DISSERTATION / DOCTORAL THESIS

Titel der Dissertation / Title of the Doctoral Thesis

„Soziale Verteilungspräferenzen in Koalitionsverhandlungen“

verfasst von / submitted by

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angestrebter akademischer Grad / in partial fulfilment of the requirements for the degree of

Doktor der Philosophie (Dr. phil.)

Wien, 2021 / Vienna 2021

Studienkennzahl lt. Studienblatt / degree programme code as it appears on the student record sheet:	UA 796 310 300
Dissertationsgebiet lt. Studienblatt / field of study as it appears on the student record sheet:	Politikwissenschaft
Betreut von / Supervisor:	Univ.-Prof. Mag. Dr. Bernhard Kittel

Danksagung

An dieser Stelle möchte ich mich bei allen meinen Wegbegleiterinnen und -begleitern bedanken, die während der Dissertation an meiner Seite waren. Ohne eure Unterstützung wäre es nicht möglich gewesen, dieses Projekt zu verwirklichen!

Zunächst möchte ich großen Dank an meinen Betreuer, Bernhard Kittel, aussprechen. Sein kritischer Blick und unser intensiver Austausch wären für die Arbeit unverzichtbar gewesen. Ebenfalls Dank gilt Markus Tepe, für sein konstruktives und hilfreiches Feedback. Weiters danke ich Sabine Neuhofer, mit der ich gemeinsam über fünf Jahre im Projekt „Verteilungspräferenzen und Bedarfsgerechtigkeit in Netzwerken" durch alle Höhen und Tiefen der Forschung gegangen bin. Ich möchte mich auch bei meinem Koautor, Jan Sauermann, bedanken, mit dem es nicht nur eine Freude war zusammenzuarbeiten, sondern der mir auch sonst mit pointiertem Feedback beiseitestand.

Zudem möchte ich allen Mitgliedern der DFG-Forschergruppe FOR2101 „Bedarfsgerechtigkeit und Verteilungsprozeduren" danken, deren Feedback während unserer regelmäßigen Treffen sehr wertvoll für meine Arbeit war. Insbesondere Stefan Traub gilt großer Dank, der sich stets Zeit genommen hat, um spieltheoretische Fragen mit mir zu besprechen. Ich möchte mich auch bei Fabian Paetzel bedanken, für unseren kreativen fachlichen Austausch und für die Möglichkeit, ein Semester im fantastischen Team der HSU an meiner Dissertation zu arbeiten.

Selbstverständlich bedanke ich mich bei allen Kolleginnen und Kollegen des Instituts für Wirtschaftssoziologie der Universität Wien, die ein so tolles Forschungsumfeld geschaffen haben. Ein besonderer Dank geht an Monika Mühlböck und Roman Hoffmann, von denen ich unglaublich viel lernen durfte. Réka Szendrő danke ich für unsere ausgezeichnete Zusammenarbeit. Ich möchte auch Wilhelm Schmid für unsere bereichernden Diskussionen danken.

Für die Finanzierung meiner Forschung danke ich dem FWF Wissenschaftsfond, sowie für die finanzielle Beteiligung an einem der Beiträge, dem C-SEB der Universität zu Köln.

Nicht zuletzt möchte ich mich bei meiner Familie für ihr Ohr und ihre liebevollen Zusprüche während der Arbeit an der Dissertation bedanken. Ich kann mich glücklich schätzen, solche Eltern, Großeltern und solch einen Bruder an meiner Seite zu wissen! Gleichzeitig danke ich Mrinalini für ihre wirklich einmalige Unterstützung während der Dissertation. Die Arbeit möchte ich meinem großen Vorbild widmen - meiner Großmutter Waltraud Marschitz.

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1. Einleitung

Verfügbare Ressourcen sind endlich. Kaum eine Tatsache hat solch weitreichende Auswirkungen auf das menschliche Zusammenleben, wie diese. Aufgrund der Knappheit von Ressourcen arbeiten Menschen zusammen, um diese zu vermehren. Das Ringen um knappe Ressourcen führt jedoch ebenso zu Konflikten, deren Auswirkungen verheerende Dimensionen annehmen können. Der Ursprung dieser Konflikte liegt in der Frage, wie die knappen Ressourcen verteilt werden sollen. Diese Frage stellt sich selbst dann, wenn die verfügbare Menge an Ressourcen durch Kooperation steigt. Im Grunde ist die Logik jedes Verteilungsproblems simpel: Je größer der Anteil an einer knappen Ressource, den eine Person erhält, desto weniger erhält eine andere. Wenn jedoch jedes Individuum einen möglichst großen Anteil der Ressourcen erhalten möchte, entsteht ein Zielkonflikt. Wenn es in der Politik also um die Frage geht: „Wer bekommt was, wann und wie?“ („Who Gets What, When, How“, Lasswell, 1936), dann geht es im Kern von politischen Entscheidungen um genau diese Verteilungskonflikte.

Um die Verteilung der Ressourcen zu beeinflussen, bilden Individuen unter demokratischen Entscheidungsregeln Koalitionen.[1] Eine Koalition ist in dieser Arbeit definiert als ein temporärer Zusammenschluss mehrerer Individuen zur Durchsetzung bestimmter Ziele. Koalitionen werden unter anderem gebildet, um das notwendige Quorum zu erfüllen und trotz etwaiger Zielkonflikte demokratische Verteilungsentscheidungen treffen zu können. Die Koalitionsforschung in der Neuen Politischen Ökonomie befasst sich vor allem mit zwei Fragen: Welche Koalitionen bilden sich (de Swaan, 1973; Schofield, 1995; Van Deemen, 1997; Van Roozendaal, 1992) und welche Verteilungsentscheidungen treffen die Koalitionen (Baron & Ferejohn, 1989; Gamson, 1961; Peleg, 1981)? Das Forschungsfeld bezieht sich hierbei insbesondere auf Regierungskoalitionen, wobei Koalitionen im Grunde alle Sphären des sozialen Lebens durchdringen, sofern eine Entscheidung demokratischen Entscheidungsmechanismen zugrunde liegt (Gamson, 1961; Ray, 2007).

Die spieltheoretischen Analysen und empirischen Tests der Koalitionsforschung gehen typischerweise davon aus, dass Individuen versuchen in den Koalitionsverhandlungen ihren Nutzen zu maximieren. In den letzten drei Jahrzehnten hat sich der wissenschaftliche Kenntnisstand zu den Fragen, woraus Nutzen gezogen und wovon dieser beeinflusst wird, jedoch enorm weiterentwickelt (Cooper & Kagel, 2016; Konow & Schwettmann, 2016). Die Verhaltensökonomie,

[1] In dieser Arbeit spreche ich von Individuen, da diese in den Studien die Analyseeinheit bilden. Eine Koalition kann selbstverständlich auch aus einem Zusammenschluss von Parteien, Organisationen oder Staaten bestehen, welche selbst jeweils aus einem Zusammenschluss von Individuen bestehen.

die sich maßgeblich aufgrund von Fragen der Neuen Politischen Ökonomie entwickelt hat (Munger, 2015), greift psychologische (Kahneman & Tversky, 1979) und soziale Faktoren (Fehr & Fischbacher, 2004) auf und bettet diese innerhalb der Rational Choice Theorie ein, um akkuratere Erklärungsmodelle und bessere Verhaltensprognosen machen zu können. Die experimentellen Erkenntnisse der Verhaltensökonomie zeigen insbesondere, dass Verteilungsentscheidungen weitaus weniger egoistisch getroffen werden als in der klassischen Rational Choice Theorie vorhergesagt, selbst wenn strategische Motive ausgeschlossen werden können (Fehr & Fischbacher, 2003; Frohlich & Oppenheimer, 2006).

Die Erforschung und spieltheoretische Modellierung von Präferenzen, die über das strikte Eigeninteresse hinaus gehen, fand weitgehend parallel zu den Weiterentwicklungen in der Koalitionsforschung statt. Wenn Individuen in Koalitionsverhandlungen jedoch nicht nur eigeninteressiert, sondern auch prosozial motiviert sind, dann verändern sich die Voraussagen der Verteilungsentscheidungen trotz gleicher institutioneller Rahmenbedingungen fundamental (Frohlich & Oppenheimer, 2007). Im Extremfall gibt es zwischen den koalierenden Individuen keinen Verteilungskonflikt. Der Einfluss von Prosozialität auf Mehrheitsentscheidungen wurde bisher nur bedingt untersucht (bspw. Sauermann & Kaiser, 2010). Im Kontext von Koalitionsverhandlungen gibt es zwei entscheidende Fragen: Erstens, wie interagieren soziale Präferenzen verschiedener Individuen in Koalitionsverhandlungen und beeinflussen die gemeinsame Verteilungsentscheidung? Zweitens, wie wirkt sich die Entscheidungsstruktur von Koalitionsverhandlungen auf die Prosozialität von Individuen aus? Die Entscheidungsstruktur kann das prosoziale Verhalten auf mehreren Ebenen beeinflussen, wodurch geklärt werden muss, wie stark Prosozialität in Koalitionsverhandlungen ausgeprägt ist. Ziel dieser Arbeit ist es, einen Beitrag zu leisten diese Fragen zu beantworten. Dazu werden die zugrundeliegenden, theoretischen Zusammenhänge auf einem abstrakten Niveau experimentell untersucht.

Prosozialität in Koalitionsentscheidungen

Ausgangspunkt dieser Arbeit bildet der Beitrag ökonomischer Theorien der Politikwissenschaft zur Koalitionsforschung (Humphreys, 2008; Linhart, 2013). Verteilungsentscheidungen von Koalitionen werden dabei als ein zentrales politisches Phänomen verstanden. Um diese und die diversen Motive der Individuen im vollen Umfang verstehen zu können, ist es jedoch notwendig die interdisziplinären Erkenntnisse der Verhaltensforschung einzubeziehen. In der Rational Choice Theorie wird angenommen, dass Menschen in der Lage sind, die erwarteten Resultate unterschiedlicher Handlungsalternativen zu bewerten, in eine Präferenzordnung zu bringen und aus dem Aktionsraum jene Alternative zu wählen, die mit der höchsten Präferenz assoziiert ist.

Folgt das Verhalten dieser Logik, wird es als rational bezeichnet. Rationales Handeln muss jedoch nicht implizieren, dass Individuen stets versuchen, ihren materiellen Gewinn zu maximieren (Fehr & Gintis, 2007).

Die Verhaltensforschung hat ökonomische, psychologische und soziale Einflussfaktoren identifiziert, welche das prosoziale Verhalten auf unterschiedlichen Ebenen beeinflussen (Gintis et al., 2005; Sabbagh, 2010). Diese werden hier im Rahmen des PES-*(Psychological-Economic-Social)*-Ansatzes (Konana & Balasubramanian, 2005) analysiert. Sozialpsychologische Faktoren beeinflussen den intrinsischen Nutzen, der aus der prosozialen Handlung gezogen wird. Aus einer ökonomischen Perspektive kann es rational sein, prosozial zu agieren oder zu kooperieren, um bspw. soziale Dilemmata (Olson, 1965) zu überwinden und den erwarteten Profit zu erhöhen. Auf der sozialen Ebene wird das prosoziale Verhalten hingegen durch die geltenden Verteilungsnormen beeinflusst. Die Entscheidungsstruktur von Koalitionsverhandlungen beeinflusst bestimmte Aspekte aller drei genannten Ebenen.

Auf der sozialpsychologischen Ebene spielt in Koalitionsentscheidungen die wahrgenommene Verantwortung der Individuen eine entscheidende Rolle. In einer Koalition entscheiden per Definition mehrere Individuen über die Verteilung. Laut Theorie reduziert sich dadurch die wahrgenommene Verantwortung der entscheidungstragenden Individuen für das Verteilungsergebnis (El Zein et al., 2019). Das Verantwortungsbewusstsein hat wiederum einen Einfluss auf den intrinsischen Nutzen, der durch die prosoziale Handlung gezogen wird (Dana et al., 2007). Experimentelle Untersuchungen zeigen in Übereinstimmung mit den theoretischen Überlegungen, dass Kollektive egoistischere Entscheidungen treffen als Individuen (Charness & Sutter, 2012; Kugler et al., 2012). Zudem haben zu Beginn einer Koalitionsverhandlung auch die später ausgeschlossenen Mitglieder der Gruppe, abhängig von ihrer initialen Verhandlungsmacht, ex ante die Möglichkeit, eine Mehrheit zu bilden. Diese Tatsache macht auch Gruppenmitglieder, die nicht Teil einer Koalition sind, für das Ergebnis potenziell mitverantwortlich und kann sich, abhängig vom Grad der initialen Verhandlungsmacht, ebenfalls auf die Prosozialität in Koalitionsentscheidungen auswirken (Wildschut et al., 2003). Unter der Entscheidungsstruktur einer Koalitionsverhandlung kann somit aufgrund der Verantwortungszuschreibungen erwartet werden, dass prosoziale Verteilungsentscheidungen seltener zu beobachten sind, als wenn Individuen alleine entscheiden.

Auf der ökonomischen Ebene geht es um den erwarteten Profit von Koalitionen. Koalitionen sind als temporärer Zusammenschluss von Individuen definiert, wodurch sich in einem wiederholten Kontext ökonomische Konsequenzen aus der Stabilität einer Koalition ergeben. Verteilungsentscheidungen einer Koalition sind dementsprechend von strategischen Überlegungen bezüglich der Stabilität beeinflusst. Ist eine Koalition instabil (McKelvey, 1976; Schofield, 1978), können die langfristigen monetären Auswirkungen auf das Individuum nicht eingeschätzt werden. In Abhängigkeit von den Erwartungen über das Verhalten anderer könnte jedoch antizipiert werden, dass eine faire Verteilung der Ressourcen zu stabileren Koalitionen führt. Im Kontext eines wiederholten Gefangenendilemmas ist die Strategie, kooperativ zu handeln solange sich der Verhandlungspartner auch kooperativ verhält, eine der erfolgreichsten (Axelrod, 1984). Die Ausgangsbedingungen von Koalitionsverhandlungen sind zwar nicht ident mit denen eines Gefangenendilemmas, wenn man die sogenannte ‚Tit-for-tat'-Strategie jedoch überträgt, dann können ökonomische Anreize auch das prosoziale Verhalten in kontinuierlichen Koalitionsentscheidungen beeinflussen und zu faireren Verteilungen führen.

Auf der sozialen Ebene beeinflussen Verteilungsnormen die Prosozialität in Koalitionsverhandlungen. Werden diese nicht befolgt, kann normverletzendes Verhalten durch Ausschluss aus der Koalition bestraft werden. Unklar ist zunächst, welche Verteilungsnormen Verteilungsentscheidungen in Koalitionsverhandlungen beeinflussen. Ohne weiteren Kontext wird das Gleichheitsprinzip als ‚Default-Prinzip' angesehen (D. Miller, 1999). Dem Gleichheitsprinzip hat Rawls (1971) in der politischen Philosophie eine besondere normative Bedeutung gegeben. Er leitet unter der Annahme, die Beteiligten befänden sich hinter einem Schleier des Nicht-Wissens, die Maxime ab, dass der Nutzen des schwächsten Mitglieds der Gesellschaft durch die Verteilung maximiert werden soll. Experimentelle Ergebnisse suggerieren jedoch, dass Versuchspersonen hinter dem Schleier des Nicht-Wissens mehrheitlich eine Verteilung präferieren, die jedem Gruppenmitglied einen Mindestanteil der Ressourcen zuteilt und darüber hinaus möglichst effizient ist (Frohlich & Oppenheimer, 1992). Dieser Mindestanteil wurde ex post als Bedarf interpretiert (Brock, 2005, 2013). In weiterer Folge hat auch das Bedarfsprinzip in der Politikwissenschaft an normativer Bedeutung gewonnen und es wurde als primäres Verteilungsprinzip vorgeschlagen, um die soziale Wohlfahrt und die Arbeit von Demokratien zu bewerten (Oppenheimer & Frohlich, 2009). Theoretisch können sowohl Gleichheitsnorm als auch Bedarfsnorm die Verteilungsentscheidungen beeinflussen. Die relative Bedeutung in Koalitionsverhandlungen kann somit getestet werden, sofern Bedarfe salient sind und den Individuen in der Gruppe klar zugeordnet werden können.

Forschungsfragen

Das übergreifende Forschungsinteresse dieser Arbeit betrifft die Frage: *Wie beeinflusst Prosozialität die Verteilung von Ressourcen in Koalitionsentscheidungen?* Prosozialität wird als Abweichung von den auf der Annahme des Eigeninteresses abgeleiteten spieltheoretischen Vorhersagen gemessen, wenn andere Erklärungsvariablen ausgeschlossen werden können. Ziel dieser Arbeit ist es folglich, den Zusammenhang zwischen prosozialem Verhalten, welches in individuellen Entscheidungen gemessen wird, und dem Verhalten in Koalitionsentscheidungen zu untersuchen. Dadurch sollen die speziellen Wirkungsmechanismen in Koalitionsverhandlungen identifiziert und systematisiert werden. Den Analyserahmen der Prosozialität bildet der PES-Rahmen, welcher zu folgenden drei untergeordneten Forschungsfragen führt:

1. Psychologische Ebene: Wie wirkt sich die wahrgenommene Verantwortung auf die Verteilungsentscheidungen von Koalitionen aus?
2. Ökonomische Ebene: Wie wirken sich kontinuierliche Verhandlungen auf die Verteilungsentscheidungen von Koalitionen aus?
3. Soziale Ebene: Wie wirkt sich die in Konflikt stehende Bedarfsnorm und Gleichheitsnorm auf die Verteilungsentscheidungen von Koalitionen aus?

Theoretischer Zugang

Spieltheoretischer Bezugspunkt dieser Arbeit bildet die axiomatische Verhandlungslösung von Nash (1950, 1953), welche als eine der bedeutendsten der kooperativen Spieltheorie gilt. Von diesem Bezugspunkt aus wird Prosozialität gemessen und systematisiert. Auf deren Vorhersage aufbauend wird eine der prominentesten Formalisierungen sozialer Präferenzen, das Ungleichheitsaversionsmodell von Fehr und Schmidt (1999), integriert um die Koalitionsentscheidungen zu modellieren. Das hier etablierte Entscheidungsmodell kann in zwei Dimensionen variieren. Einerseits ist es flexibel in Bezug auf die Verhandlungsmacht der zwei Koalitionsmitglieder, welche als Parameter in Anlehnung an Braun und Gautschi (2006) in das Modell integriert sind. Das heißt, es kann jedem der zwei koalierenden Individuen ein konkreter Wert für die Verhandlungsmacht zugewiesen werden (bspw. Banzhaf, 1965; Gamson, 1961; Shapley & Shubik, 1954). Andererseits erlaubt es Heterogenität in Bezug auf die Verteilungspräferenzen der Koalitionsmitglieder durch eine Integration von variablen Ungleichheitsparametern in die Nutzenfunktion (Fehr & Schmidt, 1999). Dadurch kann eine Koalitionsentscheidung in Abhängigkeit von der Verhandlungsmacht und den sozialen Präferenzen vorausgesagt und die Interaktion zwischen sozialen Präferenzen und Verhandlungsmacht analysiert werden.

Das Modell bietet damit den theoretischen Bezugspunkt des Tests der untergeordneten Hypothesen. Das Basismodell, welches von den weiteren Kontextfaktoren unabhängig ist, gibt dafür jeweils die Nullhypothese vor, während die Alternativhypothesen in der Begleitschrift im PES-Rahmen abgeleitet und interpretiert werden. Erwartet wird, dass die psychologischen, ökonomischen und sozialen Moderatoren in Abhängigkeit von der spezifischen Entscheidungsstruktur auf das prosoziale Verhalten in den Koalitionsverhandlungen einwirken und damit die Verteilungsentscheidungen beeinflussen. Studien 1 und 2 fokussieren auf die psychologische, Studie 3 auf die ökonomische und Studie 4 auf die soziale Ebene.

Methodischer Zugang

Die Beiträge folgen methodisch der experimentellen Forschungstradition zu Verhandlungen, Koalitionsbildung (Palfrey, 2016) und sozialen Präferenzen (Cooper & Kagel, 2016). Um die Komplexität der Verhandlungssituation zu Gunsten einer genauen Analyse möglichst gering zu halten, liegt der Fokus der experimentellen Untersuchungen auf Verteilungsentscheidungen in Dreiergruppen. In den Triaden müssen jeweils zwei der drei Mitglieder eine Koalition bilden, um mit einfacher Mehrheit zu entscheiden und die Ressourcen unter den Gruppenmitgliedern aufzuteilen. Um die kausalen Wirkweisen der einzelnen Mechanismen zu identifizieren, werden die drei oben genannten Ebenen in einem eigenen experimentellen Design isoliert und die Forschungsfragen in vier Studien überprüft.

Studie 1 vergleicht hierbei die individuelle Verteilungsentscheidungen mit Verteilungsentscheidungen einer vorbestimmten Koalition und analysiert deren Zusammenhang. Studie 2 untersucht die Auswirkungen der Verhandlungsstruktur auf die Verhandlungsmacht und die Verteilungsentscheidungen der Koalitionen. Studie 3 betrachtet die Verteilungsentscheidungen in kontinuierlichen Koalitionsverhandlungen und untersucht deren Auswirkung auf die Stabilität der Koalitionen. Letztlich operationalisiert Studie 4 Bedarfe in den Koalitionsverhandlungen und untersucht den Einfluss von salienten Bedarfsschwellen auf die Koalitionsentscheidungen. Zudem kann im Rahmen der Begleitschrift zwischen Studie 1 und 2 verglichen werden, inwiefern sich die Verantwortung der Gruppenmitglieder, bestimmt durch die initiale Verhandlungsmacht, auf die Verteilungsentscheidung der Koalition auswirkt.

Zusammenfassung der Ergebnisse

Die Arbeit liefert vier zentrale Erkenntnisse zur Frage, wie sich Prosozialität auf Koalitionsverhandlungen auswirkt. Erstens zeigen die Ergebnisse, dass Prosozialität sich immer erst zwischen den koalierenden Individuen auswirkt. Das heißt, es lässt sich beobachten, dass mit zunehmender Prosozialität der Koalitionsmitglieder zunächst primär die Aufteilung zwischen diesen ausgeglichener wird. Dritte Gruppenmitglieder werden erst berücksichtigt, wenn die Verteilung der Ressourcen den geltenden Fairnesskriterien zwischen den koalierenden Individuen entspricht. Zweitens zeigt sich, dass die abnehmende Verantwortung der Koalitionsmitglieder im Vergleich zu Einzelentscheidungen und die zunehmende Verantwortung des später ausgeschlossenen Gruppenmitglieds die Transfers zu dritten Gruppenmitgliedern reduzieren. Im Durchschnitt transferieren Koalitionen weniger an Dritte als Individuen. Zudem transferieren Koalitionen in Gruppen, in denen die Verhandlungsmacht ex ante ausgeglichen ist, weniger als Koalitionen in Gruppen, die das dritte Gruppenmitglied ex ante benachteiligen. Drittens zeigen die Studien, dass die verfügbaren Ressourcen insgesamt gleicher verteilt werden, wenn die Koalitionsverhandlungen kontinuierlich stattfinden, als wenn es sich um eine einmalige Entscheidung handelt. Koalitionen, die das dritte Gruppenmitglied von allen Ressourcen ausschließen, bestehen im Durchschnitt deutlich kürzer als Koalitionen, die die Ressourcen gleich verteilen. Viertens verändern Verteilungsnormen die Verteilungsergebnisse der Koalitionsverhandlungen. Wenn das Bedarfsprinzip angewendet werden kann, dann beeinflussen die Bedarfe der Koalitionsmitglieder und des dritten Gruppenmitglieds die Einigungen systematisch. Es zeigt sich jedoch auch, dass das Bedarfsprinzip seltener angewendet wird als das Gleichheitsprinzip, wenn die Verteilungsnormen in Konflikt stehen. In Summe zeigen die Resultate, dass Prosozialität Koalitionsentscheidungen beeinflusst, aber differenzierter wirkt als in Einzelentscheidungen.

Diese Arbeit trägt somit zu einem umfassenderen Grundlagenverständnis von Verteilungsentscheidungen in Koalitionsverhandlungen bei. Als Test der theoretischen Überlegungen können unter abstrakten, kontrollierten Bedingungen kausale Zusammenhänge zwischen Prosozialität und Koalitionsentscheidungen festgestellt werden, welche im Feld kaum identifizierbar wären. Zwar können experimentelle Ergebnisse nicht ohne weiteres auf natürliche Situationen übertragen werden, dennoch liefern die Resultate wertvolle Einsichten für das Forschungsfeld. Die Ergebnisse implizieren insbesondere, dass auch in natürlichen Koalitionsverhandlungen nicht zu erwarten ist, dass dritten Parteien Ressourcenanteile zugeteilt werden, solange die Ressourcenverteilung zwischen den Koalitionsparteien nicht den geltenden Fairnesskriterien entspricht. Zudem lässt der beobachtete Diskontinuitätseffekt vermuten, dass prosoziales Verhalten seltener zu beobachten ist, je höher die Politikebene angesiedelt ist, auf der Verteilungsentscheidungen ausverhandelt werden. Gleichzeitig können die Befunde einen Erklärungsansatz dafür liefern, warum Ressourcen innerhalb von langlebigen Parteien auf alle Fraktionen verteilt werden

(Ennser-Jedenastik, 2013; Mershon, 2001). Diese Erkenntnisse sind letztlich auch aus normativer Sicht von Bedeutung. Kann festgestellt werden, unter welchen Bedingungen Koalitionen eher prosozial gegenüber Dritten agieren, kann die potenzielle Gefahr einer Diktatur der Mehrheit über die Minderheit besser eingeschätzt werden (Guinier, 1994; Madison, 1945 [1787]). In Folge können politische Instrumente gezielt eingesetzt werden, um darauf zu reagieren.

Struktur der Arbeit

Die weitere Begleitschrift ist wie folgt aufgebaut: Abschnitt 2 behandelt den theoretischen Rahmen der Arbeit. Abschnitt 2.1. führt zunächst in spieltheoretische Grundkonzepte von Koalitionsverhandlungen ein. Abschnitt 2.2 entwickelt anschließend den theoretischen Bezugspunkt, in dem Verhandlungsmacht und prosoziale Präferenzen durch ein Koalitionsverhandlungsmodell vereint werden. In der Folge diskutiert Abschnitt 2.3 im Rahmen des PES-Ansatzes, wovon die Prosozialität in Koalitionsverhandlungen beeinflusst wird und wie dadurch die Verhandlungsergebnisse beeinflusst werden. Abschnitt 3 leitet methodisch in den kumulativen Teil der Dissertation ein. Abschnitte 4, 5, 6 und 7 beinhalten die vier Studien der Dissertation. In Abschnitt 8 werden die Ergebnisse der vier Studien verglichen und wird diskutiert, wie diese im übergeordneten Zusammenhang verstanden werden können. Abschnitt 9 fasst die Arbeit zusammen und schließt mit einigen Schlussfolgerungen ab.

Die vier Beiträge der Dissertation sind in Form von Artikeln für die Publikation in interdisziplinären, wissenschaftlichen Zeitschriften verfasst. Davon ist der erste in Alleinautorenschaft und die drei weiteren in Kooperation mit weiteren Wissenschaftlerinnen und Wissenschaftler entstanden. Der erste Artikel ist im *Journal of Economic Behavior and Organization* eingereicht und nach erster Begutachtung in Revision. Der zweite Artikel ist bei *Social Science Research* veröffentlicht. Der dritte Artikel ist im *European Journal of Political Economy* in Begutachtung. Der vierte Artikel ist in *PLOS One* veröffentlicht. Der erste, zweite und vierte Beitrag sind Teil des FWF-Projekts „Distributive Preferences and Needs-based Justice in Networks“ (Nummer: I1888-G11), welches als Teilprojekt in die DFG-Forschergruppe FOR2104 „Bedarfsgerechtigkeit und Verteilungsprozeduren“ integriert ist (https://bedarfsgerechtigkeit.hsu-hh.de/). Die Datenerhebung des dritten Beitrags wurde durch den C-Seb Junior Start-Up Grant der Universität Köln gefördert.

2. Theoretischer Zugang

Im Folgenden soll der theoretische Zugang zu den Forschungsfragen erläutert werden. Dazu werden zunächst die zentralen Ideen in der formalen Analyse von Koalitionsverhandlungen diskutiert. Danach werden soziale Präferenzen formal in ein Modell integriert, welches die Verteilungsentscheidungen der Koalitionsmitglieder in Abhängigkeit von der Verhandlungsmacht erklärt. Im dritten Abschnitt wird diskutiert, welche Faktoren der Entscheidungsstruktur einen Einfluss auf die prosoziale Neigung der Koalitionsentscheidungen haben können und wie sich die Faktoren dadurch theoretisch auf die Verteilungsentscheidungen auswirken.

2.1. Hintergrund: Formale Analyse von Koalitionsverhandlungen

Staatenbünde, Staaten, Länder, Gemeinden, Parteien, Unternehmen, Gewerkschaften oder Haushalte beschreiben alle unterschiedliche Interessensgruppen auf verschiedenen Ebenen der Politik, die miteinander in Austausch stehen. Gleichzeitig umfassen diese Gruppen jeweils weitere Gruppierungen oder Individuen, die sich auf einer bestimmten Ebene aufgrund ihrer gemeinsamen Interessen zusammenschließen. Interessensgruppen wurden meist als einheitliche Akteurinnen und Akteure behandelt (Bentley, 1908; Truman, 1951), bevor sich ökonomische Theorien als Forschungsstrang in der Politikwissenschaft etablierten. Einer der wichtigsten Beiträge ökonomischer Theorien der Politikwissenschaft ist es, genau diese Annahmen kritisch zu hinterfragen. Geht man von eigennützigen Individuen aus, gilt es zu klären, unter welchen Umständen sich Interessensgruppen oder Koalitionen bilden, wann sie bestehen, wie sie Entscheidungen treffen und welche Entscheidungen sie treffen.

In dieser Arbeit geht es um Gruppen, in denen Entscheidungen demokratisch getroffen werden, in denen jedoch kein einzelnes Mitglied der Gruppe das Quorum der Mehrheitsregel erfüllt, um entscheidungsfähig zu sein. Rahmenbedingung ist, dass es sich für alle Gruppenmitglieder lohnt, Teil der Gruppe zu sein, dass sich die Einzelinteressen jedoch zwischen den Gruppenmitgliedern zu einem gewissen Grad unterscheiden. Unter der Annahme eigeninteressierter Individuen besagt die Theorie, dass es von Vorteil ist, Teil der entscheidungsfähigen Mehrheit zu sein, da Individuen außerhalb der Koalition von den externen Kosten der Mehrheitsentscheidung betroffen sind (Buchanan & Tullock, 1962). Folglich besteht zwischen eigeninteressierten Individuen ein Wettbewerb, Teil der Mehrheit zu sein (Downs, 1957). Koalitionen werden gebildet, wenn kein einzelnes Individuum alleine entscheidungsfähig ist, um die eigenen Interessen in der Mehrheitsentscheidung vertreten zu können.

Von diesem Ausgangspunkt aus stellen sich zwei zentrale Fragen: Welche Individuen bilden die entscheidungsfähige Koalition und welche Entscheidungen trifft die Koalition? Um die erste Frage zu beantworten, bezieht ein erster Forschungsstrang die inhaltlichen Standpunkte der Akteurinnen und Akteure mit ein (Austen-Smith 1996; Axelrod 1970; Van Deemen 1997; Laver & Shepsle 1990, 1996; Ray & Vohra 2015; Van Roozendaal 1992; Schofield 1995, 2007; de Swaan 1973). Da sich die Modelle zumeist konkret auf Regierungskoalitionen beziehen, geht man in diesem Literaturstrang häufig explizit von politischen Parteien aus, die das Ziel haben, ihr politisches Programm durchzusetzen (‚policy seeking'). Der Kerngedanke des Ansatzes ist, dass Individuen eher eine Koalition mit jenen Gruppenmitgliedern eingehen, mit denen sie inhaltlich weniger Kompromisse eingehen müssen als mit Gruppenmitgliedern, die stärker differenzierte Standpunkte vertreten. In der Analyse werden inhaltliche Standpunkte zu einem bestimmten Thema stilisiert auf Achsen operationalisiert, auf denen ein Extrempunkt bspw. mit völliger Ablehnung und der andere mit völliger Zustimmung assoziiert ist. Reiht man die inhaltlichen Standpunkte von Parteien, dann haben jene Parteien, die mit ihrem Standpunkt den Median repräsentieren, einen strategischen Vorteil bei der Koalitionsbildung, da sie relativ näher zu den Standpunkten der anderen Parteien liegen. In mehrdimensionalen Räumen ist dies jedoch nicht zwingend der Fall (McKelvey, 1976; Schofield, 1978).

Ein zweiter Forschungsstrang beschäftigt sich mit der Frage, wie die vorhandenen Ressourcen durch die Koalition verteilt werden (Baron & Ferejohn, 1989; Gamson, 1961; Peleg, 1981; Riker, 1962). Man geht in diesem Literaturstrang davon aus, dass durch die Koalition ein Mehrwert entsteht, der unter den koalierenden Parteien verteilt werden kann. Bildet sich eine Regierungskoalition, können bspw. die Ressorts im Ministerium vergeben werden. Im Kontext von Regierungskoalitionen nimmt man diesbezüglich an, dass politische Parteien das Ziel haben, möglichst viele politische Ämter zu besetzen (‚office-seeking').[2] Geht man von eigennützigen Individuen aus, werden Ressourcen daher ausschließlich zwischen den Koalitionsparteien aufgeteilt. Zudem wird die Koalition aus der kleinstmöglichen Anzahl an Parteien gebildet (Riker, 1962). Je nach Theorieansatz nimmt der vorausgesagte Anteil der Ressource für eine Partei aufgrund der Macht über die Agenda (Baron & Ferejohn, 1989; McKelvey, 1976), der Koalitionsmöglichkeiten (Banzhaf, 1965; Shapley & Shubik, 1954), oder nominalen Fokalpunkte, bspw. den höheren Stimmenanteile (Gamson, 1961), zu. Dieser Forschungsstrang beschäftigt

[2] Die zwei Motive ‚office seeking' und policy seeking' überlappen zu einem gewissen Grad. Speziell politische Ziele können durch die Besetzung von Ressorts eher umgesetzt werden als ohne (Laver & Shepsle 1990).

sich also mit dem Einfluss der Verhandlungsstruktur auf die Verhandlungsmacht, welche die Verteilung der Ressourcen bestimmt.

Mittlerweile gibt es eine Reihe von Beiträgen die diese beiden Ansätze verbinden und sowohl politische Standpunkte als auch die strukturelle Verhandlungsmacht in die Analyse der Koalitionsverhandlungen miteinbeziehen (für einen Überblick, siehe Linhart, 2013). In dieser Arbeit liegt der Fokus auf der Frage des zweiten Literaturstrangs, da der Einfluss von Prosozialität auf die Verteilungsentscheidung von Koalitionen untersucht werden soll. Der Grad der Prosozialität eines Individuums kann prinzipiell auch auf einer eindimensionalen Achse gereiht werden und weist damit Gemeinsamkeiten mit der Modellierung von politischen Standpunkten auf. Es besteht außerdem ein Näheverhältnis zur Modellierung von Koalitionsverhandlungen über die Verteilung von privaten und öffentlichen Gütern (Volden & Wiseman, 2007), wenn man sich Gleichheit als eine Art öffentliches Gut vorstellt. Der eigene Ressourcenanteil und die Gesamtverteilung der Ressource sind jedoch in Modellierungen von sozialen Präferenzen keine unabhängigen Faktoren, wodurch sie sich von der bisherigen Literatur unterscheiden. Prosozialität ist primär als Eigenschaft des handelnden Individuums gedacht und nicht als politische Position für Fragen der Umverteilung. Zudem bezieht sich die Arbeit nicht explizit auf Koalitionsentscheidungen von Regierungsparteien. Zwar stärken die Ergebnisse das Verständnis von Koalitionsentscheidungen in Regierungsverhandlungen, soziale Präferenzen sind allerdings eher in Koalitionsentscheidungen zwischen Individuen innerhalb einer Partei oder eines Betriebsrats beobachtbar als im Parlament (d.h. zwischen Bundesparteien), wie noch ausführlicher in Abschnitt 8 diskutiert wird.

Der Einfluss der strukturellen Verhandlungsmacht auf die Verteilung wird in den spieltheoretischen Modellen abstrakt untersucht. Um das Entscheidungsproblem von Koalitionsverhandlungen zu analysieren, greift die Arbeit auf verschiedene Versionen des ‚Divide-the-Dollar‘ (DD) Spiels zurück. Das DD-Spiel beschreibt stilisierte Koalitionsverhandlungen formal. In dem Spiel verhandeln drei Subjekte darüber, wie ein Mehrwert in Form einer Ressource unter den Subjekten aufgeteilt werden soll.[3] Der Verhandlungsraum beschreibt alle möglichen Verteilungen der Ressource auf die drei Subjekte. Wenn sich zwei oder mehr Subjekte auf eine Verteilung einigen, dann erhält jedes Subjekt den entsprechenden Anteil aus der vereinbarten Verteilung. Anderenfalls kommt keine Entscheidung zu Stande und alle drei Subjekte gehen leer aus. Da unter den Standardannahmen des DD-Spiels für jede vorstellbare Koalition eine

[3] ‚Subjekt‘ steht hier repräsentativ als geschlechtsneutrale Alternative zu Spielerin und Spieler für die Analyseeinheit, also das handelnde Individuum oder die handelnde Interessensgruppe.

andere Koalition gefunden werden kann, die zwei der drei Subjekte besserstellt, und es daher keinen sogenannten ‚Kern' gibt (Gillies, 1959), ist es grundsätzlich schwierig, in dem Spiel klare spieltheoretische Vorhersagen zu machen.

Ein Teil der Literatur löst dieses Problem, indem es ein streng strukturiertes Verhandlungsprotokoll annimmt (Austen-Smith & Banks, 1988; Baron & Ferejohn, 1989; Eraslan & Evdokimov, 2019). In dieser Arbeit wird jedoch auf ein strukturiertes Verhandlungsprotokoll verzichtet und die theoretischen Zusammenhänge werden von einer kooperativen Verhandlungslösung abgeleitet (Austen-Smith & Banks, 1999, 2005; Sened, 1996). Wenige Annahmen über die institutionellen Rahmenbedingungen erlauben den Einfluss sozialer Präferenzen direkter zu untersuchen als unter einem strengen Verhandlungsprotokoll, da die Beziehungen unabhängig von einem Interaktionseffekt zwischen sozialen Präferenzen und Verhandlungsprotokoll untersucht werden können (Gächter & Riedl, 2005; Galeotti et al., 2019). Zudem haben strukturelle Verhandlungsprotokolle im Allgemeinen eine geringe ökologische Validität, da die meisten Verhandlungen (zumindest im Hintergrund) informell und unstrukturiert geführt werden (Camerer, 2003; Camerer et al., 2019; Karagözoğlu, 2019; Tremewan & Vanberg, 2016). Um die Entscheidung der Koalitionsmitglieder über die Verteilung vorherzusagen, ohne ein Verhandlungsprotokoll annehmen zu müssen, macht sich die Arbeit Nashs (1950, 1953) axiomatische Verhandlungslösung zu nutze. Diese, sowie ihre frühen Erweiterungen (bspw. Kalai, 1977b; Kalai & Smorodinsky, 1975), zählt zu den einflussreisten axiomatischen Verhandlungslösungen der kooperativen Spieltheorie.[4]

Nash definiert vier Eigenschaften, die eine Einigung haben muss, und schlägt für seine Lösung der Verhandlung vier Axiome vor. Erstens muss die Verhandlungslösung *pareto-effizient* sein. Das bedeutet, dass es im Vergleich zur Verhandlungslösung keine alternative Einigung gibt, die eine der beiden Verhandlungsparteien besserstellt, ohne die andere schlechter zu stellen. Zweitens muss die Verhandlungslösung für zwei idente Verhandlungsparteien *symmetrisch* sein. Tauschen zwei nicht unterscheidbare Verhandlungsparteien die Rollen, muss das Verhandlungsergebnis daher gleich sein. Drittens ist die Verhandlungslösung *unabhängig von irrelevanten Alternativen*. Das heißt, wird bspw. die Menge der möglichen Einigungen um Punkte im Verhandlungsraum ergänzt, die nicht *pareto-effizient* sind, hat dies keinen Einfluss auf die Verhandlungslösung. Viertens, die Verhandlungslösung ist *unabhängig von positiven,*

[4] Weitere frühe, einflussreiche Lösungskonzepte kommen von Shapley (1952), Davis und Maschler (1965), Schmeidler (1969), Aumann (1961) und Aumann und Maschler (1961). Diese können jedoch teilweise die Lösungsmenge nur einschränken, ohne eine eindeutige Punktprognose zu machen.

linearen Transformationen. Das bedeutet, für die Verhandlungslösung ist nicht der aus den Geldeinheiten gezogene Nutzen, sondern nur der objektive Wert relevant, solange der Nutzen linear mit den Geldeinheiten zusammenhängt. Es ist also bspw. für die Verhandlungslösung unerheblich, in welcher Währung verhandelt wird, auch wenn die Währung für die Verhandlungsparteien unterschiedlich viel Wert hat.

Anhand der vier Axiome zeigt Nash formal, dass nur eine einzige Verhandlungslösung existiert, die alle vier Axiome gleichzeitig erfüllt – und zwar jene Verteilung, die das Produkt der Nutzen maximiert. Das Verhandlungsergebnis hat somit eine theoretisch eindeutige Punktprognose. Nash entwickelte die Verhandlungslösung für Verhandlungen, in denen die Verhandlungsmacht unter den Subjekten symmetrisch, das heißt gleich, ist und die Einigung rein durch Einstimmigkeit ermittelt wird. Das Axiom der Symmetrie ist jedoch nicht notwendig. Die Verhandlungslösung wurde später auf asymmetrische Verhandlungssituationen (Kalai, 1977a) in Netzwerken (Braun & Gautschi, 2006) oder Koalitionsverhandlungen (Binmore, 1985; Laruelle & Valenciano, 2007) angewandt, in denen die Verhandlungsmacht zwischen den Verhandlungspartnern variiert. Der nächste Abschnitt bezieht sich konkret auf Nashs asymmetrische Verhandlungslösung.

In Summe umfassen spieltheoretische Ansätze in der Koalitionsforschung somit verschiedene Forschungsstränge, welche grob in Fragen zur Koalitionsbildung und Verteilungsentscheidung sowie in strukturierte und nicht-strukturierte Ansätze eingeteilt werden können. Die Ansätze haben gemeinsam, von eigeninteressierten Akteurinnen und Akteuren auszugehen, unabhängig davon ob diese nun das Ziel verfolgen, ihr politisches Programm durchzusetzen oder möglichst viele Ressorts zu erhalten. Aus dem historischen Kontext gesehen eröffnete das Feld auf diese Weise neue Sichtweisen und leistet einen wichtigen Beitrag zum Erkenntnisstand der Politikwissenschaft. Die Erklärungsmodelle motivieren zudem eine Vielzahl empirischer Studien, die versuchen, die Ergebnisse von Regierungskoalitionen zu erklären (bspw. Budge & Laver, 1992; Debus, 2008; Warwick & Druckman, 2001). Prosozialität wurde in diesem Zusammenhang bisher in der Nutzenfunktion der handelnden Individuen nicht berücksichtigt. Die theoretische Literatur liefert für die Analyse der Prosozialität allerdings einen wichtigen Bezugspunkt, von dem aus Einigungen, die unter kontrollierten Bedingungen von den Vorhersagen abweichen, als prosoziales Verhalten interpretiert werden können.

2.2. Ungleichheitsaversion in Koalitionsentscheidungen

In diesem Abschnitt wird analysiert, auf welche Verteilung sich zwei koalierende Subjekte mit potenziell unterschiedlich starker Verhandlungsmacht einigen, wenn sie nicht nur durch Eigeninteresse, sondern auch durch Ungleichheitsaversion motiviert sind. Dazu werden die Gewichte in Nashs asymmetrischer Verhandlungslösung als Parameter der individuellen Verhandlungsmacht interpretiert (Binmore, 1985; Braun & Gautschi, 2006; Kalai, 1977a; Laruelle & Valenciano, 2007). Anschließend werden die soziale Nutzenfunktionen für die zwei koalierenden Subjekte in das Modell eingefügt (vgl. Birkeland & Tungodden, 2014; Luhan et al., 2019), mit denen Ungleichheitsaversion als Präferenz modelliert werden kann (Fehr & Schmidt, 1999).

Verteilungsproblem

Das Verteilungsproblem ist wie folgt definiert. Es gibt eine Gruppe bestehend aus $n = 3$ Subjekten. In der Gruppe kann zumindest eine Koalition, bestehend aus zwei Subjekten $a \in \{1, 2, 3\}$ und $b \in \{1, 2, 3| \, b \neq a\}$, gebildet werden, um die Ressource r unter den Koalitionsmitgliedern und dem dritten Subjekt $c \in \{1, 2, 3| \, c \neq a \cup c \neq b\}$ aufzuteilen. Eine Koalition kann sich dazu auf ein Tripel $y = (y_a, y_b, y_c)$ einigen, welches jedem Subjekt $i \in \{a, b, c\}$ einen Anteil der Ressource $y_i \in [0, r]$ zuteilt und innerhalb der Verhandlungsmenge $Y = \{y : y_a + y_b + y_c \leq r\}$ liegt. Als Status Quo, s, wird der Nullpunkt festgelegt, das heißt $s = (0, 0, 0)$. Die Verhandlungsmacht von Subjekt a gegenüber Subjekt b ist durch den Parameter v_a gegeben. Umgekehrt ist die Verhandlungsmacht von Subjekt b gegenüber Subjekt a durch den Parameter v_b gegeben. Von den zwei Subjekten der Koalition ist Subjekt a als Subjekt mit der höheren Verhandlungsmacht definiert, das heißt es gilt $v_b \leq v_a$.

Der Fokus der Analyse liegt zunächst auf der Frage, auf welche Verteilung sich zwei Subjekte einigen, wenn sie eine Koalition bilden. Entsprechend Nashs asymmetrischer Verhandlungslösung wird angenommen, dass sich Subjekt a und b einigen, als würden sie das Optimierungsproblem,

$$\max \left(u_a(y) - u_a(s)\right)^{v_a} * \left(u_b(y) - u_b(s)\right)^{v_b}, \qquad (1)$$

unter der Nebenbedingung $y \in Y$ lösen. Das heißt, der individuelle Nutzen u_i wird im Exponenten um die Verhandlungsmacht v_i gewichtet und das Produkt der zwei gewichteten Nutzen maximiert.

Geht man zunächst nur von Eigeninteresse aus, $u_i(y) = y_i$, und löst das Optimierungsproblem in (1), dann sagt das Modell voraus, dass die zwei Koalitionsmitglieder die Ressourcen relativ zu ihrer Verhandlungsmacht aufteilen. Das heißt Subjekt a erhält den Anteil $v_a r / (v_a + v_b)$, oder schlicht $p_a r$, wenn die relative Verhandlungsmacht als $p_a = v_a / (v_a + v_b)$ definiert ist (Braun & Gautschi, 2006). Subjekt b erhält entsprechend den Anteil $p_b r = (1 - p_a) r$. Ist die Verhandlungsmacht von Subjekt a höher als die von Subjekt b, überträgt sich die Verhandlungsmacht in der Einigung in einen relativ höheren Anteil an der Ressource. Das Modell ist an dieser Stelle agnostisch gegenüber der Frage, wie die Verhandlungsmacht konkret bestimmt wird. Die Verhandlungsmacht kann bspw. spieltheoretisch (Banzhaf, 1965; Shapley & Shubik, 1954), durch nominale Fokalpunkte (Gamson, 1961), oder einen anderen Ansatz bestimmt werden, welcher weitere kontextbezogene Variablen einbezieht.

Ungleichheitsaversion

Aufbauend auf einem breiten Fundament experimenteller Untersuchungen geht man in der Verhaltensökonomie davon aus, dass Individuen nicht nur durch monetäres Eigeninteresse, sondern auch durch prosoziale Präferenzen motiviert sind. Diese Präferenzen werden in Nutzenfunktionen dargestellt. Um soziale Präferenzen zu berücksichtigen, wird hier von der von Fehr und Schmidt (1999) entwickelten Nutzenfunktion Gebrauch gemacht. Das Modell der Ungleichheitsversion gehört, neben dem Modell von Bolten und Ockenfels (2000), zur Klasse der ‚ergebnisbasierten' sozialen Nutzenfunktionen (Cooper & Kagel, 2016). Das Modell definiert den Nutzen von Subjekt i in einer Koalitionsverhandlung mit drei Subjekten gleich

$$u_i(y) = y_i - \frac{\alpha_i}{2}\sum_{j\neq i} \max[y_j - y_i, 0] - \frac{\beta_i}{2}\sum_{j\neq i} \max[y_i - y_j, 0], \qquad (2)$$

unter der Annahme, dass für die Ungleichheitsparameter $\beta_i \leq \alpha_i$ und $0 \leq \beta_i < 1$ gilt. Der erste Parameter, α_i, beschreibt die Nutzenreduktion, wenn ein Subjekt weniger und der zweite Parameter, β_i, wenn ein Subjekt mehr von den verfügbaren Ressourcen besitzt als andere Subjekte. Die Ungleichheitsparameter α_i und β_i beschreiben also die Intensität der Ungleichheitsaversion in einer ökonomisch schlechter gestellten bzw. besser gestellten Position, wobei die Ungleichheitsaversion in der schlechter gestellten Position für jedes Subjekt stärker wirkt als die Ungleichheitsaversion in der besser gestellten Position.

Um die Auswirkungen der Nutzenfunktion zu reflektieren, ist es hilfreich, zunächst anzunehmen, Subjekt a würde in der beschriebenen Entscheidungssituation alleine über die Verteilung der Ressource entscheiden. Eine Geldeinheit auf sich selbst aufgeteilt erhöht den Nutzen um eins, kann den Nutzen aber auch reduzieren, wenn dadurch die Ressourcen ungleicher zwischen sich selbst und den anderen Subjekten aufgeteilt sind. Je nachdem wie hoch β_a ist und ob die

Nutzenreduktion dadurch kleiner oder größer als eins ist, präferiert das Subjekt diese Geldeinheit auf sich selbst oder ein anderes Subjekt zu verteilen. Die Nutzenfunktion in (2) impliziert, dass sich ein Subjekt mit $2/3 < \beta_a$ für die Verteilung $y = (1/3r, 1/3r, 1/3r)$ und ein Subjekt mit $\beta_a < 2/3$ für die Verteilung $y = (r, 0, 0)$ entscheidet. Entscheidet das Subjekt alleine über die Verteilung, spielt α_a nur eine indirekte Rolle, da dieses Subjekt keinen Anreiz hat, anderen Subjekten jemals mehr Anteile der Ressource zu überlassen, sofern sich die Menge an Punkten dadurch insgesamt nicht erhöht.

