefs (e.g. Johnson 1971; Carlson-Sabelli and Sabelli 1984; Epley et al. 2006); and moderated by inherent predispositions to (emotional and cognitive) perspective-taking and to feelings of concern for the wellbeing of others (Davis 1983; Jordan et al. 2016). The features of the action situation in which participants are situated (e.g. whether it is a competitive or cooperative setting) could also moderate the effects that inducing perspective-taking may trigger (e.g. Johnson 1971; Epley et al. 2006; Ku et al. 2015). In Chapter 4 of this thesis we studied the mediating role of emotional reactions in perspective-taking induced through unilateral role reversal.

systematic investigation on the mechanisms that enable and underpin the results we have observed. Research tackling these aspects would not only contribute to expanding our understanding of the relationship between pro-social behaviour and perspective-taking. It would also contribute to gleaning further evidence on the scope and caveats of drawing on the inducement of perspective-taking to promote pro-social actions for environmental protection and natural resource management.

Our work makes two main contributions to the literature. First, we generate evidence that procedures aimed at inducing perspective-taking can, in fact, be associated with higher pro-social behaviour. Our experimental set up allows us to separate the effect of perspective-taking from other possible confounding variables. Furthermore, our evidence and analysis let us conclude that inducing perspective-taking has the potential to motivate actual natural resource users to engage in actions which contribute to attaining socially desirable social-ecological outcomes in the context of watershed management. Our study thus contributes to expanding our understanding of the potential and possible policy relevance of perspective-taking.

Nonetheless, in drawing out policy implications, at least two caveats are in order. First, although the farmers in our sample share key characteristics with the general farmer population in the Cañete province,¹⁰³ our sample is not perfectly representative. Particularly, the low turnout rate indicates that there were farmers with high opportunity costs we did not manage to recruit—e.g. large-scale farmers not attracted by the activity, in general, or by the compensation we offered in particular. Additionally, not all participants answered the post-experiment survey, arguably due to time and/or literacy restraints. As a result, not all observable characteristics were measured for all participants—so that the regression analysis was performed on a smaller, and less representative subsample. Even though our results are not substantially altered by whether these participants are included in the analysis or not, a natural next step for further research would be to systematically assess the potential of interventions inducing perspective-taking with larger and more representative samples and involving larger stakes.

¹⁰³ Farmers in our sample are primarily small- and medium-scale farmers, the type of farmers that constitute the majority of farmers in Cañete Valley. Furthermore, our sample is constituted by both farmers that own their own plots and farmers that work on rented land—the predominant forms of land tenure in the valley—and by farmers belonging to the seven irrigation canals irrigating the entire valley, with the farmers from the canals with the largest number of water users representing the largest portion of our sample. Appendix 5C includes the descriptive statistics, by treatment and control condition, of the sociodemographic characteristics of the farmers in our sample.

Second, as previous research has well indicated, the effects of inducing perspective-taking are procedure-, situation- and context-specific. Therefore, further research is warranted to assess the impact of other types of perspective-taking procedures (e.g. watching the video with *imagine-other* perspective-taking instructions but without the perspective-taking task), with other types of resource users (e.g. large-scale farmers from the same valley or farmers from other watersheds in the Andean region), involving (and/or interaction with) other types of policy framings and approaches (e.g. a PES or PES-like scheme). This could be done in the same general context (e.g. watershed management context involving upstream-downstream social and ecological asymmetries) to isolate effects. In addition, the moderating effect of the broader institutional context is worth evaluating in future research.¹⁰⁴

Chapter 5 references

- Andreoni, James, and Justin M. Rao. 2011. "The power of asking: How communication affects selfishness, empathy, and altruism." *Journal of Public Economics* 95: 513-520. doi:10.1016/j.jpubeco.2010.12.008.
- Ansell, Chris, and Alison Gash. 2008. "Collaborative Governance in Theory and Practice." *Journal of Public Administration Research and Theory* 18 (4): 543-571.
- Baland, Jean-Marie, and Jean-Philippe Platteau. 1999. "The Ambiguous Impact of Inequality on Local Resource Management." *World Development* 27 (5): 773-788. doi:10.1016/S0305-750X(99)00026-1.
- Baland, Jean-Marie, and Jean-Philippe Platteau. 1998. "Wealth inequality and efficiency in the Commons, part II: the regulated case." *Oxford Economic Papers* 50: 1-22. doi:10.1093/oxfordjournals.oep.a028631.
- Baland, Jean-Marie, and Jean-Phillipe Platteau. 1996. *Halting degradation of natural resources. Is there a Role for Rural Communities?* Rome: Food and Agriculture Organization of the United Nations.
- Bardsley, Nicholas. 2008. "Dictator game giving: altruism or artefact." *Experimental Economics* 11: 122-133. doi:10.1007/s10683-007-9172-2.
- Batson, C. Daniel. 2011. *Altruism in Humans*. Oxford: Oxford University Press.
- Batson, C. Daniel. 1987. "Prosocial motivation: is it ever truly altruistic?" *Advances in Experimental Social Psychology* 20: 65-122. doi:10.1016/S0065-2601(08)60412-8.
- Batson, C. Daniel, Shannon Early, and Giovanni Salvarani. 1997. "Perspective Taking: Imagining How Another Feels Versus Imagining How You Would Feel." *Personality and Social Psychology Bulletin* 23 (7): 751-758. doi:10.1177/0146167297237008.
- Beierle, Thomas C., and Jerry Cayford. 2002. *Democracy in Practice: Public Participation in Environmental Decisions*. Washington DC: Resources for the Future.

¹⁰⁴ In our study, farmers donate to a policy initiative led by a government organisation and community organisations of upstream farmers. Although downstream farmers were not well-acquainted with the landscape reserve, it had a good reputation with those who knew it. Moreover, an academic organisation—the university the authors of the study are affiliated to—was conducting the meetings and guaranteeing that the farmers' donations would be effectively transferred upstream. When interviewed during the post-experiment survey about their willingness to contribute to a PES-like scheme, for example, farmers declared they were willing to do so insofar as clear monitoring conditions were established to avoid money donated to the scheme from being diverted to unproductive uses.

- Bohnet, Iris, and Bruno S. Frey. 1999. "The sound of silence in prisoner's dilemma and dictator games." *Journal of Economic Behavior & Organization* 38: 43-57. doi:10.1007/978-1-4615-5187-4_11.
- Bowles, Samuel. 2014. "Nicolò Machiavelli and the Origins of Mechanism Design." *Journal of Economic Issues* XLVIII (2): 1-11.
- Bowles, Samuel. 2008. "Policies designed for Self-Interested Citizens may Undermine "The Moral Sentiments": Evidence from Economic Experiments." *Science* 320 (5883): 1605-1609. doi:10.1126/science.1152110.
- Bowles, Samuel, and Sandra Polanía-Reyes. 2012. "Economic Incentives and Social Preferences: Substitutes or Complements?" *Journal of Economic Literature* 50 (2): 368-425. doi:10.1257/jel.50.2.368.
- Cárdenas, Juan Camilo, and Juan Felipe Ortiz-Riomalo. 2018. "Acción colectiva para abordar conflicto socio-ambientales. El caso de Santurbán." In *Modos de gobernanza del agua y sostenibilidad. Aportes conceptuales y análisis de experiencias en Colombia*, edited by Andrés Hernández Quiñones. Bogotá D.C.: Centro Interdisciplinario de Estudios sobre Desarrollo (CIDER), Ediciones Uniandes, Universidad de los Andes.
- Cardenas, Juan Camilo, Luz Angela Rodriguez, and Nancy Johnson. 2011. "Collective action for watershed management: field experiments in Colombia and Kenya." *Environmental and Development Economics* 16 (3): 275-303. doi:10.1017/S1355770X10000392.
- Cardenas, Juan-Camilo. 2003. "Real wealth and experimental cooperation: experiments in the field lab." *Journal of Development Economics* 70: 263-289.
- Cardenas, Juan-Camilo, John Stranlund, and Cleve Willis. 2000. "Local Environmental Control and Institutional Crowding-Out." *World Development* 28 (10): 1719-1733. doi:10.1016/S0305-750X(00)00055-3.
- Carlson-Sabelli, Linnea. 1989. "Role reversal: A concept analysis and reinterpretation of the research literature." *Journal of Group Psychotherapy, Psychodrama and Sociometry* 42: 139-152.
- Carlson-Sabelli, Linnea, and Hector Sabelli. 1984. "Reality, perception, and the role reversal." *Journal of Group Psychotherapy, Psychodrama and Sociometry* 36: 162-174.
- Carlsson, Fredrik, and Olof Johansson-Stenman. 2012. "Behavioral Economics and Environmental Policy." *Annual Review of Resource Economics* 4: 75-99.
- Carr, G., G. Blöschl, and D.P. Loucks. 2012. "Evaluating participation in water resource management: A review." *Water resources research* 48 (11).
- Charness, Gary, and Martin Dufwenberg. 2006. "Promises and Partnership." *Econometrica* 74 (6): 1579-1601. doi:10.1111/j.1468-0262.2006.00719.x.
- Cialdini, Robert B., Stephanie L. Brown, Brian P. Lewis, Carol Luce, and Steven L. Neuberg. 1997. "Reinterpreting the empathy–altruism relationship: When one into one equals oneness." *Journal of Personality and Social Psychology* 73 (3): 481- 494. doi:10.1037/0022-3514.73.3.481.
- Corbera, Esteve, and Unai Pascual. 2012. "Ecosystem Services: Heed Social Goals." *Science* 335 (6069): 655-656. doi:10.1126/science.335.6069.655-c.
- Czap, Natalia V., Hans J. Czap, Gary Lynne, and Mark E. Burbach. 2015. "Walk in my shoes: Nudging for empathy conservation." *Ecological Economics* 118: 147-158. doi:10.1016/j.ecolecon.2015.07.010.
- Dal Bó, Pedro, Andrew Foster, and Louis Putterman. 2010. "Institutions and Behavior: Experimental Evidence on the Effects of Democracy." *American Economic Review* 100: 2205-2229.
- Davis, Mark H. 1996. *Empathy. A Social Psychological Approach*. New York: Routledge.
- Davis, Mark H. 1983. "The effects of dispositional empathy on emotional reactions and helping: A multidimensional approach." *Journal of Personality* 51 (2): 167-184.