Verteilungseinigung und Koalition

Eine Implikation der Nutzenfunktion in (2) ist, dass der Nutzen für den festgelegten Status-quo gleich $u_i(s) = 0$ ist. Das bedeutet, dass für zwei koalierende Subjekte nur jene Punkte der Verhandlungsmenge die Lösungsmenge darstellen können, die für beide einen nicht-negativen Nutzen ergeben, da nur diese Einigungen eine Pareto-Verbesserung implizieren (Birkeland & Tungodden, 2014). Die Nutzenfunktion in (2) kann nun in das Optimierungsproblem in (1) eingesetzt werden, um die Verteilungsentscheidung in Abhängigkeit von der Ungleichheitsaversion zu lösen. Dies ergibt die Lösung,

$$y_a(\beta_a, \beta_b, \alpha_b, v_a, v_b) = \begin{cases} p_a r - \left(p_a \frac{\alpha_b}{2+2\alpha_b-\beta_b} + p_b \frac{-\beta_a}{2-3\beta_a}\right) r & if \quad \beta_b < \frac{2(v_a - v_b - \alpha_b v_b)}{(v_a - v_b)} \cup \beta_a < \frac{2(\beta_b-2)v_a + 2(2+2\alpha_b-\beta_b)v_b}{3(\beta_b-2)v_a + (2+2\alpha_b-\beta_b)v_b}, \\ \frac{1}{2} r & if \quad \frac{2(\beta_b-2)v_a + 2(2+2\alpha_b-\beta_b)v_b}{3(\beta_b-2)v_a + (2+2\alpha_b-\beta_b)v_b} \leq \beta_a \leq \frac{2(\beta_b-2)v_a + 2(3\beta_b-2)v_b}{3(\beta_b-2)v_a + (3\beta_b-2)v_b}, \\ p_a r - \left(p_a \frac{2-2\beta_b}{2-3\beta_b} + p_b \frac{-\beta_a}{2-3\beta_a}\right) r & if \quad \frac{2(\beta_b-2)v_a + 2(3\beta_b-2)v_b}{3(\beta_b-2)v_a + (3\beta_b-2)v_b} < \beta_a < \frac{2v_a + 2v_b - 3v_b\beta_b}{3v_a} \\ \frac{1}{3} r & if \quad \frac{2v_a + 2v_b - 3v_b\beta_b}{3v_a} \leq \beta_a; \end{cases}, \quad (3)$$

wenn nach y_a aufgelöst wird.[5] Im Folgenden werden zunächst die Implikation der Lösung für die Frage, welche Koalition sich bildet, beschrieben. Im nächsten Abschnitt wird im Detail beschrieben, wie sich die Ungleichheitsparameter auf die vereinbarte Verteilung auswirken.

Durch die Verhandlungslösung in (3) können die potenziellen Einigungen der *relevanten* Koalitionen {1,2}, {1,3} und {2,3} vorausgesagt werden. Eine Koalition zwischen zwei Subjekten wäre nicht relevant, wenn sie bspw. aufgrund der Stimmenverteilung keine entscheidungsfähige Mehrheit repräsentiert. Sind die Koalitionen $\{i,j\}$ und $\{i,k\}$ relevant, kann für Subjekt *i* der Nutzen einer Koalition mit Subjekt *j*, u_{ij}, und der Nutzen einer Koalition mit Subjekt *k*, u_{ik}, verglichen werden. Gibt es im Fall von drei relevanten Koalitionen eine Koalition, für deren

[5] Gilt $v_a = v_b$, dann entspricht diese Lösung der FS-Verhandlungslösung in Studie 1.

Einigung $u_{ik} < u_{ij}$ und $u_{jk} < u_{ji}$ gilt, dann kann die Koalition $\{i, j\}$ eindeutig vorausgesagt werden.[6] Sind nur zwei Koalitionen in einer Gruppe von drei Subjekten relevant, ist $u_{ik} < u_{ij}$ hinreichend, um die Koalition zu bestimmen. Ist nur eine einzige Koalition relevant, dann ist die Koalition ebenso eindeutig. Trifft hingegen keiner der genannten Fälle zu, ist der Kern leer. Es wird dennoch eine der Koalitionen gebildet, welche genau kann jedoch nicht eindeutig vorausgesagt werden.

Ungleichheitsaversion in der Verteilungseinigung

Um den Einfluss der Ungleichheitsaversion auf die Einigungen näher zu diskutieren, wird die Verhandlungsmacht des starken Subjekts exemplarisch auf $v_a = 5.48$ und die des schwachen Subjekts auf $v_b = 1.14$ festgelegt. Diese konkreten Werte errechnen sich im *Network Control Bargaining* Modell (Braun & Gautschi, 2006) für die ungleiche Verhandlungssituation in Studie 2 und 4.[7] In den zwei Studien enthält die Verhandlungssituation nur zwei relevante Koalitionen. Das heißt, ein Subjekt hat die Möglichkeit, mit jeweils einem der beiden anderen Subjekte eine Koalition zu bilden, während die anderen Subjekte nur mit ersteren und nicht miteinander eine Koalition bilden können. Solch eine Situation findet sich bspw., wenn zwei von drei Parteien es ablehnen, Koalitionsverhandlungen zu führen, um ihr Wahlversprechen einzuhalten (Debus, 2008, p. 521ff.). Dementsprechend ist die Verhandlungsposition des Subjekts mit mehreren Koalitionsmöglichkeiten besser, was sich in einem höheren Wert der Verhandlungsmacht widerspiegelt.[8]

Die relative Verhandlungsmacht des stärkeren Koalitionsmitglieds ist in dieser Situation gleich $p_a = 0.83$ und die des schwächeren gleich $p_b = 0.17$. Sind beide Subjekte rein eigeninteressiert, das heißt $\beta_i = 0$ und $\alpha_i = 0$, dann überträgt sich die Verhandlungsmacht direkt auf die Verteilung und die koalierende Subjekte einigen sich entsprechend der spieltheoretischen Lösung in (3) auf die Verteilung $y = (0.83r, 0.17r, .00r)$. Das heißt das stärkere Subjekt erhält 83 Prozent

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6 Die Einigungen der Koalitionen in (3) sind absolut. Man könnte einwenden, dass ein Subjekt, das antizipiert, nicht Teil der Koalition zu sein, seine Angebote nochmals verbessert, um zu verhindern, ausgeschlossen zu werden. Diese Überlegung spielt bei der Bestimmung der Verhandlungsmacht eine Rolle, an dieser Stelle ändern sich die Angebote jedoch nicht. In ähnlichen nicht-kooperativen Verhandlungsmodellen sind die Einigungen ebenfalls resistent gegenüber weiteren Angeboten, siehe Binmore (1985, 276).

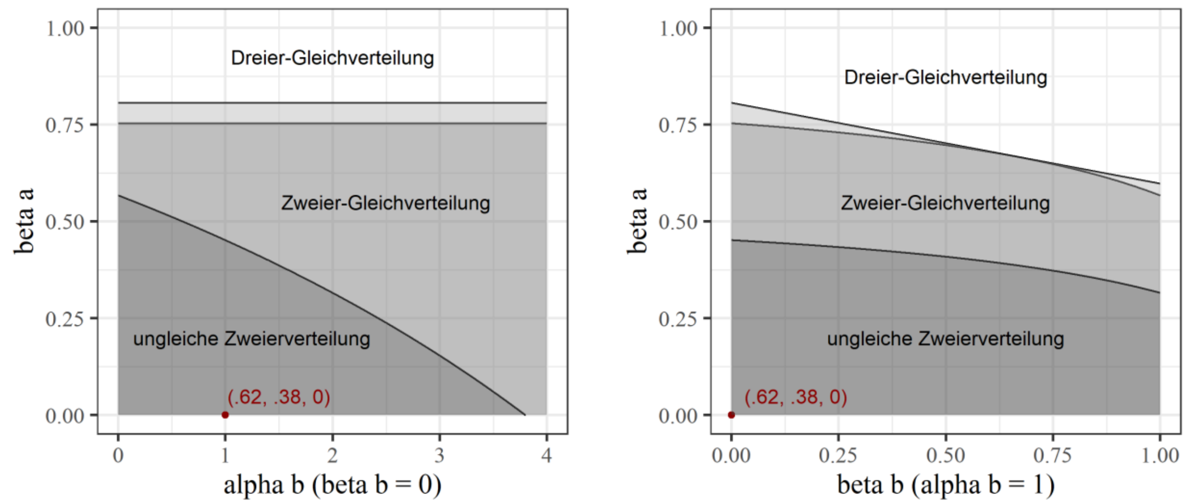
7 Die Verhandlungsmacht von Subjekt *i* berechnet sich in dem Modell als $v_i = -1/\log((m+n)(1/n_i \Sigma\, 1/n_k)/(1+m+n))$, wobei *n* die Anzahl an Gruppenmitgliedern, *m* die Anzahl an Koalitionsmöglichkeiten, n_i die Anzahl der eigenen Koalitionsmöglichkeiten, und n_k die Anzahl der Koalitionsmöglichkeiten der potenziellen Koalitionspartnerinnen und Koalitionspartner ist.

8 Eine Interpretation der Gewichte nach Gamson (1961) wäre, dass sich die Verhandlungsmacht aus Stimmanteilen ermittelt, eine Partei bei einer Wahl bspw. 5.48 Tausend Stimmen, die andere Partei 1.14 Tausend Stimmen erhalten hat und die Parteien koalieren wollen.

der Ressourcen, das schwächere Subjekt 17 Prozent und das dritte Gruppenmitglied geht leer aus.

Abbildung 1 illustriert die theoretische Lösung in (3) graphisch, wenn $p_a = 0.83$ und $p_b = 0.17$, in Abhängigkeit der Ungleichheitsaversion der zwei koalierenden Subjekte a und b. Die vier Schattierungen visualisieren die vier unterschiedlichen Bereiche der Stufenfunktion in (3) und deren Abhängigkeit von der Ungleichheitsaversion. Zunächst ist zu beachten, dass die Verhandlungslösung immer unabhängig von α_a ist, da sich die Verhandlungspartnerin bzw. der Verhandlungspartner in der stärkeren Position niemals auf eine Einigung einlässt, die jemandem anderem mehr Punkte zuteilt als ihr bzw. ihm selbst. Mathematisch gesehen können diese Einigungen aufgrund der Annahme $\beta_i \leq \alpha_i$ nicht optimal sein. Daher hat α_a nur einen indirekten Einfluss auf die Koalitionsverhandlungen.

Abbildung 1. Theoretische Vorhersage mit ungleicher Verhandlungsmacht



Die konkrete Lösung der Verhandlung ist somit von β_a, α_b und β_b abhängig. Der Ausgangspunkt $\beta_a = 0$, $\beta_b = 0$, $\alpha_b = 0$, mit der Verteilung (.83*r*, .17*r*, .00*r*), ist dem Bereich der ungleichen Zweierverteilungen zugeordnet, da die Ressource ungleich auf die zwei koalierenden Subjekte aufgeteilt wird (dunkelgrauer Bereich in Abbildung 1). In diesem Bereich ist die Einigung von β_a und beiden Ungleichheitsaversionsparametern des schwachen Subjekts, α_b und β_b, abhängig. Ist die Ungleichheitsaversion von einem der Subjekte höher, egal ob von *a* oder *b*, so sagt das Modell eine stärker ausgeglichene Einigung unter den Koalitionsmitgliedern voraus. In Abbildung 1 ist als Beispiel die Lösung für $\beta_a = 0$, $\beta_b = 0$, $\alpha_b = 1$ durch einen Punkt gekennzeichnet. Die entsprechende Verteilung (.62*r*, .38*r*, .00*r*) ist im Vergleich zur klassischen Lösung zwischen den koalierenden Subjekten ausgeglichener. Grund dafür ist, dass das schwächere Subjekt durch die Ungleichheitsaversion bis zu einem bestimmten Grad bevorzugt, sich nicht zu einigen, anstatt die ungleiche Verteilung zu akzeptieren. Die Gleichheit der Verteilung nimmt zu, je stärker die Ungleichheitsaversion ausgeprägt ist.

Ein Hauptergebnis der Analyse ist, dass, solange Subjekt *b* keine gleiche Aufteilung zwischen sich und Subjekt a erreicht hat, die Ungleichheit gegenüber dem dritten Subjekt nachrangig ist. Zwar präferiert das schwache Subjekt möglicherweise nicht, dass der Dritte keine Anteile an der Ressource erhält, allerdings führt die von Fehr und Schmidt (1999) eingeführte Annahme $\beta_i \leq \alpha_i$ dazu, dass das starke Subjekt das schwache Subjekt dennoch günstiger für eine Einigung gewinnt, wenn die Ressourcenanteile des schwachen Subjekts steigen und nicht die des dritten Subjekts. Diese Dynamik führt zu der theoretischen Vorhersage, dass dritte Gruppenmitglieder erst Anteile an der Ressource erhalten, wenn die Ressource zwischen den koalierenden Subjekten gleichverteilt sind. Daher geht die Verhandlungslösung erst von der ungleichen Zweierverteilung in die gleiche Zweierverteilung und dann in die Dreierverteilung über.

Ist die Ungleichheitsaversion der Koalitionsmitglieder so stark, dass sie die Ressourcen unter sich selbst gleich aufteilen (‚Zweier-Gleichverteilung', grauer Bereich in Abbildung 1), wirkt α_b nur indirekt, da das schwächere Subjekt nicht weniger Punkte als das stärkere Subjekt erhält. Die ‚ungleiche Dreierverteilung' und die ‚Dreier-Gleichverteilung' hängen also nur indirekt von α_b ab. Auf der linken Seite von Abbildung 1 kann dies dadurch erkannt werden, dass die Grenzlinien parallel zur x-Achse verlaufen. Der Fokus richtet sich also ab der Zweier-Gleichverteilung auf die Ungleichheit gegenüber dem dritten Subjekt.

Auf der rechten Seite von Abbildung 1 sieht man, dass der Ressourcenanteil des dritten Subjekts von der Höhe von β_a und β_b abhängt. Man erkennt an den asymmetrischen Grenzlinien außerdem, dass die Ungleichheitsaversion des Subjekts in der stärkeren Verhandlungsposition einen relativ stärkeren Einfluss auf die Einigung hat. Der Bereich der ‚ungleichen Dreierverteilung' (hellgrauer Bereich in Abbildung 1) ist relativ schmal. In diesem Bereich erhält das dritte Subjekt einen Anteil zwischen null und einem Drittel der Ressource und der Rest wird unter den Koalitionsmitgliedern strikt gleichverteilt. Ist die Ungleichheitsaversion so stark, dass $2/3 \leq p_a \beta_a + p_b \beta_b$ gilt, werden die Ressourcen unter allen drei Subjekten gleichverteilt (weißer Bereich in Abbildung 1).

Zusammengefasst zeigt die Verhandlungslösung in (3), dass Subjekte in der stärkeren Verhandlungsposition einen Vorteil haben und ihre Verteilungspräferenzen auch dann eher durchsetzen können, wenn soziale Präferenzen auf die Einigung wirken. Soziale Präferenzen reduzieren jedoch die Möglichkeit des stärkeren Subjekts von der höheren Verhandlungsmacht zu profitieren, wenn dieses versucht, möglichst viele Ressourcen aus der Einigung zu erhalten. Zudem impliziert die hier verwendete Nutzenfunktion, dass die sozialen Präferenzen in Koalitionsverhandlungen nicht gleichermaßen gegenüber dem koalierenden Subjekt und dem dritten Gruppenmitglied auswirken: In erster Linie wirken sich soziale Präferenzen auf die Verteilung der Ressourcen unter den Koalitionsmitgliedern aus. Erst wenn Gleichheit zwischen den koalierenden Individuen hergestellt ist, spielt die Ungleichheitsaversion auch gegenüber dem dritten Gruppenmitglied eine Rolle. Dies zeugt von einem wesentlichen Unterschied der Entscheidung in der Koalition zu individuellen Entscheidungen, in denen beide weiteren Gruppenmitglieder den gleichen Stellenwert haben.

2.3. Struktur der Koalitionsverhandlungen und Prosozialität

Im vorangegangenen Abschnitt wurde der Einfluss von sozialen Präferenzen auf die Verteilung in Koalitionsverhandlungen diskutiert. Das Modell bietet einen Erklärungsansatz für den Befund, dass die von Individuen getroffenen Koalitionseinigungen selbst unter kontrollierten Versuchsbedingungen fast ausnahmslos gleicher verteilt sind als spieltheoretisch vorhergesagt (Baranski & Morton, 2020; Diermeier & Morton, 2005; Fréchette et al., 2003; McKelvey, 1991; L. Miller & Vanberg, 2013; Palfrey, 2016; Tremewan & Vanberg, 2016). Die verwendete Nutzenfunktion (Fehr & Schmidt, 1999) gilt heute als rein ergebnisbasiert und berücksichtigt nur die finale Verteilung, während weitere Kontextfaktoren ausgeblendet werden. Die letzten zwei Jahrzehnte Forschung zu sozialen Präferenzen haben jedoch auch gezeigt, dass prosoziales Verhalten stark vom Kontext abhängt (Cooper & Kagel, 2016; Konow & Schwettmann, 2016; Nicklisch & Paetzel, 2020). Um diesen Erkenntnissen gerecht zu werden, wird der Einfluss der Entscheidungsstruktur auf die Prosozialität in den Koalitionsverhandlungen weiter im PES-Rahmen analysiert.[9]

Psychologische Ebene

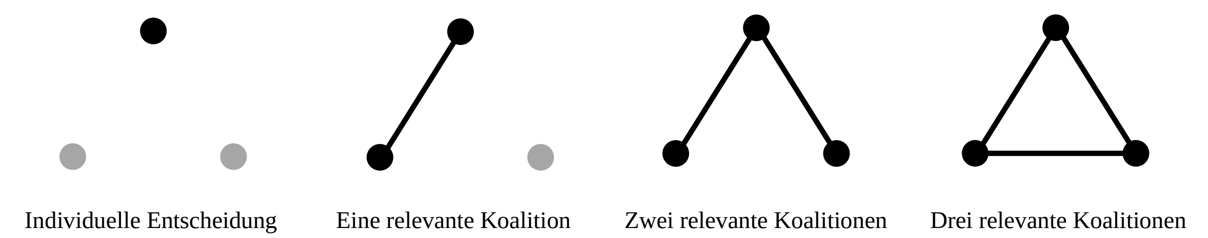
Individuen ziehen einen unterschiedlich großen Nutzen aus prosozialem Verhalten, was sich empirisch durch die Heterogenität des prosozialen Verhaltens in an sich identischen Situationen zeigt (Engel, 2011). Darüber hinaus können jedoch auch sozialpsychologische Faktoren das prosoziale Verhalten kontextabhängig von ein und demselben Individuum beeinflussen. Das

[9] Eine Anwendung des PES-Rahmens im Bereich der Technologieadaption findet sich in Konana und Balasubramanian (2005).

Spektrum der sozialpsychologischen Literatur ist selbstverständlich sehr breit (siehe bspw. Hogg & Vaughan, 2011). Diese Arbeit konzentriert sich auf einen bestimmten Faktor, und zwar das Verantwortungsgefühl, da es in Koalitionsverhandlungen aufgrund der Struktur der Entscheidungssituation eine besondere Rolle einnimmt. Im Folgenden wird dieser Zusammenhang näher erläutert.

Koalitionsverhandlungen haben zwei spezifische Merkmale, die theoretisch für die Zuschreibung von Verantwortungen ausschlaggebend sind. Einerseits trifft in einer Koalition nicht nur ein Individuum alleine eine Entscheidung, sondern mehrere Individuen gemeinsam. Andererseits ist vor den Koalitionsverhandlungen meist nicht sicher, welche Individuen die Koalition bilden. Um dies näher zu veranschaulichen, illustriert Abbildung 2 vier unterschiedliche Szenarien in einer Dreiergruppe. Die Punkte in der Abbildung repräsentieren Gruppenmitglieder und die Linien die Koalitionsmöglichkeiten. Die individuelle Entscheidung links beschreibt eine Situation, in der ein Subjekt alleine über die Verteilung bestimmen kann, was durch die farbliche Unterscheidung der Punkte dargestellt ist. In den weiteren Szenarien kann entweder eine, eine von zwei oder eine von drei möglichen Koalitionen die Ressourcen verteilen.

Abbildung 2. Koalitionsmöglichkeiten in einer Dreiergruppe



Bildet sich eine Koalition, entscheiden zwei Subjekte über die Verteilung der Ressource, anstatt, wie in der individuellen Entscheidung, ein Subjekt alleine. Darüber hinaus variiert zwischen den Szenarien die Chance des später ausgeschlossenen Gruppenmitglieds, ex ante Teil der Koalition zu sein. Gibt es eine relevante Koalition, ist das dritte Subjekt mit Sicherheit nicht Teil der Koalition (Abbildung 2, zweite Darstellung von links). Die Ausschlusswahrscheinlichkeit ist daher bereits zu Beginn der Verhandlungen 100 Prozent. Gibt es zwei relevante Koalitionen, hat das dritte Subjekt zu Beginn der Verhandlungen dieselbe Möglichkeit, eine Koalition zu bilden, wie das andere Subjekt in der schwachen Verhandlungsposition (dritte Darstellung von links). Die Ausschlusswahrscheinlichkeit liegt bei 50 Prozent. Gibt es drei relevante Koalitionen, hat jedes Subjekt dieselben Chancen die Koalition zu bilden und die Ausschlusswahrscheinlichkeit liegt vor den Verhandlungen bei 33 Prozent (vierte Darstellung von links).

Die beschriebenen Unterschiede wirken sich auf die Verhandlungsmacht und die Verantwortlichkeit der Subjekte für die Verteilungsentscheidung aus. In der individuellen Entscheidung trägt das entscheidungsfähige Subjekt die volle Verantwortung, während die zwei anderen Subjekte keinen Einfluss auf die Verteilungsentscheidung haben und dadurch auch keine Verantwortung dafür tragen können. Gibt es eine relevante Koalition, teilen sich die koalierenden Subjekte die Entscheidungsmacht und dadurch auch die Verantwortung für die Verteilungsentscheidung. Gibt es zwei oder drei relevante Koalitionen, kann das dritte Subjekt die Verhandlung in Abhängigkeit von der Verhandlungsposition beeinflussen und daher ebenso Verantwortung für den Ausgang der Koalitionsverhandlungen zugeschrieben bekommen. War das Subjekt außerhalb der Koalition während der Verhandlung zu wenig kompromissbereit oder hat zu lange gezögert, ist dieses für das Ergebnis mitverantwortlich. Die Verantwortung steigt mit der initialen Verhandlungsmacht, da der Einfluss auf die Entscheidung umso größer ist, je stärker die initiale Verhandlungsmacht ist.

Verantwortung hat in der Sozialpsychologie eine große Bedeutung für prosoziales Verhalten. Die systematische Erforschung des prosozialen Verhaltens wurde in der Sozialpsychologie Mitte der 1960er Jahre durch die Beobachtung initiiert, dass Menschen in einer Notsituation seltener Hilfe leisten, wenn weitere Personen anwesend sind (Dovidio et al., 2006). Bereits frühe Studien zeigen, dass das Verantwortungsbewusstsein eine wichtige Rolle dabei spielt, ob Menschen prosozial handeln oder nicht (Darley & Latané, 1968). Ein zentrales Ergebnis des Forschungsfelds ist, dass die Wahrscheinlichkeit, dass Menschen prosozial handeln, stark nachlässt, je mehr andere Personen in einer Entscheidungssituation präsent sind (Latané & Darley, 1970; Latané & Rodin, 1969). Das Ergebnis wird in erster Linie auf die Diffusion der Verantwortung zurückgeführt (Latané & Darley, 1976). Panchanathan et al. (2013) konnten dieses Ergebnis auch unter kontrollierten, anreizbasierten Laborbedingungen replizieren.

Das Entscheidungsverhalten ist jedoch nicht nur weniger prosozial *neben* anderen Individuen, sondern ebenso, wenn Entscheidungen *mit* anderen Individuen getroffen werden. Vergleichsstudien zwischen Individuen und Teams zeigen, dass Individuen, die kollektiv in Teams entscheiden, eine klare Tendenz haben, weniger von verteilbaren Ressourcen abzugeben als einzelne Individuen (für Überblicksartikel, siehe Charness & Sutter, 2012; Kugler et al., 2012). Dieser Effekt wird auch als Diskontinuitätseffekt bezeichnet. Empirische Befunde implizieren, dass der Mechanismus der Verantwortungsdiffusion auch für diesen Effekt hauptverantwortlich ist (El Zein et al., 2019).

Zudem können neben den Entscheidungsträgern auch die Rezipientinnen oder Rezipienten Verantwortung tragen. Die Zuschreibung von Verantwortung ist bedingt durch das Bewusstsein, dass das Individuum anders hätte handeln können (Frith, 2014). Blount (1995) zeigt, dass in strukturierten, bilateralen Verhandlungen unfaire Angebote seltener abgelehnt werden, wenn sie von einem Computer oder einem dritten Individuum gemacht werden als von der eigentlichen Verhandlungspartnerin oder dem eigentlichen Verhandlungspartner. Wildschut et al. (2003) finden als eines der Hauptergebnisse ihrer Metastudie, dass der Diskontinuitätseffekt stärker ausgeprägt ist, je weniger das Verhalten der Rezipientinnen oder Rezipienten durch die Experimentalleiter eingeschränkt ist. Dies bedeutet im Umkehrschluss, dass Rezipientinnen oder Rezipienten, die mehr Handlungsfreiheiten haben, weniger Ressourcen in Verteilungsentscheidungen zugewiesen bekommen.

Wie am Anfang dieses Abschnitts diskutiert, vermindert sich in Koalitionsentscheidungen die individuelle Verantwortung der Subjekte für die Verteilung im Vergleich zu Einzelentscheidungen und, je nach Szenario, erhöht sich die Verantwortung des später ausgeschlossenen Subjekts für das Verhandlungsergebnis. Tatsächlich geben Versuchspersonen in Mehrheitsentscheidungen an, weniger Verantwortung für das Ergebnis zu empfinden als in Einzelentscheidungen (Nicolle et al., 2011). Als einer der Hauptgründe für den Einfluss der Verantwortungsdiffusion auf das prosoziale Verhalten wird in der Sozialpsychologie die Reduktion der empfundenen Reue und des empfundenen Stresses angeführt (El Zein et al., 2019). Übersetzt in die in Abschnitt 2.2 eingeführte Nutzenfunktion führt dies zu der Erwartung, dass der Parameter für die besser gestellte Ungleichheitsaversion, β_i, mit abnehmender Verantwortung der Entscheidungsträgerinnen und Entscheidungsträger und mit zunehmender Verantwortung der Rezipientinnen und Rezipienten abnimmt.

Dies führt insgesamt zu der Erwartung, dass unter den strukturellen Bedingungen von Koalitionsverhandlungen die Ressourcenanteile dritter Individuen im Vergleich zu individuellen Entscheidungen abnehmen. Die sozialpsychologischen Einflussfaktoren deuten weiters darauf hin, dass die Ressourcenanteile Dritter mit zunehmender Anzahl an relevanten Koalitionen abnehmen. Die relative Verhandlungsmacht wirkt sich auf die Verteilung der Ressourcen zwischen den koalierenden Subjekten aus. Die Verantwortung des dritten Gruppenmitglieds wirkt sich auf die Verteilung zwischen Koalitionsmitgliedern und dritten Gruppenmitglied aus. Wäre letzteres nicht der Fall, muss die Verteilung zwischen Koalitionsverhandlungen mit einer und drei relevanten Koalitionen gleich sein, da die relative Verhandlungsmacht zwischen den koalierenden Subjekten in den beiden Szenarien gleich ist.

Ökonomische Ebene

Aus einer ökonomischen Perspektive kann es rational sein, prosozial zu agieren, um den erwarteten Profit zu erhöhen. Zum Beispiel kann kooperatives Verhalten in einem sozialen Dilemma (Olson, 1965) zu einem besseren ökonomischen Ergebnis führen als unmittelbar eigennutzenmaximierendes Verhalten. Ist das Ziel vor allem ökonomisch zu profitieren, kann prosoziales Verhalten daher auch ein strategisches Mittel sein. Das eigene prosoziale Verhalten hängt in diesem Fall stark von den Erwartungen über das Verhalten anderer ab. Typische Beispiele für prosoziale Motive, die auch eine strategische Komponente beinhalten, sind schwache Formen der Reziprozität (Fehr et al., 2002) oder bedingte Kooperation (Fischbacher et al., 2001).

In Koalitionsverhandlungen ist der erwartete Profit von der Stabilität von Koalitionen abhängig. Theoretische Erkenntnisse über die Inkohärenz und mögliche Instabilität von Mehrheitsentscheidungen stellen einen wichtigen Initialpunkt der ökonomischen Theorien der Politikwissenschaft dar (Arrow, 1951; McKelvey, 1976). Wenn man von rein egoistischen Verteilungspräferenzen ausgeht, dann gibt es im DD-Spiel, wie in Abschnitt 2.1 diskutiert, keinen Kern, da jede mögliche Koalition durch eine andere Koalition geschlagen werden kann, die zwei der drei Subjekte besserstellt. Verhalten sich Menschen myopisch, kann daher davon ausgegangen werden, dass Koalitionen in kontinuierlichen Koalitionsverhandlungen instabil sind. Welche ökonomischen Konsequenzen hat aber die Instabilität auf die Gruppenmitglieder und wäre ein Individuum in einer stabilen Koalition bessergestellt?

Angenommen zwei von drei rein eigeninteressierten Subjekten einigen sich in einem symmetrischen DD-Spiel mit drei relevanten Koalitionen zu einem Zeitpunkt $t = 0$ auf eine beliebige Verteilung $y = (y_0, r - y_0, 0)$. Die zwei Subjekte teilen die Ressourcen also unter sich auf und schließen das dritte Subjekt aus. Zu diesem Zeitpunkt hat das dritte Subjekt einen klaren Anreiz, eine neue Koalition zu bilden. Es könnte bspw. Subjekt 1 ein Angebot machen, dass dieses etwas besserstellt und sich selbst besserstellt $(y_0 + \varepsilon, 0, r - y_0 - \varepsilon)$, wobei Epsilon hier für eine beliebig kleine Zahl steht, die gerade noch größer als null ist. Da das Angebot Subjekt 1 etwas besserstellt, nimmt ein eigennütziges und myopisches Subjekt dieses Angebot an. Genauso könnte Subjekt 1 jedoch Subjekt 3 ein Angebot machen, welches dieses etwas und sich selbst besserstellt $(r - \varepsilon, 0, \varepsilon)$. Subjekt 3 nimmt dieses Angebot ebenso an, wenn es eigennützig und myopisch handelt. Dieselben Argumente gelten für Angebote, die Subjekt 2 involvieren. Spieltheoretisch lässt sich die nächste Koalition und die nächste Verteilung nicht voraussagen. Klar ist nur, dass das zukünftige dritte Subjekt von eigennützigen Subjekten von der Verteilung ausgeschlossen und die Ressource unter den Koalitionsmitgliedern aufgeteilt wird. Unabhängig von der Einigung zu Zeitpunkt $t = 1$ gilt natürlich auch selbes für $t = 2, 3, 4$ und so fort.

Diese Dynamik ist ein Beispiel für die theoretische Arbitrarität von kollektiven Entscheidungen, aufgrund derer insbesondere Riker (1982) die normative Bedeutung von demokratischen Entscheidungen anzweifelte. Während in den Koalitionsverhandlungen keine Punktprognose möglich ist, lässt sich jedoch möglicherweise eine Voraussage für die durchschnittliche Verteilung über einen längeren Zeitraum machen. Um dies zu illustrieren, wird ein simpler Algorithmus simuliert. Dieser startet mit einer zufälligen Verteilung, die die Ressource $r = 1$ zwischen Subjekt *i* und *j* aufteilt. Zum Zeitpunkt *t* gibt es vier Möglichkeiten. Subjekt *k* macht Subjekt *i* ein Angebot. Subjekt *k* macht Subjekt *j* ein Angebot. Subjekt *i* macht Subjekt *k* ein Angebot. Subjekt *j* macht Subjekt *k* ein Angebot. Welches Angebot als erstes gemacht wird, ist zufällig. Die Verteilung stellt die Empfängerin bzw. den Empfänger des Angebots gegenüber dem Status-quo jeweils um $\varepsilon = 0.01$ besser, weshalb es angenommen wird, und weist die restliche Ressource der Senderin bzw. dem Sender zu. Wenn sich Subjekt *i* nicht mehr verbessern kann, weil dieses bereits 0.99 Anteile der Ressource hat, dann sind nur Angebote zwischen *j* und *k* relevant.

Aufgrund des Gesetzes der großen Zahlen ist die durchschnittliche Verteilung in diesem Prozess gleich (1/3, 1/3, 1/3), wenn $lim_{t\to\infty}$. Wenn die Verhandlungen nach diesem Prozess 1000-mal simuliert werden, zeigen die Ergebnisse, dass die durchschnittliche Verteilung im Mittel nach 120 Runden auf die erste Kommastelle genau (1/3, 1/3, 1/3) ist. In 99 Prozent der Simulationen gibt es nach 17 Runden kein Subjekt mehr, das durchschnittlich mehr als 1/2 verdient. Je strukturierter der simulierte Prozess, desto schneller nähert sich die Verteilung (1/3, 1/3, 1/3) an. Das Koalitionsmodell in Abschnitt 2.2 sagt unter der Annahme von rein eigeninteressierten Präferenzen voraus, dass sich von einem beliebigen Status-quo die zwei schlechter gestellten Subjekte einigen und die Ressourcen des am besten gestellten Subjekts gleich zwischen sich aufteilen. Im simulierten Prozess ist die durchschnittliche Verteilung im Mittel ab Runde 7 auf die erste Kommastelle genau (1/3, 1/3, 1/3).[10] In 99 Prozent der Fälle gibt es nach der zweiten Runde kein einzelnes Subjekt mehr, das durchschnittlich mehr als 1/2 verdient. Mit prosozialen

[10] Folgen die Koalitionsverhandlungen diesem Prozess, ist zu Zeitpunkt *t* die höchste Auszahlung gleich $\frac{2}{3}(1 + (-1)^{t+1}2^{-t})r + \left(-\frac{1}{2}\right)^t y_0$, die zweithöchste Auszahlung gleich $\frac{1}{3}(1 + (-1)^t 2^{1-t})r + (-1)^{t+1}2^{-t}y_0$ und die Auszahlung des dritten Subjekts gleich 0. Wenn $lim_{t\to\infty}$, dann konvergiert die höchste Auszahlung gegen 2/3 und die zweithöchste gegen 1/3. Die Verteilung konvergiert gegen die Folge (2/3, 1/3, 0), (0, 2/3, 1/3), (1/3, 0, 2/3).

Präferenzen kann dies sogar noch schneller der Fall sein. Gilt für zumindest zwei der drei Subjekte $2/3 < \beta_i$, dann ist die Verteilung (1/3, 1/3, 1/3) bereits ab der ersten Runde stabil.

Die Strategie, myopisch zu handeln, führt somit zu der Erwartung, im Durchschnitt ein Drittel von der Ressource in den Koalitionsverhandlungen zu erhalten. Je analytischer ein Subjekt ist, desto eher ist diese Entwicklung evident. Noch klarer ist zu erkennen, dass langfristig kein einzelnes Subjekt mehr als die Hälfte der Ressource erhält, wenn jedes Subjekt ein myopisches Strategieprofil wählt. Die Frage ist nun, ob es für ein Subjekt, welches diese Dynamik durchschaut, eine Strategie gibt, die dieses langfristig besser als $1/3r$ stellt. Prinzipiell wäre dafür jede stabile Einigung interessant, bei der beide koalierenden Subjekte langfristig mehr als ein Drittel der Ressource erhalten.

Ein Kandidat dafür ist die ‚Tit-for-tat'-Strategie. Die auf dem Prinzip der Reziprozität aufbauende Strategie wurde im Kontext von iterierten Gefangenendilemmata bekannt (Axelrod, 1984). In einem Gefangenendilemma zwischen zwei Subjekten wird das soziale Optimum erreicht, wenn beide Subjekte kooperieren. Die individuelle Auszahlung ist für beide Subjekte geringer, wenn beide Subjekte defektieren. Da die Subjekte ihre individuelle Auszahlung jedoch kurzfristig erhöhen, wenn sie defektieren, unabhängig davon, ob das andere Subjekt kooperiert oder defektiert, ist die spieltheoretische Voraussage, dass beide Subjekte defektieren. Diese Strategie wird hier als myopisch-rationale Strategie bezeichnet. Die ‚Tit-for-tat'-Strategie beschreibt hingegen ein Strategieprofil, in dem ein Subjekt kooperiert, wenn das andere Subjekt kooperiert, und defektiert, wenn das andere Subjekt defektiert. Die Prinzipien der schwachen Reziprozität (Fehr & Fischbacher, 2002) und der bedingten Kooperation (Fischbacher et al., 2001), die das eigene kooperative Verhalten vom Verhalten des anderen Subjekts abhängig macht, folgen derselben Logik. Axelrod (1984) konnte in einem Turnier verschiedener Strategieprofile zeigen, dass die ‚Tit-for-tat'-Strategie im wiederholten Gefangenendilemma finanziell erfolgreicher ist als eine rein myopische Strategie. Proto et al. (2019) konnten zeigen, dass intelligentere Subjekte diese Strategie eher verfolgen und dadurch signifikant höhere Einkommen erzielen.

Unter bestimmten Bedingungen kann die ‚Tit-for-tat'-Strategie auch in Koalitionsverhandlungen erfolgreich sein. Von einem Status-quo ($1/3r$, $1/3r$, $1/3r$), den man aufgrund der langfristigen Verteilung annehmen kann, einigen sich zwei rein eigeninteressierte Subjekte laut dem Modell aus Abschnitt 2.2 auf die Verteilung ($1/2r$, $1/2r$, 0). Myopisches Verhalten kann nun als defektieren und der Verbleib bei der Verteilung ($1/2r$, $1/2r$, 0) als kooperieren definiert werden. Die ‚Tit-for-tat'-Strategie entspricht dann folgender Strategie: Ein Subjekt verbleibt solange in einer Koalition mit der Verteilung (1/2*r*, 1/2*r*, 0), solange das andere Koalitionsmitglied die Koalition ebenfalls nicht verlässt; ansonsten verhält es sich myopisch. Es ist leicht zu erkennen, dass zwei koalierende Subjekte mit diesem Strategieprofil langfristig eine höhere Auszahlung erhalten, da sie beide die Koalition mit der Verteilung (1/2*r*, 1/2*r*, 0) nicht aufgeben, selbst wenn sie ein kurzfristig besseres Angebot vom dritten Subjekt erhalten. Langfristig erhalten beide Subjekte mit dieser Strategie daher die Hälfte anstatt nur ein Drittel der Ressource.

Ob ein Subjekt eine ‚Tit-for-tat'-Strategie in Koalitionsverhandlungen verfolgt, hängt davon ab, wie analytisch dieses selbst ist, und als wie analytisch es die anderen Subjekte einschätzt. Je stärker diese Faktoren ausgeprägt sind, desto eher wird es die ‚Tit-for-tat'-Strategie anwenden. Nur ein Subjekt, welches die langfristige Dynamik von Koalitionsverhandlungen erkennt, versteht, dass der langfristige Gewinn durch eine bilaterale Kooperation größer ist. Ebenso macht es nur Sinn, eine Koalition, die sich auf die Verteilung (1/2*r*, 1/2*r*, 0) einigt, nicht zu verlassen, wenn erwartet wird, dass das andere Koalitionsmitglied die Koalition ebenfalls nicht verlässt. Zusätzlich müssen zukünftige Auszahlungen hinreichend wichtig für das Subjekt sein, das heißt, das Subjekt darf zukünftige Einkommen nicht zu stark diskontieren. Sind diese Kriterien erfüllt, dann erzeugt kooperierendes, prosoziales Verhalten gegenüber der Koalitionspartnerin bzw. dem Koalitionspartner aus theoretischer Sicht langfristig einen finanziellen Vorteil in kontinuierlichen Koalitionsverhandlungen.

Soziale Ebene

Soziale Faktoren beeinflussen das prosoziale Verhalten durch die geltenden Verteilungsnormen. Soziale Normen sind als Verhaltensstandards definiert, die auf weit verbreiteten Überzeugungen darüber beruhen, wie sich einzelne Gruppenmitglieder in einer bestimmten Situation verhalten sollten (Elster, 1989; Horne, 2005). Normverletzendes Verhalten kann soziale und ökonomische Nachteile nach sich ziehen, weil es von den Gruppenmitgliedern bestraft wird. Koalitionsverhandlungen finden in der Regel zwischen zwei oder mehr Subjekten in einer Gruppe von drei oder mehr Mitgliedern statt. In Koalitionsverhandlungen kann normverletzendes Verhalten daher durch Ausschluss aus der Koalition bestraft werden. Insofern nehmen Verteilungsnormen in Koalitionsverhandlungen einen wesentlich wichtigeren Platz ein als in individuellen Entscheidungen.

Die vier wichtigsten Verteilungsnormen beruhen auf dem Gleichheitsprinzip, dem Bedarfsprinzip, dem Leistungsprinzip und dem Anrechtsprinzip (Liebig & Sauer, 2016). Je höher die Leistung, der Bedarf, oder das Anrecht des Gegenübers angesehen werden, desto höher müssen theoretisch die Zuteilungen zu diesem Subjekt sein. Grundbedingung für die Anwendung des Bedarfs-, Leistungs- und Anrechtsprinzip sind jedoch Informationen über die relevanten Dimensionen. Ohne die notwendigen Informationen über individuelle Bedarfe, Leistungen oder Anrechte können diese drei Verteilungsprinzipien nicht angewandt werden. Wenn notwendige Informationen fehlen, um andere Verteilungsnormen anzuwenden, wird auf die Gleichheitsnorm zurückgegriffen (D. Miller, 1999). In den bisherigen Überlegungen wurde daher implizit vom Gleichheitsprinzip als geltende Verteilungsnorm in Koalitionsverhandlungen ausgegangen, weil weitere Informationen über die Verteilungskriterien nicht berücksichtigt wurden.

Um das Gleichheitsprinzip einem anderen Verteilungsprinzip gegenüber zu stellen, fokussiert diese Arbeit auf das Bedarfsprinzip. Vor dem Hintergrund der unterschiedlichen Verteilungsnormen sticht das Bedarfsprinzip aus drei Gründen hervor. Erstens wurde das Bedarfsprinzip als primäres Verteilungsprinzip vorgeschlagen, um die soziale Wohlfahrt und die Arbeit von Demokratien zu bewerten, da dieses im Vergleich zu alternativen Kriterien (bspw. Bruttoinlandsprodukt) aussagekräftiger ist (Oppenheimer & Frohlich, 2009). Zweitens konnten bereits frühe politikwissenschaftliche Experimente zeigen, dass Versuchspersonen hinter dem Schleier des Nicht-Wissens weder nach Harsanyi (1953, 1955) bevorzugen, die Effizienz in Gruppen zu maximieren, noch nach Rawls (1971), die Ungleichheit zu minimieren. Stattdessen weisen die Versuchspersonen jedem Mitglied der Gruppe einen Mindestanteil zu und maximieren darüber hinaus die Effizienz (Frohlich & Oppenheimer, 1992). Evidenz für diese Verteilungspräferenz konnte repliziert werden (Traub et al., 2005) und wurde später als Präferenz für bedarfsgerechte Verteilungen interpretiert (Brock, 2005, 2013). Zudem geben Umfrageteilnehmende an, dass das Bedarfsprinzip noch vor dem Gleichheitsprinzip das wichtigste Kriterium ist, um eine faire Verteilung von Ressourcen in der Gesellschaft zu gewährleisten (Hülle et al., 2018). Drittens gibt es im Gegensatz zu anderen Verteilungsprinzipien bisher keine gesicherte empirische Evidenz, in welcher Form heterogen ausgeprägte Bedarfe in Verteilungsentscheidungen berücksichtigt werden.

Um weiter vom Bedarfsprinzip sprechen zu können, gilt es zunächst, die Definition von Bedarfsgerechtigkeit zu klären. Bedarfe sind grundsätzlich als ein monetäres Erfordernis definiert, welches für die Erfüllung eines Bedürfnisses erforderlich ist. Für das Bedarfsprinzip sind all jene Bedürfnisse relevant, die im jeweiligen Kontext sozial als ‚notwendig‘ anerkannt werden (Kittel, 2020). Von einer bedarfsgerechten Verteilung kann gesprochen werden, wenn sie die Grundbedürfnisse aller Gruppenmitglieder erfüllt (Konow, 2001).

Grundbedürfnisse zu bestimmen ist allerdings nicht trivial, da es keine allgemeingültige Regel gibt, welche Bedarfe notwendig sind und welche nicht (Dean, 2010). Doyal & Gough (1991) gehen insbesondere auf die biologischen Grundbedürfnisse ein. Um die Frage der Notwendigkeit näher beantworten zu können, hat sich in der philosophischen Literatur jedoch auch der Zusatz ‚notwendig für ein menschenwürdiges Leben' entwickelt (Reader, 2006), welche auch soziale Bedürfnisse miteinschließt. Eine breitere Auflistung an Bedarfen im Sinne des ‚Capabilities'-Ansatzes (Nussbaum, 2011) wurde im UN Human Development Index entwickelt, welcher unterschiedliche Grundbedürfnisse zusammenfasst. Auf diesen beziehen sich auch Frohlich und Oppenheimer (2009), wenn sie von Bedarfsgerechtigkeit sprechen.

Informationen über Bedarfe sind notwendig, weil sie zwischen Menschen meist unterschiedlich hoch ausgeprägt sind. Wenn man bspw. an Menschen mit körperlicher Behinderung denkt, so können deren finanzielle Aufwendungen für Mobilität deutlich höher sein als für Menschen ohne körperliche Behinderung. Nach dem Bedarfsprinzip wird in den meisten westlichen Staaten gewährleistet, dass alle öffentlichen Einrichtungen und Gebäude auch für Menschen mit körperlicher Behinderung zugänglich sind. Ebenso werden bspw. behindertengerechte Kraftfahrzeuge vom Staat gefördert. Die Zuwendung zu heterogenen Bedarfen führt daher zu einer ungleichen Ressourcenverteilung. Dies kann zu einem Konflikt zwischen Bedarfsprinzip und Gleichheitsprinzip führen, welche in einer Verteilungsentscheidung nicht gemeinsam erfüllt werden können.

Voraussetzung für die Anwendung des Bedarfsprinzips ist die Information darüber, wie hoch die individuellen Bedarfe sind. Die Höhe des Bedarfs wird im Folgenden abstrakt als ‚Bedarfsschwelle' bezeichnet. Ist die Bedarfsschwelle erfüllt, wird somit das als sozial notwendig anerkannte Bedürfnis befriedigt. Werden die Bedarfsschwellen aller Subjekte in der Gruppe erfüllt, ist die Verteilung bedarfsgerecht. Beeinflusst nun das Bedarfsprinzip die Verteilungsentscheidung einer Koalition, muss sich die Verteilung entsprechend der Bedarfsschwellen ändern. Ist in einer Koalitionsverhandlung die abstrakte Bedarfsschwelle eines Subjekts in einer Situation gleich $0.40r$ und in der anderen Situation gleich $0.05r$, kann entsprechend des Bedarfsprinzips erwartet werden, dass das Subjekt in der ersten Situation einen höheren Anteil an der Ressource erhält als in der zweiten. Die Verteilung der Bedarfsschwellen hat somit theoretisch einen Einfluss auf das prosoziale Verhalten, welches wir in den Koalitionsentscheidungen beobachten können. Es gilt aber zu beachten, dass sich die zweite Bedarfsschwelle in einer Gruppe von drei Subjekten nicht mit der Verteilung ($0.33r$, $0.33r$, $0.33r$) vereinbaren lässt, wodurch die Verteilung nicht gleichzeitig bedarfsgerecht und gleichverteilt sein kann. Es ist daher eine empirische

Frage, ob Ressourcen in Koalitionsverhandlungen eher gleichverteilt oder bedarfsgerecht verteilt werden. Im folgenden Abschnitt wird daher der methodische Zugang zu dieser Frage und denen der vorangegangenen Abschnitte beschrieben.

3. Methodischer Zugang

Vor dem Hintergrund unterschiedlicher institutioneller Rahmenbedingungen, verstrickter Einzelinteressen und der Komplexität von sozialen Präferenzen ist es in alltäglichen Koalitionsverhandlungen schwierig - wenn nicht unmöglich - das Verhalten verschiedener Individuen umfassend nachzuvollziehen. Um mit einem hohen Maß an interner Validität die kausalen Effekte der einzelnen Faktoren herauszuarbeiten, werden diese daher in Laborexperimenten untersucht. In dieser Arbeit sollen Verteilungsentscheidungen unter kontrollierten Bedingungen mittels experimenteller Evidenz zunächst im Labor besser verstanden werden.

Grundsätzlich machen sich sozialwissenschaftliche Experimente drei Instrumente zu Nutze, um kausale Zusammenhänge festzustellen: Kontrolle, Randomisierung und monetäre Anreize (Fréchette & Schotter, 2015; Kubbe, 2016; Morton & Williams, 2010; Schram & Ule, 2019; Webster & Sell, 2014).[11] In einem idealen experimentellen Forschungsdesign sind alle Input- und Output-Variablen festgelegt und die Input-Variablen werden kontrolliert variiert. Dadurch kann bei Beobachtung eines Unterschieds der Output-Variable kausal auf den Einfluss der Input-Variable geschlossen werden. Die unterschiedlichen Eigenschaften und Einstellungen der Teilnehmenden werden durch einen zufallsgenerierten Zuweisungsmechanismus zur Experimental- und Kontrollgruppe kontrolliert, wodurch sich bei einer ausreichend großen Fallzahl die Verteilung aller Attribute zwischen den Versuchsanordnungen im Durchschnitt ausgleicht. Zusätzlich sorgen die monetären Anreize für reale Konsequenzen der Verteilungsentscheidungen, wodurch man sich nicht auf den Wahrheitsgehalt von Meinungen oder Verhaltensangaben in hypothetischen Szenarien verlassen muss.[12]

In allen vier Beiträgen der Dissertation geht es in den Experimenten darum, in Dreiergruppen eine gegebene Ressource unter den Gruppenmitgliedern aufzuteilen (vgl. DD-Spiel, Abschnitt 2). Die Verteilungsentscheidung kann dabei immer durch eine Koalition in Form einer einfachen Mehrheit, also durch zwei von drei Individuen, getroffen werden. Studie 1 vergleicht individuelle Verteilungsentscheidungen mit Verteilungsentscheidungen in der sogenannten 2er-Linie (eine relevante Koalition). Studie 2 vergleicht die 3er-Linie (zwei relevante Koalitionen) mit dem Dreieck (drei relevante Koalitionen). Studie 3 betrachtet kontinuierliche Koalitionsentscheidungen von Dreiergruppen (drei relevante Koalitionen, in welchen Angebote auch für

[11] Eine weiteres Instrument, die Täuschung von Teilnehmenden, die teilweise in den sozialpsychologischen Experimenten angewendet wird (Kubbe, 2016), kommt in dieser Arbeit nicht zur Anwendung.

[12] Übersichten zu Experimenten in den Sozialwissenschaften finden sich in Druckman et al. (2006, 2011), Kagel & Roth (2016), Kittel et al. (2012) oder Palfrey (2009).

Dritte ersichtlich sind). Letztlich implementiert Studie 4 Bedarfsschwellen in Koalitionsverhandlungen in der 3er-Linie. Das experimentelle Design der vier Studien unterscheidet sich im Hinblick auf die jeweilige Forschungsfrage.

Der erste Beitrag beschäftigt sich mit der Frage, wie soziale Präferenzen in einer bilateralen Verhandlung zusammenwirken, wenn eine vorbestimmte Dyade die verfügbaren Ressourcen auf drei Individuen aufteilt. Dazu wird die Anzahl der entscheidenden Individuen variiert und Prosozialität sowohl individuell als auch in Mehrheitsentscheidungen von zwei Koalitionsmitgliedern gemessen. Das dritte Gruppenmitglied hat in der ersten Studie keinerlei Einfluss auf die Entscheidung und kann als passives Individuum nur darauf hoffen, dass ihn die Verhandlungspartnerinnen und Verhandlungspartner in die Verteilung inkludieren. In der ersten Studie kann somit untersucht werden, wie sich die wahrgenommene Verantwortung der multiplen Entscheidungsträgerinnen und Entscheidungsträger in den bilateralen Koalitionsverhandlungen im Vergleich zu Einzelentscheidungen auswirkt.

Im zweiten Beitrag geht es um die Auswirkung der Verteilung der Verhandlungsmacht auf die Koalitionsentscheidungen. Dazu werden die Verteilungsentscheidungen von Koalitionen in zwei unterschiedlichen Interaktionsstrukturen verglichen. Während in einer Versuchsanordnung alle drei Gruppenmitglieder die Möglichkeit haben, jeweils bilateral zu verhandeln und eine Mehrheit zu bilden, hat in der anderen Anordnung nur ein Gruppenmitglied die Möglichkeit, eine Koalition mit einem der beiden anderen Gruppenmitglieder zu bilden. In der ersten Versuchsanordnung ist die Verhandlungsmacht daher gleich verteilt, während in der zweiten die Verhandlungsmacht des zentralen Gruppenmitglieds höher ist als die der peripheren Individuen. Somit kann auch die Auswirkung der zuschreibbaren Verantwortung des initial gleich starken oder schwächeren und später ausgeschlossenen Gruppenmitglieds auf dessen Anteil an der Ressource überprüft werden. Die Resultate von Studie 2 können mit jenen von Studie 1 verglichen werden, in welcher dem dritten Gruppenmitglied keine Verantwortung für das Ergebnis der Koalitionsverhandlungen zugeschrieben werden kann, da dieses in der passiven Rolle keinen Einfluss auf die Entscheidung hat.

Der dritte Beitrag geht auf die Verteilungsentscheidungen von Koalitionen und deren Stabilität ein. Dazu werden die Koalitionsverhandlungen als kontinuierlicher Prozess modelliert. Über einen vorgegebenen Zeitraum können die Versuchspersonen innerhalb der Gruppe in Echtzeit nach Belieben Koalitionen bilden, aufbrechen und mit dem anderen Gruppenmitglied eine neue Koalition eingehen. Zudem wird analysiert, welchen Einfluss die individuelle Prosozialität und kognitive Fähigkeiten der Koalitionsmitglieder auf die Entscheidung über die Verteilung haben.

Übergreifend kann in dieser Studie daher untersucht werden, ob Transfers zu den dritten Gruppenmitgliedern in den kontinuierlichen Verhandlungen höher sind als in den einmaligen Koalitionsverhandlungen der ersten zwei Studien.

Der vierte Beitrag schließt mit einer kritischen Betrachtung der den vorherigen Studien zugrundeliegenden normativen Verteilungskriterien ab. Unter einer ähnlichen Verhandlungsstruktur wie in Studie 2 wird überprüft, inwiefern die Ergebnisse standhalten, wenn neben Gleichheitsnorm auch die Bedarfsnorm in den Verteilungsentscheidungen angewendet werden kann. Die Bedarfe der Gruppenmitglieder werden in dem Experiment in Form von Schwellen operationalisiert, die durch die Verteilung der Ressourcen erfüllt werden müssen, um in einem zweiten Teil des Experiments die Möglichkeit zu haben, weiteres Einkommen zu verdienen. Im Fokus der Studie steht die Frage, wie die Konkurrenz zwischen den Verteilungsprinzipien in den Koalitionsverhandlungen aufgelöst wird, wenn die individuelle Bedarfshöhe innerhalb der Gruppen variiert.

Einige zentrale Elemente der Experimente sind in allen vier Studien konstant gehalten. Unter anderem finden die Koalitionsverhandlungen in allen vier Studien über den Computer statt. Das bedeutet, den Versuchspersonen wird am Anfang des Experiments ein visuell von anderen abgetrennter Computerbildschirm zugewiesen. Die weiteren Instruktionen und Interaktionen im Experiment erfolgen anonym. Alle experimentellen Versuchsanordnungen sind mittels der Computersoftware z-tree (Fischbacher, 2007) programmiert und durchgeführt worden. Die Teilnehmenden sind in allen vier Studien Studierende der Universität, an welche das Labor angebunden ist, in dem das Experiment durchgeführt wurde.[13]

Eine der wichtigsten Gemeinsamkeiten der experimentellen Untersuchungen ist die Art des Verhandlungsprotokolls. In allen vier Studien ist das Verhandlungsprotokoll unstrukturiert und nicht streng vorgegeben. Das bedeutet, dass die Individuen in den Verhandlungen frei entscheiden können, wann und wie oft sie während der Verhandlung Angebote machen. Ebenso kann frei entschieden werden, wann ein Angebot angenommen wird. Die Verteilungsvorschläge werden während der Verhandlungen in allen vier Studien allerdings rein numerisch und nicht verbal

[13] Eine Diskussion zu Studierenden als Versuchspersonen in Experimenten findet sich in Kapitel 8 von Morton und Williams (2010). Ein direkter, experimenteller Vergleich zwischen Studierenden und anderen Versuchspersonen findet sich in Belot et al. (2015). Siehe auch Druckman et al. (2011) und Fréchette & Schotter (2015).

gemacht. Das bedeutet, ein Angebot enthält die vorgeschlagene Verteilung, jedoch keinen weiteren Begleittext. Weitere Kommunikation ist während der Experimente untersagt, um Störvariablen zu kontrollieren.

Trotz einiger Gemeinsamkeiten stehen die Studien in ihrer Konzeption allerdings in erster Linie für sich allein.[14] Die vier Studien sind interdisziplinär interpretiert, um den Einfluss sozialer Präferenzen auf die Koalitionsverhandlungen zu untersuchen. Studie 1 nimmt eine vergleichsweise verhaltensökonomische Perspektive auf bilaterale Verhandlungen ein. Studie 2 bezieht sich auf die soziologische Netzwerkaustauschtheorie. Studie 3 ist aus Sichtweise der politikwissenschaftlichen Literatur zur Stabilität von Mehrheitsentscheidungen argumentiert, während die Konzeption von Bedarfen in Studie 4 primär auf der philosophischen Literatur zu Verteilungsgerechtigkeit aufbaut.

[14] Unterschiede zwischen den Experimenten finden sich bspw. hinsichtlich der Rundenanzahl oder den zusätzlich erhobenen Kontrollvariablen. Kausalitätsschlüsse der komparativen Ergebnisse sind daher nur eingeschränkt möglich, weshalb sich Abschnitt 8 auf einen deskriptiven Vergleich der Ergebnisse beschränkt.

4. Studie I

Sharing with the Powerless Third:

Other-regarding Preferences in Dynamic Bargaining

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Zeitschrift: Journal of Economic Behavior & Organization

Status des Beitrags: Überarbeitung und Wiedereinreichung

Elsevier Editorial System(tm) for Journal of Economic Behavior & Organization
Manuscript Draft

Manuscript Number: JEBO-D-20-01090

Title: Sharing with the Powerless Third: Other-regarding Preferences in Dynamic Bargaining

Article Type: Research Paper

Keywords: Free-form bargaining, Unstructured bargaining, Other-regarding Preferences, Social preferences, Third Agent

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Abstract: Other-regarding preferences are powerful drivers of human behavior, leading individuals to forgo their own economic gains to share with the less fortunate. However, when actors with different levels of other-regarding concern bargain about how to distribute payoffs, it is unclear whether joint bargaining decisions reflect the individual preferences. In this study, I examine how heterogeneous other-regarding preferences interact and influence negotiated distribution decisions that involve a third passive actor. In a dynamic free-form bargaining experiment, two subjects must allocate payoffs between themselves and a powerless third subject. The data reveal that fairness between the bargainers is more important than fairness towards the third subject; bargainers only allocate payoff shares to third subjects if the other bargainer is willing to allocate the same amount, even if their other-regarding preferences differ strongly from each other when revealed individually. Through the formal analysis, I can systematically link the results to the other-regarding preferences elicited individually and, thereby, provide important insights into other-regarding preferences in joint decision-making environments.

Research Data Related to this Submission

Title: Sharing with the Powerless Third: Other-regarding Preferences in Dynamic Bargaining
Repository: X-econ
https://dx.doi.org/10.23663/x2656

Sharing with the Powerless Third: Other-regarding Preferences in Dynamic Bargaining

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Abstract

Other-regarding preferences are powerful drivers of human behavior, leading individuals to forgo their own economic gains to share with the less fortunate. However, when actors with different levels of other-regarding concern bargain about how to distribute payoffs, it is unclear whether joint bargaining decisions reflect the individual preferences. In this study, I examine how heterogeneous other-regarding preferences interact and influence negotiated distribution decisions that involve a third passive actor. In a dynamic free-form bargaining experiment, two subjects must allocate payoffs between themselves and a powerless third subject. The data reveal that fairness between the bargainers is more important than fairness towards the third subject; bargainers only allocate payoff shares to third subjects if the other bargainer is willing to allocate the same amount, even if their other-regarding preferences differ strongly from each other when revealed individually. Through the formal analysis, I can systematically link the results to the other-regarding preferences elicited individually and, thereby, provide important insights into other-regarding preferences in joint decision-making environments.

Keywords

Free-form bargaining, Other-regarding and Social preferences, Third Agent, Unstructured bargaining

JEL-Classification

C78, C92, D64, D9

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[2] I gratefully acknowledge funding by the German Forschungsgemeinschaft (DFG, KI 1419/2-1) and the Austrian Wissenschaftsfonds (FWF, I1888-G11). I thank Bernhard Kittel, Stefan Traub, Jan Sauermann, Fabian Paetzel, Roman Hoffmann, Marina Chugunova, and Mrinalini Cariappa for helpful comments and suggestions. Declaration of interest: none.

Highlights

- I examine how other-regarding preferences aggregate in a free-form bargaining experiment
- Third subjects only receive payoffs if the bargainers retain equal payoffs
- Transfers to third subjects vary considerably depending on the bargaining partner
- The formal analysis can link the results to the individual preferences of the bargainers

1. Introduction

Any group, whether it is a state, a business cooperation or a union, must decide how to distribute available resources among its members. Often, these decisions affect third parties that, at the decision-making stage, have no direct influence on the outcome. For example, once actors have formed a majority coalition and are able to make decisions on behalf of the group, they negotiate the distribution of resources for themselves and the group members outside the coalition. In other instances, the negotiating parties may be managers, party leaders, or states and the affected third parties are co-workers, party members, or asylum seekers from third countries. Third parties appear in very different contexts, in which the motives and distribution preferences of decision-makers can be just as different. In this paper, I examine in a stylized way under which circumstances bargainers take third subjects into account and how the distribution decisions depend on their individual levels of other-regarding preferences.

It is now well established that other-regarding preferences are an important driving force of individual behavior (Cooper and Kagel 2016; Fehr and Schmidt 2006; Konow and Schwettmann 2016). Despite the extensive amount of evidence, most of the bargaining literature refrain from incorporating other-regarding preferences in the analysis and focus on institutional factors (for a survey see, Palfrey 2016). Distributional preferences, however, appear to be crucial in determining joint distribution decisions. While one would expect that self-interested actors leave anyone outside the majority coalition empty-handed, as allocating any payoff shares to third actors would be 'coalitionally irrational' (Aumann and Maschler 1961), other-regarding actors might happily share payoffs equally among the whole group (Sauermann et al. 2020). Given that individuals are heterogenous with respect to their other-regarding preferences, the same institutions can exhibit very different bargaining outcomes depending on the decision-makers.

However, the relationship between individual other-regarding preferences and collective decisions is more intricate than it appears at first. Decisions made individually are typically poor predictors of decisions made jointly (Charness and Sutter 2012), and even though groups make a substantial amount of decisions that benefit others, other-regarding concern is usually less pronounced (Kugler et al. 2012). The question is, what happens when multiple individuals bargain about the distribution of payoffs? How do bargainers' distributional preferences interact and aggregate, whose preferences affect the agreement more, and under which circumstances do they take third actors into account? The experimental bargaining literature, dominated by highly structured approaches, typically assigns tremendous proposer power to one of the bargainers. Yet, other-regarding preferences can interact with the bargaining position, which makes it difficult to derive clear insights on these questions from existing studies.

To examine the influence of individual other-regarding preferences on bargaining outcomes, I conduct a free-form bargaining experiment and refrain from imposing structural inequalities. A predefined majority of two active subjects have to agree on the distribution of payoffs between themselves individually and a third passive subject. The free-form bargaining setting allows unrestricted back-and-forth interaction, which makes bargainers structurally equivalent. To disentangle the influence of the individual preferences on the outcome, subjects assigned to the active role bargain consecutively with different subjects. Additionally, I elicit subjects' distributional preferences in individual choice tasks in two treatments, either before or after the bargaining game. To solve the bargaining problem theoretically, I derive closed-form solutions by applying prominent social preference functions (Bolton and Ockenfels 2000; Fehr and Schmidt 1999) to the Nash bargaining solution (Nash 1950, 1953). Then, I fit the derived solution functions to the observed bargaining behavior. This allows me to (i) assess which assumptions about the other-regarding preferences explain the bargaining behavior best and (ii) compare subjects' bargaining behavior with their individual distribution choices. I also report on the dynamics of the bargaining process, which is much richer in the free-form bargaining environment than under a structured bargaining protocol.

My main result is that when third subjects receive payoff shares, bargainers retain equal amounts of the payoff in 94 percent of the cases. A substantial share of the bargaining subjects care about the third subject; however, fairness between the bargainers appears to be more important than sharing fairly with the third subject. If other-regarding subjects are not able to enforce equal contributions, then the third subjects receive no payoff shares, because virtually no bargainer is willing to reduce inequality between themself and the third subject at the expense of an increase in inequality between themself and the other bargainer. After fitting the solution functions, the bargaining solution that captures this relationship in the underlying utility function (Fehr and Schmidt 1999) outperforms alternative solutions significantly. The rationale is also apparent when analyzing the bargaining process. In view of structured bargaining studies, which led to the conclusion that "players care neither about the absolute nor about the relative payoffs of other individuals" (Bolton and Ockenfels 2008), but just about their own payoff relative to the average, this result is surprising.

The results further show that bargaining outcomes are often polarized. In a majority of agreements, third subjects receive none or exactly one-third of the payoff. The analysis indicates that other-regarding preferences derived from the bargaining behavior correlate strongly with the revealed other-regarding preferences from the individual choice tasks. Moreover, analyzing the dynamics of the bargaining process reveals that the individual other-regarding preferences of the proposer of the final agreement influence the payoff distribution significantly stronger than the preferences of the receiver of the agreed offer. Also, the data confirm the presence of an 'anchor effect' (Chertkoff and Conley 1967) and a 'deadline effect' (Roth et al. 1988), implying that first offers have a lasting impact on the outcome and most agreements are formed during the last seconds of the negotiations.

The study touches upon several streams of literature. First, it contributes to studies that examine negotiated transfers to third individuals. A passive third individual was first introduced by Güth and van Damme (1998) in an extended version of the ultimatum game. They find that proposers and responders predominantly agree on the three-way even split in early periods, which can be replicated with samples outside the laboratory (Güth et al. 2007). In later periods, when the proposer learns to use their first-mover power, receivers of the take-it-or-leave-it offer care mostly about their own relative payoff share and less about the third, which is corroborated by electrophysiological data (Alexopoulos et al. 2012). The results from the structured bargaining experiments led to the conviction that self-interested bargainers are free to exploit other-regarding bargainers if they receive their own fair share, defined as the own payoff share relative to the average payoff share (Bolton and Ockenfels 1998, 2000, 2008). According to the evidence presented here, this conjecture cannot be supported in less structured bargaining environments.

Second, the study connects to the multilateral bargaining and coalition formation literature. Under simple majority rule, classic approaches predict that groups form minimum winning coalitions which distribute payoffs exclusively among the majority (Aumann and Maschler 1961). Experimental tests in this field show that multilateral bargaining outcomes are generally more equal than theoretically predicted by the assumption of strict self-interest (Diermeier and Morton 2005; Fréchette et al. 2003; McKelvey 1991; Palfrey 2016). However, after a few periods, many coalition agreements tend to exclude group members outside the coalition from any payoffs (Agranov and Tergiman 2014; Miller and Vanberg 2013; Okada and Riedl 2005). In comparison to these endogenous majorities, the predefined majorities in this study appear to exclude third subjects less. Likewise, when the bargaining protocol is unstructured (Schwaninger et al. 2019), endogenous majorities transfer less to subjects outside the coalition than observed here. These results suggest indirectly that either other-regarding concerns are higher when subjects outside the coalition have no power to respond or that self-interested subjects are more likely to select into the majority.

With respect to the main result, the study is also related to findings in variants of the dictator game with two dictators and one recipient. Evidence on the question of whether transfers to the same recipient align between multiple dictators is mixed, however. Panchanathan et al. (2013), who utilizes the strategy-method, find that 13 percent of all subjects condition their transfer on the transfer of the other dictator. Yet, they also find that 36 percent compensate for the other dictators' self-interest and 51 percent of all subjects do not react to the transfer of other dictators. Similarly, Gächter et al. (2017) find considerable heterogeneity regarding the influence of others on the dictators' sharing behavior. Only Xu et al. (2020) find that charitable giving is higher when a first subject suggests to donate the same amount as a second dictator, as compared to cases in which the first subject suggests to donate a lower amount than the second dictator. When the payoffs between the dictators are equal by design, the average transfers to third subjects are higher if the decision is based on the average distribution proposal instead of consensus (Ellman and Pezanis-Christou 2010).

Finally, the study contributes to the growing body of unstructured bargaining experiments. Advocates argue that results from unstructured bargaining have higher external validity than structured bargaining (Camerer 2003; Tremewan and Vanberg 2016). Furthermore, the results from unstructured bargaining protocols allow for more interesting analyses of the bargaining processes preceding the bargaining outcome

(Camerer et al. 2019; Karagözoğlu 2019). In this particular study, using an unstructured bargaining protocol has the additional advantage of making bargainers strategically equivalent (Gächter and Riedl 2005; Galeotti et al. 2019), which means that other-regarding preferences do not interact with the bargaining position. In unstructured bargaining experiments without further context, two bargainers predominantly agree on a two-way equal split (Isoni et al. 2014; Nydegger and Owen 1974). Introducing a third passive subject to an unstructured bargaining protocol adds to this literature, even though, to control for linguistic abilities, I do not allow for cheap talk in the experiment.

The remainder of this paper is structured in the following way: First, I derive predictions for the bargaining problem on the basis of three different classes of utility functions. In section 3, I describe the experimental design to compare the predictive quality of the different models. In sections 4 and 5, I derive the hypotheses and present the results. Finally, I summarize and discuss the findings.

2. Cooperative Bargaining Solution with Inequality Aversion

This study focusses on the question of is how two individuals divide payoffs among themselves and a third individual if they bargain in an unrestricted and costless bargaining environment. Building on Birkeland and Tungodden (2014) and similar to Luhan et al. (2019), I make use of the Nash bargaining solution (Nash 1950) to predict the division, allowing for heterogeneous other-regarding preferences. More concretely, suppose there are $n = 3$ individuals $j = a, b, c$. While individuals $i = a, b$ bargain over the distribution of a bargaining value, v, individual c is excluded from bargaining. The two bargaining individuals can agree on any triple $y = (y_a, y_b, y_c)$ of payoff shares, $y_j \in [0, v]$, which belong to the set of feasible bargaining agreements $Y = \{y : y_a + y_b + y_c \leq v\}$. The disagreement point d is zero, $d = (0, 0, 0)$, which means that individuals receive no payoff if they cannot agree on any offer and that disagreement entails the risk of losing a potential increase of utility. I assume individuals a and b bargain over the payoff shares y_j as if they were solving the following optimization problem,

$$max\ (u_a(y) - u_a(d)) * (u_b(y) - u_b(d)) \text{ subject to } y_a + y_b + y_c = v, \qquad (1)$$

where $u_i(y)$ is the utility of individual i, which depends on the distribution of the payoff shares. If the utility functions are convex, this bargaining solution is symmetric, independent of scale, independent of irrelevant alternatives, and Pareto efficient (Nash 1950).[1] Pareto efficiency implies that if the utility at the disagreement point is zero, i.e. $u_i(d) = 0$, which applies to the utility functions I compare in the following,

1 For an extension to nonconvex problems, see Conley and Wilkie (1996).

an individual will not agree to any outcome resulting in a negative individual utility (Birkeland and Tungodden 2014).

When all individuals aim to maximize their own monetary payoffs, i.e. $u_i(y) = y_i$ and $d_i = 0$, the distribution $y = (v/2, v/2, 0)$ maximizes the Nash product. In this case, individual c introduces only irrelevant alternative distributions and the third individual receives no payoff since the bargaining individuals are strictly self-interested. In contrast, assuming individuals value not only their own payoffs but also the relation of their own payoffs to the payoffs of others, the third individual may receive some payoff shares. The outcome then depends on the specific properties of the utility function of the two bargaining individuals and the relative weights attached to own and other's payoffs.

Here, I examine three classes of outcome-based utility functions that incorporate the idea of other-regarding preferences in different ways.[2] As a reference, I derive predictions assuming preferences that are described by the Cobb-Douglas form (henceforth CD), which is frequently used to model the trade-off between own and others' payoffs (Andreoni 1990; Andreoni and Miller 2002; Nax et al. 2015). The second utility function integrates the properties proposed by Bolton and Ockenfels (2000) and conceptualizes inequality aversion (henceforth BO). The third utility function was developed by Fehr and Schmidt (1999) and conceptualizes pairwise inequality aversion (henceforth FS). After two decades of research on other-regarding preferences, the literature is clear that the latter two models explain individual behavior accurately in decision settings with the concrete properties at hand (Konow and Schwettmann 2016). The accuracy decreases, however, when the decision-makers face an equality-efficiency trade-off (e.g., Kagel and Wolfe 2001) or have further information about intentions, merit, or need (Cooper and Kagel 2016; Nicklisch and Paetzel 2020).

2.1. Cobb-Douglas Utility

To solve the optimization problem in (1), I consider each utility function separately, assuming that the utility weight attached to other individuals' payoffs varies across individuals in order to allow for heterogeneity of other-regarding preferences. For a utility function of Cobb-Douglas form, I assume the utility to be

$$u_i(y) = y_i^{1-\delta_i} \prod_{j \neq i} y_j^{\delta_i/(n-1)}, 0 \leq \delta_i \leq 1, \tag{2}$$

where parameter $1 - \delta_i$ weights own against others' payoffs. Thereby, the model captures the inclination of subjects to allocate some payoffs to other subjects. Using (2) in (1) and solving for y_c gives:

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[2] An implicit assumption in Nash's bargaining solution is that the bargainers know each other's utility function. Arguably, the distribution preferences are revealed during the bargaining process when bargainers repeatedly make their distribution offers. For a bargaining solution with incomplete information, see Harsanyi and Selten (1972). Their approach is difficult to combine with common conceptions of other-regarding preferences because types are usually not discrete. Hence, I follow Birkeland and Tungodden's (2014) and Luhan et al.'s (2019) approach.

$$y_c(\delta_a, \delta_b) = \frac{1}{4}(\delta_a + \delta_b)v. \quad (3)$$

Hence, if $\delta_i > 0$, then CD can explain positive transfers to the third individual. Depending on the weights of the bargaining individuals, the payoff share of the excluded individual can lie within the range $y_c(\delta_a, \delta_b) \in [0; v/2]$. This means CD also rationalizes bargaining outcomes that allocate more payoff to the third individual than to the bargaining individuals. If $\delta_a = \delta_b = 2/3$, then the bargainers would agree on the even three-way split.

2.2. Inequality Aversion

BO assumes a utility function that decreases exponentially when the own payoffs deviate from the average payoff,

$$u_i(y) = \begin{cases} y_i - \vartheta_i \left(\frac{y_i}{v} - \frac{1}{n}\right)^2 & if\ v \neq 0, \\ 0 & if\ v = 0; \end{cases}, 0 \leq \vartheta_i, \quad (4)$$

where parameter ϑ_i weights the inequality between own payoffs and mean payoffs. Using (4) in (1) and solving for y_c gives:

$$y_c(\vartheta_a, \vartheta_b) = \begin{cases} \left(\frac{1}{3} - \frac{v}{2}\left(\frac{1}{\vartheta_a} + \frac{1}{\vartheta_b}\right)\right) v & if\ \frac{\vartheta_a + \vartheta_b}{\vartheta_a \vartheta_b} < \frac{2}{3v}, \\ 0 & otherwise; \end{cases}. \quad (5)$$

Similar to CD, BO predicts the third individual will obtain positive payoff shares if the disutility of inequality of both players is sufficiently strong ($\vartheta_a \vartheta_b / (\vartheta_a + \vartheta_b) > 3v/2$). In contrast to CD, however, BO formalizes inequality aversion and the solution implies that it cannot be optimal that the third player's payoff share is higher than one third, i.e. $y_c(\vartheta_a, \vartheta_b) \in [0; v/3]$.

2.3. Pairwise Inequality Aversion

FS assumes individuals compare their payoff pairwise to others' payoffs and dislike disadvantageous inequality more than advantageous inequality; that is,

$$u_i(y) = y_i - \frac{\alpha_i}{n-1} \sum_{j \neq i} \max\{y_j - y_i, 0\} - \frac{\beta_i}{n-1} \sum_{j \neq i} \max\{y_i - y_j, 0\}, \ \beta_i \leq \alpha_i, 0 \leq \beta_i < 1; \quad (6)$$

where parameters α_i and β_i express the disutility from being worse or better-off in payoffs. Using (6) in (1) and solving for y_c gives:

$$y_c(\beta_a, \beta_b) = \begin{cases} 0 & if \quad \beta_a + \beta_b \leq \frac{3}{4}\beta_a \beta_b + 1, \\ \left(\frac{3\beta_a \beta_b - 4(\beta_a + \beta_b) + 4}{9\beta_a \beta_b - 6(\beta_a + \beta_b) + 4}\right) v & if \quad \frac{3}{4}\beta_a \beta_b + 1 < \beta_a + \beta_b < \frac{4}{3}, \\ \frac{1}{3} v & if \quad \frac{4}{3} \leq \beta_a + \beta_b; \end{cases} \quad (7)$$

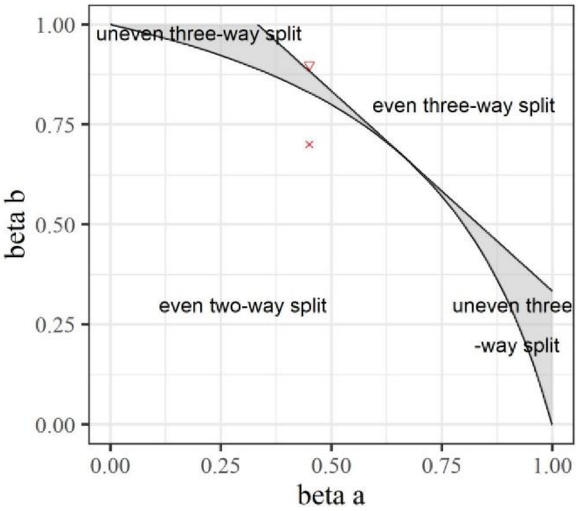
Like BO, inequality aversion in FS also implies that $y_c(\beta_a, \beta_b) \in [0; 1/3]$. The key difference between FS and the other two bargaining solutions concerns the predicted payoff shares between the bargainers. CD and BO rationalize different and independent payoff shares of the bargainers since the utility of own payoffs is not affected by others' payoffs or only affected by the mean, which is a constant. FS, on the other hand, implies that any optimum requires even payoff shares between the bargaining individuals, i.e. $y_a = y_b$. The reason is that the other-regarding preferences necessary to break this condition ($1 + 0.5\ \alpha_i < \beta_i$) are never realized due to the assumptions of the model ($\beta_i \leq \alpha_i$ and $0 \leq \beta_i < 1$). Intuitively, the two bargainers will always agree on even payoffs between themselves because the utility gained by reducing the payoff difference to the third individual is always lower than the negative utility gained by increasing the payoff difference to the bargaining partner simultaneously (and the lower utility from the lower payoff share). Thus, in contrast to CD or BO, FS captures the idea that bargaining individuals are deeply concerned about a fair allocation between themselves.

Let me further discuss how the preferences modeled by FS aggregate through the Nash product. In isolation, FS attains its inner maximum either when $(v, 0, 0)$ or $(v/3, v/3, v/3)$, depending on whether $\beta_i < 2/3$ or $\beta_i > 2/3$ (in the two-player case, $\beta_i \lesseqgtr 1/2$). The worse-off weight α_i only plays an indirect role as it ensures that an individual does not prefer a lower payoff, but never becomes effective due to the assumption $\beta_i \leq \alpha_i$. When two individuals bargain with each other over the distribution of some payoff, we can differentiate three cases: both bargaining individuals are rather self-interested with $\beta_a < 2/3$ and $\beta_b < 2/3$, both individuals are rather prosocial with $\beta_a > 2/3$ and $\beta_b > 2/3$, or one individual prefers to maximize own payoffs, $\beta_a < 2/3$, while the other individual prefers equal payoffs, $\beta_b > 2/3$.

The first two cases are straightforward. When two rather self-interested individuals bargain, they will agree on the even two-way split. As long as both $\beta_i < 2/3$, the specific better-off weights do not affect the outcome because Nash's bargaining solution ensures that the agreement is independent of scale. In contrast, when two rather prosocial individuals bargain, they will agree on the even three-way split since their preferences both peak at the even three-way split.

The most interesting case is the third, when one individual prefers maximum payoff and the other prefers equal payoffs. In this case, the relative weights of the inequality aversion parameters determine the outcome (see Figure 1). It can be inferred that individuals with stronger preferences are more assertive and enforce their preferences. For example, let the better-off weight of an individual a be $\beta_a = 9/20$. Alone, this individual prefers to maximize own payoffs. When a bargains with an individual b with $\beta_b = 14/20$, who prefers equality, a's preferences are relatively stronger in comparison and individual a enforces the even two-way split (in Figure 1, this point is indicated by a red cross). However, if individual b has relatively stronger egalitarian preferences, say $\beta_b = 18/20$, then the relative influence flips and the bargainers will agree on the even three-way split (red triangle).

Figure 1. Predicted agreement depending on FS better-off weights.



In other words, the more important profit (equality) is for an individual, the closer the outcome is to this individual's distribution preferences, since the individual is more reluctant to agree on a more (less) equal distribution. Only when the preferences are relatively similarly weighted will the bargaining individuals agree on a compromise by which they receive an even share and allocate a share between zero and one third to the third individual. In a majority of cases, however, the Nash product transforms individual preferences into the outcome preferred by the individual with stronger preferences.

3. Experimental Design

The experiment, designed to emulate the theoretical environment, incentivizes bilateral negotiations in which the participants distribute payoffs between themselves and an uninvolved third subject. In addition, I elicit distribution preferences in an individual choice setting. To control for ordering effects, I vary the sequence of the bargaining game and the individual tasks between subjects. In the I-B treatment, participants complete the individual decision tasks before they play the bargaining game; in the B-I treatment, they complete the individual tasks after the main experiment.

4.1. Free-form Bargaining

At the start of the bargaining game, two-thirds of the participants are randomly selected to bargain over the distribution of payoffs and one-third of the participants are excluded from the payoff-relevant negotiations. The role assignments remain constant throughout an entire session of the experiment. In each round, two bargainers are matched together with one excluded participant and must bargain over the distribution of 72 points.

To make an offer, a subject has to allocate exactly 72 points between herself, the other bargainer, and the excluded subject who cannot participate in the negotiations.[3] The format of the proposals is restricted to numbers displayed on the computer screen. Further communication is prohibited during the experiment to control for confounding factors, such as differences in the linguistic abilities. Subjects are able to send as many offers and counteroffers as they choose at any point during a round. The most recent proposal of the other bargainer can be accepted at any time during the round by clicking on an 'Accept' button. In this sense, bargaining is costless, unrestricted, and not subject to a tightly structured protocol. If the bargainers agree on a distribution of payoffs, the round ends and the payoffs are implemented for all three subjects. The time limit to reach an agreement is two minutes. If no agreement is reached within the time limit, all three subjects receive zero points. When an agreement is reached or the time ends, the subjects are informed about their payoffs and a new round begins.

Each session consists of 24 participants who engage in 20 rounds of negotiations. In the first five rounds, the 16 bargainers are randomly matched in every round. In the last 15 rounds, the 16 subjects are matched so that each bargainer bargains exactly once with all other bargainers. At the end of the session, three rounds are randomly selected and paid out. In the meantime, the 8 excluded subjects also bargain in groups of two, but their outcomes are not relevant for the payoff. Even though I do not use these data, this procedure ensures the roles remain anonymous during the experiment. The subjects learn the own role prior to the bargaining game. The roles are held constant during the experiment to control for indirect reciprocity.

4.2. Individual distribution preferences

To compare the bargaining behavior with the decisions of the individual choice task, I elicit the individual distribution preferences in two ways. All subjects complete an extended Equality-Equivalence test (henceforth EET; Kerschbamer 2015) and a three-person random dictator game.

The *EET* measures preferences for inequality aversion. It is an incentivized task assessing an individual's distributional preferences based on decisions between various distribution alternatives in two blocks. In the disadvantageous inequality block (DIB), subjects face five pairs of allocations and, for each pair, they must choose whether they prefer an equal distribution between themselves and another subject (20, 20) or an unequal distribution (20 + x, 30), where $x \in \{-5, -1, 0, 1, 5\}$. In the advantageous inequality block (AIB), they must also choose whether they prefer an equal distribution (20, 20) or the unequal distribution (20 + x, 10), but the payoff share of the other subject is smaller. I can observe when a subject

[3] I choose a relatively high number of points to broaden the action space of the subjects and allow for a meaningful variance of outcomes. Participants can use a calculator integrated in the bargaining interface.

switches from left to right and use this decision as a proxy for the inequality aversion weight. The EET originally includes five items for DIB and AIB. I extend the latter with three additional items, where x ∈ {10, 20, 50}, to get a more precise measure of the better-off weight. One decision is randomly chosen per subject and is paid out to the decision-maker and a paired recipient. Hence, each subject earns two payoffs, once as a decision-maker and once as a recipient. The setup ensures that a dictators' recipient is not simultaneously the recipients' dictator, so decisions are not mutually payoff relevant. [4]

The *dictator game* elicits a subject's most preferred distribution between herself and two other subjects. Participants are randomly assigned to groups of three. Each participant must allocate exactly 72 points between herself and two other subjects. At the end of the experiment, one of the three group members is randomly selected as dictator and her decision is paid out. The group size and stakes are the same as in the bargaining game. In comparison, the number of active decision-makers changes from one to two and the number of passive group members changes from two to one. The three-person dictator game elicits the distribution that a subject aims to enforce during the bargaining game.

All decisions in isolation are anonymous and participants do not receive any information about their payoff from the individual tasks until the end of the experiment. Since the participants are unaware of the final outcomes of the individual tasks, the influence on the bargaining game should be relatively low in the I-B treatment. To control for possible ordering or framing effects, I vary the order of the experiment and elicit the individual preferences after the bargaining game in the B-I treatment.

4.3. Further Measurements

At the end of the experiment, the participants answer a short questionnaire. Since risk preferences are frequently discussed in bargaining literature, I include a self-reported measure for risk preferences, which is argued to be more predictive of empirical behavior than alternative incentivized measures (Dohmen et al. 2011; Lönnqvist et al. 2015). To gain more information about factors that could influence the bargaining behavior, I included questions about assertiveness, compassion, and trust (Danner et al. 2016; Soto and John 2017), a self-reported assessment of the bargaining skills, and socio-economic background variables. See Attachment 4 in the Supplementary Material for the full translated questionnaire.

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[4] Since the EET is designed for two players, I included a separately incentivized battery with seven items that distributes the payoff among three subjects. Designed similarly to the EET, these items aim to capture the willingness to share payoff with a third individual, given the payoff of a second individual and a constant sum of payoffs. In this paper, I focus on the decisions in the EET and the dictator game. Attachment 1 in the Supplementary Material shows all implemented choice items.

4.4. Procedure

I conducted six sessions with 24 subjects each at the Vienna Center for Experimental Economics in March 2018, resulting in a sample of 144 participants evenly divided between the two treatments. All subjects were university students, on average in their sixth semester, with a median age of 23. The experiment was fully computerized using z-Tree (Fischbacher 2007) and the participants were recruited using ORSEE (Greiner 2015). All experimental sessions lasted fewer than two hours. The experimental data is available at the data repository, X-econ (see, Schwaninger 2020).

The participants were all provided with written instructions. Instructions for the individual tasks and the bargaining game were handed out after each other. Participants knew the experimental session consists of several parts but did not know the content of the future parts before the respective instructions are provided. See the attached Experimental instructions for the instructions in English and German.

At the end of the experiment, the program converted the earned payoff points into Euros and the laboratory assistants paid the participants separately and in private. In sum, the payoff of the participants consisted of three bargaining outcomes (three randomly selected rounds) and three individual decisions (EET, additional items, dictator game). The payoffs between the first and second part (B and I) were evenly weighted and paid roughly the same on average. The participants earned, on average, 29.43 Euros, including a 5.71 Euro (40 points) show-up fee.

4. Hypotheses

To investigate how subjects' other-regarding preferences aggregate and influence the bargaining outcomes, I compare the explanatory power of the derived bargaining solutions after calculating the best model fit of each bargaining solution. The comparison is based on the residual vectors, i.e. the remainders of each model that cannot be explained. Additionally, I generate random bargaining outcomes and fit the models to construct confidence intervals that will allow me to qualify the explanatory value of the models when I fit them to the empirical data.

To compare the models against each other, I first estimate the individual other-regarding preferences that explain the bargaining outcomes best. I do not include the first five rounds in the empirical analysis to control for learning effects. Hence, in each session, I observe sixteen individuals, $i = 1, \dots, 16$, who bargain in fifteen rounds in new pairs ab, where $a \neq b$, over the distribution of $v = 72$ points. Thus, in each round, each pair ab can transfer a payoff $y_{c,ab} \in [0,72]$ to the excluded individual c. I estimate the parameters $\tilde{p}_i = \delta_i, \vartheta_i, \beta_i$, of CD, BO, and FS such that the Nash bargaining solution minimizes the sum of squared residuals between the actual and the predicted transfers, i.e. $min \sum_1^{120} \left(y_{c,ab} - y_c(\tilde{p}_a, \tilde{p}_b)\right)^2$. Afterwards, I can compare the remaining residuals against each other. The lower the squared residuals, the better the explanatory power of the functional form is.[5]

Bolton and Ockenfels (2008) formulate conjectures about the mechanism of other-regarding preferences in multiple-player bargaining games. Applying these conjectures to the free-form bargaining setting, each bargainer should insist on at least one third of the payoff. Hence, third subjects are expected to receive one third of the payoff at most. This restriction is not present in the CD model. Therefore, I hypothesize that the CD model captures the bargaining behavior less precisely than the BO model and the squared residuals derived from the CD model are higher than the squared residuals derived from the BO model. Furthermore, the conjectures state that subjects do not care about relative payoffs of other subjects. Subjects who are strongly motivated by other-regarding preferences aim to obtain close to one third of the payoff and are indifferent on how the remaining payoff is distributed. Hence, when bargaining with self-interested subjects, they are willing to agree to a distribution in which the latter receive the remaining payoffs. This prediction is in stark contrast to the bargaining solution derived from the FS model, which predicts equal payoff shares between the bargainers. Hence, I hypothesize that after fitting the bargaining solutions, the squared residuals of the FS model are higher than the squared residuals of the BO model.

Comparing the different models against each other without further context has two potential problems. First, because one model predicts relatively better than the other model, this does not mean that it can explain the observed behavior in any meaningful way. Second, if two models are too similar or too flexible, it might be impossible to distinguish sufficiently between the explanatory power of the models. To address the first potential problem, I estimate parameters that minimize the sum of squared residuals of randomly generated data. In line with the empirical experiment, I generate 120 random transfer values for one simulated session (8 pairs times 15 rounds). Thereafter, I estimate the parameters that fit these data best for each model, repeat this procedure for 10^3 sessions, and calculate the 95-percent quantile of the squared residuals (SR).

Table 1 provides the results. The upper and lower bound in the column "Chance" summarize the mean residuals of the simulations for each of the three different models. If the residuals, calculated on basis of the empirical data, lie below the lower 95-percentile threshold, there is statistical evidence that the alleged functional relationship has some explanatory power. In other words, the model can organize the data better than it can organize arbitrary behavior, which speaks for systematic patterns of the bargaining behavior. Otherwise, there is no explanatory power of the model, as it works as well on completely arbitrary data as it works on the observed bargaining behavior.

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5 Given that I estimate one parameter for each individual in each model to predict the transfers, the models are all as parsimonious. To fit the non-linear functions, I use the R implementation of a particle swarm optimizer (Bendtsen 2012) and a simulated annealing process (Xiang et al. 2013).

Table 1. Simulated Residuals.

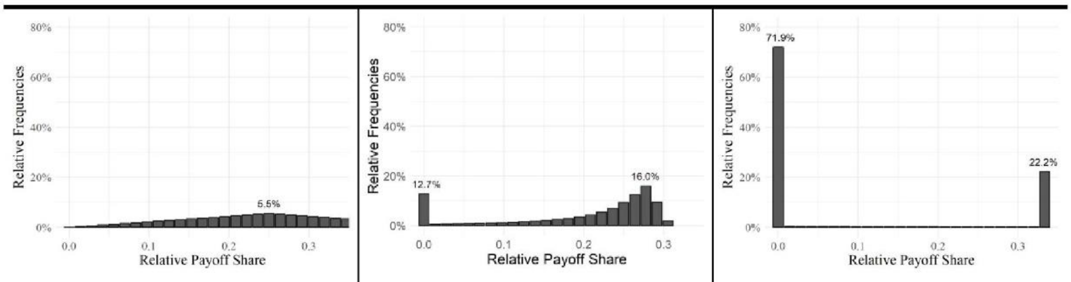
Estimated Model	Generated Data			
	Chance [1]	CD [2]	BO [2]	FS [2]
CD	93.4	0.0	9.6	40.5
	[76.2, 111.0]	[0.0, 0.0]	[0.0, 24.2]	[13.5, 56.4]
BO	94.5	9.3	0.0	20.2
	[77.7, 112.8]	[0.8, 22.5]	[0.0, 0.6]	[2.9, 40.6]
FS	104.1	16.1	17.1	0.0
	[84.1, 126.5]	[8.3, 26.5]	[7.8, 29.3]	[0.0, 0.5]

Table shows the mean residual sum of squares (95%-quantiles in parenthesis).

[1] Transfers generated by chance are drawn from a uniform distribution within the theoretical predictions [0, 36].

[2] Other-regarding parameters for the CD, BO, and FS models are drawn from uniform distributions within the range [0, 1], [0, 2000] and [0, 1] to simulate the transfers.

Figure 2. Simulated outcomes: Payoff share of the third individual



Cobb-Douglas (**CD**):	Inequality Aversion (**BO**):	Pairwise Inequality Aversion (**FS**):
$\delta_i \in U(0,1)$, $v = 72$;	$\vartheta_i \in U(0,2000)$, $v = 72$;	$\beta_i \in U(0,1)$, $v = 72$;

Predictions are rounded to $1/72$.

To address the second potential problem, I first visualize how the three preference models shape the predictions. Figure 2 shows the predicted transfers to the third individual assuming a uniform distribution of other-regarding weights within each class, which enables arguably the most insightful visual overview of the outcome dynamics. In the CD model, the payoff shares of the third individual peak at $0.25v$. In the BO and FS models the shares accumulate at zero and around one-third due to the alleged inequality aversion. Since payoff shares between the bargainers are predicted to be independent in the BO model, the distribution is less polarized compared to the FS model. Recall that the FS model predicts that one of the bargainers enforces their preferences in a majority of agreements, whereas the other bargainer gives in.

Furthermore, I conduct similar simulations as I did for the first problem but sample the simulated data from the models directly. The mean residuals and the corresponding 95-percentiles in Table 1 (column "CD", "BO", "FS") indicate how well each model explains the data when they are simulated from another model. The results show that all three models are better in explaining each other's simulated bargaining outcomes than random outcomes. This result is important since it shows that the bargaining solutions work better on systematically generated data than random data. The results also demonstrate that the relationship suggested by the FS model is unique among the three models. If the behavior follows the relationship suggested by the FS model, then the chance that another model explains the data as well as the FS model is vanishingly small. However, Table 1 also suggests there is an overlap between CD and BO. If the true relationship follows the BO model, then the CD model can explain the data as well as the BO model with some considerable chance, as indicated by the corresponding lower 95-percentile. This highlights the importance in the empirical analysis to draw on to the two qualitative outcome criteria that separate the models distinctly: (i) How frequently do the bargainers transfer more than one third of the payoff to the third subject? (ii) How frequently are the payoff shares distributed equally between the bargaining partners? Furthermore, it is crucial to validate the estimated individual distribution preferences by analyzing the relationship between the other-regarding preferences estimated from the bargaining behavior and the other-regarding preferences elicited from the individual distribution tasks.

5. Results

Analyzing the data consists of three parts. In the first part, I give a descriptive overview of the observed bargaining outcomes. In the second part, I fit the three different models and test which functional form explains the data most accurately. Thereafter, I compare the estimated other-regarding preferences from the bargaining game with the individual decisions in the EET and the transfers in the dictator game. In the third part, I report on results regarding the bargaining process.

5.1. Bargaining Outcomes

The bargaining data show that in 67.3 percent of the cases, bargainers allocate a payoff share greater than zero to the excluded individual. On average, they transfer 15.8 percent of the payoff. Figure 3 shows the relative payoff share transferred to the third subject in the two treatments (I-B, B-I) over time. In the initial rounds, the transfers decrease and converge to about 15 percent of the distributable payoff. The transfers do not decrease significantly after round 5 in either treatment (Pearson corr., $p = .59$, $p = .67$). To control for the learning effects in the first 5 rounds, I concentrate on rounds 6 to 20 in the following analysis of the data. Furthermore, there is no statistical difference between the average transfers in I-B and B-I according to the two-sided Mann-Whitney test (in each round, $p > .10$, with and without a Bonferroni correction). The statistical indifference between the two treatments indicates no significant framing or ordering effects of the individual tasks on the bargaining game.

As discussed in section 2, the predicted bargaining outcomes of the three models, CD, BO and FS, can be clearly distinguished on two levels: (i) the distribution of transfers to third subjects and (ii) the allocation of payoff shares between the bargainers. Figure 4 is concerned with the first level and shows the distribution of payoff shares transferred to the third subject. In line with the BO and FS models, transfers to third subjects virtually never exceed one-third of the payoff (0.01 percent). In a majority of cases, the bargaining subjects transfer exactly zero (35.1 percent) or 24 (24.4 percent) points, which shows similarities with the patterns predicted by FS. Another focal point seems to be one-sixth of the payoff (10.0 percent). Transferring 12 points may be attractive since it offers an even compromise between more self-interested and more other-regarding subjects.

Figure 3. Payoff share of the third subject over time.

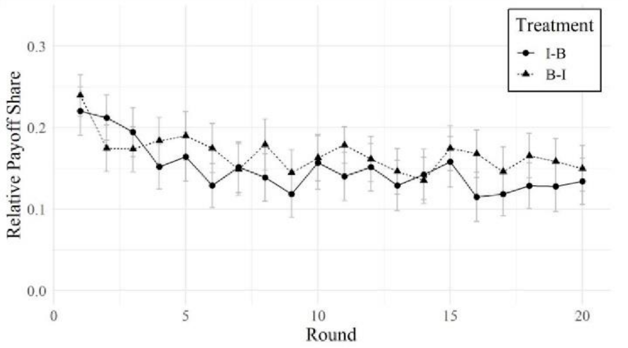
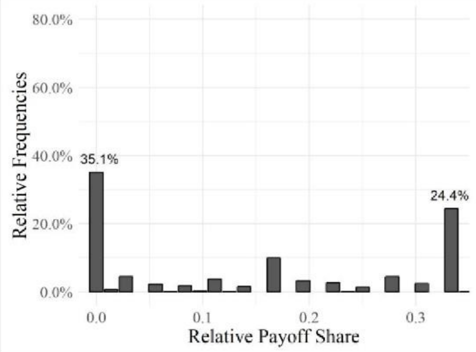


Figure 4. Distribution of third subjects' payoff.



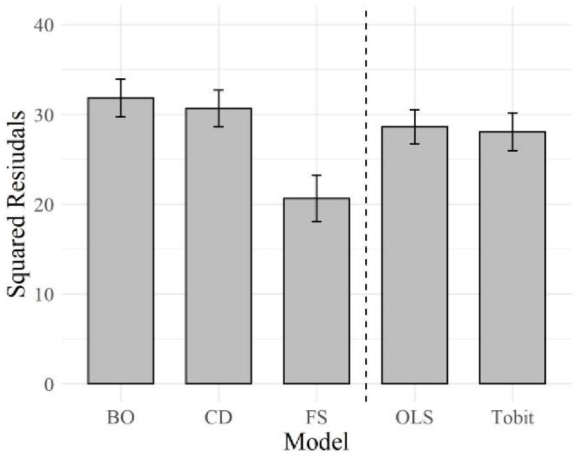
Mean transfers and 95%-confidence intervals.

Concerning the second level, the results show the payoff shares between the bargainers are equal in 90.5 percent of the agreements. More precisely, in 17 out of the 720 negotiations (2.4 percent), the subjects cannot agree on a distribution. In 456 of the 703 negotiations (64.9 percent), the third subject receives more than zero points. In 429 out of these 456 negotiations (94.1 percent), the bargainers agree on even payoffs between themselves. Hence, also regarding the second level, the bargaining patterns are closest to the ones predicted by the FS model.

5.2. Explaining the Bargaining Outcomes

To explain the bargaining outcomes, I optimize the other-regarding parameters with respect to the specific functional forms. Figure 5 shows how the models perform in comparison. The lower the squared residuals, the better the explanatory power of a model. All three models, CD, BO and FS, perform significantly better when they are fitted to the empirical data than the randomly generated transfers, SR_{CD} = 30.7, SR_{BO} = 31.8, SR_{FS} = 20.6. Recall that the lower 95-percentile of the residuals of the randomly generated transfers are equal to 76.2, 77.7, and 84.1 for the three bargaining solutions. The empirical residuals are significantly lower (Mann-Whitney tests, $p < 0.01$). This result suggests that the bargaining behavior is systematic and can, to some extent, be organized by the alleged functional relationships of the bargaining solutions.

Figure 5. Squared Residuals across Models



Mean squared residuals and 95%-confidence intervals.

Furthermore, the FS model performs significantly better than CD and BO (both paired Wilcoxon tests, $p < 0.01$).[6] Hence, the data reject the hypotheses that BO explains the behavior better than CD and FS, which are derived from structured bargaining experiments. In fact, BO explains the data worse than the other models. The SR of the FS model is also significantly lower than the SR of an ordinary least squares model with individual fixed effects (SR = 28.6, paired Wilcoxon test, $p < .01$) or a Tobit model with a lower limit at zero (SR = 28.1, paired Wilcoxon test, $p < .01$). To put these results into perspective, calculating the absolute residuals of FS and the best alternative (Tobit model) reduces the mean residual from 3.8 points to 2.3 points (the distributable payoff is 72 points), which improves the average accuracy by 64 percent.

To further investigate the validity of the results, I examine the relationship between the individual other-regarding preferences estimated from the bargaining game and the other-regarding preferences elicited from the individual distribution tasks. Two types of information about the individual preferences are available. The switching points of the two blocks of the EET (DIB and AIB) provide information on the advantageous and disadvantageous inequality aversion of the subjects. The median switching point for the bargaining subjects lies at 3 out of 5 in DIB and 5 out of 8 in AIB. Subjects' transfers in the three-player dictator game give a measure of the distribution preferences. The dictators in the sample allocate on average

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6 I base my statistical tests on the average residual of each individual. The average residual per individual, like the residuals of the bargaining outcomes, are not a truly independent observations because the subjects interact with each other during the experiment. However, the dependency is systematic since each subject interacts exactly once with each other subject within a session. If I aggregate the data on the truly independent session level, the two-tailed paired Wilcoxon tests are still statistically significant (both, $p = .03$), but the p-value is lower due to the low number of observations.

17.2 percent of the payoff share to each recipient.[7] Most subjects allocate zero or two thirds (even three-way split) to the recipients. The correlation between the lower transfer in the dictator game and the switching point in AIB is equal to 0.25 (p = .01).

The estimated other-regarding parameters of the FS model correlate significantly with the behavior in the AIB (corr. = 0.31, p < 0.01) measured by the EET and the transfers in the dictator game (corr. = 0.43, p < 0.01). DIB and the FS better-off weights do not correlate (p = 0.35), which supports the notion that the worse-off weight plays no role in the bargaining game. Regressions I – IV in Table 2 analyze the relationship closer and controls for fixed effects on the session level. Further controls include observable traits such as gender, age, field of study, experience in experiments, and self-reported characteristics such as risk preferences, bargaining skills, assessment on a political left-right scale, extraversion, and agreeableness.

Table 2. Relation between individual and bargaining behavior.

Dependent variable:	Other-regarding preferences of the bargaining game			
	I	II	III	IV
Transfer dictator game	0.006***	0.007***		
	(0.002)	(0.002)		
AIB			0.041***	0.045***
			(0.014)	(0.015)
DIB			0.016	0.015
			(0.019)	(0.023)
Controls	No	Yes	No	Yes
Observations	96	96	96	96
R^2	0.154	0.212	0.097	0.142
F Statistic	16.217***	2.149**	4.721**	1.193

Fixed effects on session level. *** p < .01, ** p < .05, * p < .10.