- Davis, Mark H., Jay G. Hull, Richard D. Young, and Gregory G. Warren. 1987. "Emotional Reactions to Dramatic Film Stimuli: The Influence of Cognitive and Emotional Empathy." *Journal of Personality and Social Psychology* 52 (1): 126-133.
- Dhami, Sanjit. 2016. *The Foundations of Behavioural Economic Analysis*. New York: Oxford University Press.
- Eisenberg, Nancy, and Paul A. Miller. 1987. "The Relation of Empathy to Prosocial and Related Behaviors." *Psychological Bulletin* 101 (1): 91-119. doi:10.1037/0033-2909.101.1.91.
- Engel, Christoph. 2011. "Dictator games: a meta study." *Experimental Economics* 14: 583-610. doi:10.1007/s10683-011-9283-7.
- Engel, Stefanie, and Marleen Schaefer. 2013. "Ecosystem services — a useful concept for addressing water?" *Current Opinion in Environmental Sustainability* 5: 696–707. doi:10.1016/j.cosust.2013.11.010.
- Engel, Stefanie, Stefano Pagiola, and Sven Wunder. 2008. "Designing payments for environmental services in theory and practice: An overview of the issues." *Ecological Economics* 65 (4): 663-674. doi:https://doi.org/10.1016/j.ecolecon.2008.03.011.
- Epley, Nicholas, and Eugene Caruso. 2009. "Perspective Taking: Misstepping Into Others' Shoes." Chap. 20 in *Handbook of imagination and mental simulation*, edited by William M.P. Klein, Julie A. Suhr and Keith D. Markman, 297-311. New York: Psychology Press.
- Epley, Nicholas, Eugene M. Caruso, and Max H. Bazerman. 2006. "When Perspective Taking Increases Taking: Reactive Egoism in Social Interaction." *Journal of Personality and Social Psychology* 91 (5): 872-889. doi:10.1037/0022-3514.91.5.872.
- Erle, Thorsten M., and Sascha Topolinski. 2017. "The Grounded Nature of Psychological Perspective-Taking." *Journal of Personality and Social Psychology* 112 (5): 683-695. doi:10.1037/pspa0000081.
- Food and Agriculture Organization of the United Nations. FAO, 2002. *Land-water linkages in rural watersheds*. Proceedings of the electronic workshop organized by the FAO Land and Water Development Division 18 September - 17 October 2000. Rome: FAO Land and Water Bulletin No.9. 78p.
- Francesconi, Wendy, Natalia Uribe, Jefferson Valencia, and Marcela Quintero. 2018. "Modeling for Management. A Case Study of the Cañete Watershed, Peru." Chap. 4 in *Andean Hydrology*, edited by Diego A. Rivera, Alex Godoy-Faundez and Mario Lillo-Saavedra, 84 - 101. Florida: CRC Press.
- Francesconi, Wendy, Raghavan Srinivasan, Elena Pérez-Miñana, Simon P Willcock, and Marcela Quintero. 2016. "Using the Soil and Water Assessment Tool (SWAT) to model ecosystem services: A systematic review." *Journal of Hydrology* 535: 625-636. doi:10.1016/j.jhydrol.2016.01.034.
- Fritsch, Oliver, and Jens Newig. 2012. "Participatory Governance and Sustainability: Findings of a Meta-Analysis of Stakeholder Involvement in Environmental Decision Making." In *Reflexive Governance for Global Public Goods*, edited by Eric Brousseau, Tom Dedeurwaerdere and Bernd Siebenhüner, 181-203. MIT Press.
- Gächter, Simon, Chris Starmer, and Fabio Tufano. 2015. "Measuring the Closeness of Relationships: A Comprehensive Evaluation of the 'Inclusion of the Other in the Self' Scale." *PLoS ONE* 10 (6): e0129478. doi:10.1371/journal.pone.0129478.
- Gurung, Tayan Raj, Francois Bousquet, and Guy Trébuil. 2006. "Companion Modeling, Conflict Resolution, and Institution Building: Sharing Irrigation Water in the Lingmuteychu Watershed, Bhutan." *Ecology and Society* 11 (2): 36 [online] URL: <http://www.ecologyandsociety.org/vol11/iss2/art36/>.
- Hodgson, S. 2004. *Land and water –the rights interface*. Rome: FAO legislative study. No.84. Food and Agriculture Organization of the United Nations.

- Johnson, David W. 1971. "Role reversal: A summary and review of the research." *International Journal of Group Tensions* 1 (4): 318-334.
- Jordan, Matthew, Dorsa Amir, and Paul Bloom. 2016. "Are Empathy and Concern Psychologically Distinct?" *Emotion* 16 (8): 1107-1116. doi:10.1037/emo0000228.
- Kerr, John. 2007. "Watershed Management: Lessons from Common Property Theory." *International Journal of the Commons* 1 (1): 89-109.
- Ku, Gilian, Cynthia S. Wang, and Adam D. Galinsky. 2015. "The promise and perversity of perspective-taking in organizations." *Research in Organizational Behavior* 35: 79-102. doi:10.1016/j.riob.2015.07.003.
- List, John A. 2007. "On the Interpretation of Giving in Dictator Games." *Journal of Political Economy* 115 (3): 482-493. doi:10.1086/519249.
- List, John A., Sally Sadoff, and Mathis Wagner. 2011. "So you want to run an experiment, now what? Some simple rules of thumb for optimal experimental design." *Experimental Economics* 14 (439). doi:10.1007/s10683-011-9275-7.
- Lliso, Bosco, Petr Mariel, Unai Pascual, and Stefanie Engel. 2020a. "Increasing the credibility and salience of valuation through deliberation: Lessons from the Global South." *Global Environmental Change* 62: 102065. doi:https://doi.org/10.1016/j.gloenvcha.2020.102065.
- Lliso, Bosco, Unai Pascual, Stefanie Engel, and Petr Mariel. 2020b. "Payments for ecosystem services or collective stewardship of Mother Earth? Applying deliberative valuation in an indigenous community in Colombia." *Ecological Economics* 169: 106499. doi:https://doi.org/10.1016/j.ecolecon.2019.106499.
- Lopes, Ana Faria, Jacob L. Macdonald, Paula Quintero, Luís Arroja, Cláudia Carvalho-Santos, Maria A. Cunha-e-Sá, and Ana Cláudia Dias. 2019. "Surface vs. groundwater: The effect of forest cover on the costs of drinking water." *Water Resources and Economics* 28: 100123. doi:10.1016/j.wre.2018.06.002.
- Lubell, Mark, and Lucas Lippert. 2011. "Integrated regional water management: a study of collaboration or water politics-as-usual in California, USA." *International Review of Administrative Sciences* 77 (1): 76-100. doi:10.1177/0020852310388367.
- Medema, Wietske, Alison Furber, Jan Adamowski, Qiqi Zhou, and Igor Mayer. 2016. "Exploring the Potential Impact of Serious Games on Social Learning and Stakeholder Collaborations for Transboundary Watershed Management of the St. Lawrence River Basin." *Water* 8 (5): 175. doi:10.3390/w8050175.
- Meinzen-Dick, Ruth. 2014. "Property rights and sustainable irrigation: A developingcountry perspective." *Agricultural Water Management* 145: 23-31.
- Moffat, Peter. 2015. *Experimentics. Econometrics for Experimental Economics*. New York: Macmillan Publishers.
- Muradian, Roldan, and Laura Rival. 2012. "Between markets and hierarchies: The challenge of governing." *Ecosystem Services* 1: 93-100.
- Mutz, Diana C., Robin Pemantle, and Philip Pham. 2019. "The Perils of Balance Testing in Experimental Design: Messy Analyses of Clean Data." *The American Statistician* 73 (1): 32-42. doi:10.1080/00031305.2017.1322143.
- Ostrom, Elinor, and Roy Gardner. 1993. "Coping with Asymmetries in the Commons: Self-Governing Irrigation Systems Can Work." *Journal of Economic Perspectives* 7 (4): 93-112. doi:10.1257/jep.7.4.93.
- Ostrom, Elinor. 2000. "Crowding out citizenship." *Scandinavian Political Studies* 23 (1): 3-16. doi:10.1111/1467-9477.00028.
- . 2005. *Understanding Institutional Diversity*. Princeton: Princeton University Press.

- Ovando, Paola, and Roy Brouwer. 2019. "A review of economic approaches modeling the complex interactions between forest management and watershed services." *Forest Policy and Economics* 100: 164-176. doi:10.1016/j.forpol.2018.12.007.
- Pahl-Wostl, Claudia. 2002. "Participative and Stakeholder-Based Policy Design: Evaluation and Modeling Process." *Integrated Assessment* 3 (1): 3-14.
- Pahl-Wostl, Claudia, and Matt Hare. 2004. "Processes of Social Learning in Integrated Resources Management." *Journal of Community & Applied Social Psychology* 14: 193-206. doi:10.1002/casp.774.
- Pascual, Unai, Jacob Phelps, Eneko Garmendia, Katrina Brown, Esteve Corbera, Adrian Martin, Erik Gomez-Baggethin, and Roldan Muradian. 2014. "Social Equity Matters in Payments for Ecosystem Services." *BioScience* 64 (11): 1027-1036. doi:10.1093/biosci/biu146.
- Pascual, Unai, Roldan Muradian, Luis C. Rodríguez, and Anantha Duraiappah. 2010. "Exploring the links between equity and efficiency in payments for environmental services: A conceptual approach." *Ecological Economics* 69 (6): 1237-1244. doi:10.1016/j.ecolecon.2009.11.004.
- Pfaff, Alexander, María Alejandra Vélez, Kenneth Broad, Amar Hamoudi, and Renzo Taddei. 2019. "Contracts versus trust for transfers of ecosystem services: Equity and efficiency in resource allocation and environmental provision." *Water Resources and Economics* 28: 100118. doi:https://doi.org/10.1016/j.wre.2018.04.001.
- Quintero, Marcela, Jeimar Tapasco, and Piedad Pareja. 2013. *Diseño e Implementación de un Esquema de Retribución por Servicios Ecosistémicos Hidrológicos en la Cuenca del Río Cañete*. Lima: Ministerio del Ambiente (MINAM), Centro Internacional de Agricultura Tropical (CIAT).
- Reddy, V. Ratna. 2000. "Sustainable Watershed Management: Institutional Approach." *Economic and Political Weekly* 35 (38): 3435-3444. https://www.jstor.org/stable/4409750.
- Reserva Paisajística Nor Yauyos Cochas (RPNYC). 2016. *Reserva Paisajística Nor Yauyos Cochas. Plan Maestro 2016 - 2020*. SERNANP.
- Rode, Julian, Erik Gómez-Baggethun, and Trosten Krause. 2015. "Motivation crowding by economic incentives in conservation policy: A review of the empirical evidence." *Ecological Economics* 117: 270-282. doi:10.1016/j.ecolecon.2014.11.019.
- Schlager, Edella, and Elinor Ostrom. 1992. "Property-Rights Regimes and Natural Resources: A Conceptual Analysis." *Land Economics* 68 (3): 249-262.
- Small, Deborah A., and George Loewenstein. 2003. "Helping a Victim or Helping the Victim: Altruism and Identifiability." *Journal of Risk and Uncertainty* 26 (1): 5-16.
- Swallow, Brent M., Dennis P. Garrity, and Meine van Noordwijk. 2001. *The Effects of Scales, Flows and Filters on Property Rights and Collective Action in Watershed Management*. Washington D.C.: CAPRI Working Paper No. 16. CGIAR Systemwide Program on Collective Action and Property Rights.
- Vesterlund, Lise. 2016. Using Experimental Methods to Understand Why and How We Give to Charity. Vol. 2, chap. 2 in *The Handbook of Experimental Economics*, edited by John H. Kagel and Alvin E. Roth, 91-152. Princeton: Princeton University Press. doi:10.1515/9781400883172-003.
- Voinov, Alexey, and Francois Bousquet. 2010. "Modelling with Stakeholders." *Environmental Modelling and Software* 25: 1268-1281.
- von Korff, Yorck, Katherine A. Daniell, Sabine Moellenkamp, Pieter Bots, and Rianne Bijlsma. 2012. "Implementing Participatory Water Management: Recent Advances in Theory, Practice, and Evaluation." *Ecology and Society* 17 (1): 30.
- Vorlaufer, Tobias. 2019. "Effects of double-anonymity on pro- and anti-social behavior: Experimental evidence from a lab in the field." *Journal of Behavioral and Experimental Economics* 81: 216-225. doi:10.1016/j.socec.2019.07.001.

- Wald, Dara M., Elizabeth A. Segal, Erik W. Johnston, and Ajay Vinze. 2017. "Understanding the influence of power and empathic perspective-taking on collaborative natural resource management." *Journal of Environmental Management* 199: 201-210. doi:10.1016/j.jenvman.2017.05.030.
- Wunder, Sven, Stefanie Engel, and Stefano Pagiola. 2008. "Taking stock: A comparative analysis of payments for environmental services programs in developed and developing countries." *Ecological Economics* 65: 834 – 852.
- Zizzo, Daniel John. 2010. "Experimenter demand effects in economic experiments." *Experimental Economics* 13: 75-98. doi:10.1007/s10683-009-9230-z.

Chapter 5 appendixes

Appendix 5A – Experiment’s procedures and instructions

5A1. Procedures of the experiment

1. Preparation for a session

- a. A copy of all instructions and these procedures is printed out and distributed to each experimenter.
- b. A summary of the relevant instructions is placed in each private booth wherein participants will perform their respective tasks during the experiment.
- c. A three-part questionnaire is printed and sorted by participant.
- d. Registration form is prepared.
- e. On the same table:
 - i. White bags labelled “Suyo” (yours, in Spanish) are placed close to sixteen sets of sixteen one-sol coins each, i.e. each participant’s endowment. Each endowment is left out of the bag (see below).
 - ii. Yellow bag labelled “Feria” (fair, in Spanish) and also marked with a code for each participant, i.e. the number of observation. This mark is made within the bag, on the sly, so that no participant can see it without close inspection.
- f. An A4 envelope is also discreetly marked with this same code.
- g. To not mix up questionnaires and bags with different identification numbers, the three parts of the questionnaire, the envelope, the yellow bag, the informed-consent document, and the receipt of the endowment are put together in a clipboard to be handed out to participants as described below.