The results suggest that subjects who transfer higher payoff shares in the dictator game are also less self-interested during the bargaining game, which means that one can observe a behavioral consistency across the individual choice and the bargaining game. In regression I the average better-off weight in the bargaining game increases, from 0.38 if the individual transfers nothing in the dictator game, to 0.68 if the individual transfers all payoffs equally in the dictator game, i.e. transfers 48 points. Furthermore, in line with the theoretical conception, advantageous inequality aversion (AIB) has a statistically significant relationship with the behavior in the bargaining game, while disadvantageous inequality aversion (DIB) has no explanatory power. The regression results remain robust if I control for further characteristics, of which

[7] While the bargaining outcomes between the treatments are statistically indifferent, there is weak evidence that the mean transfer in the B-I treatment is higher than in the I-B treatment (Mann-Whitney test, p = .09), which means subjects transfer more if they play the dictator game after the bargaining game. The ordering effects may be explained by a willingness to equalize anticipated inequalities from the previous bargaining game. In direct comparison, transfers to excluded individuals are, on average, higher in the individual dictator game than in the bargaining game, independent of the order of the treatments (paired Wilcoxon tests, p < 0.01).

none is significant. The control variables remain statistically insignificant if I remove the incentivized other-regarding measures from the regression (see Table A1 in the Supplementary Material).

In sum, the data show that individual behavior and bargaining behavior are related, which supports the derived functional relationship of the FS model. The strength of this bargaining solution is that it explains seemingly arbitrary behavior. Generally, subjects' transfers to third subjects vary considerably across the different rounds in which they are matched with different bargaining partners. The mean individual range of transfers is equal to 21.3 points, which implies that many of the subjects transfer no points with one bargaining partner and one third of the payoff (24 points) with another bargaining partner. The FS model explains the aggregation process behind this finding and links the associated other-regarding preferences to the distribution decisions elicited individually.

5.3. Bargaining Dynamics

So far, I have focused on the bargaining outcomes. However, since the free-form bargaining protocol enables the bargainers to react to offers and negotiate dynamically, it generates a rich data set which can open the black box between individual other-regarding preferences and negotiated distribution outcomes further. In this section, I report on bargaining patterns that can be observed during this interaction.

As in previous unstructured experiments, I observe a 'deadline effect' (Roth et al. 1988). A majority of the agreements (52.3 percent) are made just within the last ten seconds of the available bargaining time. When the distribution preferences of the bargainers do not match, instead of seeking a compromise, the bargainers tend to play a chicken game. That is, bargainers make an offer and wait until the other bargainer eventually gives in to prevent losing all payoffs. To illustrate this, I separate the two bargainers of the final agreement into the sender and the receiver and analyze their influence on the outcome distribution. Regression I in Table 3 estimates the influence of the senders' and receivers' other-regarding preferences, measured by the dictator game, on the transfer to the third subject, in a Tobit model with session fixed effects and robust standard errors. The results suggest that individual other-regarding preferences of both subjects, sender and receiver, significantly influence the agreement. Yet, a Wald-test that compares the two coefficients indicates that the influence of the sender is significantly stronger than the influence of the receiver on the bargaining outcome ($p < 0.01$).

This finding leads to the question of which subjects are more inclined to give in? To answer this question, I count the number of times each individual is the receiver of the final distribution offer and examine the relationship between accepting the final offer and the transfer in the dictator game. Other-regarding preferences appear not to explain the tendency to accept offers (Poisson model with session fixed effects, $p = 0.30$, see Table A2 in the Supplementary Material). The data suggest that neither other-regarding nor self-interested subjects are more likely to give in.

Table 3. Analysis of the bargaining process.

Dependent variable:	Negotiated payoff allocated to the third subject		
	I	II	III
Transfer dictator game	0.285^{***}	0.191^{***}	0.188^{***}
(Sender)	(0.031)	(0.032)	(0.031)
Transfer dictator game	0.090^{***}	0.014	0.001
(Receiver)	(0.032)	(0.032)	(0.033)
First offer		0.349^{***}	0.458^{***}
		(0.058)	(0.126)
ID accepted offer			0.033
			(0.362)
First offer x			-0.021
ID accepted offer			(0.019)
Observations	703	524	524
Log Likelihood	-1,988.096	-1,496.084	-1,493.076
Wald Test	207.999^{***}	259.650^{***}	269.073^{***}

Tobit models. Fixed effects on session level. Robust standard errors. *** $p < .01$, ** $p < .05$, * $p < .10$.

Next, I look closer into the bargaining process. The data indicate that, not only are the payoff shares of the bargainers equal in the outcomes, but they are already equal when they propose the offers. From round 6 to 20, the subjects make 720 first offers. In none of these offers does the proposer offer to pay more for the payoff share of the third subject than the other bargainer. In response to received offers, the subjects make, in sum, 2288 counteroffers, of which 890 (38.9 percent) suggest an increase in the payoff share of the third subject. In only 31 (3.5 percent) of these offers do the bargaining subjects propose to reduce their own payoff share more than the payoff share of the other bargainer to pay for the higher transfer to the third actor. Out of these 31 offers, 21 ultimately equalize the payoff shares between the bargainers, since the standing offer benefited the proposer of the counteroffer. When subjects suggest increasing the payoff share of the third actor, they primarily suggest reducing their own payoffs equally (57.1 percent) or they suggest that the other bargainer should pay more for the higher transfer to the third actor (39.4 percent). In sum, the bargaining dynamics imply that subjects virtually never want to pay more for the payoff share of the third subject. Equal sharing appears not to be an artefact of the bargaining outcomes.

Finally, I investigate the first offers and their influence on the outcome. Beginning with Chertkoff and Conley (1967), several researchers find that first offers set an anchor that determines the course of the negotiations. To examine this relationship, I first exclude all 179 agreements in which the first offer is simultaneously the accepted offer, since first offer and outcome are identical by definition in those cases. Within the remaining subset, I include the payoff share allocated to the third subject in the first offer of this round as an explanatory variable of the final share while keeping the other-regarding preferences of the bargainers as control variables. Regression II in Table 3 suggests that the first offer has a significant impact on the outcome. The anchor effect also remains robust when bargainers negotiate longer, as indicated by Regression III. The latter regression includes a variable that accounts for the number of offers that are exchanged before the final offer is accepted and an interaction effect between this variable and the first offer. Additionally, testing who is more likely to make first offers reveals that subjects with stronger other-regarding preferences make significantly more first offers (Poisson model with session fixed effects, $p = 0.01$, see Table A3 in the Supplementary Material).

6. Conclusion

Whenever bargainers have to allocate payoffs among a group of actors, socially concerned coalition members may be willing to distribute payoffs to third actors. The question is, what deal can the bargainers make to take third actors into account and who is willing to forgo payoffs to benefit the third actor? In this study, I examine negotiated distribution outcomes in a controlled experimental environment to identify the influence of other-regarding preferences on the bargaining outcomes and bargaining dynamics.

I find that preferences aggregate systematically in groups with internal conflict. In more than 90 percent of the bargaining outcomes, the payoff shares are equal between the bargaining subjects. The bargaining subjects care about how much payoff is allocated to the third subject but they also care about how much the other bargainer contributes to benefit the third subject. Since unilateral transfers would increase inequality between the bargainers, transfers to third subjects depend on both bargaining subjects. In other words, the bargaining problem involves two conflicting fairness aspects and a bargaining solution must respect both. If there is a conflict between the distributional preferences of the bargainers, the outcome depends on the subject who has stronger preferences. The properties of the bargaining outcome can be best explained by assuming pairwise inequality aversion (Fehr and Schmidt 1999).

Furthermore, the analysis allows for linking the bargaining behavior to the individual distribution decisions made in the choice tasks. Individuals that are more inequality averse in the EET or transfer more in the dictator game are also more likely to transfer higher payoff shares to the third subject in the bargaining game, even though, depending on the other bargainer and the relative strength of their preferences, single negotiated distribution decisions can deviate from the own preferred outcome. Due to the specific preference aggregation mechanism, the outcomes tend to become more extreme and, in a majority of cases, the bargainers either share payoffs equally or exclude the third subject completely from any payoffs. Moreover, the analysis of the bargaining process reveals that the proposer of the final offer has a stronger influence on the outcome. Similarly, first offers impact the distribution outcomes significantly.

Given that free-form bargaining experiments are viewed as being more externally valid than structured bargaining experiments, the results offer important perspectives on findings outside the lab. For example, the results can increase the understanding of why Bansak et al. (2017:1) find that "citizens care deeply about the fairness of the responsibility-sharing mechanism, rather than only the consequences of the asylum policy" in their survey. Based on the evidence of this incentivized experiment, citizens might only be willing to support refugees if other states do so too. The same result is difficult to explain on the basis of existing structured bargaining experiments, which leads to an important methodological issue. Evidence based on a tightly structured bargaining protocol certainly contributes to a richer understanding of institutional factors. At the same time, they appear to create different outcomes than less structured bargaining protocols in some instances, which potentially limits the external validity of structured bargaining experiments. For example, evidence suggests that communication decreases the number of fair offers in structured multilateral bargaining settings (Agranov and Tergiman 2014; Baranski and Kagel 2015). In this study, the results suggest indirectly that the possibility of back-and-forth-interaction leads to different outcome patterns compared to structured bargaining experiments. A high level of structure can imply different levels of bargaining power, but, more importantly, it also restricts the interaction between bargainers. Any form of interaction can influence the available information in the bargaining situation and may change the perceived responsibility of the decision-makers. Considering that many negotiations in natural environments are hardly structured, it appears important to learn more about these differences.

Altogether, this study shows that bilateral bargaining agreements can decrease and increase transfers to third subjects, depending on the subject with the stronger preferences. Whether one or the other should be facilitated through institutional design is ultimately a normative question. However, the question of how other-regarding preferences are influenced by institutional factors in these settings offers interesting future research avenues. The disagreement value, an endogenously produced surplus and differently perceived merits, or a shared social identity could change bargaining dynamics and their variation potentially leads to outcome differences.

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Supplementary Material

Additional Tables.

Table A1. Relation between individual and bargaining behavior (full table).

Dependent variable:	Estimated other-regarding preferences of the bargaining game				
	I	II	III	IV	V
Transfer dictator game	0.006***	0.007***			
	(0.002)	(0.002)			
AIB			0.041***	0.045***	
			(0.014)	(0.015)	
DIB			0.016	0.015	
			(0.019)	(0.023)	
Female		-0.094		-0.062	-0.051
		(0.064)		(0.069)	(0.070)
Age		-0.002		-0.001	-0.001
		(0.005)		(0.005)	(0.006)
Economics student		-0.070		-0.016	-0.046
		(0.079)		(0.086)	(0.087)
Experience in Exp.		0.005		0.003	0.004
		(0.004)		(0.004)	(0.005)
Risk-taking		0.009		-0.003	-0.005
		(0.014)		(0.015)	(0.015)
Bargaining skills		-0.012		-0.017	-0.005
		(0.020)		(0.021)	(0.022)
Left-Right		-0.014		-0.017	-0.019
		(0.016)		(0.017)	(0.017)
Extraversion		0.002		0.006	0.004
		(0.005)		(0.005)	(0.005)
Agreeableness		-0.001		0.004	0.001
		(0.005)		(0.005)	(0.005)
Observations	96	96	96	96	96
R^2	0.154	0.212	0.097	0.142	0.039
F Statistic	16.217***	2.149**	4.721**	1.193	0.366

Fixed effects on session level. *** p < .01, ** p < .05, * p < .10.

Table A2. Relation between other-regarding preferences and the number of accepted offers

Dependent variable:	Accepted offers
	I
Transfer dictator game	0.002
	(0.002)
Observations	96

Poisson model. Fixed effects on session level.
*** p < .01, ** p < .05, * p < .10.

Table A3. Relation between other-regarding preferences and the number of first offers

Dependent variable:	First offers
	I
Transfer dictator game	0.008**
	(0.003)
Observations	96

Poisson model. Fixed effects on session level.
*** p < .01, ** p < .05, * p < .10.

Attachment 1. Implemented individual choice tasks (Part 1).

	Left Option				Right Option				
	Me	**Pers. 2**	**Pers. 3**	**Results**	**Me**	**Pers. 2**	**Pers. 3**	**Chooses left first**	**Inequality aversion weights**
				Two-player allocation decisions (EET)					
1	15	30	-	6.2% - 93.8%	20	20	-	1	$\alpha \leq -1/3$
2	19	30	-	21.9% - 78.1%	20	20	-	2	$-1/3 \leq \alpha \leq -1/11$
3	20	30	-	68.8% - 31.2%	20	20	-	3	$-1/11 \leq \alpha \leq 0$
4	21	30	-	69.8% - 30.2%	20	20	-	4	$0 \leq \alpha \leq 1/9$
5	25	30	-	79.2% - 20.8%	20	20	-	5	$1/9 \leq \alpha \leq 1$
								Never	$1 \leq \alpha$
6	15	10	-	11.5% - 88.5%	20	20	-	1	$\beta \leq -1$
7	19	10	-	9.4% - 90.6%	20	20	-	2	$-1 \leq \beta \leq -1/9$
8	20	10	-	11.5% - 88.5%	20	20	-	3	$-1/9 \leq \beta \leq 0$
9	21	10	-	35.4% - 64.6%	20	20	-	4	$0 \leq \beta \leq 1/11$
10	25	10	-	57.3% - 42.7%	20	20	-	5	$1/11 \leq \beta \leq 1/3$
				Two-player allocation decisions (extended EET)					
11	30	10	-	74.0% - 26.0%	20	20	-	6	$1/3 \leq \beta \leq 1/2$
12	40	10	-	82.3% - 17.7%	20	20	-	7	$1/2 \leq \beta \leq 2/3$
13	70	10	-	86.5% - 13.5%	20	20	-	8	$2/3 \leq \beta \leq 5/6$
								Never	$5/6 \leq \beta$
				Three-player allocation decisions					**main interest**
14	18	36	18	39.6% - 60.4%	36	36	0		conditional sharing
15	30	36	6	56.2% - 43.8%	36	36	0		conditional sharing
16	30	30	12	66.7% - 33.3%	36	36	0		conditional sharing
17	36	24	12	26.0% - 74.0%	36	18	18		alter-alter differences
18	36	36	0	38.5% - 61.5%	24	24	24		conditional sharing
19	72	0	0	45.8% - 54.2%	24	24	24		better-off weight
20	0	36	36	5.2% - 94.8%	24	24	24		altruism

Attachment 2. Translated comprehension questions before the individual choice tasks (as in the original EET).

Alternative LEFT	Alternative LEFT	YOUR CHOICE	Alternative RIGHT	Alternative RIGHT
You receive points	Passive person receives points	Make your choice here	You receive points	Passive person receives points
25	30	LEFT ◉ ◎ RIGHT	20	20

I1. Imagine that you have made the decision above and this decision situation has been selected for payment. Which payoff as an active person do you get from this part of the experiment? *[scale: 0-1000]*

I2. Imagine that you have made the decision above and this decision situation has been selected for payment. Which payoff does the participant assigned to you as passive person get from this part of the experiment? *[scale: 0-1000]*

Alternative LEFT	Alternative LEFT	YOUR CHOICE	Alternative RIGHT	Alternative RIGHT
You receive points	Passive person receives points	Make your choice here	You receive points	Passive person receives points
21	10	LEFT ◎ ◉ RIGHT	20	20

I3. Imagine that you have made the decision above and this decision situation has been selected for payment. Which payoff as an active person do you get from this part of the experiment? *[scale: 0-1000]*

I4. Imagine that you have made the decision above and this decision situation has been selected for payment. Which payoff does the participant assigned to you as passive person get from this part of the experiment? *[scale: 0-1000]*

Attachment 3. Translated comprehension questions before the bargaining game (correct answer in bold).

B1. How many people are matched each round? *[2 people; **3 people**; 4 people; 5 people]*

B2. Do you always bargain with the same person? *[**NO, in each round I am matched with a new person**; YES, the people always stay the same]*

B3. How many rounds are played in total? *[3; 10; 12; **20**]*

B4. How many points must be divided for an offer? *[24; **72**; 144; 432]*

B5. Can you and the other bargainer accept several offers each round? *[YES; **NO**]*

B6. How many rounds are paid out? *[one round is randomly selected and paid out; **three of the rounds are randomly selected and paid out**; half of the round are paid out; all rounds are paid out]*

Attachment 4. Translated post-experimental questionnaire.

Q1. If you were able to choose the distribution of 72 points, how would you divide the points between the 3 people in retrospect?
[Points for me; Points for passive person 1; Points for passive person 2]

- Page break -

Q2. In one word, how did you experience the game? *[open question]*

Q3. In one word, what do you think the game was about? *[open question]*

- Page break -

Q4. How important were the following factors to you when agreed to a distribution? Please rank these 3 statements, with 1 being the most important and 3 being the least important:

a. That my own profit is as large as possible *[1; 2; 3]*
b. That everyone gets something *[1; 2; 3]*
c. That all profits are as equal as possible *[1; 2; 3]*

- Page break -

Q5. How do you see yourself: are you enforcing your interests in negotiations?
[scale: 1 (never) – 10 (always)]

Q6. How do you see yourself: are you generally a person who is fully prepared to take risks or do you try to avoid taking risks?
[scale: 1 (not at all willing to take risks) – 10 (very willing to take risks)]

Q7. In politics, people sometimes use the terms **left** and **right**. When you think of your own political views, where would you rank yourself on a 10-point scale?
[scale: 1 (left) – 10 (right)]

Q8. How interested are you in politics in general? *[very interested; quite interested; hardly interested; not at all interested; prefer not to say]*

Q9. How do you see the role of the state for the economy? *[the state should not put any limits on the economy; the state should leave the economy alone, but set certain limits; the state should set clear barriers to the economy; the state should direct the economy]*

Q10. How should people living in [country] behave? *[they should always adapt to local customs; they should adapt to the local customs in public; they should live according to their own customs, but be able to adapt to local customs in certain situations; they should live according to their own customs]*

- Page break -

Q11. I am someone who is outgoing, sociable.
[scale: 1 (disagree strongly) – 5 (agree strongly)]

Q12. I am someone who is compassionate, has a soft heart.
[scale: 1 (disagree strongly) – 5 (agree strongly)]

Q13. I am someone who has an assertive personality.
[scale: 1 (disagree strongly) – 5 (agree strongly)]

Q14. I am someone who is respectful, treats others with respect.
[scale: 1 (disagree strongly) – 5 (agree strongly)]

Q15. I am someone who rarely feels excited or eager.
[scale: 1 (disagree strongly) – 5 (agree strongly)]

Q16. I am someone who tends to find fault with others.
[scale: 1 (disagree strongly) – 5 (agree strongly)]

Q17. I am someone who tends to be quiet.
[scale: 1 (disagree strongly) – 5 (agree strongly)]

Q18. I am someone who feels little sympathy for others.
[scale: 1 (disagree strongly) – 5 (agree strongly)]

Q19. I am someone who is dominant, acts as a leader.
[scale: 1 (disagree strongly) – 5 (agree strongly)]

Q20. I am someone who starts arguments with others.
[scale: 1 (disagree strongly) – 5 (agree strongly)]

Q21. I am someone who is less active than other people.
[scale: 1 (disagree strongly) – 5 (agree strongly)]

Q22. I am someone who has a forgiving nature.
[scale: 1 (disagree strongly) – 5 (agree strongly)]

Q23. I am someone who is sometimes shy, introverted.
[scale: 1 (disagree strongly) – 5 (agree strongly)]

Q24. I am someone who is helpful and unselfish with others.
[scale: 1 (disagree strongly) – 5 (agree strongly)]

Q25. I am someone who finds it hard to influence people.
[scale: 1 (disagree strongly) – 5 (agree strongly)]

Q26. I am someone who is sometimes rude to others.
[scale: 1 (disagree strongly) – 5 (agree strongly)]

Q27. I am someone who is full of energy.
[scale: 1 (disagree strongly) – 5 (agree strongly)]

Q28. I am someone who is suspicious of others' intentions.
[scale: 1 (disagree strongly) – 5 (agree strongly)]

Q29. I am someone who is talkative.
[scale: 1 (disagree strongly) – 5 (agree strongly)]

Q30. I am someone who can be cold and uncaring.
[scale: 1 (disagree strongly) – 5 (agree strongly)]

Q31. I am someone who prefers to have others take charge.
[scale: 1 (disagree strongly) – 5 (agree strongly)]

Q32. I am someone who is polite, courteous to others.
[scale: 1 (disagree strongly) – 5 (agree strongly)]

Q33. I am someone who shows a lot of enthusiasm.
[scale: 1 (disagree strongly) – 5 (agree strongly)]

Q34. I am someone who assumes the best about people.
[scale: 1 (disagree strongly) – 5 (agree strongly)]

- Page break -

Q35. Your sex: *[male; female]*

Q36. Your age: *[scale: 17-100]*

Q37. In which country have you spent the longest part of your life so far? *[open question]*

Q38. Your field of studies: *[Natural Sciences (Chemistry, Physics, Mathematics, Geology ...); Technical studies; Economic sciences (Economics, Business Administration ...); Social and Behavioral Sciences (Sociology, Psychology, Education, Law ...); Human Sciences (Languages, Philosophy, Theology, Art ...); Life Sciences (Medicine, Biology ...)]*

Q39. Number of semesters studied so far: *[scale: 1-100]*

Q40. In how many experiments have you participated in before? (approximately) *[scale: 0-100]*

Experimental instructions

File 1. Instructions translated from German to English, treatment I-B.

Instructions

Welcome! You and the other participants will make several decisions today through which you can earn money. It is important that you read the instructions carefully to gain a thorough understanding of the situations in which you will make decisions.

If something seems unclear to you while reading or if you have any other questions, please raise your hand. We will then answer your questions individually.

Please do not ask your questions openly. Please do not talk to the other participants and do not pass any information to the other participants. Complying with these rules is very important for the scientific value of the experiment.

At the end of the experiment, you will be paid individually, privately and in cash. The amount you earn will depend on your decisions and the decisions of other participants. The anonymity of all the participants will be maintained throughout the entire experiment.

Throughout the experiment, we do not speak of Euros but of points. After the experiment, these will be converted at the following exchange rate:

1 Euro = 7 Points

The experiment consists of two separate parts. On the following pages, you find the instructions for the first part.

1

Instructions for Part 1 of the experiment

Part 1 of the experiment consists of 21 decision situations in total. Initially, you have to make 13 decisions. In each of these 13 decisions, the computer will randomly match you with another participant. In the following, we will call your randomly matched participant "your passive person". Later on, you will understand why we call this person the "passive person". At no point will your identity or the identity of your passive person be revealed to each other.

Each of your 13 decisions is a choice between the alternatives LEFT and RIGHT. Each alternative has consequences for your payout and the payout of your passive person.

Example: You could be asked if you would rather choose the alternative LEFT, where you receive ***19 points*** *and your passive person* ***30 points,*** *or alternative RIGHT, where you receive* ***20 points*** *and your passive person receives* ***20 points*** *as well. You then have to decide between the two alternatives. The decision problem would be presented on your screen as follows:*

Alternative LEFT	**Alternative LEFT**	**YOUR CHOICE**	**Alternative RIGHT**	**Alternative RIGHT**
You receive points	Passive person receives points	Click here for your choice	You receive points	Passive person receive points
25	30	LEFT ○ ○ RIGHT	20	20

Overall, you will make 13 decisions in this manner.

Your payout will be determined as follows:

Payout as an active person: For each participant, one of the 13 decision situations will be chosen randomly. You will then receive the payout of the alternative chosen in that particular decision situation. For example, if the decision situation described above would have been chosen and you would have chosen alternative RIGHT, you would receive 20 points as an active person while your passive person would receive 20 points as passive person.

Payout as a passive person: Just as your passive person receives points from your decision without doing something for it, you will also receive points from another participant without doing something for it. This means that you are the passive person for that participant. It will be assured that you will not be assigned the same participant twice, which mean that if person X is your passive person, you will not be the passive person for person X.

Additional decision situations

After the 13 decision situations, you have to make another 7 decisions. There are two differences in these 7 decisions as compared to the previous decision situations.

First, there are now **two passive people** instead of one. That means you have to choose between the alternatives LEFT and RIGHT, which have payout consequences for three people.

Secondly, from three people chosen at random, only **one person's decision** will be **relevant for the payout**. This means that for these three people, one person will decide actively, and two people will receive points passively. Only at the end of the experiment, will it be revealed which person was active and which two were passive. For now, each person decides as if they were active.

At the end of the first part, every person makes an additional decision. Here the **distribution of points** to the three people can be **chosen freely**. Again, only one out of three people will be selected randomly, whose decision is relevant for the payout.

Summary of the payouts from Part 1 of the experiment

- From the first 13 decisions made by each person, one decision will be selected at random and paid. You receive points once as an active person *and* once as a passive person.
- From the next 7 decisions, one person will be randomly selected as an active person and the chosen decision will be paid. You will receive points as an active *or* passive person.
- From the last decision, one person will be randomly selected as an active person and their chosen decision will be paid out. You will receive points as an active *or* passive person.

In sum, you will receive points from four decisions. At the end of the experiment, the outcome from the random selection of decisions made by you and the other participants will be revealed along with the total number of points earned by you.

If you have any questions, please raise your hand.

Instructions for Part 2 of the experiment

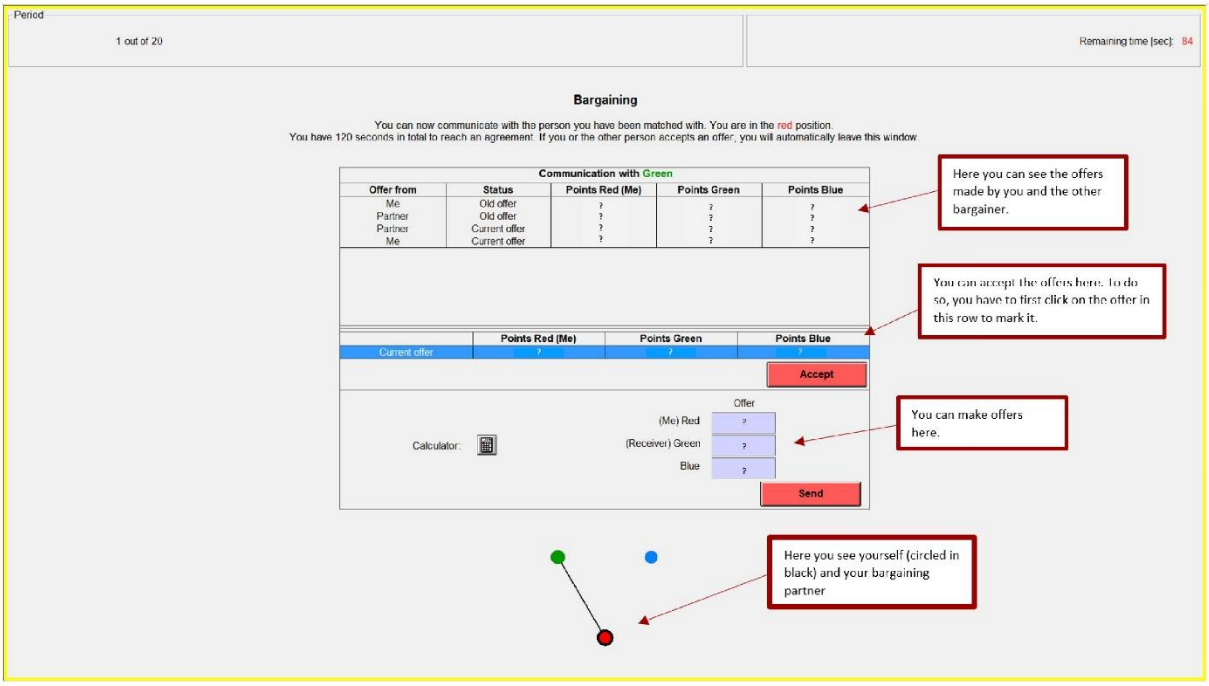
This experiment is about negotiating the distribution of 72 points.

To do so, you will be divided into **groups of three**. The experiment consists of **20 rounds** in total. In each round, you will be reassigned to a new group of three. To ease the orientation, the different people in the groups of three are marked as red, green and blue. You will see yourself in the color red, your bargaining partner in green and the third person in blue throughout the experiment.

In each round, you and one other person bargain **about the distribution of 72 points**. The **person** you bargain with and the third person **change** in each round. On the next page, you can see the bargaining screen. The communication occurs through the input window, in which you make offers about the distribution of the 72 points. You have **two minutes** to come to an agreement during which you can send and receive offers from the other person. **Offers can only be accepted after the expiration of the first 30 seconds**. To accept an offer, you have to mark it first, thereby it will turn blue and then click on the button "Accept". Only the latest offer can be accepted. If you **do not reach an agreement** within two minutes, every person receives **zero points**.

In the first round, you will learn whether you are one of the bargainers or not. After the positions are randomly selected in the first round, they do not change throughout the experiment. Those who are not selected as a bargainer will bargains about the distribution of 72 points but exclusively with others who are not bargainers. Their agreements are only hypothetical and not relevant to the payout. Only the agreements of the selected bargainers are relevant to the payout.

For the payout, only three of the 20 rounds are selected. The rounds selected will be determined at random. The probability that a round is selected for the payout is the same for each round. However, no round can be selected twice. Therefore, at the end of the experiment, **three rounds are selected randomly,** and you receive the number of points from the decisions in those rounds **paid out in Euros**.


Period
1 out of 20
Remaining time [sec]: 84
Bargaining
You can now communicate with the person you have been matched with. You are in the red position.
You have 120 seconds in total to reach an agreement. If you or the other person accepts an offer, you will automatically leave this window.
Communication with Green
Offer from
Status
Points Red (Me)
Points Green
Points Blue
Me
Partner
Partner
Me
Old offer
Old offer
Current offer
Current offer
Current offer
Accept
Offer
(Me) Red
(Receiver) Green
Blue
Calculator:
Send
Here you can see the offers made by you and the other bargainer.
You can accept the offers here. To do so, you have to first click on the offer in this row to mark it.
You can make offers here.
Here you see yourself (circled in black) and your bargaining partner

End of the experiment

At the end of the experiment, you will receive a questionnaire. Please take your time to answer the questions. Once you have completely filled-in the questionnaire, you will receive **40 points**.

The points earned throughout the experiment are added together and converted into Euros at the rate of 7:1. This sum will be paid to you at the end of the experiment.

File 2. Instructions in German, treatment I-B.

Instruktionen

Herzlich willkommen! Sie und die anderen Experimentteilnehmerinnen und -Teilnehmer werden heute mehrere Entscheidungen treffen, in denen Sie Geld verdienen können. Es ist wichtig, dass Sie die Instruktionen sorgfältig durchlesen, damit Sie die Entscheidungssituationen vollständig verstehen.

Falls Ihnen beim Lesen etwas unklar erscheint oder falls Sie sonstige Fragen haben, so zeigen Sie das bitte per Handzeichen. Wir werden Ihre Fragen dann einzeln beantworten.

Bitte stellen Sie Ihre Frage(n) auf keinen Fall laut. Bitte sprechen Sie nicht mit anderen Teilnehmern und geben Sie keine Informationen an andere Teilnehmer weiter. Die Einhaltung dieser Regeln ist für den wissenschaftlichen Wert des Experiments sehr wichtig.

Am Ende des Experiments werden Sie einzeln, privat und in bar ausgezahlt. Wie viel Sie darüber hinaus verdienen, hängt von Ihren Entscheidungen und den Entscheidungen der anderen Experimentteilnehmer ab. Selbstverständlich bleibt Ihre Anonymität gegenüber anderen Teilnehmern während des gesamten Experiments gewahrt.

Während des Experimentes sprechen wir nicht von Euro, sondern von Punkten. Diese werden nach dem Experiment zu folgendem Wechselkurs umgerechnet:

1 Euro = 7 Punkte

Das Experiment besteht aus zwei Teilen. Auf den folgenden Seiten finden Sie die Instruktionen für den ersten Teil.

Instruktionen zum 1. Teil des Experiments

Teil 1 des Experiments besteht insgesamt aus 21 Entscheidungssituationen. Zunächst müssen Sie 13 Entscheidungen treffen. In jeder dieser 13 Entscheidungen wird Ihnen vom Computer zufällig ein anderer Experimentteilnehmer zugeordnet. Wir nennen den Ihnen zugeordneten Teilnehmer im Folgenden "Ihre Passive Person". Sie werden weiter unten sehen, wieso wir diese Person als "Passive Person" bezeichnen. Sie erfahren zu keinem Zeitpunkt die Identität Ihrer Passiven Person. Ihre Passive Person erfährt zu keinem Zeitpunkt Ihre Identität.

Jede Ihrer 13 Entscheidungen ist eine Wahl zwischen den Alternativen LINKS und RECHTS. Jede Alternative hat Konsequenzen für Ihre eigene Auszahlung und für die Auszahlung Ihrer Passiven Person.

Beispiel: Sie können gefragt werden, ob Sie lieber Alternative LINKS wählen, in der Sie ***19 Punkte*** *erhalten und Ihre Passive Person* ***30 Punkte****, oder Alternative RECHTS, in der Sie* ***20 Punkte*** *erhalten und Ihre Passive Person ebenfalls* ***20 Punkte*** *erhält. Sie müssen sich dann für eine der beiden Alternativen entscheiden. Dieses Entscheidungsproblem würde am Bildschirm wie folgt präsentiert:*

Alternative LINKS	Alternative LINKS	IHRE WAHL	Alternative RECHTS	Alternative RECHTS
Sie erhalten Punkte	Passive Person erhält Punkte	Hier Ihre Wahl anklicken	Sie erhalten Punkte	Passive Person erhält Punkte
19	30	LINKS ○ ○ RECHTS	20	20

Sie treffen insgesamt 13 solche Entscheidungen.

Ihr Verdienst wird wie folgt bestimmt:

Auszahlung als Aktive Person: Es wird für jeden Teilnehmer separat und zufällig eine der 13 Entscheidungssituationen ausgewählt und die in dieser Entscheidungssituation gewählte Alternative wird dann tatsächlich ausgezahlt. Würde z.B. die oben beschriebene Entscheidungssituation ausgewählt und hätten Sie sich in dieser Entscheidungssituation für die Alternative RECHTS entschieden, so erhielten Sie 20 Punkte als Aktive Person, während Ihre Passive Person 20 Punkte als Passive Person erhielte.

Auszahlung als Passive Person: Genau so wie Ihre Passive Person Punkte aus Ihrer Entscheidung erhält, ohne etwas dafür zu tun, erhalten Sie Punkte von einem anderen Experimentteilnehmer, ohne etwas dafür zu tun, d.h. Sie sind für diesen anderen Teilnehmer die Passive Person. Es wird sichergestellt, dass Ihnen als Aktive und als Passive Person nicht zwei Mal derselbe Teilnehmer zugelost wird. Das heißt, wenn die Person X ihre Passive Person ist, dann sind Sie sicher nicht die Passive Person von Person X.

Weitere Entscheidungssituationen

Nach den 13 Entscheidungssituationen müssen Sie wieder 7 Entscheidungen treffen. In diesen 7 Entscheidungen gibt es zwei Unterschiede zu den vorangegangenen Entscheidungssituationen.

Erstens gibt es nun **zwei Passive Personen** anstatt nur einer Passiven Person. Das heißt, Sie müssen nun zwischen den Optionen LINKS und RECHTS wählen, die für insgesamt drei Personen auszahlungsrelevant sind.

Zweitens wird für jeweils drei Personen nur **eine Person** zufällig bestimmt, deren zufällig ausgewählte **Entscheidung auszahlungsrelevant** ist. Dies bedeutet, dass für jeweils drei Personen eine Person aktiv entscheidet und zwei Personen passiv Punkte erhalten. Erst zum Schluss des Experiments wird aufgedeckt, welche Person aktiv und welche Personen passiv waren. Zunächst entscheidet jede Person, als ob sie aktiv wäre.

Zum Schluss des ersten Teils trifft nochmals jede Person eine Entscheidung. Hier kann die **Aufteilung der Punkte** auf drei Personen **frei gewählt** werden. Wieder wird nur eine von drei Person zufällig bestimmt, deren ausgewählte Entscheidung auszahlungsrelevant ist.

Zusammenfassung der Auszahlung des ersten Teils

- Aus den ersten 13 Entscheidungen wird von jeder Person eine Entscheidung zufällig ausgewählt und ausgezahlt. Sie erhalten einmal Punkte als Aktive Person *und* einmal Punkte als Passive Person.
- Aus den nächsten 7 Entscheidungen wird eine Person zufällig als Aktive Person bestimmt und deren ausgewählte Entscheidung ausgezahlt. Sie erhalten Punkte als Aktive *oder* Passive Person.
- Aus der letzten Entscheidung wird eine Person zufällig als Aktive Person bestimmt und deren ausgewählte Entscheidung ausgezahlt. Sie erhalten Punkte als Aktive *oder* Passive Person.

Insgesamt erhalten Sie demnach aus vier Entscheidungen Punkte. Wie viele Punkte genau und welche Entscheidungen von Ihnen und den anderen Personen zufällig ausgewählt wurden, erfahren Sie am Ende des Experiments, nach dem 2. Teil.

Bei Fragen heben Sie bitte die Hand.

Instruktionen zum 2. Teil des Experiments

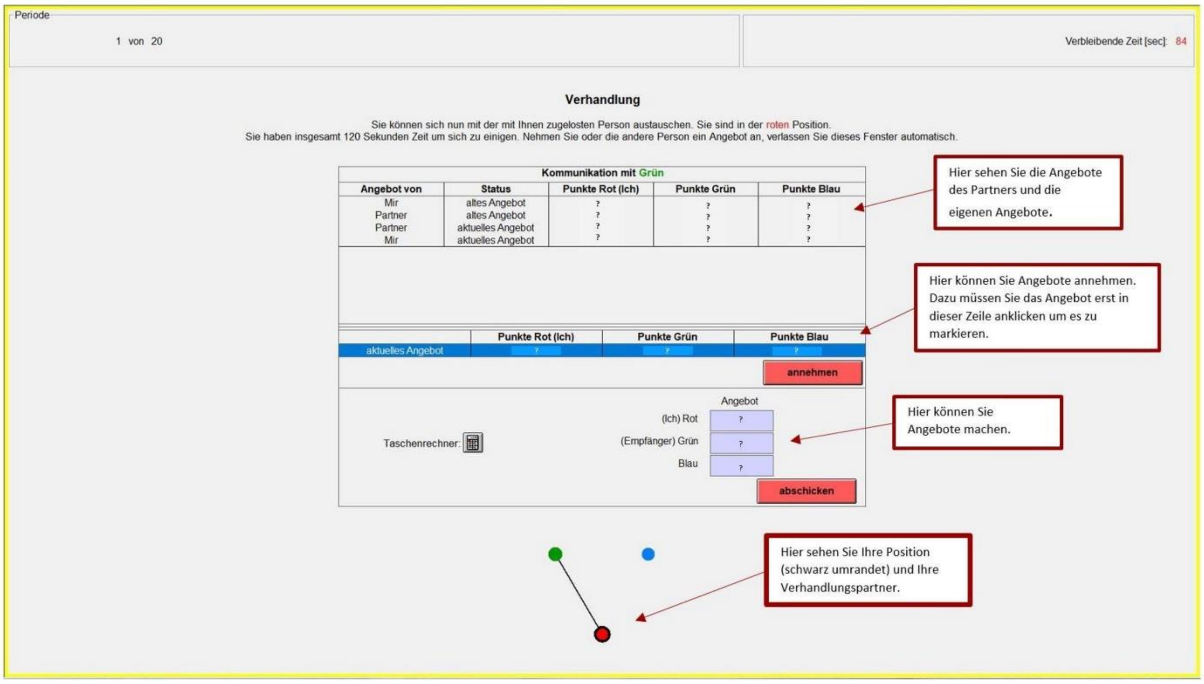
In diesem Experiment geht es darum auszuhandeln, wie 72 Punkte aufgeteilt werden sollen.

Dazu werden Sie in Gruppen zu **drei Personen** eingeteilt. Das Experiment besteht insgesamt aus **20 Runden**. In jeder Runde werden Sie einer neuen Dreiergruppe zugeordnet. Zur besseren Orientierung sind die verschiedenen Personen in den Dreiergruppen mit den Farben rot, grün und blau gekennzeichnet. Sie sehen sich selbst immer in der Farbe Rot, Ihren Verhandlungspartner in der Farbe Grün und die dritte Person in der Farbe Blau.

In jeder Runde verhandeln Sie und eine andere Person **über die Verteilung von 72 Punkten**. Die **Person** mit der Sie verhandeln und die dritte Person **ändern sich** in jeder Runde. Auf der nächsten Seite sehen Sie den Verhandlungsbildschirm. Die Kommunikation erfolgt über Eingabe-Fenster, in denen Sie Angebote über die Verteilung der 72 Punkte machen können. Sie können Angebote senden und Angebote von der anderen Person erhalten. **Erst nach Ablauf von 30 Sekunden können gesendete Angebote angenommen werden.** Es kann immer nur das aktuellste Angebot angenommen werden. Um ein Angebot anzunehmen müssen Sie es erst markieren, dadurch wird es blau hinterlegt, und dann auf den Button „annehmen“ drücken. Sie haben insgesamt **zwei Minuten Zeit**, um zu einer Einigung zu kommen. Die erste getroffene Einigung ist für alle gültig. Wenn Sie sich in den zwei Minuten **nicht einigen**, erhält jede der drei Personen in jedem Fall **null Punkte**.

In der ersten Runde erfahren Sie, ob Sie einer der Verhandlungspartner sind oder nicht. Nachdem die Positionen in der ersten Runde zufällig bestimmt wurden, ändern sie sich im gesamten Experiment nicht mehr. Personen, die nicht als Verhandlungspartner ausgewählt werden, verhandeln trotzdem über die Verteilung von 72 Punkten, allerdings ausschließlich mit Personen, die auch nicht Verhandlungspartner sind. Die Einigungen sind in diesem Fall rein hypothetisch und nicht auszahlungsrelevant. Auszahlungsrelevant sind immer nur die Einigungen der zugeordneten Verhandlungspartner.

Für die Auszahlung sind nur drei der 20 Runden relevant. Welche der Runden ausgewählt werden, wird zufällig bestimmt. Die Wahrscheinlichkeit, für die Auszahlung ausgewählt zu werden, ist für jede einzelne Runde gleich. Es kann jedoch keine Runde zweimal ausgewählt werden. Am Ende des Experiments werden also **drei Runden zufällig ausgewählt** und Sie bekommen die Anzahl der Punkte aus den Entscheidungen dieser Runden **in Euro ausbezahlt**.


Periode
1 von 20
Verbleibende Zeit [sec]: 84
Verhandlung
Sie können sich nun mit der mit Ihnen zugelosten Person austauschen. Sie sind in der roten Position.
Sie haben insgesamt 120 Sekunden Zeit um sich zu einigen. Nehmen Sie oder die andere Person ein Angebot an, verlassen Sie dieses Fenster automatisch.
Kommunikation mit Grün
Angebot von
Status
Punkte Rot (Ich)
Punkte Grün
Punkte Blau
Mir
altes Angebot
Partner
altes Angebot
Partner
aktuelles Angebot
Mir
aktuelles Angebot
aktuelles Angebot
annehmen
Angebot
(Ich) Rot
(Empfänger) Grün
Blau
Taschenrechner:
abschicken
Hier sehen Sie die Angebote des Partners und die eigenen Angebote.
Hier können Sie Angebote annehmen. Dazu müssen Sie das Angebot erst in dieser Zeile anklicken um es zu markieren.
Hier können Sie Angebote machen.
Hier sehen Sie Ihre Position (schwarz umrandet) und Ihre Verhandlungspartner.

11

Abschluss

Am Ende des Experiments folgt ein Fragebogen. Bitte nehmen Sie sich für die Beantwortung des Fragebogens Zeit. Für einen komplett ausgefüllten Fragebogen bekommen Sie **40 Punkte**.

Die in den einzelnen Teilen verdienten Punkte werden zusammengezählt und mit dem Faktor 7:1 in Euro umgerechnet. Dieser Betrag wird Ihnen am Ende des Experiments in bar ausgezahlt.

5. Studie II

Offers Beyond the Negotiating Dyad: Including the Excluded in a Network Exchange Experiment

Manuel Schwaninger, Sabine Neuhofer und Bernhard Kittel

Zeitschrift: Social Science Research, Volume 79

Status des Beitrags: Publikation 2019

Social Science Research 79 (2019) 258–271

Contents lists available at ScienceDirect

Social Science Research

journal homepage: www.elsevier.com/locate/ssresearch

Offers beyond the negotiating dyad: Including the excluded in a network exchange experiment☆

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ARTICLE INFO

Keywords:
Fairness
Experiment
Network exchange
Social value orientation

ABSTRACT

Based on the assumption of self-interest, allocations in network exchange models and experiments are typically restricted to negotiating dyads. Network members beyond the dyad are excluded by design from a share of the divided resource. Social value orientation may, however, induce subjects to allocate parts of the resource to third network members. We experimentally study three-person networks in which subjects can make bilateral offers that allocate payoff shares to all network members. Our results show that subjects give on average ten percent of the bargaining value to third network members if they have this option. The concern for third network members is moderated by social values: the stronger the social value orientations of the deciding individuals, the more payoff is allocated to third network members. We conclude that fairness is an important initial motivator that affects the way in which structural power is used in network exchange.

1. Introduction

Social exchange theory interprets social interactions as “an exchange of activity, tangible or intangible, and more or less rewarding or costly, between at least two persons” (Homans, 1961:13). Developments in this literature, such as the *Power-Dependence Theory* (Emerson, 1972a, 1972b) or the *Elementary Theory* (Willer and Anderson, 1981) and their refinements (see, Cook et al., 2013; Neuhofer et al., 2015), embed social exchange in a network structure (Granovetter, 1985). The network structure describes the relations between network members and determines which dyads benefit from exchange. Social exchange theories predict the distribution of a resource within a network from the structural power of its members. These theories usually assume that network members are rational and seeking to maximize their own payoff. Therefore, within the logic of rational payoff maximization, all negotiable payoffs are expected to be allocated within the agreeing dyad.

However, we find networks outside the laboratory in which third parties are affected by bilateral exchange. Often those cases occur in the form of externalities (Dijkstra and Van Assen, 2006). For example, a newly concluded contract between two companies does not only distribute profits among these two companies, but can implicitly lead to new orders for other companies in the network and, thus, can have negative or positive effects on other network members. When actors are aware of the effects of exchange on other network members, the notion of fairness can play an important role in the distribution of resources (e.g., Fehr and Fischbacher, 2003). The latter is exemplified when a lecturer decides to invest time to give feedback on a studentU+02BCs term paper. This effort

☆ This work was supported by the Deutsche Forschungsgemeinschaft (DFG, FOR2104, B1) and the Austrian Wissenschaftsfonds (FWF, I1888-G11). We thank Thomas Gautschi, Stefan Traub, Fabian Paetzel, Nadja Müller, Réka Szendrő and two anonymous reviewers for helpful comments and suggestions.

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https://doi.org/10.1016/j.ssresearch.2018.10.014
Received 2 November 2017; Received in revised form 24 October 2018; Accepted 24 October 2018
Available online 26 October 2018
0049-089X/

may not only depend on the self-interested preferences of the lecturer and the student, who wish to minimize and maximize the invested time, respectively. It would also be conceivable that the lecturer limits the time in this exchange in order to spend a fair amount of time on all studentsU + 02BC term papers, or the student refrains from demanding extensive feedback such that other students in the network also have the same chance to get feedback.

Even though a recent turn in the social exchange literature appreciates affective regard for exchange partners, reciprocity, and fairness considerations as motivations for exchange (Cook et al., 2013), the theoretical and empirical work on other-regarding preferences in social exchange is still sparse. In contrast, in non-network contexts, motives other than self-interested utility maximization have been of great interest from the late 1960s onwards (Balliet et al., 2009; Griesinger and Livingston, 1973; Messick and McClintock, 1968). Building on these insights, the social value orientation (SVO) framework classifies individuals into types. *Proselfs* aim to maximize their own absolute or relative payoffs and *prosocials* maximize the equality and efficiency of payoffs (Bogaert et al., 2008). The latter type voluntarily forgoes her own payoff to the benefit of others even in anonymous situations.

In traditional social exchange studies, the strict assumption of self-interest have led to two critical design choices in laboratory tests. First, offers made within a dyad can only include the exchange partner as the recipient of any benefit. Second, participants in experiments have typically been explicitly framed to maximize their own payoffs (Willer et al., 2014). Evidently, design choices depend on the research question. Given the distinction between structural bargaining *power* and actual *power use* (Markovsky et al., 1999:92), offer restrictions and framing help us to understand the potential magnitude of structural power, which in turn serves as an important reference point. Yet, in a network context, bargaining power is not necessarily used to increase oneU + 02BCs own payoffs. Willer et al. (2013:126) argue that "prosocials are seen as concerned with equity, not just dyadically, but for all others in the group". As a consequence, payoff differences may be lower than theoretically predicted by the strict assumption of self-interest if bargaining power is used to equalize payoffs. Implemented bargaining power, i.e. power use, might deserve as much attention as structural bargaining power if the goal of network exchange theory is to predict distribution outcomes in naturally occurring networks.

With this study, we contribute to the literature on negotiated network exchange by exploring exchange behavior beyond the dyad and permitting allocations that include more network members. To the best of our knowledge, no empirical study has challenged the assumption-based design restriction that offers made within a dyad should only include the exchange partner as recipient of any benefit. We extend the standard experimental design (Cook and Emerson, 1978) by adding the option to send and receive offers that also allocate profit points to network members who are neither sender nor receiver of this offer. By doing so, this study relates bargaining power in two simple network structures to fairness considerations towards third actors. We expect that the social values held by dyads, and especially by powerful subjects, contribute to the determination of exchange outcomes.

Our main result is that subjects who have the option to distribute points beyond the dyad allocate ten percent to third network members on average. Therefore, the actual use of structural power is much lower than potential power and predictions by existing theories. Moreover, the payoff share of third network members depends on the social value orientations of the deciding individuals. Prosocial individuals are more likely to distribute payoffs more equally in bilateral negotiations. The relative influence of social value orientations is hardly moderated by the structural power of the individuals.

The remainder of this paper is organized as follows. In section 2, we review the literature on fairness concerns in negotiated network exchange experiments. In section 3 we develop a variant of the Network Control Bargaining model (Braun and Gautschi, 2006) allowing for heterogeneous preferences according to the social value orientations and derive the theoretical predictions and hypotheses. In section 4 we describe the experimental design, and in section 5 we present the results. Finally, we discuss the findings and conclude in section 6.

2. Fairness preferences in negotiated network exchange

2.1. The assumption of self-interest

The notion of fair exchange is deeply rooted in social exchange theory (Cook et al., 2013; Cook and Hegtvedt, 1983; Hegtvedt and Markovsky, 1995). Nevertheless, scholars have almost ubiquitously assumed subjects to be self-interested and to maximize their own payoff. All of the most prominent concepts, such as the Power-Dependence Theory (Cook and Yamagishi, 1992; Emerson, 1972a, 1972b), Elementary Theory (Willer and Anderson, 1981; Willer and Emanuelson, 2008), Core Theory (Bienenstock and Bonacich, 1992, 1993), Expected Value Theory (Friedkin, 1992, 1995), and the Network Control Bargaining model (Braun and Gautschi, 2006) start from this assumption. All these models explain payoffs from exchange as a consequence of the network structure and the ensuing power differences between subjects. It is now considered a stylized fact that the distribution of the resource benefits those with structural power (Cook and Gillmore, 1984; Markovsky et al., 1988; Molm et al., 2000; Skvoretz and Willer, 1991, 1993; Willer and Emanuelson, 2008), even more so in repeated interactions (Emanuelson and Willer, 2009).

Yet, Cook and Emerson (1978) already show in their early experiment that fairness concerns limit the use of structural power if participants are informed about the distribution of payoffs in the network. Power enables one person to impose her will on others (Weber, 1978). However, some subjects regard an unequal distribution of payoffs as unfair and do not use their bargaining power to maximize their own payoff shares but to equalize payoffs. These fairness attitudes are a challenge to the study of power distributions in networks. The reason is that bargaining power is measured in terms of the observed proportional shares within the dyad (Cook et al., 1983; Willer et al., 2002). When powerful subjects have fairness preferences, it is unclear whether relatively equal outcomes are the result of the network structure or individual fairness concerns.