2. Registration

- a. As participants arrive to the venue, the Assistant 1 (Experimenter 3) registers participants at the desk in the lobby of the venue.
- b. Experimenter 5 welcomes each participant at the entrance and guides them to Experimenter 4 once they are registered. Experimenter 4 and Assistant 1 (Experimenter 3) are sufficiently separated from one another, in different locations, so that Experimenter 4 does not receive personal information about participants.

3. Handing out surveys, endowment, the informed-consent document, and the receipt.

- a. Upon each participant’s arrival, Experimenter 4, participant by participant, ...
 - i. ... shortly explains what the meeting participants are attending is about (i.e. a two-hour meeting consisting of an experiment and a three-part questionnaire)
 - ii. ... shows the three-part questionnaire to participants and puts part B and part C of the questionnaire in the A4 envelope. Part A is left out and the A4 envelope sealed up.

- iii. ... hands out the sixteen-sol endowment to participants
 1. Explains that the endowment is meant to be a compensation for their time, effort, and transportation costs to attend the experiment.
 2. Shows the sixteen-sol endowment to each participant.
 3. Puts these sixteen soles in a white bag labelled “Suyo” (Yours, in Spanish)
 4. Puts the white and yellow bags [TB:¹⁰⁵ as well as the blue envelope] in a small envelope.
 5. Seals the envelope and hands it out to participants—“this is for you”.
- iv. ... shows, explains, and hands out the informed-consent document and the receipt for the sixteen soles.
- v. ... puts these documents together with part A of the questionnaire above the A4 envelope on the clipboard.
- vi. ... instructs participants that they are to start reading the informed consent and responding to part A of the questionnaire once they have taken their seats.
- vii. ... tells participants to continue, choose a seat, and sit down.
- b. Experimenter 1—supported by Experimenter 5—takes care of each participant to keep them from talking to each other while the meeting commences.

4. Welcome

- a. Experimenter 1 welcomes all participants and officially starts the activity.
- b. Questions are answered.
- c. Informed consent and receipts are completed and signed.

5. [TA and TB only: Video]

- a. Participants are told by Experimenter 1 that they will see a video on the Cañete River Watershed.
- b. Participants receive information on which vantage point to watch the video from.
- c. The video is shown.

6. Introduction to choice task

- a. Participants are told by Experimenter 1 that they will decide on whether or not and, if so, how much money to transfer to upstream farmers participating in the agroecological fair.
- b. Participants are asked to take [Control and TA: the white and yellow bags] [TB: the white and yellow bags, as well as the blue envelopes] out of the small envelope.

¹⁰⁵ For communication within the research team, this is how the conditions were referred to during the execution of the experiment. Control corresponds to *Control 1 (Info on fair only)*, TA corresponds to *Control 2 (Info and video only)*, TB corresponds to *Treatment (Info and video plus perspective-taking)*.

- c. They are introduced to the choice task.

7. [TB only: Introduction to perspective-taking task]

- a. Participants are told by Experimenter 1 that before performing the choice task, they will imagine how much of the sixteen-sol endowment upstream farmers participating in the agroecological fair would like to receive.
- b. Participants are guided, one by one, to the room representing the upper part of the watershed.
- c. They are told to only take the sealed blue envelope with them and leave everything else in their seats before moving to the room.

8. [TB only: Perspective-taking task]

- a. Experimenter 3 welcomes each participant and guides them to their private booths.
- b. Once in the room, participants receive the instructions from Experimenter 3 for the perspective-taking task.
- c. The perspective-taking task is performed.
- d. Participants are asked to go back to the room where they were initially welcomed and introduced to the experiment.

9. Choice task

- a. One by one, Experimenter 1 asks participants to grab their white and yellow bags.
- b. Participants are guided to the room representing the lower part of the watershed
- c. Experimenter 2 welcomes each participant and guides them to their private booths.
- d. Once all participants are in the room, participants receive instructions for the choice task.
- e. The choice task is performed.
- f. Participants are asked to go back to the room where they were initially welcomed.

10. Questionnaire

- a. A number of participants equal to the number of experimenters and assistants available in the room start responding to part C of the questionnaire—which is applied by experimenters and assistants.
- b. In the meantime, the rest of the participants complete part A of the questionnaire and start responding to part B on their own.
- c. Once the former group of participants has finished with part C of the questionnaire, they move on to completing part A and responding to part B of the questionnaire on their own.
- d. Once the second group of participants is done, they move on to responding to part C of the questionnaire.
- e. Foods and drinks are offered during this part of the meeting.

5A2. Welcome to participants

Arriving to the venue¹⁰⁶

[Participants register upon arrival at the entrance. Assistant 1 or Experimentalist 3 carries out this registration.]

[Upon arrival, Experimentalist 4 provides the following information farmer by farmer. (If everyone has arrived and there is little time to start, the possibility of providing the instructions to everyone at the same time would be considered in order to avoid substantial delays at the beginning of the session¹⁰⁷)]

Welcome and thank you for your participation. This activity is part of the data collection phase of a study being carried out by the University of Osnabrück, based in Germany, with farmers of the province of Cañete. This study has only academic purposes.

In order to collect the necessary information for the study, today we will firstly undertake a dynamic exercise and then a survey, which is divided into three parts **[show all three parts of the questionnaire]**.

You need to answer these two parts of the survey **[show "Survey - Part A" and "Survey - Part B"]** on your own. One of the members of the research team will help you answer the third part of the survey **[show "Survey - Part C"]**. You can raise your hand at any time to ask for assistance; one of the members of the research team will help you. For now, I am going to put these two parts of the survey **[show "Survey - Part B" and "Survey - Part C"]** in this envelope **[show the envelope]** and seal it **[put Part B and Part C inside the envelope and seal it]**. Please do not open it until you are told to do so. I will put this part of the survey **[show "Survey - Part A"]** aside for you to read and respond to before the meeting starts. Please do not talk to any other participants. If there are any questions you don't understand, leave them unanswered. After the dynamic exercise, we will answer all the questions you may have.

I will also give you this sheet **[provide the informed consent]**, which is an "informed consent" form that summarizes today's meeting. Each participant must read and sign this sheet as a guarantee that their participation in the study is voluntary and informed. While waiting in the meeting room, you may start reading this document. Then, my colleague will explain it to you and resolve any questions you may have about it. She will explain how to fill it out and when to sign it. At the end of the exercise, we will give you a copy of the signed document if you require it for your personal records.

¹⁰⁶ The choice task is referred to as *ejercicio dinámico* in Spanish. It is then translated as 'dynamic exercise' in this version of the instructions. Footnotes have been added in this version of the instructions; they were absent in the original (Spanish) version used by the research team.

¹⁰⁷ This was never the case and every farmer followed this procedure.

The whole activity lasts between an hour and a half and two hours. We will reimburse your time, effort and travel costs with these sixteen soles **[count the money in front of the participant]**. I'm going to put the sixteen soles in this white bag **[insert the coins in the white bag]**.

I will also give you this yellow bag, empty **[Control and TA:] [TB: and this blue envelope, sealed]**. In this Manila envelope I put the two bags **[TB: and the blue envelope]**, and I will seal it **[fill it in and seal the envelope]**. Please do not open it until you are told to do so.

[As they receive these instructions individually, farmer-by-farmer, farmers are placed in the meeting room. Experimentalist 1, with the support of Experimentalist 5, solves doubts and questions that participants may have before the exercise begins. Important: provide only general information about the project and only provide detailed answers about the informed consent and receipt. Experimentalists should clarify that other details will be explained later].

[While they wait, ambient music –typical for the upper and lower regions of the watershed is played]

[Once all the participants are placed in the meeting room, Experimentalist 1 provides the following information]

Welcome

Good afternoon to everyone. Welcome again and thank you for your participation. As explained at the beginning of the exercise, this afternoon we will complete, firstly, a dynamic exercise and, secondly, a questionnaire. Both are part of the data collection phase of a study from the University of Osnabrück in Germany, related to agriculture in the province of Cañete. Since you are all farmers in this province, your participation is extremely important for the objectives of the project.

Introduction and general instructions

When you entered the room, you were given sixteen soles, acknowledging the time, travel expenses and effort that you are investing in this activity. Since it is not actually a talk or a training activity— we are collecting this information for the benefit of the research being conducted by the University of Osnabrück — the university is thus compensating you for your time and travel.

The money being provided is not our private money. It is provided to the University of Osnabrück for the implementation of this project by the Alexander von Humboldt Foundation, located in Germany.