Knowing that many of the subjects do not necessarily aim to maximize their own payoffs, the conclusion that the bargaining power is lower than predicted would be a misinterpretation of the observed payoffs. To identify the causal effect of the network structure on bargaining power it is necessary to control for fairness considerations. Hence, an important strand of the literature frames or explicitly instructs participants to maximize their own payoff shares in the experiments in order to limit fairness considerations from influencing the distributive outcome of the negotiation. They restrict allocations to the negotiating dyad and use explicit instructions or employ limited information settings. For example, in the programmatic study by Cook et al. (1983) "[e] mphasis was placed on the desire to earn money as a motive for taking part in the experiment. [...] In this way principles of 'equity' were effectively prevented from operating in this laboratory setting". In another experiment Thye et al. (2011) examine negotiated exchange in network structures comparable to our study. Participants are framed to represent firms in a specialized computer chip market that have to divide profits generated from exchanging the firmsU + 02BC technology. Within the tradition of Elementary Theory, all experiments prime the participants to "assume a proself orientation" and instruct them to "earn as many points as they can" (Willer et al., 2014; Willer and Emanuelson, 2008), apart from one exception which we discuss below.

Although the approach to frame participants provides indispensable insights about the power distribution in networks and the results serve as valuable benchmarks, these studies turn the assumption underlying the theoretical predictions into an instruction to subjects about how to behave in the experiment. This means that the participants may not act out of their own motivation. Even more importantly, it is uncertain whether the framing actually nullifies fairness considerations. Network exchange models that assume strict self-interest may be subject to an omitted variable bias. The most accurate theory in the experimental tests may not be the one that most accurately determines structural power in the network, but the theoretical concept that coincidentally covers fairness considerations better than other theories.

2.2. Fairness preferences

An alternative approach to the traditional assumption of strict self-interest is to include fairness preferences into the formal analysis. The influence of other-regarding preferences in non-network settings is clearest in the dictator game, where individuals are able to share their endowment with strangers. A meta study finds that 63.9 percent of all participants share at least small amounts with others without any strategic reason (Engel, 2011). For the conception of 'rationality' it is not necessary to assume that subjects maximize their utility when they maximize their own payoffs (Fehr and Gintis, 2007). Consequently, over the last two decades, behavioral economists have integrated fairness motivations into the analysis of experimental data (e.g., Bolton and Ockenfels, 2000; Fehr and Schmidt, 1999; Charness and Rabin, 2002). Since we are limited in space in this review, we refer to Kerschbamer (2015) for a discussion of major distributional preference models in that literature and an attempt to combine them.

One way to approach fairness preferences of individuals is social value orientations (SVO), which can take on three ideal-typical preference types: individualist, competitive and prosocial (Griesinger and Livingston, 1973; Messick and McClintock, 1968; Van Lange et al., 1997). They are frequently pooled into *proself* and *prosocial* (Willer et al., 2014). The basic assumption is that these types evaluate allocations differently. While proselfs endeavor to maximize their own absolute or relative payoffs, prosocials maximize the equality and efficiency of payoffs (Bogaert et al., 2008). Due to their distinct preferences, one and the same decision scenario can imply that different behavior is rational for different people. For example, in dictator games proself subjects are expected to transfer no payoff to other subjects, while prosocial subjects are expected to transfer half of their share to the other subject. In social dilemma games, such as the prisonerU + 02BCs dilemma or the public goods game, proself subjects usually defect while prosocial subjects cooperate (Balliet et al., 2009). A meta-analysis of experimental studies on SVOs shows that 36.9 percent of subjects behave as proselfs and 49.7 percent as prosocials (Au and Kwong, 2004).

Nax et al. (2015) and Willer et al. (2013) model social value orientations for game-theoretical analyses. While Nax et al. (2015) introduce a utility function that captures differences in the preferences on a continuous scale, Willer et al. (2013) develop separate utility functions for the main SVO types. To our knowledge the latter are also the only ones who deviate from the prevailing paradigm of self-interest in negotiated network exchange. Willer et al. (2013) conclude that different preference types can, at least in theory, produce different outcomes in identical network structures.

In an experimental study closely related to ours, Lewis and Willer (2017) test the predictions derived by Willer et al. (2013). They utilize Van LangeU + 02BCs (1999) Nine-Item Social Value Inventory to measure social value orientations and examine whether these affect bargaining outcomes in three different network structures. In contrast to earlier network exchange experiments, they frame the instructions neutrally. They find that SVOs do not matter if the members of the negotiating dyad are restricted to allocate payoffs between themselves. Lewis and Willer (2017) reason that the "SVO theoretic should be limited in scope to exclude economic exchange" and further ask whether "the space of social exchange [is] too large for prosocials to act prosocially". We believe, conversely, that another potential interpretation is that the traditional social exchange design is too narrow. Willer et al. (2013) already argue that the restriction to dyadic exchange does not fit the true nature of prosocial types. Significant differences may only arise if prosocials are able to allocate payoffs to third network members.

Other social exchange studies dedicated to the role of fairness also focus on the distribution of payoffs within a dyad embedded in a network. Savage et al. (2017) follow a similar idea as Lewis and Willer (2017) but make use of the concept of fairness identities. They find that individuals with a high fairness identity use power less in weak power networks than individuals with a low fairness identity. On a more general level, Molm et al. (2006) support Cook and EmersonU + 02BCs (1978) result that the salience of the payoff distribution affects participantsU + 02BC fairness evaluations. Molm (2003) also finds that allocations are more equal in reciprocal exchange than in negotiated exchange.

Recently, Dijkstra and Van Assen (2006) have highlighted the effects of externalities on the distribution of power in exchange networks. Although they do not focus on fairness aspects, they have been the first to design an experiment in which bilateral exchange causes direct payoff differences for third network members. They find that individuals in strong power positions earn

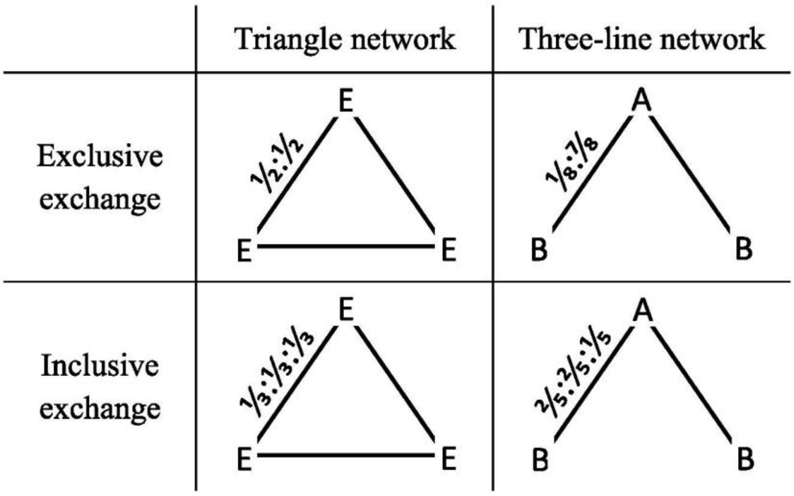

Fig. 1. Two-factorial design.

higher payoffs when no externalities are caused than when exchange produces externalities. In the externality treatment the payoffs between weak power subjects are positively related. The payoff of the excluded subject decreases the higher the payoff of the subject who holds the strong power position. Relatedly, Dijkstra and van Assen (2008a) analyze different types of externalities associated with a market, a common pool, a public good, and the household. Their results suggest that behavior systematically responds to the situations and the authors note that fairness considerations may explain the differences. Dijkstra and van Assen (2008b) also find evidence that externalities influence which dyads enter exchange in a four-line network.

The focus of our study is on the distributional consequences of unrestricted allocation possibilities depending on individual social value orientations. Previous studies on fairness preferences in network exchange have focused on power use in dyadic allocations. Studies on externalities allow payoff consequences for third network members, but focused on the influence of externalities on structural power and have generally sought to avoid equity considerations. We combine these two strands of literature and analyze the extent to which subjects take the payoff to third network members into account if the allocation to the third network member is negotiated by the exchanging dyad.

3. Hypotheses

In order to study the effect of fairness preferences on outcomes we focus on three-node networks, representing two distinctly different power structures (see Fig. 1). On the one hand, we look at the *triangle*. In this network, all three subjects are connected to each other and the structural power between each dyad is equal. On the other hand, we look at the *three-line* network. This is a strong-power network (Markovsky et al., 1993) in which one central subject is structurally advantaged by being connected to two peripheral subjects who are not connected to each other and compete for an agreement with the strong-power position. The networks are negatively connected, which implies that each network member is restricted to exchanges with not more than one other subject at a time. Thus, in negative three-node networks one subject is excluded from exchange. In the standard setting, the exclusion from exchange goes along with the exclusion from any payoff. Henceforth we refer to this setting as *exclusive exchange*. However, if the third network member receives no payoff share, the distribution between the subjects is unequal by design. This outcome should be unsatisfying for a prosocial subject. Therefore, we extend the standard setting by permitting allocations to subjects beyond the dyad, which we call *inclusive exchange*.

3.1. Social value orientations in the Network Control Bargaining model

We build on the Network Control Bargaining (NCB) model to derive our predictions. NCB combines the generalized Nash bargaining solution from game theory with structural bargaining power and, thus, rests on a solid game-theoretical foundation. Within the three-person networks, subjects bargain in dyads over the distribution of a bargaining value, v. A dyad comprises two connected individuals i and j. In three-node networks a third individual k is excluded from direct exchange, since the networks are negatively connected. Each individual aims to maximize their own utility, u_i. The exchange payoff of an individual i with individual j is denoted by $x_i \in [0, v]$. If subjects do not conclude an agreement on allocations, no one receives any payoff. Individuals i and j negotiate over the payoff shares x_i, x_j and x_k as if they are solving the following optimization problem,

$$\max u_i^{b_i} * u_j^{b_j}, \text{ subject to } x_i + x_j + x_k = v, \tag{1}$$

in which the positive parameters b_i and b_j refer to iU + 02BCs and jU + 02BCs absolute level of individual bargaining power. The bargaining power depends on the degree of "control" over the relations with the other actor in the network, the exchange mode, the mutual ties in the network, and the number of network members (Braun and Gautschi, 2006).

In the original model the authors assume that all subjects are narrow payoff maximizers, with the corresponding utility function $u_i = x_i$. Thus, utility increases only with oneU + 02BCs own payoffs. By contrast, we follow Willer et al.'s (2013) approach and incorporate social value orientations into network exchange.

According to the SVO framework, the utility of an allocation depends on an individualsU + 02BC own payoff, x_i, and the payoff of all other salient individuals, $x_{s \neq i}$. Specifically, we assume that an individual cares about a number of actors n, including themselves, the negotiation partner and the excluded actors they can include in the allocation. Hence, if the negotiating dyad can include the third individual in a three-node network, $n = 3$, otherwise $n = 2$. Following Nax et al. (2015), we assume that iU + 02BCs utility depends on payoff in Cobb-Douglas form,

$$u_i = x_i^{1-\alpha_i} * \prod_{s \neq i}^{n-1} x_s^{\alpha_i/(n-1)}, \tag{2}$$

where $\alpha_i \in [0,1]$ measures the concern of individual i for others. The higher the concern for others, the larger α_i, which weights other payoffs relative to oneU + 02BCs own payoff. Different levels of concern for others rationalize different intermediate distributions. For example, the utility function of an individual matches the narrow assumption of self-interest if $\alpha_i = 0$. An individual prefers an even distribution more than any other payoff distribution if $\alpha_i = (n-1)/n$. An individual is purely altruistic and prefers to allocate all payoffs to the other individuals if $\alpha_i = 1$. Each individual maximizes the utility when $x_i = v(1 - \alpha_i)$ and $x_{s \neq i} = v\, \alpha_i/(n-1)$.

To determine the exchange payoffs influenced by the social values, we solve the optimization problem expressed in Eq. (1) using the utility function in Eq. (2). The maximization for individual i yields the exchange payoff

$$x_i = p_i v + \left(p_j \frac{\alpha_j}{n-1} - p_i \alpha_i\right) v \quad \text{for } i \neq j, \tag{3}$$

where $p_i := b_i/(b_i + b_j)$ defines iU + 02BCs relative bargaining power in the relation with j. Accordingly, the maximization for individual j yields the exchange payoff, $x_j = p_j v + (p_i \alpha_i/(n-1) - p_j \alpha_j)v$. The excluded individual obtains the remaining payoff of the bargaining value, $x_k = v - x_i - x_j$, which is equal to

$$x_k = \left(p_i \frac{\alpha_i}{n-1} + p_j \frac{\alpha_j}{n-1}\right) v \quad \text{for } k \neq i \neq j. \tag{4}$$

3.2. The influence of social values on negotiation outcomes

As already discussed, network exchange theories traditionally assume that the individuals in a network maximize their utility by strictly maximizing their own payoffs. Consequently, if two individuals bargain over exchange payoffs, they will never allocate any payoff shares beyond the dyad and thus any analysis including individuals beyond the dyad is redundant. Yet, how valid is the restriction of allocations to immediate exchange partners? Integrating heterogeneous social values into the utility function suggests that subjects who care for others individually would in principle also allocate payoffs to third individuals in a network exchange.

Under the assumption that both actors i and j are purely self-interested ($\alpha_i = \alpha_j = 0$), the exchange payoffs derived in Eq. (3) mirror exactly the predictions of the standard NCB model, where the third network member obtains no payoff share. However, Eq. (3) implies that iU + 02BCs payoff share strictly decreases with increasing concern for other individualsU + 02BC payoffs, $\partial x_i/\partial \alpha_i < 0$, while Eq. (4) shows that the payoff share of the third network member strictly increases with the other-regarding concerns of the agreeing dyad, i.e. $\partial x_k/\partial \alpha_i > 0$. Hence, if not all individuals try to strictly maximize their payoff, we expect that third network members obtain substantial proportions of the bargaining value from the agreeing dyad. Consequently, we also expect that the restriction to divide the exchange payoff within the agreeing dyad, i.e. exclusive exchange, changes the overall distribution of payoffs when compared to inclusive exchange. The extent of change depends on the other-regarding concerns of the agreeing individuals.

H1. *The payoff share allocated to third network members is positively related to the SVO score of each individual in the agreeing dyad.*

Social values do not offset structural power differences, they just influence the decision of how to allocate the payoffs. The first term $p_i v$ in Eq. (3) is equal to the exchange payoff of individual i in the standard NCB model. It implies that individual iU + 02BCs payoff share increases in line with her own relative bargaining power. Calculating the relative bargaining power according to the NCB model yields $p_i = p_j = 0.5$ in the triangle network and $p_i \approx 0.83$, $p_j \approx 0.17$ in the three-line network (Braun and Gautschi, 2006: 10). Thus, relative bargaining power is equal in the triangle network and advantageous for the central position in the three-line network. Consequently, a relatively self-interested individual in a powerful structural position is more likely to obtain higher exchange payoffs. While we presume that payoff differences are moderated by the social values in the network, overall, we still expect to replicate earlier findings on structural bargaining power.

H2. *An individualU + 02BCs payoff share is positively related to her structural power.*

Finally, our third question addresses the interaction between social values and power. Eq. (4) implies that the absolute payoff share of the third network member depends on individualsU + 02BC concern for others, but also on the relative bargaining power of an individual in the agreeing dyad. The influence of social values on the third individualU + 02BCs payoff share is weighted by the bargaining power of each individual. Therefore, we expect the social value orientations of strong network members to be relatively more important than those of their weaker counterparts.

H3. *In a three-line network, the SVO score of the powerful individual in the negotiating dyad has a stronger effect on the third individualU+02BCs payoff than the SVO score of the less powerful individual.*

Even though Willer et al. (2013) are only concerned with stylized prosocials, individualists and competitors, they derive essentially the same comparative statics from elementary theory as we do from the NCB model. They reason that proself subjects should negotiate more for themselves than prosocial subjects in the same networks. However, their predictions are restricted to exclusive exchange and thepoint predictions differ.

4. Experimental design

We conducted a two-factorial design, in which we varied the network structure between subjects and the exchange mode within subjects. The experiment was fully computerized. We used z-Tree (Fischbacher, 2007) to program the experiment and ORSEE (Greiner, 2015) to recruit participants. Prior to the main part of the experiment all subjects completed the SVO slider task (Murphy et al., 2011), which we use as a proxy for the fairness preferences of the subjects in the analysis. At the end of the experiment, the program converted the payoffs earned in the experiment into Euros and the laboratory assistants paid the participants separately and in private.

4.1. SVO slider measure

The SVO slider measure is an incentivized task aiming to assess an individualU+02BCs social value orientation score based on decisions in various scenarios as the sender in a dictator game developed by Murphy et al. (2011). In total, subjects make six consecutive decisions where they choose between a set of bilateral allocations. At the end of the experiment, one of the decisions is randomly chosen by the computer program and paid to the two participants accordingly. Each subject earns a payoff, once as a sender and once as a recipient. It is ensured that the decisions are not mutually relevant to the final payoff.

The test condenses the revealed distributional preferences of the individuals into the *SVO score*. The SVO score is a continuous variable that assigns an angle to each subject. The more prosocial the decisions of a subject, the higher the angle. Based on the SVO score, subjects can also be clustered into main types, i.e. proself and prosocial. The difference between these ideal types is approximately 30°.[1]

Upon arrival, participants were randomly seated in separate cubicles and given printed instructions for the SVO slider measure, and a task measuring risk aversion as a further control (Holt and Laury, 2002). The tasks in the instructions were neutrally referred to as ‘decision tasks’.[2] After reading the instructions, all subjects started the tasks simultaneously.[3] We ensured that the decisions of the participants are anonymous. Participants did not receive any information about their payoff from the tasks until the end of the experiment.

4.2. Network exchange

After the first part, participants received printed instructions for the main experiment, which were also formulated as neutrally as possible. In this main part subjects participated in every period in groups of three individuals. Depending on the treatment, three individuals were assigned to either a *triangle* or a *three-line* network (see Fig. 1). The network structure was varied between subjects and remained constant throughout an entire session of the experiment. The subjects were assigned to a new group and a random position in each of the ten periods and negotiated over the distribution of 24 profit points within the restrictions set by the network structure and the exchange mode. The exchange mode determined whether profit points could be allocated to excluded individuals or not. In the *exclusive treatment* (henceforth ET) subjects could make offers that only included the two negotiating individuals (i.e. within the dyad). In the *inclusive treatment* (henceforth IT) offers could include a share for the third individual, who did not take part in the bilateral negotiation. ET and IT were both played for five consecutive periods. In half of the sessions ET was implemented first and in the other half IT came first.

To negotiate subjects could send and receive offers within the connected dyads. Network members did not receive any information about the proposals made in the other dyad. To make an offer the sender had to allocate the 24 points between the two connected network members in ET and among three network members in IT. The format of the proposals was restricted to numbers and shown in private on the computer screen. Further communication was prohibited during the experiment. Within each period

[1] A subject who makes consistent individualist decisions, i.e. maximizes her own payoffs in each decision, is assigned an angle between −7.82 and + 7.82°. A prosocial subject who is inequality averse is located at an angle of 37.48°. A perfectly consistent altruist is characterized by an angle of 61.39°. The boundary for the idealized SVO types is 22.45°: Below that threshold we consider subjects as proself, above as prosocial. The measure splits proselfs also into individualistic and competitive types (for more detailed information see, Murphy et al., 2011, and Murphy and Ackermann, 2014).

[2] See the Online Supplementary Appendix for the full instructions translated from German to English.

[3] We implemented the short version of the test and used the standardized z-tree program, which the authors of the measure provide online.

individuals were free to send as many offers and counteroffers as they chose. In this sense, bargaining was unrestricted and not subject to a specific protocol, as is most common in negotiated exchange studies (e.g., Skvoretz and Willer, 1993). Only the latest offer could be accepted. If a dyad agreed on a distribution it was implemented for all three subjects. If no agreement was reached after three minutes, all three network members received zero points.

Negotiations took place simultaneously. In the triangle network, all three individuals could bilaterally send offers to each other within dyads. All network members negotiated with both other members at the same time. In the three-line network, two individuals were not connected to each other and lacked a communication device, which means they could only negotiate with the central network member. Subjects were informed about the network structure, their own position, the exchange mode and the size of the resource to be distributed. After an agreement, or when the time limit of three minutes was reached, all network members were informed about the payoffs and the period ended. After five periods, participants were informed that a new exchange mode started.

Network members changed locations in the network between periods. At the start of a session, the program assigned all 27 subjects randomly to one of three independent groups of nine. These groups of nine remained constant throughout the entire experiment. Within the groups of nine, the program then randomly re-matched subjects into three new three-person networks in each period. At the end of the session, one period out of the first treatment and one out of the second was randomly selected as payoff relevant.

4.3. Subjects

We conducted eight sessions with 27 subjects each at the Vienna Center for Experimental Economics in April 2016 and March 2018, resulting in a sample of 216 subjects. One experimental session lasted about 1 h and 20 min and the participants earned EUR 19.12 on average. Subjects were all students registered at a Viennese University, on average in their third semester, and with a median age of 22. Following the main part of the experiment, subjects completed a questionnaire including several socio-economic items such as gender, age, the country in which they have lived longest, their major, the number of completed semesters, the number of experiments they have participated in and the BIG-5 30 item personality inventory (Costa and McCrae, 1992; Schupp and Gerlitz, 2008).[4]

5. Results

Regarding our main research question, we find that third subjects obtain on average ten percent of the payoffs across both networks. Fig. 2 summarizes the results. Comparing ET to IT illustrates the shift toward the third individual: All points within the triangle formed by the edges between the three players indicate that the third player receives some payoff. Agreements cluster around two main focal points: One is located at the centroid, which indicates an equal distribution among all three subjects, the other is in the central position on the edges, indicating an equal two-way split within the agreeing dyad. Comparing the triangle to the three-line network, the shift of the data cloud towards the structurally advantaged position (node A) illustrates the structural power of this node.

We first compare both networks in the exclusive treatment and analyze the effect of social value orientations on the outcome. Then we examine the determinants of the shares for the third network member in the inclusive treatment. First, we utilize non-parametric tests and the clustered SVO *types* to test our hypotheses. Then we explain the individual payoff shares as a function of the SVO *scores*, the continuous measure of SVOs, and include further controls to the analysis. Finally, we report the results of the additional robustness checks regarding the treatment order and repetition.

5.1. Exclusive treatment

Power. In the exclusive treatment subjects can distribute the resource only within the dyad. In all ET networks, a dyad agrees on a distribution within the time limit.[5] In 79 percent of the exchanges in the triangle, the dyad agrees on an equal split ($n = 179$, s.e. < 0.1). Other agreements are closely scattered around the equal split (see Fig. 2). In the three-line network, the powerful and the weak subjects in the agreeing dyad respectively obtain 13.2 and 10.8 points on average ($n = 180$, s.e. $= 0.2$).

Central subjects obtain significantly more than 12 points (Wilcoxon test, $p < 0.01$), which implies that they realize their structural advantage and negotiate higher payoffs. Even though, the second hypothesis, that payoffs increase with structural power, is supported, our findings are inconsistent with the predictions of traditional network exchange theory of 20–4 (NCB model), 23–1 (Elementary theory), or similar (see Willer and Emanuelson, 2008). Empirically, our results are closer to network exchange studies, which find more moderate payoff differences in strong power networks (Lewis and Willer, 2017; Thye et al., 2011), than they are to the clear results found by Skvoretz and Willer (1993).

Social Value Orientations. Next, we examine how individual SVOs affect the distributional outcome in ET and whether they can help explain the outcome. According to the measure, 42.6 percent of the subjects are categorized as prosocial types and 57.4 percent as proself. In an equal power network such as the triangle, theoretical analysis led to the presumption that proself subjects obtain higher shares than prosocial subjects. However, in our results, there is no difference between payoff shares obtained by prosocials (12.0 points, $n = 168$, s.e. $= 0.1$) and proselfs (12.0 points, $n = 190$, s.e. $= 0.1$, one-tailed MWU test, $p = 0.17$). Also, when proself subjects directly bargain with prosocial subjects, their payoff shares do not increase (paired one-tailed MWU test, $p = 0.23$). In the

[4] We do not explicitly explore the BIG-5 personality testin this paper.

[5] We exclude one observation from the sample because two offers were accepted at two indistinguishable points in time, which led to an incorrect record in the output file, leaving us with a total of 359 observations for the ET at the group level.

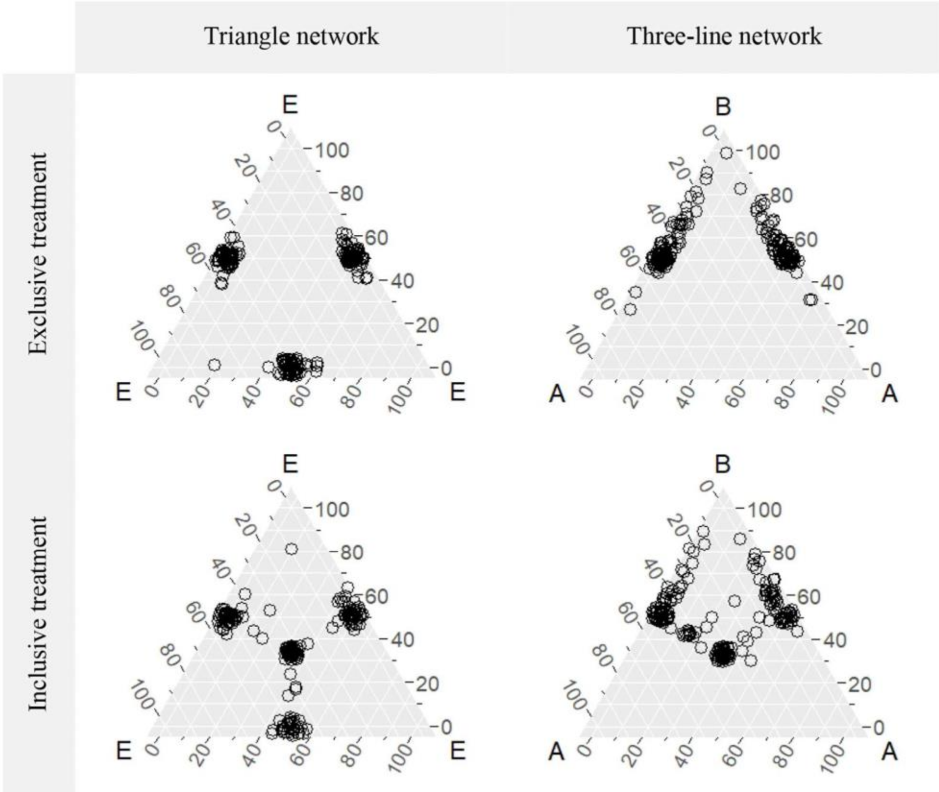

Fig. 2. Final agreements. Each triangular graph displays the distribution of agreements within a network. The left column shows the distributions for the triangle network, the right column for the three-line network. The upper panel shows the exclusive and the lower panel the inclusive treatment. Subjects are denoted with A, B, and E and their payoff shares are depicted in percentages of the bargaining value. A is peripheral, B central, and E is an equal power network member. The closer a dot is to a node, the more payoff this subject earns. A dot in the center of the graph describes an even three-way split. A dot exactly in the middle between two nodes describes an even two-way split. Dots are jittered in order to better identify their overall distribution.

three-line network, prosocial subjects in the central position obtain on average 13.0 points (n = 68, s.e. = 0.4), which is relatively close to the alleged preference to equalize payoffs. Central proself subjects earn on average 13.4 points (n = 112, s.e. = 0.2), which is far from the expected outcome. Statistically, the payoff distribution between central prosocial and central proself types is different (one-tailed MWU test, p = 0.02), but the difference is not substantial. The difference between prosocials (10.8 points, n = 71, s.e. = 0.3) and proselfs (10.8 points, n = 109, s.e. = 0.2) in weak power positions is not significant. Similarly, the SVOs of third subjects have no effect on the agreement in a dyad.

In contrast to the predictions derived from the inclusion of SVOs into the NCB model, or similarly, elementary theory (Willer et al., 2013), social value orientations seem to have no explanatory power in the exclusive exchange mode. In this respect, our results are similar to Lewis and WillerU + 02BCs study (2017), in which they also find no difference between prosocial and proselfs in the equal and strong power network.

5.2. Inclusive treatment

In the IT the resource can be allocated beyond the negotiating dyad. Overall, 358 out of 360 possible exchanges are realized. In two cases no dyad agrees on a distribution within the time constraints and, therefore, no network member earns any payoff.[6] Table 1 shows the frequency of outcomes. The columns are ordered by network and treatment. Across both networks, in 34 percent of the

[6] In the IT, we exclude one observation for the same reason as in the ET. In the following, we additionally exclude seven observations from the analysis since one of the agreeing subjects received zero points in those cases. It is difficult to rationalize why a subject accepts an offer that yields no payoff share for herself and we cannot exclude that the subject made an error. Note that by excluding those data points, the third subjects receive on average a smaller share of the resource and the performed tests are less likely to support the hypotheses. In total, this leaves us with 350 observations at the network level.

Table 1
Frequency of divisions.

Division type between the dyad	Proportion of exchange outcomes			
	Exclusive Treatment		Inclusive Treatment	
	Triangle	Three-line	Triangle	Three-line
Even two-way split (12–12–0)	0.79	0.51	0.52	0.30
Even three-way split (8–8–8)	–	–	0.22	0.26
Uneven two-way split	0.21	0.49	0.19	0.30
Uneven three-way split	–	–	0.07	0.14
Two-way split	1.00	1.00	0.71	0.60
Three-way split	–	–	0.29	0.40

cases subjects agree on a distribution that allocates points to the third subject. In 24 percent the dyads agree on an even three-way split.

Power. In the triangle each subject of the agreeing dyad receives on average 11.0 points ($n = 342$, s.e. = 0.1), leaving 2.0 points to the third subject ($n = 171$, s.e. = 0.3). In the three-line network the powerful and weak subjects receive on average 11.8 points ($n = 179$, s.e. = 0.2) and 9.6 points ($n = 179$, s.e. = 0.2), respectively. The difference between payoffs is statistically significant (paired MWU test, $p < 0.01$), which is in line with the second hypothesis that stronger structural power leads to higher payoff shares. Third subjects receive on average 2.7 points ($n = 179$, s.e. = 0.3).

Social Value Orientations. We examine the share that different SVO types allocate to the third network member. In the triangle we can distinguish three cases: two proselfs (avg. payoff share of the third network member: 1.1 points, $n = 57$, s.e. = 0.3), one proself and one prosocial type (2.0 points, $n = 84$, s.e. = 0.4), or two prosocials agree on an exchange offer (4.0 points, $n = 30$, s.e. = 0.7). The payoff of the third network member is highest if two prosocial types agree. The difference is statistically significant between all three pairs (one-tailed MWU test, $p = 0.02$, $p < 0.01$, $p < 0.01$), which supports the first hypothesis that the payoff share of the third network member is positively related to the extent of prosociality of the deciding members. Turning to the payoff distribution within the dyad, we find that proselfs do not earn more than prosocials when they negotiate with each other (paired MWU test, $p = 0.72$).

In the three-line network the average payoff share of third subjects is 2.7 points. We find that central subjects have a strong influence on the distribution outcome. If a proself type holds the powerful position, the payoff share of third subjects (1.9 points, $n = 106$, s.e. = 0.3) is significantly lower than when a prosocial is holding the powerful position (3.8 points, $n = 73$, s.e. = 0.4; MWU test, $p < 0.01$). Likewise, payoff shares of third subjects increase if the weak subject in the agreeing dyad is prosocial (2.0 vs. 3.9 points). When we compare dyads with one prosocial, it does not matter for the payoff of the third network member whether the structurally strong or weak subject is the prosocial (one-tailed MWU test, $p = 0.48$). Thus, based on the outcome, we have to reject the third hypothesis that the SVO score of the powerful subject is more influential than the SVO score of the weak subject on the payoff share of the third network member. Yet, we find support that the first offer of strong subjects is significantly closer to the final outcome than the first offer of weak subjects (paired, one-tailed ttest, $p = 0.02$), which suggest that strong subjects might nonetheless be more likely to enforce their interests.

So far, we have examined the effect of clustered SVO types on bargaining outcomes. As described in the experimental design section, the SVO slider measure also provides a continuous variable, the SVO score. In our sample, the score ranges from $-7.82°$, the most proself individual, to $+49.45°$, the most prosocial individual. According to Eq. (4) derived above, the payoff share of the third subject depends on the SVOs of the agreeing dyad weighted by the relative bargaining power of the two subjects. We use the individual SVO scores as a proxy for the value of alpha in our model to test the predictions. We run tobit regression models for both network structures, displayed in Table 2.

Table 2 suggests that the comparative statics of the first hypothesis hold, the higher the SVO scores, the higher the payoff share allocated to the third network member. The SVO coefficients indicate the estimated increase of the third subjectsU + 02BC payoffs if the SVO angle of one subject in the dyad increases by 10°. To put the coefficients in perspective, it is helpful to recall that the payoff of the even three-way split payoff is eight points. The difference between an ideal proself and prosocial subject equals roughly 30°. Accordingly, the third network member receives on average about seven points more in model I, if one of the agreeing subjects in the equal power network is prosocial. In the three-line network we can differentiate the influence of the SVO between individuals in the weak and the strong position, which is indicated by the bracket in the table. The influence of the SVO score of structurally strong and weak subjects is statistically significant. However, contrary to the third hypothesis, we find no statistical support of the claim that the SVO score of the powerful subject is more influential than the SVO score of the weak subject (Wald test, model V: $p = 0.67$).

In addition, we add several controls in models II-IV and VI-VIII to test whether the influence of the SVO score remains robust. We add a linear period effect, a dummy for the treatment order, and the interaction between period and treatment order as structural controls.[7] Furthermore, we include six individual characteristics of the deciding individuals - we control for gender, age, risk

[7] We alternatively included the periods as dummies. The results remain robust. Results are presented in the Supplementary Online Appendix.

Table 2
Influence of the SVO score on the payoff of the third network member.

	Dependent variable: ThirdsU + 02BC Payoff							
	Triangle				Three-line			
	I	II	III	IV	V	VI	VII	VIII
SVO	2.332***	2.189***	2.197***	2.522***	1.379**	1.485***	1.480***	0.995*
	(0.425)	(0.414)	(0.416)	(0.396)	(0.476)	(0.441)	(0.441)	(0.452)
SVO (Strong)					1.683***	1.857***	1.856***	1.875***
					(0.486)	(0.473)	(0.472)	(0.457)
Period		−1.230*	−0.987	−1.038		−1.051*	−1.133*	−0.832
		(0.543)	(0.938)	(0.813)		(0.416)	(0.540)	(0.504)
Order (IT follows ET)		3.883*	5.038	3.647		−3.375**	−3.889	−3.702
		(1.523)	(3.553)	(3.190)		(1.175)	(2.745)	(2.461)
Order x Period			−0.413	−0.092			0.178	0.249
			(1.153)	(1.026)			(0.848)	(0.753)
Constant	−3.745**	−2.060	−2.721	−2.430	−1.417	3.470*	3.709*	4.436+
	(1.163)	(2.142)	(3.087)	(4.193)	(0.861)	(1.451)	(1.718)	(2.382)
Sigma	8.102***	7.704***	7.690***	6.882***	7.073***	6.651***	6.649***	5.955***
	(0.585)	(0.619)	(0.619)	(0.625)	(0.473)	(0.475)	(0.475)	(0.477)
Observations	171	171	171	171	179	179	179	179
Control variables[a]	NO	NO	NO	YES	NO	NO	NO	YES
F-test	30.16	16.58	12.80	7.281	11.76	12.31	9.875	6.860
Pseudo R^2	0.046	0.070	0.070	0.119	0.0311	0.0537	0.0538	0.104
Log pseudolikelihood	−230.8	−225.1	−225.0	−213.2	−303.0	−295.9	−295.9	−280.3

Tobit regressions, lower limit at zero. Robust standard errors in parentheses.
*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, + $p < 0.1$.
Each of the eight models is significant at the $p < 0.01$ level.
SVO describes the influence of a ten-degree increase of the SVO score on the points allocated to the third network member. *SVO (Strong)* refers to the SVO score of a subject in the three-line in a structurally strong position.
Period describes a linear variable from period one to period five.
Order describes a dummy variable, which is equal to zero if the inclusive exchange mode came first and equal to one if the inclusive exchange mode followed the exclusive exchange mode.
[a] Controlled for *age, experience, risk aversion, gender, field of study, language.*

aversion, experience in laboratory experiments, field of study, and language. In all models, the effects of the social value orientations remain robust. The SVOs of the agreeing individuals increase the explanatory power of the payoff distribution. Additionally, we see that over several periods the average payoff share of the third subject decreases. The treatment order also has significant opposing effects in the two treatments, but it is not significant once we include an interaction between period and treatment order. In the next section, we discuss the latter in more detail.

To sum up, there is a distinctive difference between the distribution outcomes in ET and IT. In IT, one third of the agreeing dyads allocate points to third network members, which is not possible in ET. The transfers to the third subject seem to be systematic: in the majority of cases the third subject receives either zero or an equal share. These transfers to the third subject imply that the agreeing dyad earns less on average. Hence, inequality in IT is lower than in ET. Lower inequality in IT is mainly driven by subjects classified as prosocial. Prosocial subjects earn less if they have the possibility of allocating payoff shares to excluded network members. However, the theoretical conclusion that proselfs exploit prosocials in direct negotiations is rejected in ET as well as in IT.

5.3. Robustness checks

Treatment order. In the experiment we either examined five periods of ET followed by five periods of IT (ET-IT), or the reverse (IT-ET). Regarding the within-subject design, we observe that the same participants who are restricted in ET are willing to forgo payoffs to benefit the third when they have the option in IT. The main results are robust to the ordering of the treatments; under both conditions the third network member is included in the allocations and SVOs have explanatory power. Yet, the significant coefficients measuring the influence of the treatment order in model II and model VI of Table 2 suggest that the perception of the situation and the behavior change to some extent, depending on which exchange mode is played first. In the following we examine possible differences in ET and IT due to the order of treatments.

In the ET triangle, we cannot observe differences, since the structural power is equal and the agreeing dyad is homomorphically equivalent and, hence, indistinguishable. In the ET three-line network, powerful subjects earn slightly more in ET-IT (13.6 points, n = 90, s.e. = 0.3), than powerful subjects in IT-ET (12.9 points, n = 90, s.e. = 0.2). The difference is small and statistically not significant at the 95 percent level (MWU test, $p = 0.06$), but it appears that subjects are more likely to learn how to use structural power. While powerful subjects in the ET-IT order increase their payoff share from the first to the fifth round from 13.1 to 14.2 points, we do not observe any increase in payoffs when they play IT-ET.

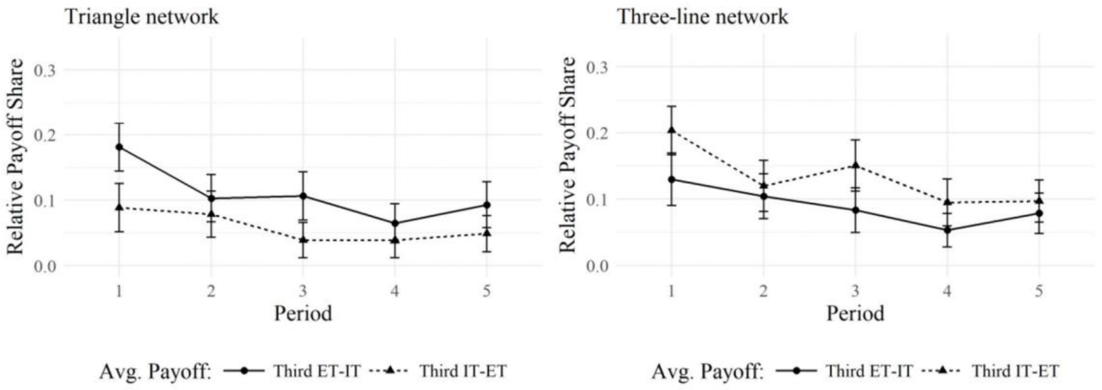

Fig. 3. Payoff of third subjects depending on treatment order. Each point displays the average payoff share and the standard error of the third network members, depending on treatment order and period. ET-IT means that the exclusive exchange mode comes before the inclusive exchange mode. IT-ET means that the inclusive comes first.

Concerning IT, Fig. 3 shows the average payoff shares of the third network member in the two networks over the five periods for both treatment orders. The data show relatively high transfers to the third subject in the very first period. After five periods the average transfer drops to 5–10 percent of the bargaining value. Interestingly, in ET-IT the third network member obtains higher payoff shares in the triangle, but lower payoff shares in the three-line network compared to IT-ET. In the equal power network, the restricted allocation options might trigger the desire for equality in initial periods of IT, while the restricted strong power network might increase the awareness of how to maximize oneU + 02BCs own payoffs. However, in the fifth period in both network structures the differences are not significant (MWU tests, $p = 0.27$, $p = 0.71$).

Period effects. The significant period coefficients in model II and model VI in Table 2 also point out that learning over the course of the five periods affects the willingness to benefit third network members. The time horizon in the experiment is rather short and we cannot rule out that network members learn to increase their own payoff shares and exclude third network members entirely over time. Furthermore, uncertainty over the future network position in the strong power network may induce reciprocal behavior. Despite the fact that subjects are in a completely anonymous setting and are randomly re-matched with strangers in every period, we cannot rule out that some form of generalized reciprocity developed within sessions. As a result, powerful subjects may anticipate the chance of becoming the occupant of the weak position in the next period, and, therefore, behave more prosocially in the present period.

In order to address the validity of these design choices, we conducted four additional sessions with a new student sample of 108 subjects. The experimental protocol followed exactly the same procedure and treatments as the previous sessions with two differences. First, subjects stayed in the same exchange mode in all ten periods. Therefore, rather than a within-subject design, these sessions implemented a between-subject design. Second, participants remained in the position randomly assigned to in the first period for the entire experiment, in order to control for indirect reciprocity.

Fig. 4 displays the results of the robustness check. In both networks the payoff share of the third network member converges to a payoff share of ten percent. Over the last five periods the share is relatively stable (Pearson corr. between period and thirdsU + 02BC payoff -0.06, $p = 0.63$). In the three-line network, the development of power is similar to that in the previous sessions, which suggests that it makes minor differences whether positions in the three-line network rotate or not in the first five periods. Over the course of ten periods, we find a clear trend in ET that powerful subjects learn over time to increase their own payoff share (Pearson corr. 0.44, $p < 0.01$). In the last period the powerful subjects obtain 15.8 points on average. The results mirror earlier network exchange studies that power use in strong power networks increase over time. Interestingly, in IT, power does not seem to develop over the last five periods (Pearson corr. 0.13, $p = 0.22$). The possibility of including third network members in a strong power network might induce fairness considerations that counteract structural power.

The last important observation concerns not the robustness of the transfers, but the SVOs. While the explanatory power of the SVO slider measure remains relatively robust in the triangle network, it completely loses its explanatory power in the three-line network.[8] One possible reason might be that subjects adapt their preferences while interacting with other preference types (Nax et al., 2015). However, the SVO types already have no explanatory power in the first period. Another reason might be that due to the specific conception of the SVO slider measure, the test is more likely to capture social value orientations in situations that do not rule out indirect reciprocity.

6. Conclusion

Different people may be driven by different motivations in exchange networks, as in other areas of daily life. Especially in non-

[8] The corresponding regression analysis can be found in the Online Supplementary Appendix, Table S4.

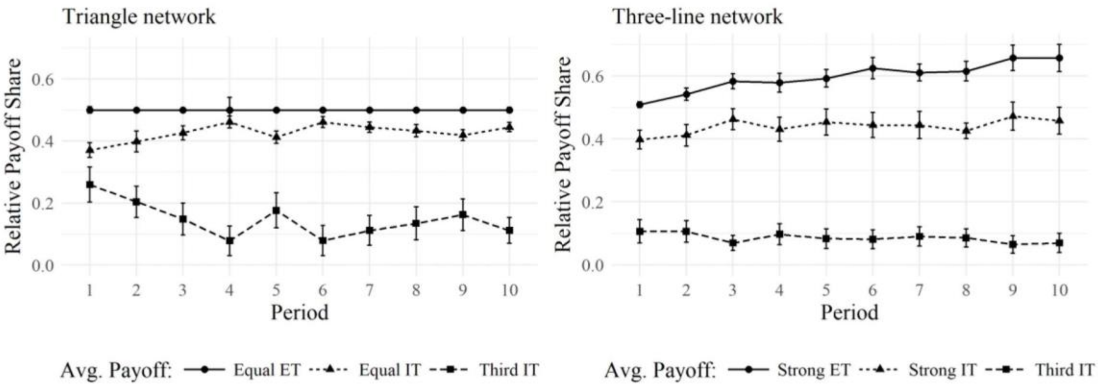

Fig. 4. Average payoff shares in treatments over ten periods. Each point displays the average payoff share and the standard error of the subjects depending on the position and the period. Equal (Strong) ET (IT) describes the average payoff of an equal (strong) power subject in the exclusive (inclusive) treatment. Third IT describes the average payoff of the third network member in the triangle and three-line network.

market contexts, some people might not seek to extract the maximum payoffs from the network they are members of. In a network of an interest group, such as a political or student network, the social well-being of the whole network might be more important to some people than their individual benefits. These people may be willing to sacrifice their own payoffs so that all network members can capitalize from the network. Then again, other subjects are indifferent about the network and only want to further their own interests. Different people produce different outcomes for the network.

This study adds to the social exchange literature by examining whether the difference between structural power and actual power use depends on social value orientations. Previous research on negotiated exchange has shown that structural power can be exploited to increase oneU + 02BCs own payoffs in dyadic negotiations. Furthermore, recent studies have found that negotiated exchange generally undermines social value orientations. We argue that the standard experimental design does not allow prosocial subjects to enforce their preferences. In order to test the influence of individual social preferences on negotiation behavior in three-person networks, we extend the action space of the participants by giving them the option to allocate shares to subjects who are not part of the dyad in a neutrally framed setting. Rather than exclusive exchange, we study inclusive exchange.

Our main finding is that agreeing dyads share on average 10 percent of the bargaining value with third network members in the inclusive exchange mode, even though one would expect no transfers when assuming mere self-interest. Social value orientations moderate exchange patterns: If individuals have the option to include third network members, individually measured social value orientations add explanatory power to network exchange outcomes. Prosocial subjects are more likely to use their structural power to allocate payoffs equally among all network members. But against expectations, the relative influence of the deciding individualsU + 02BC SVO on the payoff share of third network members is independent of the individual structural position.

We both agree and disagree with the conclusion of earlier studies that the effect of social value orientations does not apply to negotiated network exchange. On the one hand, like previous studies, we do not find any influence of social value orientations on exchange payoffs in exclusive exchange. On the other hand, our results suggest that inclusive exchange allows individuals to act according to their social values, which contradicts the conclusions of previous studies. Moreover, our findings are in line with the research on externalities in networks. The results suggest that exchange affecting the payoff of a third network member influences exchange patterns.

Furthermore, to examine the robustness of our results, we test whether our findings are limited to short-term exchange. We doubled the number of periods in the same exchange mode and find that transfers to third network members remain robust in inclusive exchange. In the exclusive exchange mode, the experiment replicates the typical patterns of strong power networks. In inclusive exchange power develops more slowly, even though it should develop in the same way if we assume purely self-interested individuals. Subjects in structurally weak positions might be able to indirectly signal prosocial attitudes to other weak subjects over the course of the exchange outcomes, which may inhibit the development of structural power in inclusive exchange. However, such strategic behavior should be quite fragile, once expectations are not met. Therefore, we regard other-regarding concerns a more reasonable explanation.

One last important finding of the study is that the agreeing dyads mostly transfer nothing to the third network member (65 percent of the cases) or choose the full three-way even split (24 percent of the cases). It appears that other-regarding preferences orientate strongly at focal points and are rarely intermediate. This observation might also be related to the finding that social value orientations have no explanatory power in the exclusive exchange mode. In this study, we followed the existing literature and integrated social value orientations into network exchange. Future research should investigate the functional form of fairness preferences in negotiated network exchange. Even though social value orientations, as measured by the SVO slider measure (Murphy et al., 2011), improve the explanatory power of the third subjectU + 02BCs payoff share in inclusive exchange, we assume that there is still room for improvement. The concept of inequality aversion (Fehr and Schmidt, 1999) might be a promising avenue. In addition, it might be interesting to examine in larger networks whether other-regarding preferences depend on the structural distance between two actors.

Social exchange theory aims to explain and predict network exchange outcomes in external environments. This study highlights the importance of the fairness motivations of network members. There are many situations where network exchange does not follow the rules of profit maximization. In those instances, taking fairness principles into account might improve the accuracy of predictions.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ssresearch.2018.10.014.

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Online Supplementary Appendix

S.1. Additional regression tables

Table S1. Influence of the SVO score on the payoff of the third network member in the Triangle Network

	Dependent variable: Thirds' Payoff Share					
	I	II	IX	IV	X	XI
SVO	2.332***	2.189***	2.520***	2.522***	2.250***	2.564***
	(0.425)	(0.414)	(0.397)	(0.396)	(0.402)	(0.397)
Period		-1.230*	-1.093*	-1.038		
		(0.543)	(0.492)	(0.813)		
Order: IT follows ET		3.883*	3.391*	3.647	3.896*	3.432*
		(1.523)	(1.428)	(3.190)	(1.509)	(1.434)
Order x Period				-0.092		
				(1.026)		
Gender: 1 Female			6.497+	6.489+		6.361+
			(3.638)	(3.658)		(3.453)
Gender: 2 Females			4.038	4.031		3.911
			(3.804)	(3.812)		(3.679)
Age			-0.268	-0.268		-0.257
			(0.193)	(0.194)		(0.190)
Experience			0.156+	0.156+		0.148+
			(0.086)	(0.086)		(0.085)
Risk aversion			0.088	0.087		0.128
			(0.318)	(0.317)		(0.319)
Field of studies			-5.538**	-5.526**		-5.624**
			(1.852)	(1.827)		(1.882)
Mother language: 1 German			-2.302	-2.261		-2.294
			(2.234)	(2.196)		(2.229)
Mother language: 2 German			-5.146*	-5.114*		-4.883*
			(2.419)	(2.398)		(2.406)
Period: 2					-3.302	-3.587+
					(2.220)	(1.917)
Period: 3					-5.412*	-4.440*
					(2.246)	(1.973)
Period: 4					-6.385**	-4.800*
					(2.226)	(2.120)
Period: 5					-4.170+	-4.477*
					(2.174)	(2.030)
Constant	-3.745**	-2.060	-2.253	-2.430	-1.900	-2.060
	(1.163)	(2.142)	(4.214)	(4.193)	(1.874)	(4.180)
Sigma	8.102***	7.704***	6.883***	6.882***	7.589***	6.829***
	(0.585)	(0.619)	(0.627)	(0.625)	(0.619)	(0.626)
Observations	171	171	171	171	171	171
F-test	30.16	16.58	7.881	7.281	10.88	6.410
Pseudo R-squared	0.046	0.070	0.119	0.119	0.077	0.123
Log pseudolikelihood	-230.8	-225.1	-213.2	-213.2	-223.2	-212.1

Tobit regressions, lower limit at zero. Robust standard errors in parentheses

In all six cases out model is significant at the $p < 0.01$ level

*** $p<0.001$, ** $p<0.01$, * $p<0.05$, + $p<0.1$

SVO describes the influence of a ten degree increase of the SVO score on the points allocated to the third network member. *Period* describes a linear variable from period one to period five.

Order describes a dummy variable which is equal to zero if the inclusive exchange mode came first and equal to one if

the inclusive exchange mode followed the exclusive exchange mode.
Gender describes dummy variables whether one or two of the subjects in the agreeing dyad are female.
Age describes the age of the participants in years.
Experience describes the number of the participations in laboratory experiments.
Risk aversion describes at which lottery the subject switched from the risky to the save option. A subject that switches earlier counts as more risk averse.
Field of studies describes a variable which is equal to one if at least one person studies Business or Economics.
Mother language describes dummy variables which are equal to one if one or two persons are German natives.