All the information collected is anonymous and will be used solely for academic purposes by the university. It will not be given to any public or private organization. During and after the activity, no one will have any way of knowing other participants' choices. In addition, no one will be able to link your identity with your decisions in the dynamic exercise or your answers to the questionnaires.

Next July¹⁰⁸, we will return to the province of Cañete to present and discuss results of this research with you.

To participate in the exercise, it is very important that you pay close attention to the instructions that we are about to give you.

- a) The activity lasts between an hour and a half and two hours.
- b) We need your full attention without distractions. Please follow all the instructions provided by my colleagues. Please, try not to use your phone or participate in any other activity that might distract you.
- c) Please do not talk with other participants during the exercise. If you have any questions, raise your hand and one of my colleagues or I will assist you.

We will be undertaking the same exercise several times throughout the following days. We request you not to discuss your decisions, answers or details of the exercise with other farmers. This way, they can come and participate under the same conditions that you have.

Up to this point, do you have any questions?

[Time to solve any questions or doubts]

Upon entering the room, my colleague handed you a sheet entitled "informed consent." As explained, it contains all the information I have provided. With your signature, this document guarantees that your participation in the exercise is voluntary and informed, and that you have received the money as a donation. It is a standard practice of the university to ensure that the activities carried out follow appropriate ethical principles.

Now, I will read the commitment at the bottom of the sheet; please go to that part and follow along. If you agree, print your name and then sign the sheet. **[Read out loud both parts of the commitment, each participant signs the first part]**

Behind the informed consent document, there is a payment receipt for the sixteen soles that were given to you. This receipt is an invoice of the payment you receive along with the administration of the project. Please read it and, if you agree with its content, sign it.

[Time for signature of informed consent and receipts]

[Once signed, Experimentalist 1 and Experimentalist 5 collect signed receipts and signed informed consents and retain them in storage]

[Control: No video presentation]

¹⁰⁸ July 2020

[**TA and TB:** Well, to begin the exercise, we will present a video with information about the ecological characteristics of the Cañete River Watershed and the people who live there. While watching,] [**TA:** please pay close attention to the information presented in the video] [**TB:** imagine what the people who live in the upper region of the Cañete River—near the river’s source—think and feel. It is not necessary to pay attention to all the information presented in the video, just concentrate on the users of the upper watershed, on what you imagining they think and feel in their current situation as described in the video.]

5A3. Instructions

Instructions for the exercise

[Control: Once participants have read and signed both the informed consent and the receipt of the sixteen soles, Experimentalist 1 gives the following information]

[TA and TB: Once participants have seen the video about the Cañete River Watershed, Experimentalist 1 gives the following information]

Thank you for your attention. Let's start the exercise now.

[**TA and TB:** As you saw in the video] Nor Yauyos Cochas Landscape Reserve is organising an agroecological fair. The aim of the fair is that the communities in the upper region of the Cañete River Watershed can sell their products to new consumers and thus improve the commercialisation of their agricultural products. These communities live close to the headwaters of the Cañete River, in grasslands and *bofedales*. The water supply of the lower regions of the river, in other words of the Cañete River Valley, depends on the conservation of these natural areas.

The farmers and ranchers who commit to not polluting water and help conserve natural areas such as pastures, *bofedales* and forests are the only ones that can sell their products at the agroecological fair.

Now, you have the possibility to support these communities in the upper watershed in the organisation of this fair. To do so, you may decide if you want to donate to the fair. If so, you may choose how much of the sixteen soles you just received you would like to donate. The amount given by you will be collected by us and delivered directly to the Nor Yauyos Cochas Landscape Reserve and other communal leaders who participate in the organization of the fair, who will use the money for the installation and promotion of the fair. The fair is taking place in the coming months.

There is no right or wrong choice, you may choose as you want. Remember, the sixteen soles are entirely yours. Therefore, you may take home the amount you do not give to the fair. Also remember that no one will link your name with the decisions you make; all decisions are anonymous.

To make your decision, carefully follow the instructions we give you: **[display in the whiteboard the slide with the corresponding instructions]**

1. First, open the small Manila envelope—the one you received at the entrance after registering.
2. As you can see, this envelope has the white bag containing your sixteen soles inside **[Control and TA:** and the yellow bag that is empty] **[TB:** the yellow bag that is empty and a closed blue envelope]
3. Only once you are in the basement in your private booth **[or room X; point out the appropriate room to the participants]** and my colleague gives you the signal, put what you want to give to the fair in the yellow bag **[show white and yellow bags while explaining the choice task.]** For now, don't open any of the bags.
4. You will make this decision in the room downstairs **[or room X; point out the appropriate room to the participants]**. The room represents the Cañete River Valley; that is, it represents the lower watershed. Here you can see the representation of the Cañete River, which goes down from the upper part of the watershed and irrigates the entire valley **[point to the blue strip representing the river]**. There's a cabin for each participant in the room downstairs. The idea is that everyone makes their decision privately and anonymously, without anyone seeing or identifying the decision they made.
5. You will be guided to the cabin; I will indicate for you to go in a moment. Take only the white bag and the yellow bag with you — remember not to open them until you are told.

So far, do you have any questions?

Start of the instructions for the perspective-taking exercise-----

6. **[TB:** Before going to your private booth to make your decision, you will imagine how much of your sixteen soles farmers who sell their products at the agroecological fair would like to receive from you.
7. For this, you will take only the blue envelope with you and will go to the second level of the venue **[or room B; point out the corresponding room to the farmers]**. The second level of the venue represents the upper watershed, where the Cañete River rises. Please do not open the envelope until you receive the indication to do so once you are in your private booth. You will receive the corresponding instructions there.
8. Please note that you will only answer how much of your 16 soles you think that the upstream farmers selling their products at the agroecological fair would like to receive. You will write that amount on the card inside the blue envelope. This is not the step in which you make your decision about how much you will give to the fair; this decision will be made later, in the room below.

If you have any questions at any time, please raise your hand; my colleagues or I will help you to resolve them.

So far, do you have any questions?

(Time for Questions and Answers)

If there are no (more) questions, each participant will now go to the private booths located on the second level of the venue **(in room B)**

(One by one, participants go to the room that represents the upper watershed)

(In the room representing the upper watershed, Experimentalist 3 welcomes each participant and tells them the following)

9. This room represents the upper region of the Cañete River Watershed; that is, it represents the area where the Cañete River rises. This is Piticocha Lake [**show**], one of the lakes where the river is born [**point out the plastic blue strip to each participant**].
10. Please sit down in one of the booths [**locate participants from the back of the room out**] and wait without opening the blue envelope until a pen is given to you.
11. In the meantime, carefully read the instructions in the booth. Please remember not to open your blue envelope yet.

(Experimentalist 3 reads the instructions to everyone once they are in the cabins.)

12. Now, open the blue envelope, which contains a card.
13. Imagine how much of your sixteen soles the farmers selling their products in the agroecological fair would like to receive from you.
14. When a pen is given to you, you write that amount in the corresponding blank on the card that is inside the blue envelope. Also on the same card, write the reasons why you imagine that people upstream would like to receive the particular amount you have chosen.
15. Please note that you will not decide how much to give to the agroecological fair here. Just imagine and write down how much of your sixteen soles the producers selling at the agroecological fair would like to receive. Also write down why you think this is the amount they would like to receive.
16. If you have any questions, please raise your hand now. I'll go to your booth and answer them.

(Time for questions and answers)

17. Now I am going to give each of you a pen. You have 3 minutes to write the amount and your reasons on the card.

[After three minutes]

18. Time is up. Put the card inside the envelope, close the envelope and leave it in the booth cabin.
19. When told, each of you will return to your seat downstairs. While you wait, please keep quiet.

[One by one, participants go to the seat where they received the instructions, take their yellow and white bags, and move towards the room that represents the lower watershed. Experimentalist 1 verifies they only take the yellow and the white bags and guides them to the corresponding room. Experimentalist 2 welcomes them in this other room, places them in the corresponding cabin, and reminds them not to make their decision until they are told; that is, they are reminded not to open either the white or the yellow bag before they are instructed to].

End of instructions for the perspective-taking exercise-----

[Control and TA: Experimentalist 1 guides each participant to their private booths. Experimentalist 2 welcomes them and places them in a booth working from the back of the room up to the front of the room.

[Control, TA and TB: As soon as all participants are in their booths, the Experimentalist 2 reads the instructions out loud]

20. In a moment I will read the instructions of the exercise, please pay attention.
21. Only when instructed (*raise voice to be clear*) you shall decide whether to donate to the agroecological fair and if so, how much of your sixteen soles you wish to donate, placing your donation in the yellow bag. You will have 3 minutes to make your choice and your possible donation. After those 3 minutes leave the yellow bag for the fair on the table, in the booth. You will keep the amount you do not donate to the fair in your white bag and will take it with you. Then I will tell you, one by one, in order, to return to your initial seats.
22. If you have any questions, please raise your hand. I'll come to the booth and answer them

[Time for Questions and Answers]

23. If there are no (more) questions, you can make your decision now.

[After 3 minutes]

24. Close the yellow bags, leave them in the booth and do not reopen them.

25. I will tell you, one by one, when you may go back to your seats upstairs to answer the survey. In the meantime, wait in silence in your booths.

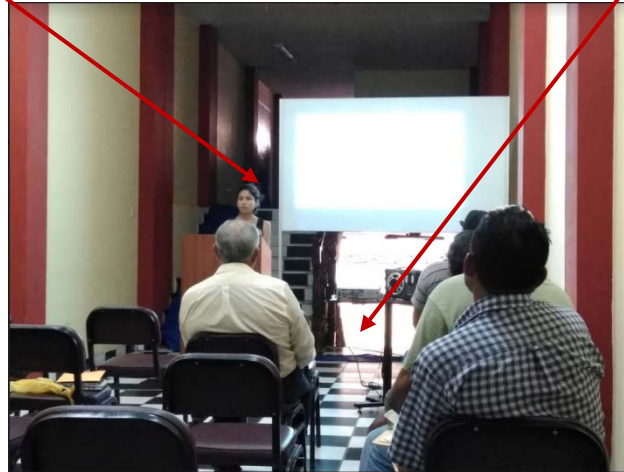
[One by one they go to the seats where they received the general instructions to answer the survey]

5A4. Organisation of rooms in the venue for the experiment

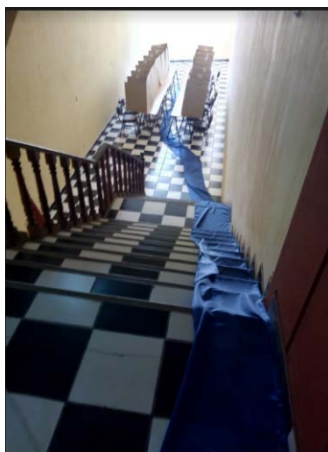
Room for general instructions and survey

Second level of the venue
(Upper watershed)

Basement
(Lower watershed)



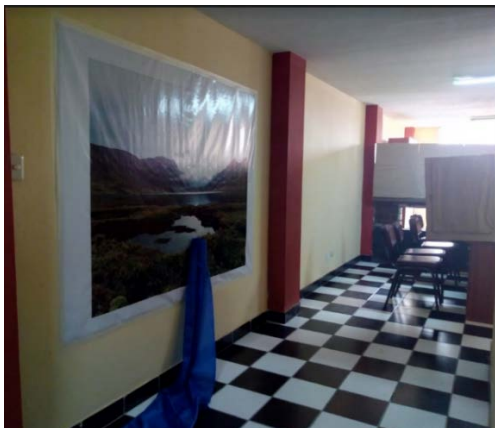
Basement - Lower watershed



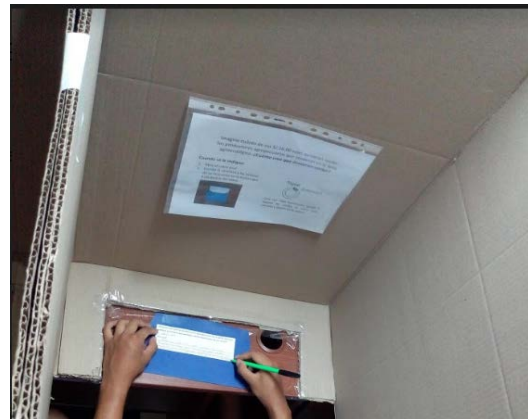
Basement - Lower watershed (Private booth)



Second level of the venue - Upper watershed



**Second level of the venue - Upper watershed
(Private booth)**



5A5. Supplementary material

(Available upon request.)

- a) Slides supporting the presentation of the instructions to participants
- b) Instructions pinned to private booths
- c) Card for perspective-taking task
- d) Three-part survey

Appendix 5B – Sampling and plan of sessions

5B1. Sampling

Commissioners of each of the seven water irrigation canals provided general information regarding (a) the sectors comprising each canal, (b) their location, and (c) the number of water irrigators located throughout the canals in these different sectors. Directives of the commissions and board of irrigators and also water operators from each commission provided help introducing us to the sectors of and farmers from each irrigation canal.

After receiving this information and these introductions, we visited downstream farmers at their plots and homes inviting them to participate in a research activity on agriculture in the Cañete Valley. Specifically, they were invited to attend a two-hour meeting consisting of a task/exercise/dynamic exercise (“*ejercicio dinámico*” originally in Spanish) and a survey on their socioeconomic characteristics as farmers as well as on their perceptions and opinions about agriculture in the region in general. In the same week, we targeted downstream farmers from the head, tail and middle canal sections. As one canal gradually became completely visited, the next canal was visited until all seven canals had eventually been covered.

When visited, farmers were...:

1. ... introduced to the project and invited to attend an activity to collect data—this included informing them about the 16 soles reimbursement they would receive for their participation in the experiment. This sum served to acknowledge their effort, time, and transportation costs accrued to attend the activity;
2.asked about some personal basic information, i.e. first name, last name, age, district, cell phone number, the name of the closest town to their plots, the size of their plots, and the products they harvest;
3. ... scheduled for a particular (experimental) session—alternatively, they were registered to be called and scheduled for a session taking place at a later date.

On a daily basis, we followed up on farmers’ (to-be-confirmed) appointments by phone.

5B2. Plan of sessions

The goal set by the research team was to obtain data from as many farmers as possible given the available time and budget. During the invitation and registration of farmers, as well as during the follow-up phone calls with registered farmers, we targeted farmers from all administrative districts, all irrigation canals and from the different parts of each canal (i.e. head, tail and middle canal sections.) in the Cañete Valley.

The assignation to treatment and control conditions was at the session level, the main reason for this being that the setup of the experiment in the venue made it logistically unfeasible to randomly assign participants to treatment and control conditions within the same session. All sessions were scheduled in the afternoon and, aside from the sessions carried out during the first week, all sessions were held at the same time slots (see details in the legend of Table 5B1).

All sessions were initially randomly assigned to treatment and control conditions. When sessions got cancelled (e.g. because no farmer showed up in a scheduled and confirmed session), assignation of remaining sessions to treatment and control conditions was (q-randomly) adjusted based on two criteria: (a) to attain a balanced assignation of sessions across the schedule (in terms of days and time slot; not to end up with sessions for a given treatment or control condition being carried out the same days or at the same time slots) and (b) to ensure a higher number of participants in the treatment condition, where most variance in the outcome variable was expected upfront (List, Sadoff and Wagner 2011, Moffat 2016). Both the initial plan of sessions and the subsequent adjustments were defined before knowing the specific characteristics of farmers attending a particular experimental session.

Table 5B1 – Plan of sessions and number of participants by session

Week (2018)	Slot	Mon.		Tue.		Wed.		Thu.		Fri.		Sat.		Sun.	
		Treat.	N	Treat.	N	Treat.	N	Treat.	N	Treat.	N	Treat.	N	Treat.	N
21-01	S1			C1	8	C2	2	C2	3			T	7		
	S2			C2	3	T*	3								
28-01	S1	C2	2	C2	4	T	2			C1	7	C1	2	C1	7
	S2	C2	2	C2	5	T	2	C2	10	T	8	C2	5		
04-02	S1			C2	4	C1	2					C1	4	C2	6
	S2	T	7			T	3	T	6	C1	7	T	13	C1	9
11-02	S1	T	2	T	3					C2	5			T	3
	S2	C1	2	T	2			C2	2	T	8	T	5	T	5

Notes: Date of Monday of each week is displayed. **S1** stands for the first time slot and **S2** for the second slot. In the first week, 16:00 and 18:00 were, respectively, the starting times of each slot. In the second, third and fourth week, 15:00 and 17:00 were, respectively, the starting times of each slot. **C1** stands for Control 1 (*Info only*), **C2** for Control 2 (*Info and video*) and **T** for Treatment (*Info and video plus perspective-taking*). In total, 182 farmers showed up to the experimental sessions. Of these, two farmers left the venue without leaving any of the bags of the choice task in their booths. Cells in blue indicate schedule sessions that got cancelled.