Table S2. Influence of the SVO score on the payoff of the third network member in the three-line Network

	Dependent variable: Thirds' Payoff Share					
	V	*VI*	*XII*	*VIII*	*XIII*	*XIV*
SVO (strong)	1.683***	1.857***	1.872***	1.875***	1.852***	1.834***
	(0.486)	(0.473)	(0.457)	(0.457)	(0.474)	(0.451)
SVO (weak)	1.379**	1.485***	1.000*	0.995*	1.508***	1.046*
	(0.476)	(0.441)	(0.451)	(0.452)	(0.437)	(0.438)
Period		-1.051*	-0.718+	-0.832		
		(0.416)	(0.389)	(0.504)		
Order: IT follows ET		-3.375**	-2.974**	-3.702	-3.352**	-3.033**
		(1.175)	(1.096)	(2.461)	(1.168)	(1.095)
Order x Period				0.249		
				(0.753)		
Female (strong)			0.164	0.162		0.232
			(1.309)	(1.308)		(1.304)
Female (weak)			1.792	1.756		1.507
			(1.399)	(1.400)		(1.382)
Age (strong)			0.092	0.094		0.094
			(0.088)	(0.091)		(0.089)
Age (weak)			0.236+	0.236+		0.236+
			(0.127)	(0.127)		(0.125)
Experience (strong)			-0.170	-0.170		-0.193+
			(0.110)	(0.110)		(0.110)
Experience (weak)			-0.372**	-0.371**		-0.368*
			(0.136)	(0.137)		(0.141)
Risk aversion (strong)			-0.511	-0.519		-0.501
			(0.474)	(0.468)		(0.459)
Risk aversion (weak)			-0.361	-0.372		-0.414
			(0.466)	(0.466)		(0.448)
Field of studies (strong)			-1.445	-1.439		-1.386
			(1.764)	(1.760)		(1.707)
Field of studies (weak)			-5.133+	-5.180+		-5.121+
			(2.715)	(2.696)		(2.691)
Mother language (strong)			-1.362	-1.360		-1.345
			(1.159)	(1.161)		(1.127)
Mother language (weak)			-2.347*	-2.314*		-2.360*
			(1.099)	(1.106)		(1.069)
Period: 2					-2.944	-2.931+
					(1.783)	(1.654)
Period: 3					-2.810	-1.636
					(1.786)	(1.616)
Period: 4					-5.020**	-3.756*
					(1.796)	(1.649)

Table S3. The decision to share the payoffs equally

	Dependent dummy variable: Thirds' Payoff (=1 if Thirds' Payoff=8)					
		Triangle			*Three-line*	
	XV	*XVI*	*XVII*	*XVIII*	*XIX*	*XX*
SVO	0.644***	0.613***	0.621***	0.350*	0.400**	0.403**
	(0.133)	(0.131)	(0.134)	(0.144)	(0.144)	(0.147)
SVO (Strong)				0.376**	0.471**	0.469**
				(0.144)	(0.159)	(0.160)
Period		-0.293+	-0.210		-0.429**	-0.476*
		(0.162)	(0.256)		(0.150)	(0.201)
Order: IT follows ET		0.628	1.034		-0.947*	-1.209
		(0.430)	(1.031)		(0.403)	(0.896)
Order x Period			-0.149			0.099
			(0.333)			(0.302)
Constant	-1.319***	-0.789	-1.011	-0.941***	0.686	0.811
	(0.210)	(0.554)	(0.816)	(0.187)	(0.472)	(0.579)
Observations	158	158	158	154	154	154
Chi-square test (d.f.)	23.4 (1)	26.0(3)	26.3(4)	13.4(2)	25. 7(4)	25.9(5)
Pseudo R-squared	0.154	0.186	0.187	0.072	0.152	0.153
Log pseudolikelihood	-72.7	-70.0	-69.9	-87.2	-79.6	-79.5

Logit regressions. Robust standard errors in parentheses
In all six cases our model is significant at the $p < 0.01$ level
*** $p<0.001$, ** $p<0.01$, * $p<0.05$, + $p<0.1$
SVO describes the influence of a ten-degree increase of the SVO score on the points allocated to the third network member.
SVO (Strong) refers to the SVO score of a subject in the three-line in a structurally strong position.
Period describes a linear variable from period one to period five.
Order describes a dummy variable, which is equal to zero if the inclusive exchange mode came first and equal to one if the inclusive exchange mode followed the exclusive exchange mode.

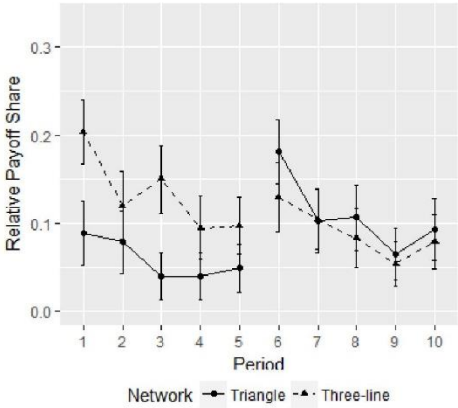
Table S4. Stable positions and SVO scores

	Dependent variable: Thirds' Payoff Share					
		Triangle			*Three-line*	
	XXI	*XXII*	*XXIII*	*XXIV*	*XXV*	*XXVI*
SVO	1.754***	1.725***	1.729***	1.276**	1.140**	1.383***
	(0.332)	(0.325)	(0.326)	(0.393)	(0.371)	(0.407)
SVO (Strong)				0.488	0.885**	1.702***
				(0.339)	(0.307)	(0.437)
Period		-1.184**	-1.079+		-0.805*	-0.767*
		(0.434)	(0.601)		(0.325)	(0.381)
Order: IT follows ET		0.828	1.551		-2.849**	-2.742
		(1.205)	(2.669)		(1.079)	(2.392)
Order x Period			-0.252			-0.128
			(0.877)			(0.713)
Fixed structural position					2.864*	2.716*
					(1.116)	(1.091)
Fixed x SVO Strong						-1.733**
						(0.539)
Fixed x SVO Weak						-1.667+
						(0.876)
Constant	-1.903*	1.337	1.041	0.257	3.293**	3.245*
	(0.871)	(1.574)	(1.978)	(0.635)	(1.217)	(1.337)
Sigma	7.637***	7.425***	7.422***	6.459***	6.013***	5.852***
	(0.455)	(0.464)	(0.463)	(0.354)	(0.351)	(0.361)
Observations	215	215	215	224	224	224
F-test	27.88	12.95	9.847	7.043	10.82	8.252
Pseudo R-squared	0.031	0.043	0.043	0.014	0.045	0.058
Log pseudolikelihood	-340.9	-336.9	-336.8	-426.9	-413.5	-408.2

Tobit regressions, lower limit at zero. Robust standard errors in parentheses
In all six cases our model is significant at the $p < 0.01$ level
*** p<0.001, ** p<0.01, * p<0.05, + p<0.1
SVO describes the influence of a ten-degree increase of the SVO score on the points allocated to the third network member.
SVO (Strong) refers to the SVO score of a subject in the three-line in a structurally strong position.
Period describes a linear variable from period one to period five.
Order describes a dummy variable, which is equal to zero if the inclusive exchange mode came first and equal to one if the inclusive exchange mode followed the exclusive exchange mode.
Fixed structural position describes a dummy variable which is equal to zero if structural positions in the three-line network rotate and is equal to one if the positions are stable.

S.2. Additional figures

Figure S1. Payoff of third subject over time and treatment order



Each point displays the average payoff share and the standard error of the third subjects depending on the treatment. In period 1-5 the inclusive exchange mode came before exclusive exchange (IT-ET). In period 6-10 the exclusive exchange mode came before inclusive exchange (ET-IT).

S.3. Instructions translated from German to English

Instructions

Welcome to today's experiment! In the course of the experiment you will have the opportunity to earn money. Your earnings depend on the decisions made by you and the other participants of the experiment. It is important that you read the instructions carefully in order to gain a thorough understanding of the decision situations. In case anything seems unclear while reading or if you have any other questions, please raise your hand. We will attend to your questions in private.

Please do not ask your question(s) aloud. It is not allowed to share any information with other participants of the experiment. Neither is it allowed to speak with the other participants at any point during the experiment. Whenever you have a question, please raise your hand; someone will come to you and answer your question. Obeying these rules is very important for the scientific value of the experiment.

At the end of the experiment you will be paid individually, privately and in cash. How much you will earn depends on the decisions you and the other participants of the experiment make. The anonymity among the participants will of course be preserved throughout the entire experiment.

During the experiment we don't speak about Euros, but about points. After the experiment, these will be converted at the following exchange rate:

1 point = 0,80 Euros

1 point = 100 point-cents

You cannot influence the duration of the experiment by making your decisions fast, since we always wait for all participants. The experiment consists of two parts.

Experiment 1: Decision situations

First decision situation:

On six consecutive screens, you see different distributions of points between two persons. On each screen, you will have to choose one of the proposed options. Out of these six decision one is selected randomly and will then be paid to you and a second participant, whose identity you don't know. The same applies the other way round: You will also be assigned points resulting from another player's decision.

Profit (first situation) = own decision + decision of another participant

Second decision situation:

On the following screen you have to choose between two payoff variants under different conditions ten times. Out of these 10 decisions one will be chosen randomly for payoff.

Profit (second situation) = decision (selected from a lottery)

Profit (experiment 1) = profit (first situation) + profit (second situation)

You will find out at the end of the experiment which rounds were randomly chosen.

After the decision situations you will receive the instructions for the second part.

Experiment 2

In this experiment, we ask you to negotiate about the distribution of 24 points.

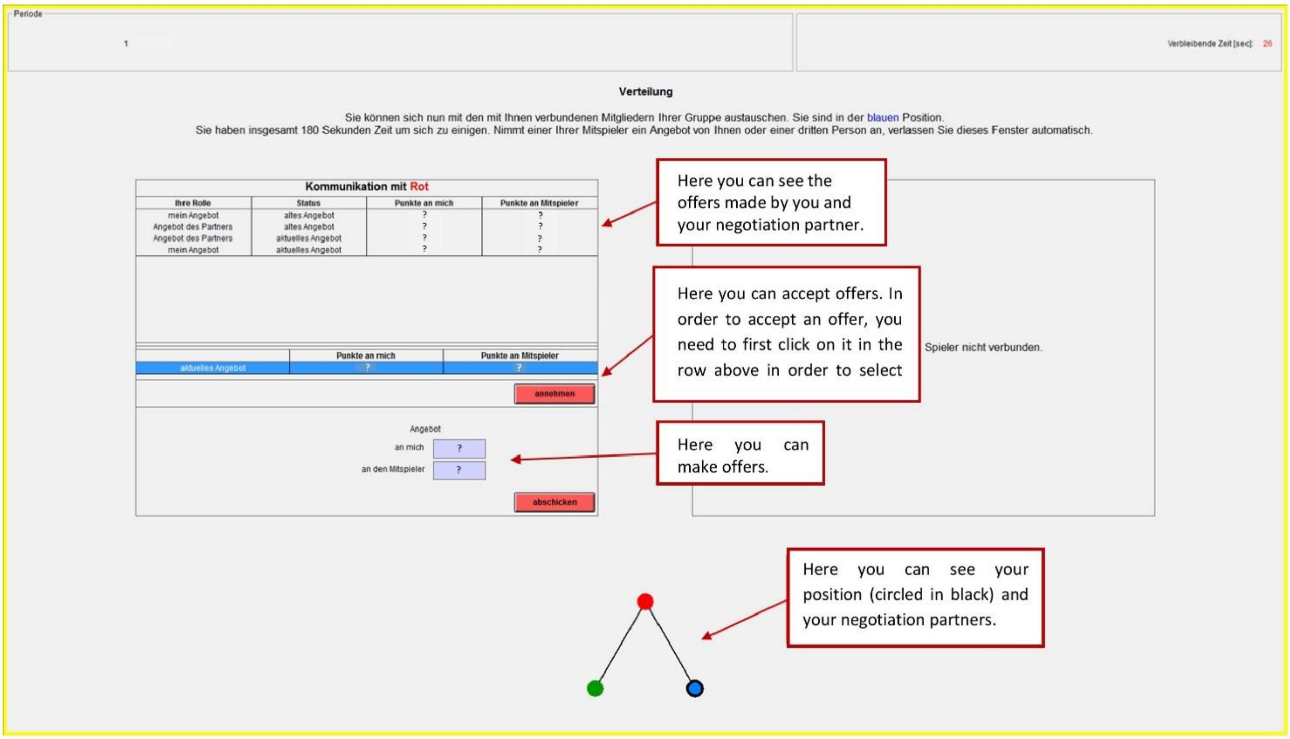
For this task you will be assigned to a group of **three persons**. The experiment consists of **10 rounds**. In each round, you will be assigned to a new group of three persons. For better orientation, the different persons in the groups of three are marked in the colours red, green and blue, these colours have no further meaning. The assignment to a group is determined randomly each round. Thereby the colour you were assigned may change from round to round.

In each round, you can negotiate about the **distribution of 24 points**. Depending on how you are connected with your group members, you can exchange offers with one or two persons in separate windows. In each round you have information about your communication possibilities and the communication possibilities of the other group members.

Communication takes place via input windows, in which you can send offers over the allocation of the 24 points to a player who is connected with you. You can send offers to and receive offers from the players who are connected with you. **Only after one minute has passed offers can be accepted**. Only the most recent offer can be accepted. You have altogether three minutes to come to an agreement. Within a group of three only one agreement can be reached. Thus, if your other two group members have come to an agreement, you cannot reach another agreement. The first met agreement between two players is therefore valid for all. If nobody is able to reach an agreement within three minutes, each of the members in your group will receive **zero points**.

At the end, only two out of the 10 rounds affect your earnings. Which of the rounds are chosen is determined randomly by the computer. Each of the rounds has the exact same probability to be selected as relevant for earnings. Thus, at the end of the experiment, **two rounds are chosen randomly as relevant for earnings** and you receive the amount of points resulting from the decisions in these rounds in Euros.

Profit (experiment 2) = points resulting from the distributions of two rounds


Periode
1
Verbleibende Zeit [sec]: 26
Verteilung
Sie können sich nun mit den mit Ihnen verbundenen Mitgliedern Ihrer Gruppe austauschen. Sie sind in der blauen Position.
Sie haben insgesamt 180 Sekunden Zeit um sich zu einigen. Nimmt einer Ihrer Mitspieler ein Angebot von Ihnen oder einer dritten Person an, verlassen Sie dieses Fenster automatisch.
Kommunikation mit Rot
Ihre Rolle
Status
Punkte an mich
Punkte an Mitspieler
mein Angebot
altes Angebot
Angebot des Partners
altes Angebot
Angebot des Partners
aktuelles Angebot
mein Angebot
aktuelles Angebot
aktuelles Angebot
annehmen
Angebot
an mich
an den Mitspieler
abschicken
Spieler nicht verbunden.
Here you can see the offers made by you and your negotiation partner.
Here you can accept offers. In order to accept an offer, you need to first click on it in the row above in order to select
Here you can make offers.
Here you can see your position (circled in black) and your negotiation partners.

11

End

The points earned in the different parts of the experiment are added up and converted to Euros with a factor of 0.80. This sum will be payed to you at the end of the experiment.

Payoff = profit (experiment 1) + profit (experiment 2)

At the end of the experiment there will be a questionnaire. Please take your time to fill in the questionnaire. For a completely filled in questionnaire you will receive 6 more points.

Summary Experiment 2

- 10 rounds in randomly assigned groups of three
- distribution of 24 points
- communication via offers, for 3 minutes
- only one agreement possible
- no points if there is no agreement
- payoff: 2 out of 10 rounds are randomly selected

6. Studie III

Making and Breaking Coalitions: Strategic Sophistication and Prosociality in Majority Decisions

Jan Sauermann, Manuel Schwaninger und Bernhard Kittel

Zeitschrift: European Journal of Political Economy

Status des Beitrags: In Begutachtung

European Journal of Political Economy

Making and breaking coalitions Strategic sophistication and prosociality in majority decisions

--Manuscript Draft--

Manuscript Number:	
Article Type:	Full Length Article
Keywords:	coalition formation; bargaining; majority rule; social preferences; strategic sophistication
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Abstract:	From a traditional rational choice perspective, coalitions are inherently unstable if collective decisions involve distributional conflicts. Empirically, however, many coalitions and distribution decisions seem rather stable. While traditional explanations for the empirical stability of coalitions refer to institutions, more recent theoretical developments argue that behavioral traits like actors' strategic sophistication and prosociality have stabilizing effects. In this study, we provide a first empirical test of this theoretical claim. In a laboratory experiment, we measure subjects' strategic abilities and their revealed social preferences. Then subjects are matched into three-person groups and play a real-time coalition formation game. Our data show that strategic subjects form more stable coalitions than myopic subjects. Prosocial subjects are more likely to agree on even allocations, and those allocations are more likely to last. Our results indicate that kind and strategically sophisticated people do not need institutions to reach stable coalitions that distribute resources evenly.
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Making and breaking coalitions: Strategic sophistication and prosociality in majority decisions

Jan Sauermann,[a] Manuel Schwaninger,[b] Bernhard Kittel[c]

Keywords: coalition formation; bargaining; majority rule; social preferences; strategic sophistication

JEL classification: C73, C78, C92, D63, D71, D91

This work has received generous funding from the Center for Social and Economic Behavior (C-SEB) at the University of Cologne. Financial support from the German Research Foundation (DFG) for the Cologne Laboratory for Economic Research is also gratefully acknowledged. We declare that there are no conflicts of interests that could inappropriately influence our work presented in the present manuscript.

This project was pre-registered under: Kittel, B., J. Sauermann and M. Schwaninger. 2018. "Making and Breaking Coalitions: The Influence of Prosociality and Rationality." AEA RCT Registry. April 06.
https://www.socialscienceregistry.org/trials/2859/history/27723

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Abstract

From a traditional rational choice perspective, coalitions are inherently unstable if collective decisions involve distributional conflicts. Empirically, however, many coalitions and distribution decisions seem rather stable. While traditional explanations for the empirical stability of coalitions refer to institutions, more recent theoretical developments argue that behavioral traits like actors' strategic sophistication and prosociality have stabilizing effects. In this study, we provide a first empirical test of this theoretical claim. In a laboratory experiment, we measure subjects' strategic abilities and their revealed social preferences. Then subjects are matched into three-person groups and play a real-time coalition formation game. Our data show that strategic subjects form more stable coalitions than myopic subjects. Prosocial subjects are more likely to agree on even allocations, and those allocations are more likely to last. Our results indicate that kind and strategically sophisticated people do not need institutions to reach stable coalitions that distribute resources evenly.

Highlights:

- We experimentally investigate coalition formation in a real-time free-form bargaining environment.
- We allocate subjects into groups according to their strategic abilities and prosocial motivations.
- Subjects who are strategically more sophisticated form more stable coalitions which exclude the third group member.
- Subjects who are more prosocially motivated distribute resources more equally and form more stable coalitions.

1 Introduction

If politics is about "who gets what, when, how" (Lasswell, 1936), then distributional conflicts form the very center of most political decisions. By definition, *democratic* decision making implies that these conflicts cannot be decided by a single individual, but some kind of collective agreement has to be reached that usually includes the support of at least a simple majority of the involved actors. Hence, in order to further their own interests, individual actors have to form and maintain coalitions with other actors in democratic decisions. In this paper, we focus on coalition building under majority rule and examine how the personality traits of decision-makers influence the stability of coalitions. The majority rule is arguably the most important democratic decision-making mechanism (Dahl, 1989; McGann, 2006), and questions concerning the formation and stability of coalitions under this rule have far-reaching normative implications for democratic theory.

From a traditional rational choice perspective, coalitions under majority rule are inherently unstable in distributional conflicts. Consider a group consisting of three individuals that have to divide a dollar among themselves in a free-form bargaining environment. The game lacks a unique equilibrium, as any three-way split of the dollar benefiting a majority can be supplanted by an alternative distribution of benefits.[1] Coalitions in the 'divide-the-dollar game' (DD-game) are generically unstable because some members of the current coalition have incentives to break the coalition and form a new one with some of the former losers. The instability problem also emerges in spatial voting models. When the policy space contains at least two dimensions,

[1] For instance, let us assume a status quo where the group divides the dollar equally among its members. The equal division (1/3, 1/3, 1/3) loses against the proposal (0.5, 0.5, 0) which is preferred by coalition members 1 and 2. This division also lacks stability as it can be beaten by proposal (0, 0.75, 0.25) through the votes of Player 2 and Player 3. Then, this proposal can again be defeated by the dollar's equal split, completing the voting cycle.

Condorcet winners or equilibria such as the core either do not exist or are highly fragile (Davis et al., 1972; Plott, 1967).[2] The so-called 'chaos theorems' demonstrate that, absent an equilibrium and given the appropriate voting agenda, majority rule may lead to any possible outcome and is, therefore, theoretically indeterminate (McKelvey, 1976; Schofield, 1978).

As Austin-Smith and Banks (1999, 184) note, the chaos theorems do not necessarily imply that "anything can happen". In particular, the theorems do not directly predict unstable majorities with group decisions cycling over all alternatives. They rather identify several structural and behavioral factors that affect the probability of the occurrence of majority instability. Contemporary research predominantly focuses on the structural conditions of coalition building (for an overview see Strøm et al., 2008). The literature is dominated by institutional and game-theoretic approaches that consider coalition building as a game being played between strategic actors (Humphreys, 2008; Riker, 1962). The most important examples are rules of government formation, the scheduling of elections, and the assignment of agenda-setting power within the government (e.g. Laver and Schofield, 1998; Laver and Shepsle, 1996). Another line of research relaxes the assumption that voting is costless. Bräuninger (2007), for example, introduces decision costs in the theoretical analysis and examines the effects thereof on the stability of majority coalitions, which can guarantee stable majority decisions near the center of the policy space.

In this paper, we focus on another important but mostly neglected aspect, namely, the *behavioral conditions* for the instability of majority rule. The chaos theorems make two assumptions about individual behavior that possibly impact the volatility of coalitions. First, individuals exhibit only limited strategic sophistication and *choose myopically* between alternatives at each stage of the decision process. Thus, they do not consider the long-term

[2] A Condorcet winner is an alternative that beats any other alternative in a pairwise vote while an alternative in the core cannot be beaten by any other alternative.

consequences of their choices but vote for the alternative that offers them the highest immediate benefit. Second, in most empirical applications of the theorems, individuals are assumed to be *self-interested* and strictly aim to maximize monetary payoffs (e.g. Riker, 1982). Hence, fairness, justice, or efficiency are not included in the analysis as decision motives.

We report results from a laboratory experiment in which we first measure subjects' strategic sophistication in a guessing game and their level of prosociality in a dictator game. Afterwards, subjects are placed in three-person groups to play a real-time coalition formation game developed by Tremewan and Vanberg (2016). The game introduces only a minimal institutional structure and thus offers an ideal setting for investigating the effects of strategic abilities and prosociality on the stability of coalitions. We find that subjects' strategic ability and their distributional preferences have a systematic effect on the stability of coalitions and the distribution of payoffs. In groups consisting of predominantly myopic and self-interested group members, subjects continuously form and dissolve new coalitions that are scattered across the whole policy space. However, when group members are more strategically sophisticated and prosocially motivated, coalitions become more stable. The coalitions concentrate on focal points representing even distributions. While sophisticated and self-interested players are more likely to form stable majoritarian two-person coalitions that share the payoffs equally between themselves, prosocial players are significantly more likely to agree on coalitions that distribute payoffs equally among all three group members.

The remainder of the paper is structured as follows. In the following section, we review the related theoretical and empirical literature. Section 3 describes our experimental design and section 4 presents the experimental results. Section 5 concludes the paper.

2 The influence of strategic sophistication and prosociality in majority decisions

There is disagreement in the literature concerning the interpretation of the theoretical indeterminacy of majority rule demonstrated in the so-called chaos theorems (McKelvey, 1976;

Schofield, 1978). Riker (1982) is the most prominent proponent of a position of democratic irrationalism. He argues that the indeterminacy of democratic decisions renders, in theory, all collective choices arbitrary and essentially meaningless. Therefore, the outcome of democratic decision making might not depend on voters' preferences, but on manipulations of the voting mechanism via strategic voting, agenda control, or the introduction of new dimensions into the policy space. In the absence of an equilibrium, "wide swings in political choices are possible and expected" (Riker, 1982, 188). Mackie (2003), however, shows that empirical evidence for the indeterminacy of collective choices is in fact rare and rests on mistaken inferences about individual preferences. Hence, he concludes that majoritarian decisions are less chaotic and arbitrary than predicted by theory. The apparent absence of endless cycling of democratic decisions demands explanation (Tullock, 1981). In the following, we focus on the influence of voters' strategic abilities and prosocial motivations on the stability of majority decisions.

2.1 Strategic sophistication in coalition bargaining

Early contributions within the rational choice paradigm tend to assume that actors are myopic and aim to maximize their immediate payoffs.[3] As an example, consider a continuous DD-game in which three players bargain repeatedly via simple majority rule over how to divide a fixed amount of payoffs. In a pure distribution game such as the DD-game, a stable outcome cannot be determined because the core is usually empty (Gillies, 1959). Without a core, the predicted set of outcomes is typically equal to the feasible set in the DD-game, because players that behave myopically accept any offer that increases their immediate payoffs.

[3] Pure game theorists and spatial modelers usually make no explicit assumption about the substance of individual preferences. In empirical applications of bargaining models, however, researchers usually employ a traditional rational choice model assuming self-interested individuals which maximize their own payoff.

Thus, the distribution agreement of a coalition at any point in time might be considered arbitrary. Nevertheless, a continuous time horizon implies additional analytical insights. If equally strong players constantly form new coalitions that sequentially benefit two of the three players, we can expect that players' payoffs equalize in the long run (e.g. McGann, 2004; Miller, 1983). In turn, anticipating that myopic behavior leads to equal long-term payoffs could imply that any stable coalition which provides a higher payoff share than one third to two of the players could be mutually beneficial to both of them in the long run. One obvious candidate for such a long-term coalition is the two-way split, which is the even focal point (Schelling, 1960) between two of the three players and the prediction of several cooperative solution concepts (e.g. Aumann and Maschler, 1964; Binmore, 1985; Davis and Maschler, 1965).

To preserve stable long-term coalition agreements and to ignore myopically payoff optimizing coalition offers requires a considerable level of strategic sophistication. The likelihood that such a strategy is played depends not only on the players' own analytic understanding but also on the players' beliefs over other players' understanding of the game. Only if players anticipate that majorities will rotate when all players behave myopically and believe that other players anticipate this too, they can be expected to form stable coalitions in continuous time. Recent experimental evidence suggests that more intelligent players are indeed more likely to ignore myopic payoffs and to remain in a stable cooperation in the iterated Prisoner's Dilemma (Proto et al., 2019). Continuous coalition formation is arguably more complex than an iterated Prisoner's Dilemma, but players with higher cognitive abilities are also more likely to play cooperatively when strategies become increasingly more complex (Jones, 2014). In the continuous DD-game, Tremevan and Vanberg (2016) find that the even two-way split of payoffs is among the most stable distributions. Their experiment, however, does not elicit the players' strategic sophistication and, thus, cannot link the stability of coalitions to the cognitive abilities of the coalition members.

Similarly, several theoretical contributions demonstrate that players' strategic foresight can reduce the stable bargaining set in various forms of the DD-game (Chwe, 1994; Miller, 1980; Penn, 2009). While coalitions may not necessarily be more stable, this line of work certainly predicts that an increased cognitive ability reduces the expected outcome swings. Yet, predictions crucially depend on the definition of farsightedness. Different definitions may even lead to predictions which directly oppose each other (e.g. Harsanyi, 1974; Ray and Vohra, 2015). So far, "[i]t is by no means obvious how the classical theory should be modified to account for farsightedness" (Dutta and Vohra, 2017, 1192) and, therefore, how to elicit foresight empirically. Furthermore, the models typically assume either strictly myopic or strictly farsighted behavior and do not account for players' heterogenous strategic abilities, which we observe empirically. Hence, in this paper we focus on the notion of strategic sophistication rather than farsightedness.

Overall, some theoretical work and especially empirical findings of iterated games suggest that more sophisticated players are more likely to form stable coalitions with other equally sophisticated players than players with lower strategic abilities. We take an empirical approach to investigate the consequences of different levels of players' strategic sophistication on outcomes and stability in the continuous DD- game. With respect to the stability of coalitions, we test the following hypothesis:

Hypothesis 1: The stability of coalitions under majority rule increases when group members' level of strategic sophistication increases.

With respect to bargaining outcomes and the expected distributions of payoffs, the theoretical literature does not yet suggest an unambiguous hypothesis, except that any stable coalition must distribute at least one third of the payoffs to each coalition partner. Yet, our results potentially reveal important insights and can inform future theoretical developments.

2.2 Prosociality in coalition bargaining

A second strand of the literature takes issue with the assumption that players are strictly self-interested. Theoretical models demonstrate how prosocial preferences can promote the stability of coalitions in majority decisions. Wittman (2003), for example, argues that individuals are motivated by both self-interest and altruism, and certain levels of altruism create conditions for stability in majority decisions. If altruistic preferences are sufficiently strong, cyclic majorities can be prevented because equally distributed alternatives become stable voting equilibria (see also Mackie, 2003, 99-108).[4]

In the three-player DD-game, sufficiently strong social preferences transform majority decision making into a game with overlapping outcome preferences and essentially guarantee the existence of a core. If the three-way equal split is the interior solution of the utility function of at least two players, then these two players agree on the three-way equal split and will never depart from it, since it is the single undominated payoff distribution (Schwaninger, 2020). Frohlich and Oppenheimer (2007) develop a more general theory on the influence of prosocial motivations in majority decisions. In their model, individuals oppose injustices and experience them as a utility-decreasing burden. Hence, individuals face a possible trade-off between material self-interest and fairness. Voters differ in their evaluation of this trade-off and can be ordered according to the strength of their prosocial motivations. Under majority rule, the voter holding the median position (median according to the strength of her social preferences) is decisive. When deciding between a given status quo and an alternative proposal, the median voter evaluates her personal payoffs as well as the fairness properties of both alternatives. When her marginal costs from an increase in injustice exceed her marginal gains in utility from higher

[4] From a game theoretical perspective, social preferences transform majority decision making into a game with overlapping outcome preferences, without actual conflict and, hence, induce a core and a unique equilibrium.

income, she will vote for the status quo. Stable equilibria arise when the median group member cannot get positive individual net benefits from any other alternative. Hence, the likelihood of the existence of an equilibrium, and therefore stability, increases with the strength of prosocial preferences of the members in the group. This is the foundation of the second hypothesis:

Hypothesis 2: The stability of coalitions under majority rule increases with the strength of group members' prosocial motivations.

While several experimental studies provide evidence for the influence of fairness motives in collective decision-making (Eavey, 1991; Eavey and Miller, 1984; Sauermann, 2018, 2021; Sauermann and Kaiser, 2010), the stability of equal or fair outcomes has received much less attention. In their seminal study on majority decision making, Fiorina and Plott (1978) find that group decisions do not scatter across the two-dimensional decision space of the experiment. Instead, choices cluster in the central area of the policy space. In a more recent series of experiments, Sauermann (2016, 2020) studies committees with fixed preferences that make multiple decisions over time. He finds that the absence of an equilibrium is not associated with increased majority rule instability. Instead, conflicting preferences lead to more instability irrespective of the existence of an equilibrium. Only when the action space is limited to the two-way and three-way even splits, players are more likely to behave selfishly and myopically (Battaglini and Palfrey, 2012). To the best of our knowledge, the current study is the first investigating the behavioral conditions for the stability of majority decisions.

3 Experimental design

To investigate the influence of myopic and self-interested behavior on the stability of majority coalitions we design an experiment consisting of two parts. In the first part, subjects play two games – a *guessing game* and a *dictator game* – to measure their strategic sophistication and to elicit the strength of their prosocial motivations. In the second part, subjects are matched into three-person groups based on their decision in the guessing game or the dictator game and *bargain* over a distribution of payoffs. The matching procedure ensures that variance of individual traits between the different groups is maximized. We use a slightly modified version of the unstructured bargaining game with continuous payments developed by Tremewan and Vanberg (2016, 2018) to measure the stability of coalitions under a minimal bargaining protocol.[5] Subjects earn tokens in both parts of the experiment, which are converted into money at a rate of 1 Euro per 600 tokens after the conclusion of the experiment.

3.1 Part 1: Measuring subjects' strategic sophistication and prosociality

In the first part of the experiment, we elicit the relevant exogenous traits of the subjects. In order to minimize the potential impact of demand effects on the later bargaining game, we measure *prosociality* first. We gather data on the subjects' willingness to give up their own payoff to the benefit of others. The most suitable game to elicit other-regarding preferences while controlling for strategic reasoning is the dictator game. We implement the strategy method of the three-player version of the game in which each player is matched into a group of three players and decides how to allocate a fixed payoff of 5,400 tokens between herself and two other unknown players (e.g., Selten and Ockenfels, 1998). One dictator and two recipients, i.e., three players, mirror the group size in the subsequent negotiations and inform us about the individually preferred distribution. At the end of the experiment, one of the three players is randomly selected and the payoff is distributed and paid according to her decision. Numerous studies show that individual behavior is usually not in line with the assumption of economic self-interest (Engel, 2011). The amount allocated to other group members as a dictator serves

[5] We are very grateful to James Tremewan and Christoph Vanberg for sharing the original z-Tree code of their experiment with us.

as our estimate of an individuals' prosociality. Hence, we attribute higher levels of prosociality to subjects the more they allocate to the other two group members in the dictator game.[6]

In the next step, we measure subjects' *strategic sophistication*. We draw on the theoretical framework of the *QLk* model (Stahl and Wilson, 1994) to distinguish among different levels of sophistication. The model is based on the assumption that individuals anticipate the reasoning of other players and play their best response accordingly. To measure individual strategic thinking, we use the behavior in the guessing game. In our parametrization of this game, every player has to state a number between 0 and 100. To determine the winning number, the stated numbers are summed, divided by the number of players in the game, and multiplied by 0.6. The goal of this game is to guess the number closest to the winning number.[7] The game is played among all subjects of an experimental session, and the winning subject earns 5,400 tokens.

According to the theoretical model, a player who does not take the actions of others into account will pick a random number from the interval [0 ;100]. Hence, the expected value of the guesses of non-strategic individuals is 50. Now, a player who anticipates others to be non-strategic will multiply the expected average by 0.6 and state 30, which is a player of level-1 type. A player who anticipates other players to be level-1 types, will again multiply 30 by 0.6 and state 18, which is called level-2 type. This reasoning can be iterated (level k) until the unique Nash-equilibrium is reached, according to which every player states 0.

[6] Similar to the display of the policy space in the later negotiation stage, the participants decide how much they want to transfer to the other two players in the dictator game by clicking on the preferred distribution on a screen that displays a range of possible distributions (similar to Figure 1).

[7] If two or more players guess the same winning number, the computer picks the winner randomly from among them.

Empirical studies show that players rarely play the equilibrium (Nagel, 1995). We exploit this fact to use the stated number as a proxy for a subjects' strategic sophistication. In general, we consider a subject's strategic sophistication higher the lower their stated number in the guessing game is. A very important feature of the game is that the decision in the game does not only depend on the reasoning ability but also on the belief about others' reasoning abilities (Agranov et al., 2012; Jin, 2020). This is exactly what we want to measure to predict the behavior in the bargaining game, since we hypothesize that stable coalitions depend on both of these factors. Furthermore, experimental studies have shown that the behavior in the guessing game correlates significantly with higher scores in the cognitive reflection test (Brañas-Garza et al., 2012) and broader cognitive abilities (Carpenter et al., 2013), which allow us to refer more broadly to the intelligence of the subjects. [8] Subjects do not receive information about their payoff from the first part of the experiment nor do they receive information about the decisions of other subjects until the end of the experiment.

3.2 Part 2: Negotiations with continuous payments

In the second part of the experiment, subjects are assigned to three-member groups and play a bargaining game. To examine the influence of behavioral traits on coalition formation, we employ an unstructured bargaining protocol developed by Tremewan and Vanberg (2016, 2018), which mirrors as closely as possible the frictionless decision environment assumed in the chaos theorems and introduces only minimal institutional restrictions. In our parametrization of the game, groups bargain in real-time over the distribution of 7,200 tokens.

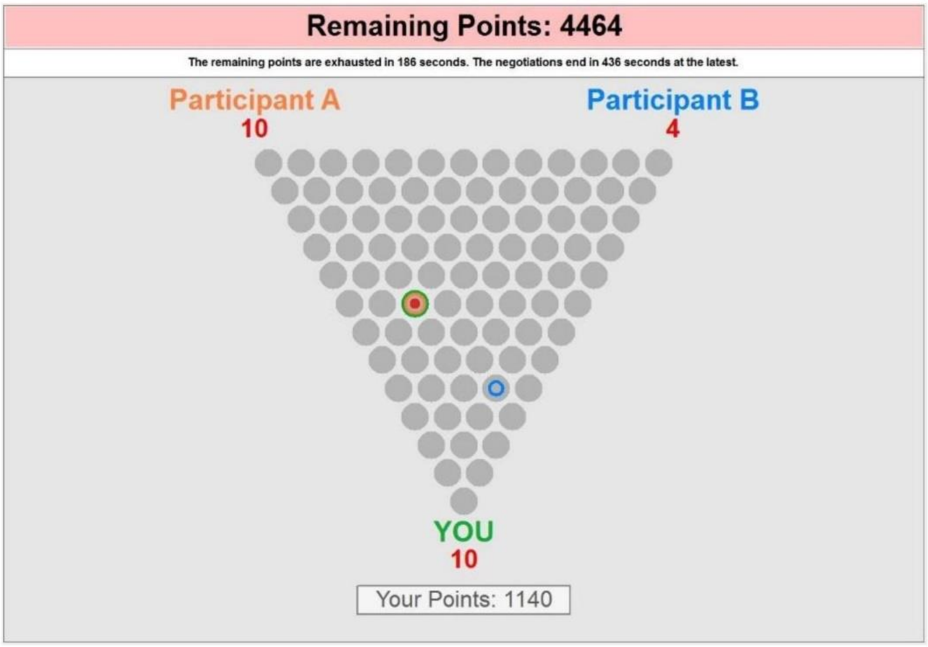
[8] Also, we utilized the guessing game because strategic sophistication is not persistent across all families of games (Georganas et al., 2015), which makes it even more important to draw on an extensively studied game that is known to correlate with cognitive abilities.

Real-time means that payoffs flow as long as at the subjects find an agreement and payoffs do not flow at any moment they disagree. Groups do not distribute the whole endowment at once, but payoffs flow continuously at one-second intervals at a rate of 24 tokens per second for up to 300 seconds (5 minutes).

Groups choose distributions by majority rule. Hence, tokens only flow if at least two group members agree on a certain allocation. Group members can make any offer about distributions of payoffs and change it as often as they want. Making an offer is costless and unrestricted. Hence, subjects can form and dissolve coalitions at any point in time. If no majority of group members agrees on a distribution, the flow of tokens is interrupted and payoffs are not allocated. The whole bargaining process stops after ten minutes at the latest, even if the 7200 tokens have not been fully distributed during that time span. Hence, efficiency does not decrease for the first five minutes if there is disagreement. Beyond five minutes of disagreement, it is costly for the group if no coalition forms.

Figure 1 displays a screenshot of the two-dimensional graphical interface for the bargaining game. Subjects can offer and agree on allocations by clicking on the circles, which represent a finite set of feasible outcomes. Each corner represents a player and the closer a circle is to a player's corner, the higher that player's payoff. During the whole bargaining game, subjects are informed about the tokens earned so far, the remaining number of tokens to be distributed, and the remaining time. The design essentially excludes any proposer power, giving equal bargaining power to all three subjects. According to classic social choice theory, the outcome of this game is unpredictable and any outcome is unstable as any allocation in our bargaining interface is majority-preferred by alternative allocations.

Figure 1. Bargaining interface



In order to systematically analyze the influence of strategic sophistication and prosociality in these negotiations, we matched the three-person groups according to the subjects' behavior in Part 1 of the experiment. One half of the subjects were matched into three-person groups based on the stated number in the guessing game. We maximized between-group variance by matching the most strategically sophisticated subjects into groups and the most myopic subjects into other groups. The other half of the subjects were assigned into groups by matching them according to their behavior in the dictator game. Hence, subjects with the largest offers are matched with similarly prosocial subjects, and subjects with small offers form groups with other egoistic subjects.[9] If the strategic sophistication and the prosociality of subjects affect the stability of coalitions, groups that consist of subjects who stated lower numbers in the guessing

[9] Subjects were not aware of the matching procedure and simply told that they would interact in three-person groups in part 2 of the experiment.

game or who transferred higher amounts in the dictator game should be more likely to form stable coalitions.

3.3 Additional measurements and procedures

After completing Part 1 and 2 of the experiment, we gather further information about the individual characteristics and attitudes of our subjects.[10] Subjects completed a questionnaire including several socio-economic items such as gender, age, the country in which they have lived longest, their field of study, the number of completed semesters, and the number of experiments they have participated in, as well as questions related to risk-aversion, trust, reciprocity, and political attitudes.[11]

Subjects were all provided with written instructions. Instructions for the second part of the experiment were handed out only after the two games of the first part were finished. Subjects knew that the experimental sessions would consist of several parts, but they did not know the contents of the following parts before the respective instructions were provided.[12]

In sum, we conducted six sessions with 27 or 30 subjects each at the Cologne Laboratory for Economic Research in May 2018, resulting in a sample of 177 subjects. Subjects were all students registered at the University of Cologne. The experiment was computerized using the software z-Tree (Fischbacher, 2007) and the subjects were recruited using the software ORSEE (Greiner, 2015). Experimental sessions lasted about 1 hour and the subjects earned EUR 16.21 on average, including a show-up fee of EUR 4.00.

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[10] Subjects played a second coalition formation game after the second part in which they distributed another 7200 tokens with a slightly different design. We do not report the results of this game in this paper.

[11] Subjects received 600 tokens for filling in the post-experimental questionnaire.

[12] An English translation of all instructions can be found in the supplementary materials.

4 Results

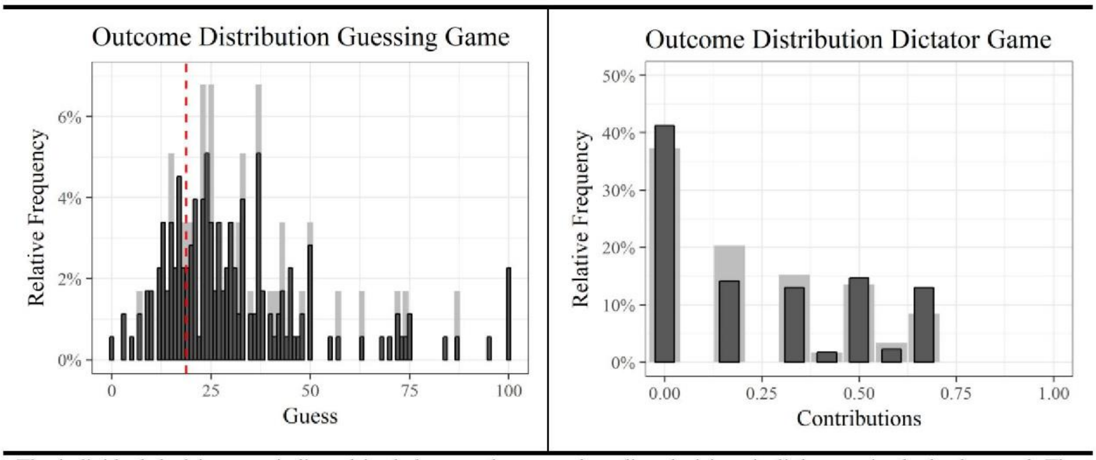
In this section, we examine how the individually revealed levels of strategic sophistication and prosocial preferences affect the bargaining outcomes. First, we describe the distribution of subjects' strategic abilities and prosociality in the sample. Then we give an overview of the overall bargaining outcomes before we divide the coalitions into categories and examine their chosen distributions and the duration of agreements. Finally, we examine the effect of the groups' median preferences on the chosen distributions and the stability of the bargaining agreements.

4.1 Individual strategic sophistication and prosociality

Figure 2 shows the distribution of guesses in the guessing game and the distribution of transfers in the dictator game. In the guessing game subjects guessed on average 31.2 (a person who thinks one step ahead should guess 30) and the average winning number is 18.7. A guess of zero, the Nash equilibrium, is made only once while guesses of 18 or less are made by over a quarter (26.6 percent) of the subjects. Nine percent of the subjects submit guesses above 60, which cannot be the winning number by definition and can be considered irrational. The results mirror previous experimental results relatively closely (e.g. Nagel, 1995).

In the three-person dictator game, subjects transferred on average 24.7 percent of the endowment of 5,400 tokens to the other two recipients. 41.2 percent of the subjects transferred nothing, while 13.0 percent transferred two-thirds of the tokens to equalize payoffs among the three group members. As for the dictator game, these findings closely replicate the results of previous studies (e.g., Selten and Ockenfels, 1998). The correlation between the stated numbers in the guessing game and transfers in the dictator game is 0.21 (Pearson correlation, $p < 0.01$), which means that people who exhibit higher levels of prosociality tend to be less strategically sophisticated on average. Vice versa, people who are more strategic also tend to be more selfish, which matches the concept of *homo oeconomicus*.

Figure 2. Revealed personality traits



The individual decisions are indicated in dark grey, the groups' median decisions in light grey in the background. The average winning number in the guessing game is indicated by the red, dotted line.

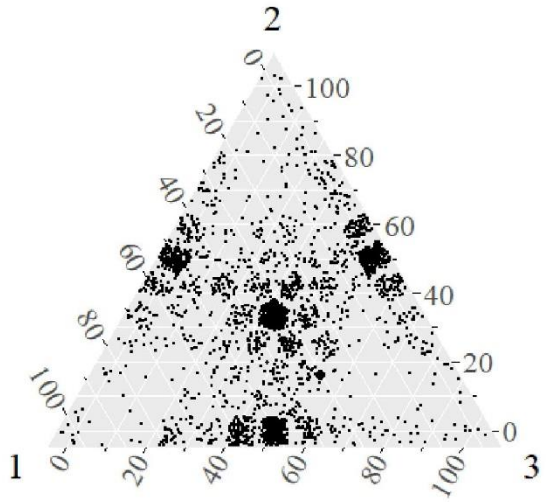
4.2 Bargaining outcomes

To get an overview over the outcomes of the unstructured coalition formation game, we describe the frequency and stability of the coalition agreements.[13] Each of the jittered dots in

[13] In the following analysis we exclude any coalition that is not payoff relevant, i.e. any coalition that dissolved before payoff could flow. Furthermore, we measure the length of any coalition in terms of payoff relevant tokens. In sum there are 300 tokens, just as many as payoff relevant seconds. However, the real time does not match the tokens perfectly due to rounding errors. Even though, we use the term 'seconds' to simplify the language for the reader when we talk about the length of a coalition in the text, we actually mean 'payoff relevant tokens'. Moreover, when a third group member joins an existing coalition, we do not count this as a new separate

Figure 3 represents an observed agreement in the policy space, whereby dots closer to a player indicate that this player obtained relatively more payoff from the agreement and larger dots indicate that the agreement remained stable for relatively longer periods. While many of the agreements are unsystematically scattered around the whole policy space, Figure 3 also shows that a considerable number of agreements cluster around the even two-way and the even three-way split.

Figure 3. Bargaining outcomes



The jittered dots indicate agreements, which are relatively larger the longer they sustained. The three axes show the payoff share of the agreement of each individual in percent.

In the following analysis we examine the stability and frequency of coalitions in four agreement categories: The even two-way split of the 24 tokens (12-12-0) and the even three-way split (8-8-8), which both serve as important theoretical and empirical focal points, the uneven two-way split, and the remaining uneven three-way splits (Tremewan and Vanberg,

coalition. The reason is that third group members who continuously join and leave an existing coalition shorten the length of a coalition arbitrarily without ever changing the actual payoffs.

2016). Furthermore, we summarize the different characteristics of these coalition types: The number of different agreements, the average duration of these agreements, and the overall frequency of agreements, which describes the average proportion of time in which these coalition types are implemented.[14]

Table 1. Frequency and duration of coalition types.

Division type	Number of agreements	Average duration	Relative frequency
12–12–0	699	7.07	0.28
8–8–8	321	20.23	0.37
Uneven two-way	751	3.57	0.15
Uneven three-way	869	4.12	0.20
Two-way	1450	5.26	0.43
Three-way	1190	8.47	0.57
Total	2640	6.71	1.00

Average duration is measured in payoff relevant seconds, the frequency is given in relative shares.

Table 1 describes these characteristics for each coalition category. Whereas the number of agreements within the coalition types alone do not offer clear insights, we see that the three-way even split (8-8-8), with an average duration of 20.23 seconds, is significantly more stable than all other coalition types (pairwise Mann-Whitney tests, each $p < .01$).[15] With 7.07 seconds on average, even two-way splits (12-12-0) are the second-most stable coalitions. In comparison, uneven three-way and two-way splits have a relatively short ‘life span’ and dissolve on average after 4.12 and 3.57 seconds. However, if we do not differentiate further between the abilities and preferences of the coalition members, even two-way splits do not last significantly longer

[14] The frequency is calculated by multiplying the number of different agreements divided by the total number of agreements, with the average duration of the coalition type divided by the average duration of all coalitions.

[15] All reported *p*-values refer to two-sided tests.

than the uneven coalition types. Accounting for the duration of even coalition types, the even two- and three-way splits are also the most frequent coalitions. These coalition types determine the payoffs in 28 and 37 percent of the whole bargaining time.

Concerning the distribution of payoffs, the data reveal that the groups are all able to distribute the available payoffs within the time limit, which means that the available resources are efficiently used. Inequality, measured as the range of payoffs, increases over the full course of the coalition formation game from 5.29 in the first to 7.82 points in the last minute of the bargaining game on average (Pearson correlation 0.29, $p < 0.01$).[16] Throughout the bargaining game, the observed inequalities of individual agreements partly equalize, as coalition membership changes and groups sometimes alternate between different agreements. In comparison, the average agreement during the negotiations has a range of 7.26 points, while the average range of the final accumulated payoff distribution amounts to 3.01 points. Nevertheless, final and average inequality significantly correlate within groups (Pearson correlation, 0.63, $p < 0.01$), which means that the micro inequalities still determine the inequality of the final distribution.

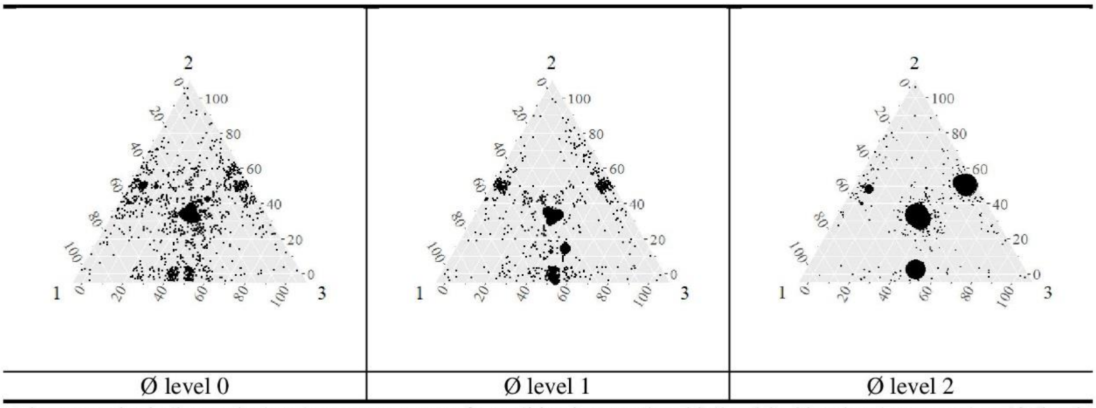
4.3 Coalitions: The influence of strategic sophistication

In the next step of our analysis, we utilize the results from the guessing game to examine the influence of subjects' strategic abilities on the bargaining results. We categorize all payoff-relevant coalitions formed during the experiment according to the average guess of its members in the guessing game. We distinguish three different types of coalitions and compare their

[16] The range of payoffs correlates strongly with the variance of payoffs and the Gini coefficient, but it has the advantage of accounting for all interpersonal payoff differences, i.e. $\max(x_i, x_j, x_k) - \min(x_i, x_j, x_k) = \frac{1}{2}\left(|x_i - x_j| + |x_i - x_k| + |x_j - x_k|\right)$.

agreements. Figure 4 shows the distribution of agreements in the policy space for coalitions categorized into *level 0* (average guess > 30), *level 1* (average guess ≤ 30 and > 18), and *level 2* (average guess ≤ 18). Coalitions that are categorized as myopic (left panel) are relatively close to the prediction that outcomes are randomly scattered across the policy space. However, with an increasing ability to anticipate and process others' behavior, coalition agreements are increasingly more patterned. Agreements between more strategically sophisticated individuals concentrate on focal points, as observed in the right panel of Figure 4.