*Data from the fourth session (N=3) is left out due to a mistake in the implementation of the procedures.

For these features of the assignation-to-treatment procedures, sample sizes are not balanced across treatment and control conditions. Distribution of farmers' characteristics, however, is fairly balanced across treatment and control conditions as can be noted in Table 5C1, below. Although we do not accompany this table with results of tests of balance (see Mutz, Pemantle and Pahn 2019 for a recent discussion on the topic), we did control for these characteristics in our regression models (see Appendix 5C, section 5C2) as part of our initial research plan. As summarised in Result 5.2, our main results hold even when controlling for

farmers individual socioeconomic characteristics. All this is evidence which indicates that our assignation to treatment procedures were seemingly successful in getting farmers assigned to treatment and control conditions independently of their characteristics, thereby avoiding a potential selection bias compromising the identification of treatment effects.

Table 5B2 – Number of participants and sessions, by condition

<i>Condition</i>	<i>N.° participants</i>	<i>N.° sessions</i>	<i>Avg. N.° Participants per session</i>
Control 1 <i>Info only</i>	48	9	5
Control 2 <i>Info + Video</i>	53	12	4
Treatment <i>Info + Video + Perspective-taking</i>	79	15	5
Total	180*	36	

*182 farmers showed up to the experimental sessions. Of these, two farmers left the venue without leaving any of the bags of the choice task in their booths and data from the fourth session ($N = 3$) is left out due to a mistake in the implementation of the procedures.

Appendix 5C – Statistical appendix

In this Appendix we present, by condition, the summary statistics of the variables we control for in the regression analysis we perform. We also discuss the possible endogeneity of two variables included in the regression analysis: perceived social distance and perceived income distance.

5C1. Summary statistics of control variables

Table 5C1 – Summary statistics of control variables, by condition

Variable	Condition			Total
	Control 1	Control 2	Treatment	
	<i>Info on the fair only</i>	<i>Info and video</i>	<i>Info and video plus perspective taking</i>	
	Mean (SD) N	Mean (SD) N	Mean (SD) N	
Age	55.61 (12.67) 49	55.83 (13.86) 53	54.15 (13.10) 78	55.04 (13.16) 180
Female (1 = Female, 0 = Male)	0.18 49	0.26 53	0.26 78	0.24 180
Education level 10 ordered categories, from lowest to highest	5.43 (2.05) 49	5.21 (2.05) 52	5.24 (1.94) 78	5.28 (2.00) 178
Head of household (1 = yes, 0 = no)	0.74 47	0.75 48	0.87 75	0.80 170
Transportation costs From and to the venue; any positive amount in PEN	7.80 (5.04) 48	7.83 (5.17) 52	8.60 (8.37) 77	8.16 (6.70) 177
Daily income 1-6 scale, by ranges of income	3.26 (1.24) 47	2.98 (1.12) 51	3.00 (1.03) 77	3.06 (1.11) 175
Manager of the plot (1 = yes, 0 = no)	0.90 49	0.91 53	0.95 78	0.92 180
Owner of the plot (1 = yes, 0 = no)	0.73 44	0.64 50	0.53 76	0.61 170
Irrigation canal the downstream farmer belongs to				
Huanca (1 = yes, 0 = no)	0.02 46	0.06 48	0.06 77	0.05 171

María Angola (1 = <i>yes</i> , 0 = <i>no</i>)	0.09 46	0.34 47	0.08 77	0.15 170
Pachacamilla (1 = <i>yes</i> , 0 = <i>no</i>)	0.07 46	0.09 46	0.03 77	0.05 169
Palo Herbay (1 = <i>yes</i> , 0 = <i>no</i>)	0.00 46	0.13 46	0.13 77	0.09 169
San Miguel (1 = <i>yes</i> , 0 = <i>no</i>)	0.20 46	0.23 48	0.18 77	0.20 171
Viejo Imperial (1 = <i>yes</i> , 0 = <i>no</i>)	0.35 46	0.20 45	0.17 78	0.22 169
Nuevo Imperial (1 = <i>yes</i> , 0 = <i>no</i>)	0.28 46	0.17 47	0.37 78	0.29 171

Way of finding out about the experiment

By research team (1 = <i>yes</i> , 0 = <i>no</i>)	0.78 49	0.75 51	0.78 78	0.77 178
By a friend (1 = <i>yes</i> , 0 = <i>no</i>)	0.08 49	0.06 51	0.08 78	0.07 178
By a relative (1 = <i>yes</i> , 0 = <i>no</i>)	0.12 49	0.12 51	0.05 78	0.09 178
By other (1 = <i>yes</i> , 0 = <i>no</i>)	0.02 49	0.08 51	0.09 78	0.07 178

Measures on perceived distance (closeness thereof) regarding upstream farmers

High closeness (IOS) Median split of the 'Other in the Self Scale' score (1 = <i>high</i> , 0 = <i>low</i>)	0.50 48	0.65 52	0.64 75	0.61 175
High distance on income Median split of the distance on income measurement which measures the relative distance on the position downstream farmers place themselves and upstream farmers in an income scale (1 = <i>high</i> , 0 = <i>low</i>)	0.50 48	0.53 53	0.59 78	0.55 179
Been up in the upper part of the watershed before (1 = <i>yes</i> , 0 = <i>no</i>)	0.59 49	0.55 53	0.40 78	0.49 180

Notes: SD is the standard deviation and N the number of non-missing observations

5C2. Complete results of regression analysis

Table 5C2 – Results of Tobit estimations

Variables	Outcome variable: amount donated to the agroecological fair			
	(1)	(2)	(3)	(4)
Perspective-taking	3.224*** [1.335, 5.112]	4.841*** [2.341, 7.341]	2.781*** [0.707, 4.856]	3.095** [0.287, 5.903]
Video			0.417 [-1.295, 2.128]	0.891 [-1.803, 3.585]
<i>Age</i>		-0.0136 [-0.107, 0.0794]		-0.00826 [-0.0983, 0.0818]
<i>Female</i>		-2.787* [-5.923, 0.349]		-2.763** [-4.918, -0.608]
<i>Education level</i>		-0.431 [-1.142, 0.280]		-0.0219 [-0.661, 0.617]
<i>Head of household</i>		-1.539 [-4.328, 1.250]		-2.112* [-4.469, 0.244]
<i>Transportation costs</i>		-0.254** [-0.462, -0.0456]		-0.165* [-0.354, 0.0235]
<i>Daily income</i>		-0.704 [-1.893, 0.484]		-1.049** [-2.024, -0.0736]
<i>Manager of the plot</i>		14.09*** [6.132, 22.04]		4.953* [-0.783, 10.69]
<i>Owner of the plot</i>		1.594 [-0.799, 3.987]		0.588 [-1.568, 2.744]
<i>Huanca</i>		-1.773 [-8.635, 5.090]		-2.924 [-9.556, 3.708]
<i>María Angola</i>		3.863 [-3.936, 11.66]		-0.714 [-4.523, 3.096]
<i>Pachacamilla</i>		1.528 [-3.501, 6.556]		1.436 [-2.537, 5.408]
<i>Palo Herbay</i>		-0.795 [-6.628, 5.038]		-0.562 [-5.146, 4.022]
<i>San Miguel</i>		-2.988** [-5.654, -0.322]		-2.295* [-4.738, 0.149]
<i>Viejo Imperial</i>		-1.515 [-4.479, 1.449]		-2.292* [-4.924, 0.339]
<i>By research team</i>		5.166** [1.219, 9.112]		0.737 [-3.625, 5.099]
<i>By a friend</i>		6.312** [1.327, 11.30]		3.697 [-1.746, 9.141]
<i>By a relative</i>		10.05*** [4.162, 15.94]		2.290 [-3.236, 7.815]
<i>Been to the upper watershed before</i>		0.169 [-2.223, 2.561]		-0.0583 [-2.205, 2.088]
<i>High distance on income</i>		-0.403 [-2.719, 1.912]		-0.420 [-2.361, 1.520]

		0.335		0.809
	<i>High closeness (IOS)</i>		[-1.777, 2.446]	[-1.241, 2.858]
	Constant	5.802***	-5.234	5.803***
		[4.806, 6.799]	[-17.08, 6.609]	[4.815, 6.609]
				7.689*
				[-1.309, 16.69]
No. of observations		124	100	177
Pseudo R2		0.01	0.07	0.01
				0.04

*** p<0.01, ** p<0.05, * p<0.1. Confidence intervals (95%) in squared brackets. Robust standard errors were calculated. **Tobit** models were estimated assuming lower and upper censoring and calculating robust standard errors. **Perspective-taking** indicates whether or not downstream farmers were induced to perspective-taking. **Video** indicates whether or not downstream farmers watched the video of the watershed.

Table 5C3 – Results with OLS estimations

Variables	Outcome variable: amount donated to the agroecological fair			
	(1)	(2)	(3)	(4)
Perspective-taking	2.664***	3.871***	2.310***	2.399**
	[1.153, 4.175]	[1.889, 5.854]	[0.630, 3.990]	[0.0271, 4.771]
Video			0.353	0.738
			[-1.136, 1.843]	[-1.653, 3.129]
<i>Age</i>		-0.0117		-0.00372
		[-0.0949, 0.0714]		[-0.0817, 0.0743]
<i>Female</i>		-2.132		-2.218**
		[-4.942, 0.679]		[-4.148, -0.287]
<i>Education level</i>		-0.370		-0.0323
		[-1.025, 0.285]		[-0.604, 0.539]
<i>Head of household</i>		-1.151		-1.709*
		[-3.531, 1.228]		[-3.702, 0.284]
<i>Transportation costs</i>		-0.205**		-0.125
		[-0.382, -0.0274]		[-0.288, 0.0372]
<i>Daily income</i>		-0.553		-0.821**
		[-1.570, 0.464]		[-1.631, -0.0107]
<i>Manager of the plot</i>		11.76***		4.423
		[5.830, 17.69]		[-1.134, 9.979]
<i>Owner of the plot</i>		1.408		0.517
		[-0.680, 3.496]		[-1.362, 2.396]
<i>Huanca</i>		-1.230		-2.222
		[-7.098, 4.637]		[-7.638, 3.194]
<i>María Angola</i>		2.544		-0.765
		[-3.232, 8.320]		[-4.064, 2.534]
<i>Pachacamilla</i>		1.109		1.054
		[-2.790, 5.008]		[-2.271, 4.379]
<i>Palo Herbay</i>		-0.668		-0.530
		[-5.696, 4.360]		[-4.489, 3.428]
<i>San Miguel</i>		-2.710**		-2.146*
		[-5.095, -0.325]		[-4.307, 0.0147]
<i>Viejo Imperial</i>		-1.182		-1.943*
		[-3.732, 1.368]		[-4.165, 0.278]

<i>By research team</i>		3.963** [0.847, 7.080]		0.556 [-3.199, 4.311]
<i>By a friend</i>		4.905** [0.713, 9.098]		2.891 [-1.763, 7.546]
<i>By a relative</i>		8.100*** [3.259, 12.94]		1.640 [-3.263, 6.544]
<i>Been to the upper watershed before</i>		0.185 [-1.921, 2.291]		-0.0257 [-1.892, 1.841]
<i>High distance on income</i>		-0.374 [-2.442, 1.693]		-0.301 [-1.999, 1.398]
<i>High closeness (IOS)</i>		0.110 [-1.786, 2.005]		0.492 [-1.301, 2.286]
<i>Constant</i>	5.816*** [4.901, 6.732]	-3.105 [-12.82, 6.611]	5.816*** [4.903, 6.730]	6.987* [-1.215, 15.19]
Observations	124	100	177	136
R-squared	0.08	0.32	0.07	0.21
Adjusted R-squared	0.08	0.15	0.07	0.07

*** p<0.01, ** p<0.05, * p<0.1 Confidence intervals in squared brackets (95%). Standard robust errors were calculated.

5C3. Diagnostics of multicollinearity

Results in Table 5C4 and Table 5C5 indicate that multicollinearity is not a critical problem in the regression models estimated with OLS wherein the measured observable variables are included. In both models, the variance inflation factor is lower than 5, being 5 or 10 the commonly used rule of thumb cut-offs to indicate whether multicollinearity might be a problem.

Table 5C4 – Variance inflation factors: diagnostics for Model 2, Table 5C3

Variable	VIF	1/VIF
By research team	3.94	0.25
By a friend	2.93	0.34
By a relative	2.54	0.39
Age	1.82	0.55
María Angola (Irrigation canal)	1.72	0.58
Education level	1.65	0.61
Owner	1.56	0.64

Female	1.53	0.65
Video and perspective-taking	1.51	0.66
San Miguel (Irrigation canal)	1.5	0.67
Viejo Imperial (Irrigation canal)	1.47	0.68
Manager	1.36	0.74
Daily income	1.35	0.74
Head of household	1.35	0.74
Palo Herbay (Irrigation canal)	1.34	0.74
Pachacamilla (Irrigation canal)	1.3	0.77
High closeness (IOS)	1.3	0.77
Huanca (Irrigation canal)	1.29	0.77
Been to the upper watershed before	1.28	0.78
Transportation costs to (from) the venue of the experimental sessions)	1.25	0.80
High distance on income	1.23	0.81
Mean VIF	1.68	

Table 5C5 – Variance inflation factors: diagnostics for Model 4, Table 5C3

Variable	VIF	1/VIF
By research team	3.33	0.30
By a relative	2.44	0.41
By a friend	2.26	0.44
Video and perspective-taking	2.09	0.48

Age	1.99	0.50
Video	1.95	0.51
María Angola (Irrigation canal)	1.76	0.57
Education level	1.61	0.62
San Miguel (Irrigation canal)	1.6	0.62
Owner	1.58	0.63
Viejo Imperial (Irrigation canal)	1.47	0.68
female	1.42	0.70
Palo Herbay (Irrigation canal)	1.37	0.73
Daily income	1.31	0.76
Pachacamilla (Irrigation canal)	1.31	0.76
Been to the upper watershed before	1.3	0.77
Head of household	1.26	0.79
High closeness (IOS)	1.24	0.81
Huanca (Irrigation canal)	1.2	0.84
Manager	1.17	0.86
Transportation costs to (from) the venue of the experimental sessions)	1.16	0.86
High distance on income	1.11	0.90
Mean VIF	1.63	

5C3.1. On the possible endogeneity of and multicollinearity between the variables measuring distance

Since they were measured after the experiment was conducted, it is possible that the values of the variables measuring perceived distance are influenced by the treatment conditions. To assess whether this is the case, we run pairwise comparisons between the variables that measure this perceived distance and the treatment variables. We also check for significant association between these variables measuring perceived distance and whether participants had previously been in the upper watershed. No statistical association between these variables seem to exist (see results of these tests in Table 5C6).

Table 5C6 – Pairwise comparisons testing association between measurements of (perceived) distance and Condition and among themselves

Comparison	<i>Pearson χ^2</i>	<i>Fisher's exact</i>	<i>N</i>
High closeness, IOS <i>vs</i> Condition	3.1 <i>P</i> = 0.21	0.23	175
High distance on income <i>vs</i> Condition	1.08 <i>P</i> = 0.58	0.58	179
High closeness, IOS <i>vs</i> Been up	3.12 <i>P</i> = 0.08	0.09	176
High distance on income <i>vs</i> Been up...	1.47 <i>P</i> = 0.24	0.24	180
High closeness, IOS <i>vs</i> High distance on income	0.01 <i>P</i> = 0.923	1.00	175

Perceived social distance was measured using the ‘Inclusion of the Other in the Self’ scale (Gächter et al. 2015). Through median split a dummy variable was created out of this variable, generating the ‘**High closeness, IOS**’ variable. To measure perceived distance on income, farmers locate both the average farmer in the upper watershed and the average farmer in the lower watershed on a scale from 1-10 according to their income. The relative distance between the values of these two rankings is what *Perceived socioeconomic distance* measures. Through median split, a dummy variable was created out of this variable, generating the ‘**High distance on income**’ variable. **Condition** indexes the control or treatment condition to which the respective downstream farmer was assigned.