Figure 4. Coalitions separated into average level of strategic sophistication



The categories indicate whether the average guess of a coalition is more than 30 (*level 0*), 30 or less but more than 18 (*level 1*), or 18 and less (*level 2*). The jittered dots indicate agreements, which are larger the longer they sustained. The three axes show the payoff share of the agreement of each individual in percent.

Table 2 quantifies the results illustrated in Figure 4. When we account for the measured strategic sophistication of coalitions and compare bargaining outcomes, we see that level-0 coalitions dissolve significantly faster than level-1 coalitions (Mann-Whitney test, $p < .01$). Level-0 coalitions are also more likely to implement uneven divisions (43 percent) than level-1 (33 percent) and level-2 (25 percent) coalitions. As mentioned, these coalitions are the relatively unstable coalitions. In contrast, level-1 and level-2 coalitions agree in two-thirds and three-quarters of the time on even payoff splits. Differences between level-1 and level-2 are more subtle. While the coalitions do not become more stable overall, even two-way splits become significantly more stable in level-2 coalitions (Mann-Whitney test, $p < .01$). In fact, even two-way splits of level-2 coalitions last three times as long as two-way splits of level-0 and level-1 coalitions. In contrast, even three-way ($p = .06$, $p < .01$) and uneven three-way ($p < .01$, $p < .01$) splits dissolve significantly earlier.

Table 2. Influence of strategic sophistication on the frequency and stability of divisions.

	Average guess of the coalition							
Division type	Average duration				Frequency			
	Total	level 0	level 1	level 2	Total	level 0	level 1	level 2
12–12–0	7.07	6.00	5.42	18.47	0.28	0.20	0.29	0.43
8–8–8	20.23	22.35	22.79	13.28	0.37	0.38	0.38	0.32
Uneven two-way	3.57	2.53	5.40	4.21	0.15	0.16	0.15	0.15
Uneven three-way	4.12	3.60	7.19	2.26	0.20	0.27	0.18	0.10
Two-way	5.26	3.74	5.41	9.94	0.43	0.35	0.44	0.57
Three-way	8.47	7.04	13.36	6.04	0.57	0.65	0.56	0.43
Total	6.71	5.38	8.11	7.80	1.00	1.00	1.00	1.00

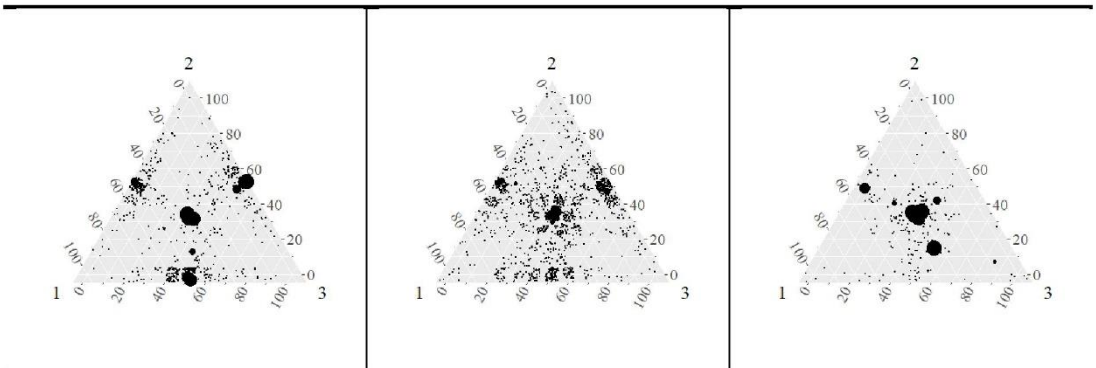
The *level of strategic foresight* indicates whether the average guess of a coalition is more than 30 (39.8 percent), 30 or less but more than 18 (41.2 percent), or 18 and less (19.0 percent).

Supporting hypothesis 1, the data suggest that coalitions formed by more strategically sophisticated individuals are more likely to agree on even divisions, which are more stable. When strategic abilities in coalitions increases from level 1 to level 2, individuals tend to maintain stable two-way splits which exclude the third individual. However, overall stability does not increase further because even three-way splits, which are not ‘coalitionally rational’ (Aumann and Maschler, 1964), dissolve earlier.

4.4 Coalitions: The influence of prosociality

We now turn to coalition formation and maintenance in groups matched on the basis of its members’ transfers in the dictator game in the first part of the experiment. Figure 5 shows the distribution of coalitions categorized into *self-interested* (average transfer = 0), *intermediate* (average transfer > 0 and ≤ 1/3), and *prosocial* (average transfer ≥ 1/3). The variance of outcomes is highest for intermediate coalitions, whose decisions are more scattered across the whole policy space, although the pattern reveals the even focal points. The agreements of self-interested and prosocial coalitions clearly cluster around the even focal points. Self-interested coalitions agree more often on even two-way splits (12-12-0) in comparison to intermediate coalitions. For prosocial coalitions the even three-way split stands out. Most prosocial coalitions agree on the equal division of payoffs (8-8-8) or distributions close to the equal split, whereas they rarely choose even two-way splits. Hence, egoistic subjects are more likely to form coalitions that exclude the third group member from the distribution of benefits, whereas prosocial subjects opt for even distributions of payoffs.

Figure 5. Coalitions separated into average level of prosociality



Self-interested	Intermediate	Prosocial

The categories indicate whether the coalition members each transferred nothing in the dictator game (*self-interested*), the coalition transferred on average a positive amount but less or equal than one third (*intermediate*), or the coalition transferred more than one third (*prosocial*). The jittered dots indicate agreements, which are larger the longer they sustained. The three axes show the payoff share of the agreement of each individual in percent.

Table 3 summarizes the results regarding the duration and relative frequency of coalitions. Coalitions with intermediate social preferences persist on average for 4.82 seconds, which are the least stable coalitions (pairwise Mann-Whitney tests, $p = .02$, $p < .01$). The outcomes of these coalitions are relatively equally distributed across the four agreement categories. In contrast, self-interested coalitions form even two-way splits in 46 percent of the time and exclude the third player from any payoffs in 64 percent of the time. Prosocial coalitions represent the other extreme. They form even three-way splits in 64 percent of the time as they persist much longer than the average agreement (on average 38.46 seconds). Accounting for all types of three-way splits, prosocial coalitions include the third group member in 90 percent of the time. Unsurprisingly, prosocial coalitions also survive significantly longer than intermediate coalitions (Mann-Whitney test, $p < 0.01$) and on average about three times longer than self-interested coalitions (Mann-Whitney test, $p < 0.01$).

Table 3. Influence of prosociality on the frequency and stability of divisions.

Division type	Average transfer of the coalition							
	Average duration				Frequency			
	Total	[0.00]	[.01, .33]	[.34, .67]	Total	[0.00]	[.01, .33]	[.34, .67]
12–12–0	7.07	7.12	6.26	21.44	0.28	0.46	0.29	0.08
8–8–8	20.23	25.54	10.63	38.46	0.37	0.23	0.27	0.64
Uneven two-way	3.57	3.12	3.87	3.97	0.15	0.18	0.22	0.03
Uneven three-way	4.12	4.59	2.78	9.01	0.20	0.12	0.22	0.26
Two-way	5.26	5.23	4.95	10.02	0.43	0.64	0.51	0.10
Three-way	8.47	9.97	4.70	19.80	0.57	0.36	0.49	0.90
All	6.71	6.30	4.82	18.01	1.00	1.00	1.00	1.00

The *average transfer of the coalition* indicates whether the coalition members each transferred nothing in the dictator game (29.6 percent), the coalition transferred on average a positive amount but less or equal than one third (41.5 percent), or the coalition transferred more than one third (28.9 percent).

Consistent with hypothesis 2, the data reveal that self-interested coalitions are more likely to limit the distribution of benefits to two group members, while prosocial coalitions usually distribute payoffs equally among all group members. Since the even three-way split aligns with the distributional preferences of prosocial individuals, the agreements are also the most stable.

4.5 Groups: Inequality and stability

In this subsection we turn to the group level and use the groups' median transfers and median guesses to explain the inequality of bargaining agreements as well as the stability of coalition agreements within groups. Inequality is measured as the average range of payoffs of the coalition agreements. Group stability is measured as the number of agreements made during the bargaining game.[17]

Table 4. Group inequality and stability.

Dependent variable:	Avg. Range of payoffs			Number of agreements		
	I	II	III	IV	V	VI
Median guess	-0.020		0.028	0.019*		0.025**
	(0.047)		(0.043)	(0.008)		(0.009)
Median transfer		-0.117***	-0.122***		-0.013	-0.019*
		(0.029)	(0.030)		(0.008)	(0.008)
Constant	7.410***	9.570***	8.827***	3.170***	4.068***	3.322***
	(1.647)	(0.933)	(1.471)	(0.352)	(0.218)	(0.341)
Sigma	1.735***	1.601***	1.597***	-	-	-
	(0.106)	(0.106)	(0.106)			
Observations	59	59	59	59	59	59
AIC	337.991	323.516	325.094	-	-	-
BIC	344.223	329.748	333.404	-	-	-
Log Likelihood	-165.995	-158.758	-158.547	-	-	-
Deviance	-	-	-	3466.533	3374.047	2969.702

Model I-III: Tobit regression models, lower limit at zero.
Model IV-VII: Quasi-Poisson regression models.
***p < 0.001, **p < 0.01, *p < 0.05
Median transfer is measured in percent of the endowment, ranging from 0 to 67 percent.

[17] The following results stay robust if we use the groups' averages as the main explanatory variables.

Table 4 shows the joint influence of the level of strategic sophistication and the groups' prosocial preferences on the inequality of the bargaining outcome.[18] In models I-III we focus on inequality and explain the average range of payoffs by the median guess and transfer in the dictator game. We find that prosocial preferences have a significant impact on the payoff distribution of agreements. The stronger the prosocial motivations, the more equal the agreements. To put the results in perspective, take into account that a range of 9 would translate into a distribution 11-11-2. Hence the model predicts that a group in which the median transfer in the dictator game is zero allocates on average about two tokens to the third group member. In a group in which the median transfer is two thirds (the three-way even split), the predicted range of payoffs is less than one, which closely translates into the three-way even split 8-8-8. The groups' median decision in the guessing game does not significantly improve the explanatory power.

Models IV-VI in Table 4 present the effect of the groups' prosocial preferences and strategic abilities on the stability of agreements, again separately and jointly. The number of agreements ranges from 1, which means that only one agreement was payoff relevant for the entire time of the experiment, to 244, which means that the agreements were highly unstable.[19] We see that more strategically sophisticated groups agree on more stable distributions. The higher the

[18] The following results stay robust if we control for further variables, including the heterogeneity of strategic abilities and prosocial preferences within the groups, or an interaction between strategic sophistication and prosocial preferences. Neither this control variable nor the interaction term turns out to be statistically significant in any variant of the tested models. We only report the main effects here, since variants do not significantly improve the explanatory power of the model.

[19] The following results stay robust if we transform this variable and take the log or measure the average seconds of the agreements within the group, for example.

median guess in the group, the more agreements the groups form on average. Accordingly, the average time spent in one coalition decreases. Also, prosociality tends to stabilize agreements. The higher a group's median transfer in the dictator game, the less often coalitions change. Instead, self-interested, sophisticated players equalize inequalities over the course of the negotiations in a series of alternating coalitions. Only 2.8 percent of the players actually earn less than 10 percent of the distributable payoff over the full course of the negotiations.

Overall, the results on the group level also support our hypotheses. The more strategically sophisticated and the more prosocially motivated the members of a group, the more stable are the agreements. Likewise, the more prosocial the group, the more equal are the distributional agreements.

5 Conclusion

In this study, we investigated the influence of strategic sophistication and prosociality on the stability and distributional consequences of coalitions under majority rule. We ran laboratory experiments that implement only minimal institutional restrictions on group bargaining. Overall, the empirical results support the theoretical claim that strategic sophistication limits the range of bargaining outcomes and leads to more stable outcomes (Chwe, 1994; Harsanyi, 1974; Penn, 2009; Ray and Vohra, 2015). The results also support theoretical contributions that argue that prosociality increases the stability of democratic decisions in distributional problems (Frohlich and Oppenheimer, 2007; Mackie, 2003; Wittman, 2003). In sum, groups composed of kind and strategically sophisticated individuals in the sense operationalized here tend to distribute a resource more evenly and tend to be more stable without needing to resort to formal institutions.

From a theoretical perspective, the results provide important insights. Individuals' abilities to correctly predict the future consequences of their actions affect collective behavior. Proto et al. (2019), for instance, show that more intelligent individuals are better able to anticipate the behavior of others which results in higher levels of profitable cooperation. Our results generalize this finding providing evidence that strategic abilities also affect bargaining outcomes and the stability of coalition agreements in the DD-game. We also extend their results, as our results show that long-term cooperation between a majority of intelligent individuals can have negative repercussions on third individuals. Hence, questions concerning the effects of cognitive abilities, intelligence, and strategic sophistication could provide promising ways for future research.

Furthermore, our results indicate how strategic sophistication should be incorporated in future theoretical developments. Our findings support the notion that the farsighted stable set, as defined by Harsayi (1974), is 'ill-suited for farsightedness' (Ray and Vohra, 2015, 978). Given the observed bargaining outcomes, the path taken by Ray and Vohra (2015) to account for coalitional sovereignty seems more promising. However, if the goal is to predict empirical distribution decisions, the results also suggest that future work should aim to incorporate the empirical heterogeneity with respect to strategic abilities.

Interpreted in a broader context, our results underline the insight that formal rules are primarily necessary to thwart attempts by selfish individuals to exploit well-meaning peers. While self-regarding individuals who take a longer-term perspective on the maximization of utility will consider others' payoffs out of rational considerations, individuals holding other-regarding preferences do so because they internalize others' payoffs. Both types of individuals do not need norms translated into formal regimes to guide their decisions. With respect to the distributional aspect, the main driving factor is prosociality. By contrast, the stability of coalitions is affected cumulatively by both prosociality and strategic sophistication, suggesting that strategic individuals tend to give to the minority as much as is necessary to inhibit them from breaking the ruling coalition with a better offer to one of the coalition members.

Our results also help to answer normative questions about the instability of majority rule. In particular, pluralistic democratic theories emphasize that the normative consequences of the stability of coalitions have to be evaluated in conjunction with the resulting distribution of benefits. Whereas excessive instability undermines the efficiency of politics, overly stable democratic distribution regimes can have negative consequences as well. When coalitions persist over an extended time period and parts of society are constantly excluded from the distribution of benefits, democracy degenerates into a "tyranny of the majority" (Guinier, 1994; Madison, [1787] 1945), which may eventually ignite an uprising of the minority. Consequently, some alternation in the composition of coalitions is desirable in order to preserve the legitimacy of democratic governance. Short-term instability in democratic choices may thus be essential for the overall longer-term stability of political systems because it prevents the emergence of permanent winners and losers in politics (e.g. McGann, 2004; Miller, 1983). In this respect, our experimental findings show that coalitions that disadvantage single players are indeed rather unstable. The most stable coalitions tend to include all group members.

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Supplementary materials – Translated instructions to the experiment

Instructions

Welcome to today's experiment. In the course of the experiment, you and the other participants of the experiment have the opportunity to earn money. It is important that you read the instructions carefully, so that you understand the decision situations completely.

If something is unclear, please raise your hand. We will attend to your questions in private in that case.

Please do not ask questions aloud. Please don't talk to other participants of the experiment and don't give any information to them. Compliance with these regulations is important to maintain the quality of research in this experiment.

At the end of the experiment, every participant will be paid in cash. In any case, everyone will receive a lump sum payment amounting to € 4.00. The additional amount of money you will earn depends on your decisions and the decisions of the other participants. Of course, your anonymity towards the other participants will be preserved throughout the whole experiment.

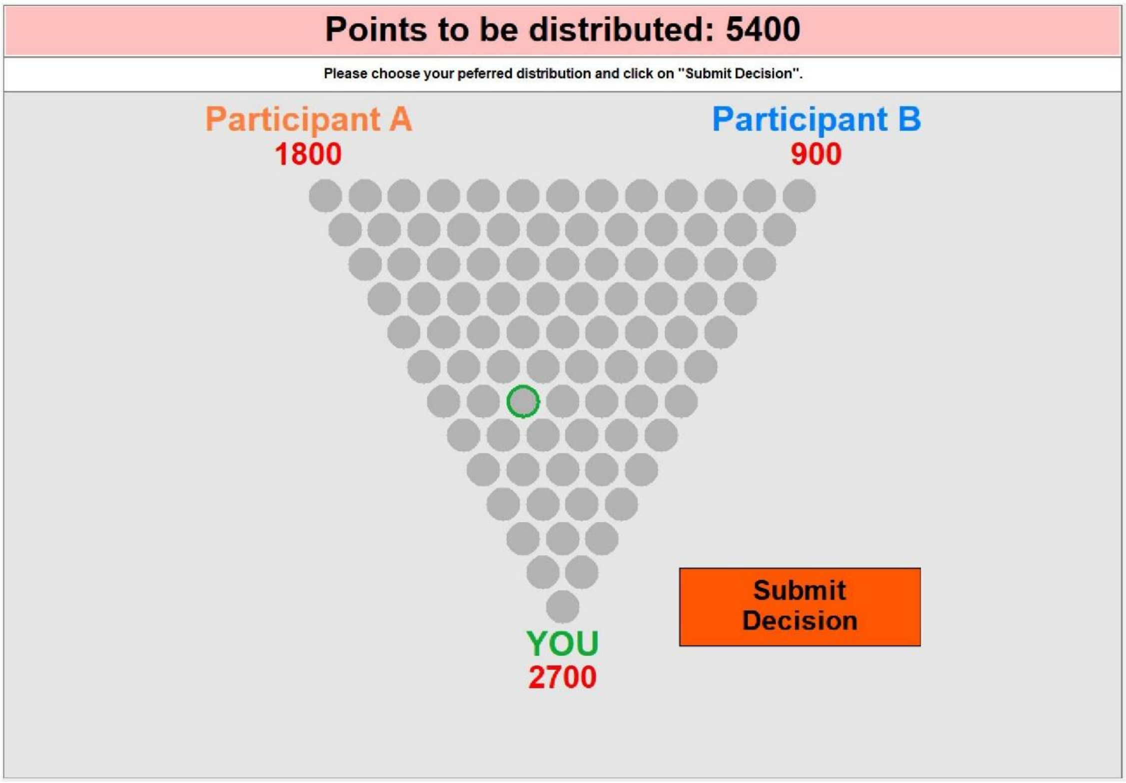
During the experiment, we do not talk about Euro, but about tokens. At the end of the experiment, tokens are converted into EURO at a ratio of:

1 Euro = 600 tokens

The experiment consists of different parts. In the following, you will find the instructions for the first two decision situations. After having completed these situations, you will receive the instructions for following decision situations. The experiment ends with a questionnaire. Please answer those questions carefully and take your time. You will receive an additional **600 tokens** for filling in the questionnaire completely.

Decision situation 1

In the first decision situation, 3 participants will be matched randomly. Every participant decides how to distribute **5400 tokens between herself and the other two participants**. The following picture shows this decision situation.



Every dark-grey circle within this triangle constitutes a different distribution. To get yourself acquainted with those distributions, you can click with your mouse on different circles. Which circle assigns how many tokens to you and the other two participants is shown next to each participant in red. In general, the closer a circle is to the corner of a particular participant, the more tokens he or she will get from that distribution. The sum of tokens is the same for each distribution.

In the example in the picture, the participant decides to assign 2700 tokens to herself, 1800 tokens to Participant A and 900 tokens to Participant B. At the end of the experiment, one out of the three persons will be chosen randomly and her decision will be relevant for the payment of all three participants. At first, each participant decides as if his or her decision would be relevant for the payment.

When you have found your preferred distribution, please submit your decision by clicking on the orange "Submit Decision" button.

Example as illustration:

Participant A chooses a distribution in which she receives 4500, Participant B 450 and Participant C 450 tokens. Participant B chooses a distribution in which she receives 2700, Participant A 1350 and Participant C 1350 tokens. Participant C chooses a distribution in which she receives 2700, Participant A 1800 and Participant B 900 tokens. At the end of the experiment, the computer determines randomly that the decision of Participant C is payment-relevant. Therefore, Participant A receives 1800 tokens, Participant B 900 tokens and Participant C 2700 tokens, which are converted into Euros and paid in cash at the end of the experiment. The decisions of Participant A and B expire in this example and are not payment-relevant.

Please make your decision for decision situation 1 on your computer now. Afterwards, please read the instructions for decision situation 2.

Decision situation 2

In the second decision situation, you and all other participants first **select an integer number between 0 and 100**. The computer calculates the average of all selected numbers (i.e., the numbers are summed up and divided by the number of participants). Then the **average is multiplied by 0.6** to determine the **winning value.** The participant whose number is closest to the winning value wins and receives **5400 tokens**. If the numbers of several participants are equally close to the winning value, the winner will be randomly selected by the computer among those participants.

Example with five participants:

Participant A chooses 70, Participant B chooses 20, Participant C chooses 30, Participant D chooses 45, and Participant E chooses 60. The average of the five chosen numbers is 45. The average multiplied by 0.6 yields 27. The number of Participant C (30) is closest to 27. Participant C wins and receives 5400 tokens, which are converted into Euros at the end of the experiment.

Payouts

At the end of the experiment, you are informed about how many tokens you have earned in the two decision situations and which decisions have been selected.

Please make your decision for decision situation 2 on your computer now. If you have any questions, please raise your hand.

Decision situation 3

This part is about negotiating on how to divide up to 7200 tokens in total. You will be assigned into groups of **three participants** each. For better orientation, different members of the group are marked in the colors green, orange and blue. You will always see yourself in green and the other members of your group in orange and in blue.

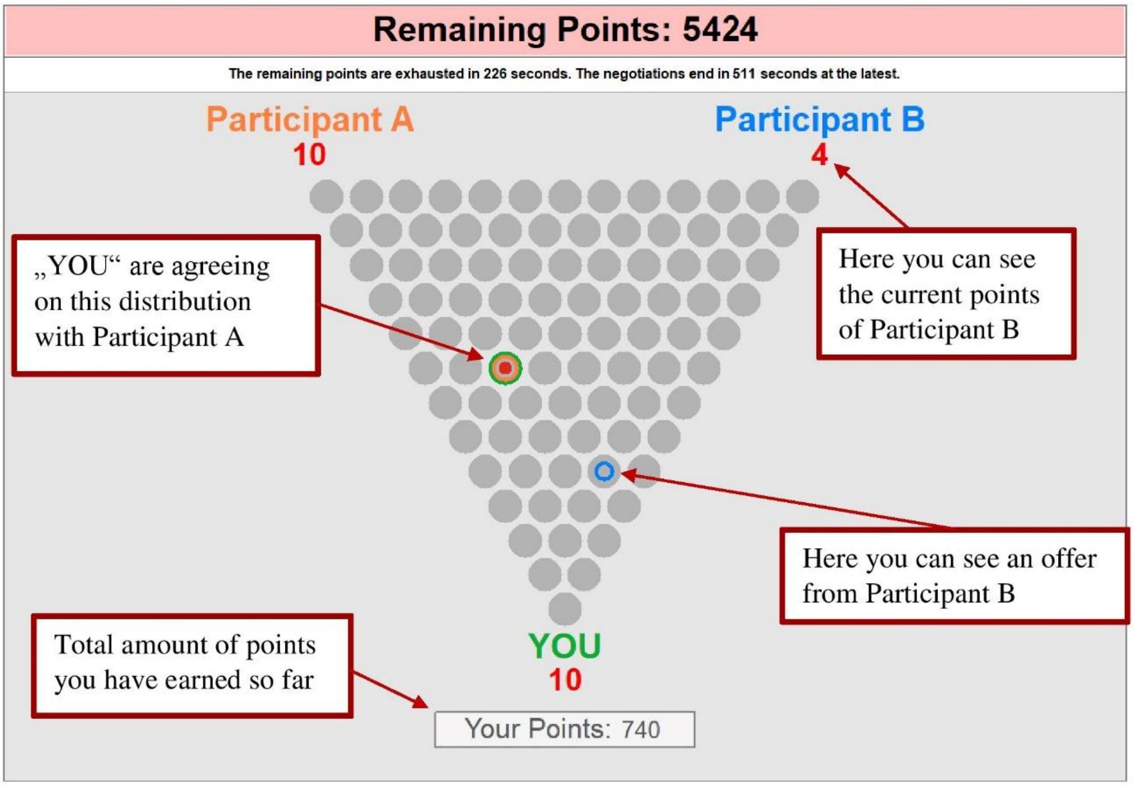
The negotiation screen is structured similarly to the first decision situation. Each dark grey circle in the illustrated triangle describes another distribution. The number of tokens that the respective distribution assigns to you and the other group members is displayed next to each participant in red. You are positioned at the bottom of the triangle. In general, the closer a circle is to the corner of a particular participant, the more tokens the person will get from that distribution. The sum of the tokens is the same for each distribution.

In comparison to the first decision situation, there are two main differences:

1. You cannot determine the distribution of tokens all by yourself but have to negotiate about it.
2. The 7200 tokens are not distributed in one move, but the tokens flow over a longer period of time. Distributions are paid out every second. Each second, 24 tokens will be distributed among the group members. These differences are explained in more detail below.

In the third decision situation, you have the opportunity to make offers to the other members of your group. This is done by clicking on one of the dark grey circles. When you do this, the corresponding distribution will be recognized as an offer and will also be displayed to the other two group members. Both, you and the other members of your group, have this opportunity. Therefore, if one of the other two group members clicks on a dark grey circle, you and the third member will see that respective offer. **An offer is considered accepted if two group members clicked on the same distribution.** This means if you offer a specific distribution and one of the other two group members clicks on the same dark grey circle, the other group member has accepted your offer. The corresponding distribution is then paid every second in which the agreement is maintained. Conversely, you can also accept offers from the other two group members by clicking on the highlighted circles. Existing agreements are indicated by a red circle at the center of the chosen distribution.

If two group members click on the same dark grey circle and an agreement is reached, 24 tokens in total will be paid per second to all three group members according to the chosen distribution. However, offers can be changed at any time by you or another member of the group by clicking on a new dark grey circle. Existing agreements can also be dissolved by a group member's click on another circle where less than two people can agree on that distribution. If an existing agreement is dissolved and no new agreement is reached, the payment of tokens will be suspended.



Your group can distribute a total of 7200 tokens. This is equivalent to 300 seconds (5 minutes), in which tokens can flow every second. Overall, your group has **600 seconds (10 minutes)** time for that. Within the period**, agreements can be dissolved at any time and new agreements can be reached.** At the top of the screen you can see how many tokens are still to be distributed and how much time your group has left for it. The third decision situation ends when either the total number of tokens is distributed, or the 600 seconds have expired. When the 10 minutes have expired, all tokens that have not been distributed up to this point will be forfeited. Your earned tokens are displayed again at the end of the experiment and paid out afterwards.

Summary

- You can make offers concerning a distribution of tokens by clicking on the corresponding circle.
- An offer is accepted and paid out if two group members click on the same distribution.
- Agreements are paid out every second for all three members of the group.
- Tokens flow only as long as there is an agreement between at least two group members.

Before you can start with the third decision situation, please answer the control questions about the instructions that are displayed on your computer.

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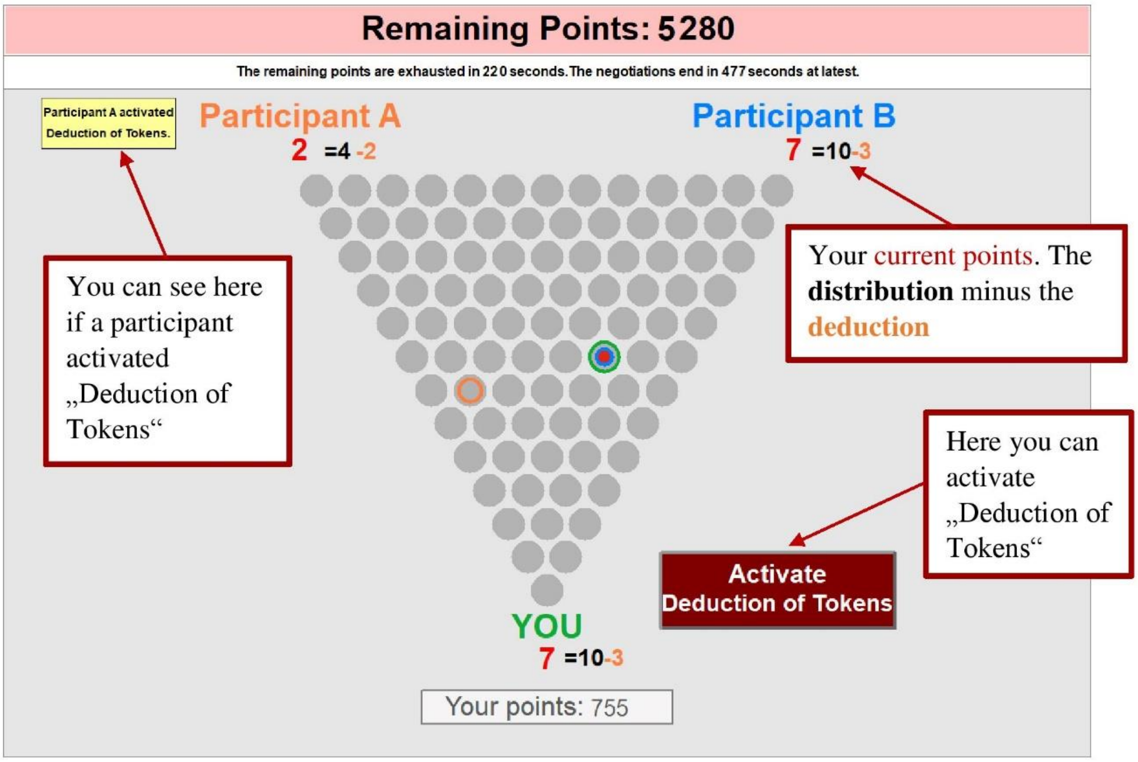
Decision situation 4

In the fourth decision situation, you will form a group with the same participants as in the third decision situation. But you do not know whether the other group members have changed their color or not.

Decision situation 4 differs from decision situation 3 only in one detail. Each participant now has the option to deduct tokens from the other members of the group at the expense of their own tokens. This is achieved by clicking a button. **As long as you press the button "Deduction of Tokens" you will lose 2 tokens per second and the other two participants will lose 3 tokens per second.** You can only activate the deduction of tokens if at least two members of your group have agreed on a distribution and tokens are flowing.

All other rules are identical to the rules in decision situation 3. If at least two group members agree on a distribution by clicking on the same circle, this distribution is paid out per second for all three group members. The possible distributions are identical to the distributions in decision situation 3. At most, tokens are deducted from this distribution if one or more group members activate the deduction of tokens. The following picture provides an example.



It is also possible to receive a negative payout in decision situation 4. This means that tokens will be deducted from your payout at the end of the experiment.

Before you can start with the fourth decision situation, please answer the control questions about the instructions that are displayed on your computer.

7. Studie IV

The Impact of Need on Distributive Decisions: Experimental Evidence in Anchor Effects on Exogenous Thresholds in the Laboratory

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Zeitschrift: PLOS One

Status des Beitrags: Publikation 2020

PLOS ONE

RESEARCH ARTICLE

The impact of need on distributive decisions: Experimental evidence on anchor effects of exogenous thresholds in the laboratory

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Citation: Kittel B, Neuhofer S, Schwaninger M (2020) The impact of need on distributive decisions: Experimental evidence on anchor effects of exogenous thresholds in the laboratory. PLoS ONE 15(4): e0228753. https://doi.org/10.1371/journal.pone.0228753

Editor: Stefan T. Trautmann, Universität Heidelberg, GERMANY

Received: August 8, 2019

Accepted: January 22, 2020

Published: April 1, 2020

Data Availability Statement: The DOI of the data and program code is https://dx.doi.org/10.23663/x2641

Funding: The project in which this paper has been produced is part of the research group FOR2104 "Need-based justice and distributional procedures" and has been funded by the Austrian Science Fund (grant numbers I1888-G11 and I3804-G27; www.fwf.ac.at), awarded to BK. The funders had no role in study design, data collection and analysis,

Abstract

Giving more to those who need more has an intuitive appeal for determining the just allocation of resources. The need principle is considered one of the three major principles of distributive justice. In contrast to equality or equity, however, evidence on the adherence to the needs principle rests mainly on stated instead of revealed preferences. In this paper we present an experimental design that exogenously assigns objective, heterogeneous need thresholds to individuals in small laboratory societies structured by a three-line network. The data reveal that a large proportion of individuals respond to others' need thresholds, but at a declining rate as thresholds increase. The equal distribution marks a discrete drop in the need satisfaction rate: Need thresholds above the equal distribution are less frequently satisfied. We conclude that others' needs are weighed against self-interest and equality. Our results provide evidence that distributions may be socially justified on grounds of the need principle.

Introduction

Needs as thresholds

A shared understanding of distributive justice and fairness among a community's members is fundamental for social order [1]. The principle of supporting others in need fosters the development of solidary communities and has contributed to the establishment of the modern welfare state [2, 3]. The satisfaction of needs is one of the major normative principles of distributive justice, next to equity and equality [4–6], and has been the focus of substantial philosophical reflection [7–10].

According to the need principle an allocation is just if the individual payoffs satisfy the needs of all members ([11], p. 149). However, assessing whether individuals consider others' needs is surprisingly challenging due to the impossibility to objectively identify relevant needs [9]. In the philosophical discussion, a common understanding is that needs cannot be defined in terms of the possession of, or access to, a set of commodities, but have to be considered as "requirements for 'the opportunity for a full life'" ([12], p. 342). This conception implies that needs extend beyond physical functioning and include social participation in society [7].

To further specify the concept of needs, the "capabilities approach" claims that there exist some thresholds for the provision of means below which the states and activities constitutive for a dignified life cannot be realized [13]. In this vein, the United Nation's Human Development

decision to publish, or preparation of the manuscript.

Competing interests: The authors have declared that no competing interests exist.

Index captures various capabilities. Nevertheless, any attempt to provide a complete and coherent list of capabilities is bound to fail due to the impossibility of identifying universally relevant capabilities, the numerous interdependencies between single needs, and the problem of adjudicating between different needs and the needs of different persons [14]. These ambiguities fundamentally hamper not only the development of an empirically informed theory of need, but also make the relevance of the need principle difficult to test in real-world contexts.

We take a more direct approach and test the recognition of the need principle in social interaction in a monetarily incentivized laboratory experiment. We implement individual need thresholds, which must be satisfied for survival in the game, in a three-person, strong-power network [15–17] and study distributive outcomes in social interactions. We focus on triads as this is the minimum group size necessary for the emergence of social properties, such as norms, and for the generation of shared values underlying norms, such as principles of justice [18]. We additionally induce a strong power differential by arranging the three group members in a hierarchical "three-line" network structure of the form *A*–*C*–*B*, where *C*, the central position, has more structural power because *C* can choose with whom to negotiate and agree. This enables us to relate our results to a clear reference prediction [19]. If needs serve as a criterion for the distribution of resources, need thresholds should form particular focal points for individual allocations.

Related literature

Our experimental results contribute to various scholarly literatures. Needs are relevant in hypothetical decision tasks [20, 21] and need satisfaction ranks high among justice attitudes in population surveys [22, 23]. In incentivized laboratory experiments, a combination of a floor constraint and the maximum average is the most popular choice [24–29]. This approach reflects the idea of inclusion but does not take into account the heterogeneity of needs. In monetarily incentivized dictator games, dictators give more to recipients who are poor or live in a poor country [30, 31]. These studies exploit subjects' knowledge about deprivation to induce them to raise transfers, which is basically a humanitarian act. However, being poorer than others does not necessarily reveal information about individual needs and neither does it include any reference to a shared norm of need-based justice. These studies strongly suggest that people hold social value orientations. A test involving real needs finds that people differentiate between basic and instrumental needs [32].

In contrast to the justice-related literature focusing on the relevance of internalized norms in distributional decisions, most traditional approaches in Social Exchange Theory assume that actors are purely self-interested and they predict that actors choose the exchange relation that maximizes their own payoffs. This framework explains relative allocations by the structure of the network, which attributes negotiation power to nodes by the number of connections to other nodes [33, 34]. For the three-line network of the form A–C–B, on which we focus, all models assuming narrow self-interest predict that the powerful, central, node C obtains most of the resource (between 1 and 5/6), the agreeing partner obtains the remaining share (between 0 and 1/6), and the third player is left with zero [35]. Newer approaches integrate the possibility that actors hold fairness preferences toward all members of the exchange network, and not just immediate interaction partners [36]. The evidence currently available on the effect of social value orientations on distributional outcomes in social exchanges is mixed, however [37, 38].

Aims: The effect of need thresholds as a structural condition

We presume that in allocative decisions subjects' material interests and normative persuasions provide potentially conflicting behavioral incentives [39]. Induced value theory assumes that by financially incentivizing a decision problem, the goal of maximizing one's own income overrides other motives [40, 41]. Many scholars assume the gain goal–the maximization of one's own payoff–to be the "natural state" of individuals [42] since subjects are assumed to voluntarily participate in laboratory experiments in order to earn money. There is ample evidence, however, that subjects also hold other-regarding preferences [43–46] and that these are closely related to justice attitudes [47]. Seen through the lens of the model of frame selection [48], self-interest is not always sufficiently strong to override internalized justice norms, such as the moral value of caring for others, that is, satisfying others' needs. For example, it has been shown in the three-line network that dyads who are given the opportunity to allocate part of their resource to a third player actually do so despite contrasting incentives [38].

In this paper, we do not aim to study social, i.e. other-regarding, preferences per se. By definition, distributive justice involves comparison with others and the criteria by which it is judged is in the eye of the beholder [49, 50]. By merely observing incentivized behavior in the laboratory it is difficult to disentangle different sources of motivation, such as social preferences. Instead, we focus on the behavioral responses to *structural* variation in need thresholds: To what extent and under which conditions are others' needs recognized as a reference point for distributive decisions in the group?

In order to assess the influence of individual need thresholds on behavior expressed as exchange patterns, we study their effect in an experimental design that contrast the recognition of needs with self-interest and the equality principle. First, the intensity of conflict between self-interest and others' need satisfaction increases with others' need thresholds. Hence, we are generally less likely to observe the satisfaction of others' needs, the higher their need thresholds are. Assuming self-regarding preferences, own needs are always put upfront and subjects will not compromise on them. Second, the need principle may enter into rivalry with other justice principles, most notably equality, which is the modal outcome in distributive decisions without further information [4]. In this study, equality relates to the distribution of a joint resource, without consideration of any further aspects related to the decision context. Need, in turn, is interpreted as the resources required to reach a position in which subjects can further accumulate resources. Satisfying others' needs thus means to place them in a position to continue earning money, which is a value in itself on top of the instrumental value of earning money [51, 52]. If need thresholds exceed the share allocated by an equal distribution, the need principle and the equality principle conflict. Therefore, if individuals adhere to the stated conception of equality, we expect a sharp drop in need satisfaction when the need threshold is raised above the equal share of the resource (see *Methods and Materials* for the formal model).

Measures: Need thresholds

We measure behavioral responses to individual need thresholds in a two-stage laboratory experiment by means of observing the outcome of *dyadic negotiations* concerning the allocation of a limited resource in a three-person network, a setup which builds on a long experimental tradition in social exchange theory [33, 34].

In order to measure the concept of *need thresholds* in a laboratory experimental setting, we simplify the multi-dimensional concept of capabilities to a one-dimensional, quantifiable property. The closest representation of the concept of "survival in dignity" [13] in a laboratory setting is the capability to proceed to a further stage in the experiment, similar to a board game in which participants drop out if they fail to meet a necessary requirement for continuation. While the intrinsic value of the opportunity to earn additional payoffs is clear, the specific extrinsic value of the second stage is relatively uncertain. Furthermore, we limit competition between subjects' need claims by setting the sum of thresholds lower than the total endowment

Table 1. Treatments: Thresholds and descriptive measures.

Scenario	Thresholds	Sum	NSR-N	Mean Range of profits
A1	c5–0–9	14	0.63	7.36
A2	c1–9–5	15	0.41	7.7
A3	c5–1–12	18	0.3	9.61
A4	c9–5–1	15	0.52	8.61
A5	c0–0–0	0	1	7.47
A6	c5–9–1	15	0.53	8.59
A7	c5–5–5	15	0.52	6.63
B1	c5–1–1	7	0.78	4.5
B2	c5–9–5	19	0.59	5.31
B3	c5–5–12	22	0.41	8.5
B4	c5–5–1	11	0.69	6
B5	c5–12–12	29	0	10.75
B6	c5–9–9	23	0.28	8.44
B7	c5–5–5	15	0.44	6.72

The table shows the distributions of thresholds–referred to as "scenarios"–participants were confronted with in a lab session. The resource per period and network was 24 points. Treatment A (heterogeneous thresholds): N = 192 observations on subject level per scenario (i.e. N = 64 on network level). In column "thresholds" the letter "c" denotes the central position. Treatments–combinations of scenarios–varied between sessions. As a robustness check the sequence of scenarios was altered to A7-A4-A6-A3-A2-A1-A5. We control for time effects in Table A in S2 File. Overall, the results are robust, with the exception of scenarios c5-5-1 and c5-0-9, which cease to be statistically significant in comparison to c5-1-1. This is not surprising, as in all three scenarios thresholds are relatively easy to satisfy. Column "NSR-N" refers to the frequency of need satisfaction on the network level. Treatment B (constant thresholds of central player): N = 96 observations on subject level per scenario (i.e. N = 32 on network level). Scenario "B5" will be excluded from analysis unless specifically stated, as the resource is smaller than the sum of thresholds. "Mean range of profits" is the absolute difference between all three players' incomes. It is a measure of profit inequality within the network–the lower it is, the closer is the distribution to the equal three-way split.

https://doi.org/10.1371/journal.pone.0228753.t001

to be distributed in all but one constellations (see Table 1). There is no financial incentive to satisfy others' needs.

A distribution of allocations is considered to be just according to the need principle if the allocation to each subject is equal to or larger than her individual threshold in *stage one* (St1) and, thus, all members of the network are admitted to participate in *stage two* (St2) and earn additional income. The *need satisfaction rate* (NSR) expresses the frequency of need satisfaction on the network level (NSR-N) and on the individual level (NSR-I).

Experimental design

In St1, the group-level allocation stage, subjects were assigned to nodes in a three-line network of the form $A–C–B$, and negotiated the allocation of a resource of 24 points to the three players by sending each other numeric proposals of distributions in the format $\{C,A,B\}$. Any number of proposals was allowed within three minutes along connecting edges of the network. No text messages were possible and only one binding agreement could be made between two of the three subjects. An agreement was concluded when the recipient of a proposal clicked on the "accept" button (see "Details on procedures" below and *"Experimental Instructions"* in S4 File for details and screenshots). If a subject earned at least her designated threshold (see Table 1 for assigned thresholds), she was admitted to St2, the real-effort stage, where she could individually and independently earn additional points in a set of tasks. If she did not reach the threshold, she kept all points obtained in St1 but could not earn anything in addition in St2. Points earned in St2 were added to those of St1 for the total individual payoff. Individual performance and earnings in this stage were private information and did not affect the others' payoffs. The tasks in St2 varied, and included summing or subtracting numbers, counting letters in sentences, and answering randomly sampled general knowledge questions. Subjects were informed about the diversity of the tasks beforehand.

Treatments. We varied the combinations of thresholds t –referred to as *scenarios*–systematically within sessions. Treatment A: Individual thresholds were heterogeneous and varied for all individuals. Treatment B: Thresholds were heterogeneous as well, but the threshold of the central position was uniformly set at 5 points. Columns 1 to 3 in Table 1 report the selection, sum, and sequence of thresholds in both treatments. In each session, subjects participated in seven scenarios, i.e. seven sequences of St1 and St2. Network positions were fixed. After each scenario, subjects were randomly matched as strangers (hence never interacting more than once) into new three-node networks. Thresholds were always common knowledge. A practice period using thresholds of 5, 1 and 9 was played without payoffs in order to familiarize participants with the procedure and offer the opportunity to ask questions regarding the functionality of the program interface and game.

Network structure. The three-line network produces variation in structural power in a very simple setting. Players negotiate the distribution of allocations in dyads, implying that the central player (C) is pivotal because she has two potential partners (A, B), whereas the other two players can only negotiate with the central player. One player is excluded from the decision by design, but may be allocated a share of the resource. Using this difference in power and limiting admissible exchanges (i.e., distributive decisions in the present context) to one per interaction sequence creates a competitive environment and, thus, generates a strong test of the relevance of need satisfaction in negotiations.

In addition we implemented the Social Value Orientation Slider Task [53], which translates distributive preferences, such as spite, self-interest, inequality aversion, efficiency concerns, or altruism, into a continuous scale and allows us to control for other-regarding preferences on a single dimension.

Hypotheses

How does the introduction of need thresholds affect distributive decisions? The higher the Social Value Orientation scale (SVO), that is, the more pro-social players are, the more likely players will take others' need thresholds into account. Thus, overall satisfaction of need thresholds should increase with an increase in aggregate social value orientations in the network.

H1: NSR-N is positively related to the aggregate SVO score of all players in the network.

However, with increasing need thresholds of other players, the share of one's own income one has to sacrifice to satisfy others' needs increases. For each level of the SVO score there is a point at which self-interest wins against the norm of need satisfaction. Hence, the willingness to satisfy each other's need thresholds is expected to decrease with rising incompatibility of self-interests and others' allocative claims.

H2: The higher player i's need threshold, the lower the probability that this threshold will be satisfied (NSR-I is negatively related to the level of player i's need threshold).

We expect that this effect will be much smaller–if present at all–for players in the agreeing dyad. One possible situation in which the peripheral player in the dyad might accept a share not satisfying her threshold may be the fear that the central player agrees with the other peripheral player on an even lower share for her. Once a dyad agrees on a distribution, the third player depends on the goodwill of the other two players. We expect that the higher the third players' need threshold is, the less likely her needs will be satisfied. The third hypothesis thus refers to the tension between the need principle and self-interest.

H3: Third players' NSR-I decreases at a faster rate than the NSR-I of the peripheral player in the dyad, for any increase in the need threshold.

If a need threshold exceeds the share corresponding to an equal distribution of the resource, the need principle is not only at odds with self-interest but also with the equality principle. The argument that relative disadvantage weighs more than relative advantage has been forcefully put forward [54]. Hence, we expect the willingness to satisfy need thresholds that exceed the allocation to self to drop sharply as the threshold surpasses the equal distribution of the available resource. Beyond the equal distribution a different mechanism is activated. Whereas the satisfaction of need thresholds below this point can be simply motivated by a concern for equal opportunity, the satisfaction of thresholds above this point additionally requires overcoming a distaste of disadvantageous inequality [55].

H4: The NSR-I is higher for thresholds below the equal three-way split than for thresholds above this level.

Results: Needs matter

We find that a large number of individuals respond to others' need thresholds. In fact, the distribution of needs affects negotiations systematically and the distribution of payoffs shifts towards the need thresholds. However, need satisfaction declines with increasing thresholds. The findings are in line with the interpretation of the equal distribution as a trigger point: We observe a substantial discrete drop in the need satisfaction rate for thresholds above the equal distribution in comparison to thresholds below that point.

Fig 1A and 1B show the two most extreme scenarios, which give an impression of the shift generated in the need satisfaction rate by the manipulation of need thresholds. We study various scenarios, denoted by $ct_C-t_A-t_B$, whereby c identifies the central player. Panel A depicts the allocation of points in scenario $c0-0-0$ and Panel B shows $c5-1-12$, in which one

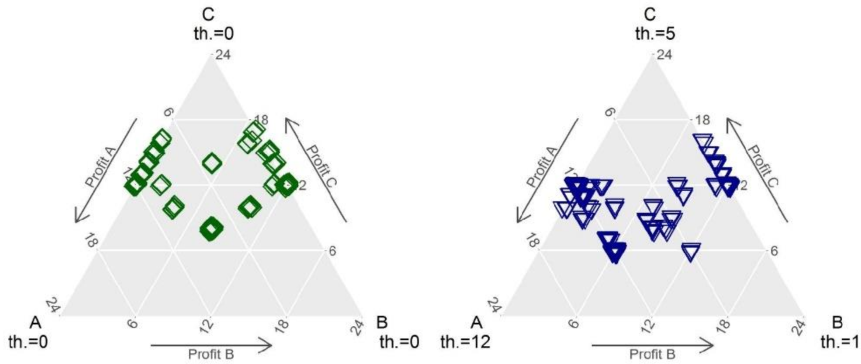

Fig 1. (A and B). Distribution of allocation agreements (accepted offers). Panel A: Scenario c0–0–0. Panel B: Scenario c5-12-1. The nodes of the graph denote the positions of the players: C is the central player, A and B are the peripherals. Thresholds are denoted below the label of the positions, whereby Panel A displays the scenario c0-0-0 and Panel B c5-12-1. The arrows aside the graphs indicate each player's payoff: The closer a mark to the position, the higher her share of the allocation decision. There is a notable difference in clusters of allocations between the scenarios presented. The cluster at the centroid denotes an equal split between all three subjects. Marks are slightly jiggled in order to visualize local clusters of player positions.

https://doi.org/10.1371/journal.pone.0228753.g001

peripheral player is attributed a comparatively high threshold. We see that in Panel A allocations are drawn both more to the top, i.e. to the central player, and to the focal points of equal three-way split and equal two-way split. In contrast, Panel B shows a larger cluster between the central and the peripheral player with threshold 12, and the accepted offers between the central and the peripheral with threshold 1 are drawn more upwards to the central position, indicating that thresholds are indeed used as focal points. Furthermore, there is a cluster of points just to the right of the focal point on the left axis of A's payoff. The small distance to the axis indicates that the other peripheral's threshold of 1 point was satisfied. The impact of need thresholds on behavior becomes even more apparent when contrasting payoffs. For peripherals, the mean payoff is 5.95 for a threshold of 1, and 7.66 for a threshold of 12, showing a qualitative difference in allocated shares between peripherals, taking into account the respective thresholds (see *"Exemplary distribution of profits"* in S2 File for more details on distribution of profits, individual income of positions and test of difference for Fig 1A and 1B).

Test of hypotheses

We find evidence for an effect of social value orientations on distributions (*H1*). Table 2 shows that, controlling for the sum of need thresholds in a network, the aggregated SVO in a network has a strong positive effect on NSR-N. The higher the SVO, i.e., the more prosocial the members of a network are, the higher NSR-N. Compared to scenario *c*5–1–1, which is characterized by both the lowest symmetrical thresholds for both peripherals and the smallest sum of thresholds, all other scenarios have a lower NSR-N, whereby the higher and the more unequal the thresholds are, the larger are the negative coefficients.

This result also holds for the share allocated to the third player, which in many cases covers this player's need threshold. The Social Value Orientation (SVO) of the agreeing dyad, and foremost of the central player, exerts a positive effect on the third player's NSR-I.

Next to the effect of social value orientations, we observe that NSR-I decreases with increasing individual need thresholds for both peripheral players (supporting *H2*), but in particular for the third player (supporting *H3*), as displayed in Fig 2. Central players' needs are always

Table 2. Logistic regression of aggregated SVO and scenarios on NSR-N on the network level.

	Coefficient	Stand Err	Lower 0.95	Upper 0.95	Odds Ratio
Sum of SVO in network	0,5142	0,1807	0,16	0,8684	1.6723
Scenarios (ref. c5-1-1)					
c5-5-5	-1,5175	0,3772	-2,2568	-0,7782	0.2193
c5-0-9	-1,039	0,4669	-1,9541	-0,1239	0.3538
c1-9-5	-1,9563	0,4549	-2,848	-1,0646	0.1414
c5-1-12	-2,4491	0,4895	-3,4086	-1,4897	0.0864
c9-5-1	-1,5032	0,4164	-2,3193	-0,6871	0.2224
c5-9-1	-1,4378	0,4541	-2,3277	-0,5478	0.2374
c5-5-1	-0,4872	0,1828	-0,8454	-0,129	0.6143
c5-9-5	-0,9046	0,2509	-1,3963	-0,4128	0.4047
c5-5-12	-1,6795	0,3374	-2,3408	-1,0183	0.1865
c5-9-9	-2,2494	0,2238	-2,6879	-1,8108	0.1055

Dependent Variable: NSR-N, 1 = all three thresholds satisfied; 0 = at least one threshold not satisfied. N = 576; scenario c5-12-12 is excluded, since NSR-N always < 1; Scenario c0-0-0 is excluded, since NSR-N always = 1. Standard Errors are clustered on the group level of the session, whereby one session consisted of either one or two independent groups of 12 individuals, depending on whether one or both treatments were implemented at the same time. See Figure A in S2 File for a plot of the predicted probabilities of the scenarios.

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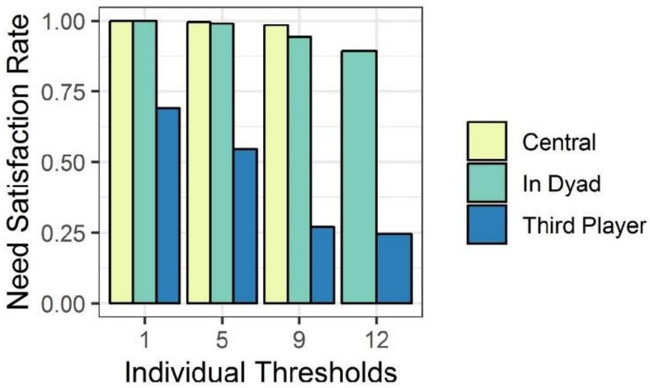

Fig 2. NSR-I by position over individual thresholds. The x-axis shows individual need thresholds, the y-axis the NSR-I for individual observations. The central player never was assigned a threshold of 12 points (see *Table 1* for list of thresholds). All scenarios with sums of thresholds smaller than the resource of 24 points are included. Columns are split by network position (central or peripheral) and by the "role" (in dyad or third player) a participant assumed in each period. The central player could not be excluded from agreements. A peripheral player either became the agreement partner, by being part of the dyad, or she became the third player, by being excluded from the agreement. Exclusion from the agreement does not imply that this peripheral player did not receive any payoffs from this period, because the agreeing dyad may allocate some share to her.

https://doi.org/10.1371/journal.pone.0228753.g002

satisfied if an agreement is reached. In two cases no agreement was concluded within the time limit of three minutes, resulting in the outcome that the central player's need threshold was also not satisfied. We observe different NSR-I for peripheral positions inside and outside the agreeing dyad. For peripheral players who are *included* in the agreeing dyad the NSR-I ranges from 100% with the lowest implemented threshold of 1 point, 99% with 5 points, 94% with 9 points, and to 89% with the highest level of 12 points (see "Tests of difference H3" in S2 File for further analyses). The logistic regression in Table 3 shows the robustness of the effect of the need threshold on need satisfaction.

In contrast, *excluded peripheral players*–third players–have more difficulty getting their need thresholds satisfied. Their NSR-I decreases more rapidly with the threshold level. It drops from 69% at the threshold of 1 point, to 55% at a threshold of 5 points, to 27% at a threshold of 9 points and to 25% at the threshold of 12 points. There is a qualitative and, particularly for the third player, significant difference in the NSR-I for need thresholds surpassing the equal three-way split (i.e., 8 points) compared to those below (supporting *H4*). Below the equal distribution NSR-I decreases with a rising need threshold, but once equality is trespassed, it stagnates at a low level, though not reaching zero.

Conclusion

Does the normative postulate that needs matter affect human behavior? Testing this proposition is intricate in "natural" environments due to the fundamental ambiguity of the concept of needs. In order to experimentally test the effect of needs in distributive decisions, we operationalized need thresholds in terms of a requirement for access to a next stage in a monetarily incentivized experiment. We explored the effect of heterogeneous need levels in dyadic distributive decisions in a triad on the responsiveness of allocations to threshold levels controlling for social preferences and network positions.

First, we find that need thresholds are effective focal points of individual allocations, in comparison to distributions observed in an environment without such thresholds. Central

Table 3. Logistic regression of SVO, threshold and other controls on the probability of need satisfaction of the third player.

	Coeff.	S.E.	Lower 0.95	Upper 0.95	Odds Ratio
SVO of network members					
SVO central player	1,2578	0,3135	0,6432	1,8723	3.5175
SVO coalition partner	0,0854	0,212	-0,3301	0,501	1.0892
SVO third player	-0,0876	0,1567	-0,3946	0,2195	0.9161
Period	-0,3521	0,1747	-0,6945	-0,0098	0.7032
Individual threshold of third (ref. = 1)					
Threshold = 5	-0,5901	0,2257	-1,0324	-0,1479	0.5543
Threshold = 9	-1,8599	0,2611	-2,3716	-1,3482	0.2610
Threshold = 12	-2,0505	0,3309	-2,6991	-1,4019	0.1287
Sociodemographic variables of third player					
Female	0,2945	0,19	-0,078	0,667	1.3425
Experimental experience (1 = more than 3)	0,2332	0,2216	-0,2011	0,6674	1.2626
Age (1 = above median of 23 yrs.)	0,2277	0,2065	-0,1771	0,6324	1.2556

The dependent variable of this logistic regression is the probability of the third (i.e. excluded) player having her need threshold satisfied (1) or not (0). We control for the central player's SVOs and the third player's own SVO (numeric, all multiplied by 10 for display ease; minimum = -16.26, maximum = 57.83, mean = 20.36), as well as gender (binary; 1 = female), age (binary; 0 = up to 22 years, 1 = 23 years and older) and experimental experience (binary; 0 = 3 or fewer times, 1 = 4 or more times participated in any lab experiment), as these factors can influence bargaining behavior.

N = 546; all scenarios with affluence (i.e. sum of thresholds < available resource), furthermore scenario c0-0-0 is excluded, as there are no thresholds to be satisfied; furthermore, all cases where the individual threshold = 0 are excluded (c5-0-9). Cases without agreement are excluded.

Standard Errors are clustered on the group level of the session, whereby one session consisted of either one or two independent groups of 12 individuals, depending on whether one or both treatments were implemented at the same time.

https://doi.org/10.1371/journal.pone.0228753.t003

players in the three-line network do not uniformly use their power to increase their own allocation but behave in line with their social values. In one quarter of all observed decisions, the dyad forgoes half of the available resource in order to lift the third player above the threshold, which means that the power structure is overruled by the norm of need satisfaction in these cases. Second, as expected, the need satisfaction rate declines with increasing thresholds, in line with the expectation that subjects are confronted with a trade-off between their self-interest and their social values. People tilt toward self-interest the more maintaining their social values becomes costly to themselves. Third, this trade-off is substantially more pronounced for the allocation to outsiders. Fourth, the equal distribution marks the point at which the need satisfaction rate of outsiders collapses. Beyond the equal distribution, the principle of need-based justice does not only compete with self-interest, but also conflicts with the principle of equality.

The paper makes three arguments. First, it shows that norms and shared values are relevant in network exchanges and that research designs that restrict the decision space to self-interest by assumption miss an important aspect of human behavior. Second, the results reveal that needs are a highly relevant criterion of distributive decisions in small-scale laboratory societies. And third, it extends our understanding of the conditions under which different principles of justice come into play. In particular, if equality and needs conflict, short-term outcome equality concerns tend to win against individual needs.

We suspect that in this situation, equality is actually used by at least some players as a scapegoat to mask self interest because it is a socially more acceptable reason to deny the satisfaction of needs to those who need more than the equal share. Disentangling these motives, however, must be left to further inquiry using an experimental design that focuses on these differences.

Materials and methods

Model

We explore the trade-off between self-interest and justice preferences. We use a general utility function assuming that there exists a payoff distribution embodying a just distribution of payoffs [56]. Without further specifying the properties of this distribution, a vector U captures the differences between individual payoff and the payoff perceived as just. Each individual evaluates U via a personal weighting function, $f_i(U)$, which is monotonically increasing in injustice, and a weighting factor, α_i, which weights injustice against one's own payoff y_i. The general functional form for evaluating one's own payoffs with a concern for justice is then: $V_i(y,U) = y_i-\alpha_i f_i(U)$.

By avoiding the question of what constitutes justice, this form incorporates justice perceptions such as equality or equity and covers prominent preference functions such as inequality aversion [54, 57]. The satisfaction of needs constitutes an important part of this just distribution. We assume that there exists a threshold vector T, which constitutes the need thresholds of each individual in the society, t_i [11, 58, 59]. An individual's need is satisfied if her payoff is equal to or higher than this threshold, i.e. $s_i \in \{0,1\}$, where $s_i = 1$ if $y_i \geq t_i$ and 0 otherwise. Thus, the need satisfaction vector S shows the proportion of individuals in society whose needs are satisfied. Importantly, injustice increases monotonically the fewer needs are satisfied. We assume that any deviation from the just distribution that does not satisfy individual needs affects the weighting function more severely than other deviations. To visualize the effect, we split vector U into two parts, one which disregards needs and one which focuses only on needs, $U = \{U^{\neg S} \cap U^S\}$. For simplicity we assume that the personal weighting function is additive for this relation, i.e. $f_i(U^{\neg S}, U^S) = g_i(U^{\neg S}) + h_i(U^S)$. Thus, a utility function which separates the need principle from further injustice takes the following form:

$$V_i(y, U^{\neg S}, U^S) = y_i - \alpha_i g_i(U^{\neg S}) - \alpha_i h_i(U^S) \quad (1)$$

Satisfying need thresholds by means of the distribution of resources fulfills a minimal justice criterion, which enters the utility function here as a (need) penalty if others' or own needs are not satisfied. Thus, when individuals allocate payoffs, we expect that (varying) need thresholds pull allocation patterns towards these thresholds, which constitute focal points [60], compared to a situation without needs.

Experimental design: Additional information

Additional measures. Social value orientations, an incentivized, social-psychological construct to measure other-regarding motivations, were measured by means of the SVO slider task [53] prior to the start of the first scenario. In this task, participants are confronted with six different allocation decisions between self and a present but unknown recipient, whereby trade-offs between individual profit maximization, equality, efficiency and altruistic concerns are implemented. One of these six decisions was randomly chosen for payoff, as sender and as recipient. Payoffs from this task were communicated at the end of a session, after completion of the main part of the experiment and the questionnaire. After the seventh round, subjects completed a questionnaire comprising socio-demographic questions. Points were converted to Euros at the end of the experiment.

Recruitment method, sample and implementation. The experiment was programmed in zTree [61] and subject recruitment from the university pools was administered by ORSEE [62] and hroot [63]. Experiments were implemented in the VCEE Laboratory at the University of Vienna in 2016 and in the WISO-Experimentallabor at Universität Hamburg in 2017. Both laboratories adhere to the principles of economic experiments and have obtained a waiver from their institutions' ethics commissions (Ethikkommission der Universität Wien, http://ethikkommission.univie.ac.at/; Ethikkommission des Fachbereichs Informatik der Fakultät für Mathematik, Informatik und Naturwissenschaften der Universität Hamburg, https://www.inf.uni-hamburg.de/en/home/ethics.html). They do not admit experiments using deception or that interfere in any other way with the participants' rights. All participants have voluntarily registered for the subject pool and have been informed about the conditions of economic experiments. Students receive invitations to sessions via email. In the present experiment, invitations were restricted to pool members who indicated to understand the local language. 288 individuals participated in total. In both experiments, the resulting sample contained about 60 percent women, average age was about 24 years and participants were in their fifth semester on average. While in Vienna, the average subject had participated in ten experiments before, this number was three in Hamburg (for a more detailed description of the demographic details, see Table A in S1 File). The inclusion of a dummy representing the laboratory in the regression models does not substantively or statistically alter the coefficient estimates (see *Table A in S3 File*). Subjects were randomly seated in computer cubicles upon their arrival and obtained instructions (see S4 File) and answered control questions. Subjects earned on average 22.6 Euros (median = 23.5; range = [8.5; 40]) in about two hours. One scenario was randomly selected and added to the payoff from the SVO task.

Details on procedures. If the central player received more than one offer at the same time–one from each player–she could choose between these offers or send counter offers. This constitutes the power of the central position. Players in peripheral network position could only send offers to or receive offers from the central player. They could choose between accepting and not accepting the last offer that they received or send a counter offer to the central player. Accepting an offer was possible by clicking on the offer that was displayed on screen and click the agreement-button. This was also described in the instructions that were handed to the participants. The instructions also included a screen shot of this stage of the experiment. In the practice period subjects had the possibility to familiarize themselves with this mechanism and ask clarifying questions.

Supporting information

S1 File. Supplementary information on sample. Table A. Demographic statistics of subjects in the sample.
(DOCX)

S2 File. Additional results. Exemplary effects of differences in thresholds. Tests of difference H3. Tests of difference H4. Further empirical observations. Figure A. Predicted Probabilities (95% conf. int.) of the regression in Table 2. Table A. Logistic regression on NSR-N including control for period. Figure B. Predicted probabilities (95% conf. int.) of regression in Table A in S2 File.
(DOCX)

S3 File. Difference in experience between samples. Table A. Logistic regression of NSR-I of third player including lab dummy. Table B. Logistic regression on NSR-N including lab dummy.
(DOCX)

S4 File. Experimental instructions (translated from German).
(DOCX)

S5 File. List of abbreviations and notation.
(DOCX)

Acknowledgments

We thank our project partners in the research group FOR2104 "Need-based justice and distributional procedures" for a variety of comments. In particular, we thank the two anonymous reviewers and the academic editor Stefan Trautmann for their comments which were invaluable for improving the clarity of our argument.

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S1 File: Supplementary Information on Sample

Table A. Demographic statistics of subjects in the sample

	VIENNA (n=144)	HAMBURG (n=144)	Total (n=288)
Sex			
Female	84 (58.3%)	88 (61.1%)	172 (59.7%)
Male	60 (41.7%)	56 (38.9%)	116 (40.3%)
Age (years)			
Mean (SD)	24.4 (4.47)	24.0 (7.00)	24.2 (5.87)
Median [Min, Max]	23.0 [18.0, 45.0]	22.0 [17.0, 58.0]	23.0 [17.0, 58.0]
Semester			
Mean (SD)	6.27 (4.05)	4.81 (4.27)	5.54 (4.22)
Median [Min, Max]	6.00 [1.00, 22.0]	3.00 [1.00, 20.0]	5.00 [1.00, 22.0]
Field of Study			
Natural Sciences	20 (13.9%)	37 (25.7%)	57 (19.8%)
Technical Studies	10 (6.9%)	15 (10.4%)	25 (8.7%)
Economics	42 (29.2%)	14 (9.7%)	56 (19.4%)
Social Sciences	42 (29.2%)	38 (26.4%)	80 (27.8%)
Human Sciences	23 (16.0%)	24 (16.7%)	47 (16.3%)
Life Sciences	7 (4.9%)	16 (11.1%)	23 (8.0%)
Experimental Experience			
Mean (SD)	10.4 (11.9)	3.31 (4.30)	6.85 (9.60)
Median [Min, Max]	6.50 [0.00, 100]	2.00 [0.00, 30.0]	4.00 [0.00, 100]

S2 File: Additional results

Exemplary effects of differences in thresholds

Distribution of profits in scenarios c0-0-0 and c5-12-1: The mean range of allocated points in these two scenarios is 7.47 and 9.61 points, implying that equality decreases with the introduction of need thresholds. Mean payoff in scenario $c0-0-0$ is 10.92 for the central position and 6.8 averaged over the two peripheral positions. The difference between the powerful position and the peripheral positions is substantial (Wilcoxon rank sum test, z = 5.188, p < 0.001, two-sided), in line with the higher structural power of the central position. Mean payoff in scenario $c5-1-12$ is 10.39 for the central position (threshold of 5). For peripherals, the means are 5.95 (threshold of 1) and 7.66 (threshold of 12), leading to a notable difference of 1.71 points between their allocations (Wilcoxon rank sum test, z = -2.238, p = 0.025, two-sided). The difference in mean payoffs between the central and the peripheral position with a threshold of 1 is substantial and significant (Wilcoxon rank sum test, z = 5.489, p < 0.001, two-sided). This difference to the other peripheral position with a threshold of 12 points is substantially smaller, albeit still significant (Wilcoxon rank sum test, z = 1.981, p = 0.048, two-sided). This difference in points received by either the powerful or the peripheral player with a threshold of 12 points is also notably smaller than it is in the reference scenario $c0-0-0$: 2.73 points compared to 4.38 points. Thus, a higher individual threshold translates into a larger mean allocation to this player.

Tests of difference H3

The decrease of 1 percentage point (pp) in NSR-I between thresholds 1 and 5 (below equal split) is not substantial (z-test; p = 0.655; 95% CI [-0.001; 0.021]). Somewhat stronger are the decreases in NSR-I of 5pp each between thresholds 5 and 9 (z-test; p = 0.0246; 95% CI [0.003; 0.091]) and between thresholds 9 and 12 (z-test; p = 0.395; 95% CI [-0.060; 0.159]).

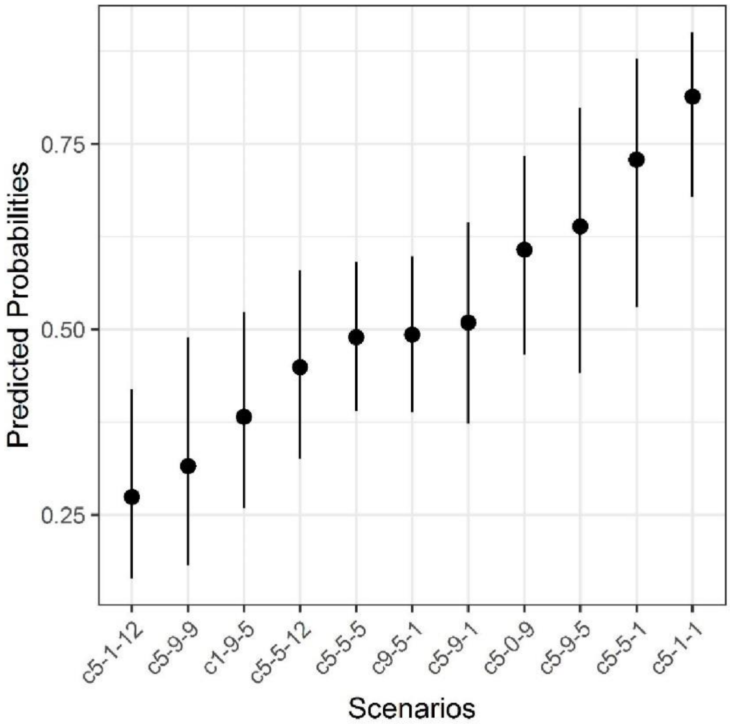
Tests of difference H4

The 14pp decrease between thresholds 1 and 5 is substantial (z-test; p = 0.007, 95% CI [0.040; 0.249]), as is the difference in the 28pp decrease between thresholds 5 and 9 (z-test; p = 0.000; 95% CI [0.170; 0.384]). The difference of 2pp in NSR-I between thresholds 9 and 12, which are both above the equal split, is not substantial and not significant (z-test; p = 0.889, 95% CI [-0.132; 0.181]).

Further empirical observations

Tables 1 shows the distributions of thresholds – scenarios – in each experiment. Column 3 displays the sum of all thresholds per network. Column 4 refers to the need satisfaction rate at the network level (NSR-N); Column 5 displays the mean range of profits within a network, that is, a measure of inequality of the distribution of the resource. In treatment A, the sum of thresholds is consistently negatively related to the NSR-N. Comparing all scenarios with a sum of 15, $c1-9-5$ deviates to the lower end. It appears that the need level of the central position negatively influences her willingness to attend to others' needs. The mean range of profits is smallest in the scenario $c5-5-5$, where need thresholds are homogeneous, and largest when the range of thresholds (with a maximum of 12) is largest as well. In treatment B, the NSR-N is negatively related to the sum of thresholds, with one exception, the scenario $c5-5-5$. This deviation may be explained by the fact that in the preceding period the resource was insufficient to satisfy all three need thresholds ($c5 - 12 - 12$). Furthermore, it was the final scenario before the end of the session.

Figure A. Predicted Probabilities (95% conf. int.) of the Regression in Table 2



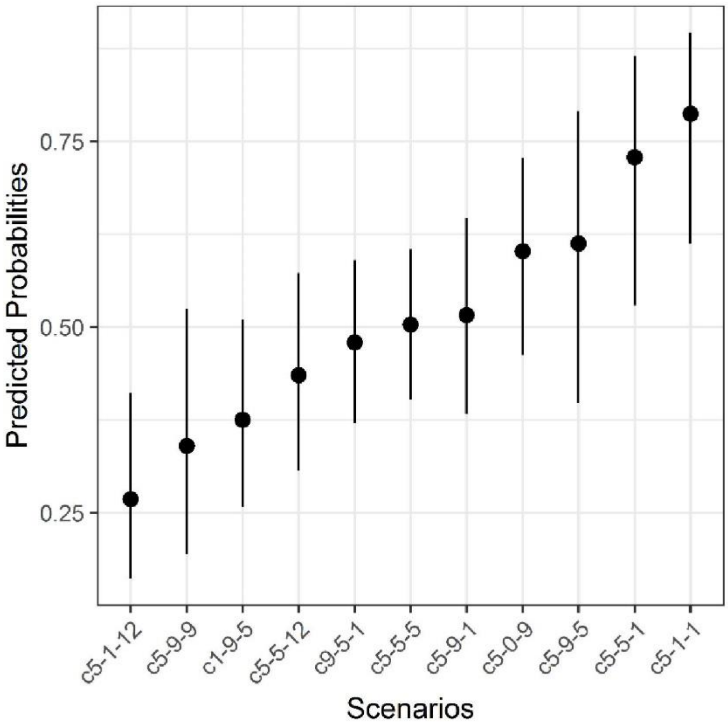
In S1 Figure A predicted probabilities of the treatment effects in the logistic regression in Table 2 are plotted. The sum of SVO of all network members is set at the mean angle of 61.2. Not all scenarios differ substantially from each other, but there are marked differences between groups of scenarios. Note that scenario c5-1-1, in which the sum of thresholds equals 7 points (reference category in regression), has the highest probability of need satisfaction, closely followed by scenario c5-5-1 (sum = 11). In comparison, scenario c5-1-12, which is highly heterogeneous in the distribution of need thresholds and has a sum of 18 points, and scenario c5-9-9, which is less heterogeneous in need threshold distribution but has a sum of 23 points, have the lowest probability of NSR-N reaching 1 (i.e. all three thresholds satisfied). Thus the sum of thresholds and their distribution within the network influence the probability of need satisfaction.

Table A. Logistic Regression on NSR-N. Including control for Period

Dependent Variable: NSR-N, 1 = all three thresholds satisfied; 0 = at least one threshold not satisfied					
	Coefficient	Stand Err	Lower 0.95	Upper 0.95	Odds Ratio
Sum of SVO in network	0,5114	0,1813	0,1561	0,8666	1,6675
Scenarios (ref. c5-1-1)					
c5-5-5	-1,2936	0,4588	-2,1929	-0,3944	0,2743
c5-0-9	-0,8918	0,522	-1,915	0,1313	0,4099
c1-9-5	-1,8171	0,5229	-2,842	-0,7922	0,1625
c5-1-12	-2,3089	0,5402	-3,3676	-1,2502	0,0994
c9-5-1	-1,3898	0,4457	-2,2634	-0,5162	0,2491
c5-9-1	-1,2414	0,4878	-2,1974	-0,2854	0,289
c5-5-1	-0,3197	0,2386	-0,7873	0,148	0,7264
c5-9-5	-0,8486	0,2553	-1,349	-0,3482	0,428
c5-5-12	-1,5676	0,3605	-2,2742	-0,861	0,2085
c5-9-9	-1,9698	0,3999	-2,7535	-1,1861	0,1395
Period	-0,2233	0,2455	-0,7045	0,2578	0,7998

Note: N = 576; scenario c5-12-12 is excluded, since NSR-N always < 1; Scenario c0-0-0 is excluded, since NSR-N always = 1. Standard Errors are clustered on the group level of the session, whereby one session consisted of either one or two independent groups of 12 individuals, depending on whether one or both treatments were implemented at the same time.

Figure B. Predicted Probabilities (95% conf. int.) of the Regression in Table A in S2 File.



SVO at mean = 61.2, Period at mean = 5. Predicted probabilities are not substantially affected through the inclusion of the time variable.

S3 File: Difference in experience between samples

Table A. Logistic Regression of NSR-I of third including lab-dummy.

Dependent Variable: Need of the third player satisfied (no = 0, yes = 1)					
	Effect	S.E.	Lower 0.95	Upper 0.95	Odds Ratio
SVO of network members					
SVO central player	12,256	0,3203	0,5979	18,533	34,061
SVO coalition partner	0,0356	0,206	-0,3681	0,4394	10,363
SVO third player	-0,1118	0,1728	-0,4505	0,2268	0,8942
Period	-0,3588	0,1736	-0,6991	-0,0184	0,6985
Individual threshold of third (ref. = 1)					
Threshold = 5	-0,5941	0,2246	-10,342	-0,154	0,552
Threshold = 9	-18,657	0,2603	-23,759	-13,555	0,1548
Threshold = 12	-20,586	0,3243	-26,942	-1,423	0,1276
Sociodemographic variables of third player					
Female	0,314	0,1759	-0,0308	0,6587	13,688
Experimental experience (1= more than 3)	0,299	0,2265	-0,1448	0,7429	13,485
Age (1 = above median of 23 yrs.)	0,2321	0,2073	-0,1742	0,6384	12,612
Lab	0,1888	0,4021	-0,5994	0,977	12,078

Note: N = 576; scenario c5-12-12 is excluded, since NSR-N always < 1; Scenario c0-0-0 is excluded, since NSR-N always = 1. Standard Errors are clustered on the group level of the session, whereby one session consisted of either one or two independent groups of 12 individuals, depending on whether one or both treatments were implemented at the same time.

Table B. Logistic regression on NSR-N including lab-dummy

Dependent Variable: NSR-N = 1 (all three thresholds sastisfied); 0 (not all thresholds satisfied)					
	Effect	S.E.	Lower 0.95	Upper 0.95	Odds Ratio
Sum of SVO in network	0,4375	0,1811	0,0825	0,7924	15,488
Scenarios (ref. c5-1-1)					
c5-5-5	-16,815	0,3654	-23,977	-0,9654	0,1861
c5-0-9	-1,285	0,48	-22,258	-0,3441	0,2767
c1-9-5	-22,088	0,4403	-30,718	-13,459	0,1098
c5-1-12	-27,053	0,4712	-36,288	-17,818	0,0669
c9-5-1	-17,524	0,4017	-25,397	-0,9651	0,1734
c5-9-1	-16,855	0,4248	-25,181	-0,8529	0,1854
c5-5-1	-0,4865	0,1813	-0,8417	-0,1312	0,6148
c5-9-5	-0,9016	0,25	-13,915	-0,4117	0,4059
c5-5-12	-16,721	0,337	-23,326	-10,117	0,1878
c5-9-9	-22,389	0,2231	-26,763	-18,016	0,1066
Lab	0,3923	0,268	-0,133	0,9176	14,804

Note: The dependent variable of this logistical regression is the probability of the third (i.e. excluded) player having her need threshold satisfied (1) or not (0). We control for the central player's SVOs and the third player's own SVO (numeric, all multiplied by 10 for display ease; minimum = -16.26, maximum = 57.83, mean = 20.36), as well as gender (binary; 1 = female), age (binary; 0 = up to 22 years, 1 = 23 years and older) and experimental experience (binary; 0 = 3 or fewer times, 1 = 4 or more times participated in any lab experiment), as these factors can influence bargaining behavior. N = 546; all scenarios with affluence (i.e. sum of thresholds < available resource), furthermore scenario c0-0-0 is excluded, as there are no thresholds to be satisfied; furthermore, all cases where the individual threshold = 0 are excluded (c5-0-9). Cases without agreement are excluded. Standard Errors are clustered on the group level of the session, whereby one session consisted of either one or two independent groups of 12 individuals, depending on whether one or both treatments were implemented at the same time.

S4 File: Experimental instructions (translated from German)

Welcome to the experiment
and thank you for your participation!

Please do not talk to other participants during the experiment!

In this experiment you and all other participants have to decide on several occasions. Your payoff depends on the decisions of the other participants as well as your own decisions. The decisions are the same for all participants.
Please read the instructions carefully and take your time on your decisions.

Please do not ask your questions openly! Please raise your hand if you have any questions. One of the laboratory personnel will come to you to answer your questions individually. Also, you are not allowed to communicate with other participants during the experiment. It is important for the scientific value of the experiment to abide by this rules.

You will receive your payoff after the experiment anonymously and in private. You and the other participants will not be informed about the interaction partners or anyone's payoff, during or after the experiment.

Throughout the experiment we speak of **tokens** instead of real money. After the experiment the tokens you earned will be converted to real money at the rate of:

1 tokens = 1 Euro
1 token = 100 token-cents

Each participant has the potential to earn 22 tokens (22 Euros) on average, depending on own and other's decisions. The experiment will last about 1.5 hours on average.
You cannot influence the duration of the experiment with a quick decision, as you have to wait for the other participants to finish.

Experiment 1
In to following you will be confronted with several decision situations.

First Situation:
In this experiment you have to decide on the allocation of points between yourself and another participant on several occasions. You are offered to choose the allocations you prefer most from 9 options on 6 different occasions. At the end of the experiment one of this 6 decisions is chosen randomly and paid to you and a randomly matched partner. You will also receive the payoff of the allocation some other participant chose.

Profit (First situation) = own decision + decision of one other participant

Second Situation:
In this experiment you have to decide between two payoff variants under different circumstances in 10 situations. One of you choices will be chosen randomly for your payoff.

Profit (Second situation) = own decision (randomly chosen lottery)

Profit (Experiment 1) = Profit (First situation) + Profit (Second situation)

You will be informed about the payoff of experiment 1 at the end of the whole experimental session.

Experiment 2
For this experiment you will be matched into groups of three people. In total this experiment has **7 periods.** At the beginning you are allocated to one position in the group. You will remain in this position for the entire experiment (labelled with colors red, green, and blue). In each period you are matched with a new group (meaning two new group members). You are also randomly assigned **threshold**. This happens to all participants.

Each period has two parts (part A and B). In the first part you can communicate with the members of your group and come to an agreement about the allocation of 24 tokens. If you manage to obtain enough points to overcome the threshold that was assigned to you, you may earn additional profit in the third part of the experiment.

Part A: Allocation of points
In the second part of the experiment you can communicate with your group members about the allocation of 24 tokens. Depending on how you are connected to the members of the group you will see either one or two windows on your computer screen in which you can communicate with one other group member individually. In each period you will receive information about the connections within your group. The thresholds that were assigned to you and the others are displayed as numbers next to the colored circles that mark the positions in the group.
You can communicate using the windows on your screen, in which you can **send offers about the allocation of 24 tokens** back and forth. You can send and receive offers from the participants you are

connected with. After **one minute** you can accept the last offer that was sent. Only one offer can be accepted per period. You have **three minutes** to find an agreement. If you do not agree, all group members receive 0 points. Only one agreement is possible. If your two fellow group members manage to agree, you will be informed about their agreement subsequently. The first agreement made between two participants is also valid for the whole group.
If you manage to obtain enough tokens to satisfy the threshold that was assigned to you in a period you can earn additional profit in the third part of this experiment. The thresholds are randomly allocated each period and thus can change each period. The thresholds are common knowledge within a group.

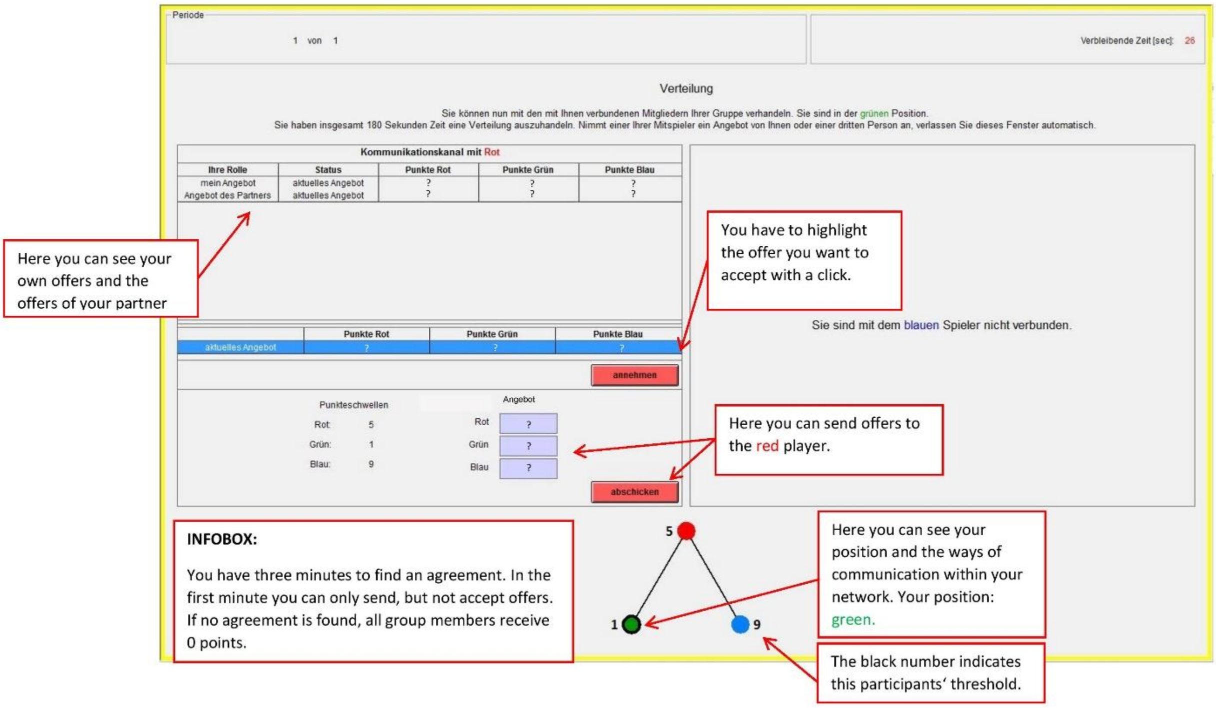
Part B: Tasks
If you managed to obtain enough points to satisfy your threshold **you can earn additional money in this part of the experiment by completing different real effort tasks**. The points you add in this part are added to the points you obtained in part 2. There are different tasks to be completed, such as addition or multiplication of numbers, answering quiz questions. The tasks can be of varying difficulty and the profit to be earned is related to the level of difficulty. At the end of each period you will be informed about the tokens you earned in this period.
If you did not earn enough points to satisfy you threshold, you cannot earn additional profit, but you can still participate in the completion of the tasks. In this case you receive the tokens you obtained in part 2.
Example 1: You threshold to participate in part 3 is 5 tokens. Your group agreed that you should receive 8 tokens. Thus you can participate in part three and earn additional tokens. In this period you earn 8 tokens plus anything you earned in part 3.
Example 2: You threshold to participate in part 3 is 5 tokens. Your group agreed that you should receive 4 tokens. Thus you cannot earn additional profit in part 3. Your profit of this period equals 4 tokens.

Payoff of experiment 2
For payoff only one of the 7 periods is relevant. One period will be randomly drawn for payoff at the end of the experiment. You will receive the payoff of this period and your points will be converted to Euros.

At the beginning of Experiment 2 we ask you to complete some comprehensive questions and to state your preference about some exemplary distributions. Subsequently all participants will complete a trial period in order to familiarize yourself with the procedure. This period is not relevant for payoff.

Conclusion
The tokens you earned in experiment 1 and experiment 2 will be added and converted. At the end of the experiment you will receive the payoff you earned in both experiments.

At the end of the experiment you will find a short questionnaire. Please fill in the questionnaire. You will receive 4 tokens for the completion of the questionnaire.
On the next page you will find a summary of experiment 2.



Periode
1 von 1
Verbleibende Zeit [sec]: 26
Verteilung
Sie können nun mit den mit Ihnen verbundenen Mitgliedern Ihrer Gruppe verhandeln. Sie sind in der grünen Position.
Sie haben insgesamt 180 Sekunden Zeit eine Verteilung auszuhandeln. Nimmt einer Ihrer Mitspieler ein Angebot von Ihnen oder einer dritten Person an, verlassen Sie dieses Fenster automatisch.
Kommunikationskanal mit Rot
Ihre Rolle
Status
Punkte Rot
Punkte Grün
Punkte Blau
mein Angebot
Angebot des Partners
aktuelles Angebot
aktuelles Angebot
annehmen
Punkteschwellen
Angebot
Rot: 5
Grün: 1
Blau: 9
abschicken
Sie sind mit dem blauen Spieler nicht verbunden.
Here you can see your own offers and the offers of your partner
You have to highlight the offer you want to accept with a click.
Here you can send offers to the red player.
INFOBOX:
You have three minutes to find an agreement. In the first minute you can only send, but not accept offers. If no agreement is found, all group members receive 0 points.
Here you can see your position and the ways of communication within your network. Your position: green.
The black number indicates this participants' threshold.

4

S5 File: List of abbreviations and notation

Abbreviations

A-C-B	Positions in the implemented network, whereby C as central player is in the strong power position and A and B as peripheral players are in a weak power position.
St1, St2, St3	Stage one, two or three of the conducted experiment.
NSR	Need satisfaction rate.
NSR-I	Need satisfaction rate on an individual level, i.e. the proportion of individuals whose needs are satisfied for a specific individual threshold.
NSR-N	Need satisfaction rate on a network level, i.e. the proportion of need thresholds that are satisfied in the network.
SVO	Social value orientation.
N	Number of observations.

Notation

n	Number of individuals in the network or the group.
U	Vector that captures the difference between individual payoffs and just payoffs for each member *1* to *n*.
$f_i(U)$	Function of individual *i* that weights the injustice within the utility function.
y_i	Payoff of individual *i*.
α_i	Factor of individual *i* that weights the own payoff against perceived injustice in the utility function.
$V_i(\cdot)$	Utility function of individual *i*.
t_i	Need threshold of individual *i*.
T	Vector consisting of all need thresholds t_i of members 1 to *n*.
s_i	Individual need satisfaction, which is equal to 1 if $y_i \geq t_i$ and 0 otherwise.
S	Vector displaying whether the individual thresholds of members 1 to *n* are satisfied.
U^{-S}	Vector that captures the difference between the actual payoff distribution and the just distribution without considering individual needs.
U^S	Vector that captures the proportion of needs that are *not* satisfied, which is equal to 1-S.
$g_i(U^{-S})$	Function of individual *i* that weights the perceived non-need related injustice, such as inequality concerns.
$h_i(U^S)$	Function of individual *i* that weights the need related injustice, i.e. weights the need thresholds that are not satisfied.

8. Diskussion der Studienergebnisse im Vergleich

Durch den Vergleich der Koalitionsentscheidungen stechen vier zentrale Ergebnisse hervor: Erstens, Fairnesskriterien wirken sich erst gegenüber dritten Individuen aus, wenn die Fairnesskriterien unter den Koalitionsmitgliedern erfüllt sind. Zweitens, die Verhandlungsstruktur beeinflusst, wie die Ressourcen zwischen den Koalitionsmitgliedern und dritten Gruppenmitgliedern aufgeteilt werden. Drittens, in kontinuierlichen Koalitionsverhandlungen sind Ressourcen eher gleichverteilt als in einmaligen Koalitionsverhandlungen. Viertens, wie aufgrund des Bedarfsprinzips erwartet, beeinflussen die Bedarfsschwellen die Verteilung der Ressourcen. Tabelle 1 gibt einen vergleichenden Überblick über die zentralen Ergebnisse. Diese werden im Folgenden näher erläutert und am Ende jedes Abschnitts in einem etwas breiteren Kontext interpretiert.

Tabelle 1. Studienübergreifender Vergleich der Koalitionsentscheidungen.

	2er-Linie	3er-Linie	Dreieck	Gruppe (kont.)	3er-Linie mit Bedarfen $B_3 \leq 33\%$	$B_3 > 33\%$
Punkte Koalitionsmitglieder	.421	.434	.447	.411	.423	.420
Punkte gleichverteilt	.911	.665	.800	.683	.567	.563
Punkte Dritter	.159	.131	.106	.179	.154	.160
Punkte Dritter > 33%	.004	.007	.008	.058	.004	.240
Korr. mit indiv. Verhalten	.380	.267	.280	.515	.123	.286

Bei den angegebenen Werten handelt es sich um Anteilswerte. ‚2er-Linie',‚3er-Linie' und ‚Dreieck' beschreiben die Koalitionsverhandlungen mit einer, zwei und drei relevanten Koalition (Studie 1, 2). ‚Gruppe' beschreibt die Koalitionsverhandlungen, in denen kontinuierlich verhandelt wird und die Angebote öffentlich sind (Studie 3). Mit Bedarfen sind die Einigungen geteilt in Fälle in denen das dritte Gruppenmitglied eine Bedarfsschwelle von weniger oder mehr als ein Drittel hatte (Studie 4).

8.1. Verteilung unter den Koalitionsmitgliedern

Die Ergebnisse aus Studie 1, welche sich mit dem Vergleich zwischen individuellem Verhalten und Verhalten in bilateralen Verhandlungen beschäftigt, zeigen, dass koalierende Individuen die Ressource in über 90% der Fälle untereinander gleich aufteilen. Dieses Ergebnis wird in der Studie im Einklang mit der theoretischen Analyse auf die Ungleichheitsaversion in den Koalitionsverhandlungen zurückgeführt. Aufgrund der Gleichverteilung zwischen den koalierenden Individuen lassen sich die Transfers zum dritten Gruppenmitglied daher auch als bedingte Transfers interpretieren. Ein weiteres auffälliges Merkmal der Transfers ist, dass Dritte in sehr wenigen Einigungen mehr als ein Drittel der Ressourcen erhalten. Dies entspricht ebenfalls der Vorhersage, die sich aus der Hypothese der Ungleichheitsaversion ergibt. Das formale Modell aus der ersten Studie ist ein Spezialfall des in Abschnitt 2.2 eingeführten Modells, für das die

Verhandlungsmacht zwischen den koalierenden Subjekten ident ist. Die Ergebnisse der weiteren Studien können jedoch ebenfalls mit Hilfe der theoretischen Ergebnisse aus Abschnitt 2.2 interpretiert werden.

Zunächst sollen die Ergebnisse der 2er-Linie mit jenen des Dreiecks und der Gruppe verglichen werden, da die Koalitionsmitglieder in diesen Konstellationen jeweils dieselbe Verhandlungsmacht haben. Es zeigt sich, dass im Dreieck der Anteil an Einigungen, welche die Ressourcen unter den Koalitionsmitgliedern gleich aufteilen, mit 80% ebenfalls relativ hoch liegt. Dennoch führt der in der Mehrheitsentscheidung angelegte Wettbewerb im Koalitionsfindungsprozess des Dreiecks im direkten Vergleich zur 2er-Linie zu einem Rückgang von zehn Prozentpunkten des Anteils egalitärer Punkteaufteilungen. Erweitert man diese Einigungen jedoch um jene Einigungen, die um jeweils einen Punkt von einer gleichen Aufteilung abweichen, so machen diese in Summe bereits 92% aller Einigungen aus. Das heißt, verteilt die Koalition die Ressourcen untereinander nicht genau gleich, liegen die weiteren Einigungen trotzdem in der Nähe der Verteilung.

Im Prinzip ähneln die Ergebnisse der Gruppe denen des Dreiecks. Zwar ist die Ressource in etwas mehr als zwei Drittel aller Einigungen unter den Koalitionsmitgliedern genau gleichverteilt, dennoch liegt dieser Wert unter den Werten des Dreiecks und der 2er-Linie. Zählt man allerdings die nächstgleichen Einigungen wieder hinzu, inkludiert dies 87% aller Einigungen. Das zeigt, dass sich auch in der Gruppe ein Großteil der Einigungen um die gleichen Aufteilungen gruppiert. Ein wichtiger Faktor, der die unterschiedlichen Punktergebnisse zwischen Dreieck und Gruppe erklären kann, bezieht sich auf die kontinuierlich laufenden Auszahlungen des Gruppenexperiments. Unter den geringeren, marginalen Auswirkungen einer kurzfristigen Einigung ist es für die Gruppenmitglieder möglich, zu versuchen, bestehende Koalitionen durch Lockangebote aufzubrechen, welche das potenzielle Koalitionsmitglied im Vergleich zur bestehenden Einigung ein wenig besserstellen. In Folge bilden sich kurzfristige Koalitionen, die verfügbare Ressourcen untereinander nicht ganz genau gleich aufteilen.

Die Ergebnisse aus der 2er-Linie, dem Dreieck und der Gruppe zeigen insgesamt, dass die Ungleichheitsaversion zwischen den koalierenden Individuen eine starke Wirkung auf das Ergebnis einer Verhandlung hat. Selbst wenn die Ressource zwischen ihnen nicht exakt gleich aufgeteilt ist, ist die Abweichung meist nur sehr gering. In den Einigungen scheint das Gleichheitsprinzip unter den Koalitionsmitgliedern wichtiger als gegenüber dem dritten Gruppenmitglied zu sein, was sich theoretisch aufgrund des Unterschieds zwischen benachteiligter und bevorteilter Ungleichheitsaversion erklären lässt (Fehr & Schmidt, 1999).

Ebenso deutlich zeigt sich dieses Ergebnis in der 3er-Linie. Aufgrund der ungleichen Verhandlungsmacht ist zu erwarten, dass die Punkte zwischen den koalierenden Individuen in der 3er-Linie seltener gleichverteilt sind als in der 2er-Linie, dem Dreieck oder der Gruppe (siehe Abschnitt 2.2 und Studie 2). Das Individuum in der mächtigen Position hat in der 3er-Linie aufgrund des strukturellen Vorteils die Möglichkeit, mehr Punkte für sich selbst zu verhandeln. Laut den theoretischen Überlegungen ist die entscheidende Frage, ob die Ressourcen unter den Koalitionsmitgliedern gleichverteilt sind, wenn der Dritte einen Anteil größer null erhält. Theoretisch sollten Dritte nur einen Anteil an den Ressourcen erhalten, wenn die Punkte zwischen diesen gleichverteilt sind. Tatsächlich trifft dies in 83% der Fälle zu, beziehungsweise in 94%, sofern man die nächstgleichen Einigungen hinzuzählt. In Abbildung 2 von Studie 2 ist diese Systematik deutlich erkennbar, da die meisten Einigungen auf der Linie zwischen dem mächtigen Individuum und der Zweiergleichverteilung und darüber hinaus auf der direkten Linie zwischen Zweier- und Dreiergleichverteilung liegen. In der 3er-Linie unterstützen die Ergebnisse damit ebenso die Vorhersagen, die aus der Hypothese der Ungleichheitsaversion folgen.

Den kritischsten Test für die gleiche Aufteilung zwischen den koalierenden Individuen liefert die vierte Studie, in welcher durch die individuellen Bedarfe ein weiteres Verteilungskriterium neben der Gleichverteilung erzeugt wird. Hier zeigt sich, dass die Ressource in der Mehrheit aller Einigungen zwar immer noch gleich zwischen den koalierenden Individuen aufgeteilt wird, das Niveau jedoch deutlich geringer ist als in der 3er-Linie. Der Anteil an Koalitionen, welche die Punkte unter sich gleich verteilen, ist ebenfalls nicht höher, wenn man nur jene Einigungen vergleicht, in denen der Dritte einen positiven Anteil der Punkte erhält. Während die Punkte unter den Koalitionsmitgliedern in der 3er-Linie in 83% der Fälle gleichverteilt sind, ist das mit Bedarfen in nur 44% bzw. 54% der Einigungen der Fall, je nachdem, ob der Bedarf unter oder über der Gleichverteilung liegt. Grund für diese deutliche Differenz ist, dass sich die Bedarfserfüllung nicht in allen untersuchten Situationen mit der Gleichverteilung vereinbaren lässt und die Verteilungsprinzipien somit in Konflikt geraten.

Auf einer abstrakteren Ebene sind sich die Entscheidungsmuster zwischen Studie 4 und den anderen Studien dennoch ähnlicher als es auf den ersten Blick scheint. Auch für das Bedarfsprinzip gilt, dass Fairness häufig erst zwischen den koalierenden Individuen hergestellt wird, bevor Fairness gegenüber dem dritten Individuum eine Rolle in der Entscheidung spielt. Sind die Bedarfe der Koalitionsmitglieder erfüllt, ist meist auch der Bedarf des dritten Individuums erfüllt (71.2%). Im Gegensatz dazu, ist der Bedarf von einem der beiden Koalitionsmitglieder nicht erfüllt, ist auch der Bedarf des dritten Gruppenmitglieds selten durch die Einigung erfüllt

(20.5%). Unabhängig davon, ob das primäre Verteilungsprinzip nun das Gleichheits- oder das Bedarfsprinzip ist, folgen die Einigungen einer ähnlichen Logik, die besagt, dass die Koalitionsmitglieder erst gleichgestellt werden müssen bevor der Dritte berücksichtigt wird.

Anhand der experimentellen Ergebnisse lassen sich im Weiteren auch Verhandlungsergebnisse aus alltäglichen Situationen durch die Linse von prosozialen Präferenzen interpretieren. In Regierungsverhandlungen werden Ressourcen typischerweise im Einklang mit ‚Gamson‘s Law‘ (Gamson, 1961) relativ zu den Regierungssitzen oder Stimmanteilen der Parteien verteilt (Browne & Frendreis, 1980; Schofield & Laver, 1985; Warwick & Druckman, 2001). Wenn es allerdings Abweichungen von dieser Vorhersage gibt, dann gleicht sich zunächst die Verteilung der Ressourcen zwischen den koalierenden Parteien an. Das heißt, kleinere Parteien mit einer geringeren Anzahl an Regierungssitzen werden im Vergleich zu den größeren Parteien über die proportionale Aufteilung hinaus überkompensiert (Browne & Franklin, 1973, p. 461; Warwick & Druckman, 2006, p. 647). Die präsentierten Ergebnisse könnte man daher dahingehend interpretieren, dass sich Gleichheitspräferenzen auch in Regierungsverhandlungen auf die Verteilung der Ressourcen auswirkt. Denkbar wäre, dass vor allem kleinere Parteien nicht willig sind eine Koalition einzugehen, wenn die Ressourcen zu stark ungleich verteilt werden. Die experimentellen Ergebnisse geben Indizien hierfür. Ob die Ungleichheitsaversion jedoch tatsächlich verantwortlich ist, muss in zukünftigen Studien genauer untersucht werden. Es könnte ebenso sein, dass kleinere Parteien sich in der Oppositionsrolle ein besseres Ergebnis für die nächste Wahl versprechen und innerhalb der Koalition für diese Erwartung kompensiert werden müssen.

Überdimensionierte Koalitionen (im Gegensatz zu minimalen Gewinnkoalitionen) kommen auf den höchsten Ebenen der Politik allerdings selten vor. Es scheint naheliegend, dass politische Parteien auf nationalstaatlicher Ebene in der Regel nicht als sonderlich prosozial beschrieben werden können. An dieser Stelle kann jedoch festgehalten werden, dass die Ergebnisse von Regierungskoalitionen den hier vorgestellten Analysen nicht widersprechen. Wie diskutiert, ist nicht zu erwarten, dass soziale Präferenzen auf dritte Parteien wirken bevor die Koalitionsparteien durch die Einigung gleichgestellt sind.[15] Weitaus wichtiger erscheint der Einfluss sozialer Präferenzen, wenn die Koalitionen von einzelnen Individuen getroffen werden. Als Beispiel,

[15] Anekdotische Evidenz von Ausnahmefällen unterstützen die dargestellten Zusammenhänge. In der Koalition der belgischen Regierung von 1978 wurde neben den christlich-demokratischen und sozialistischen Parteien zwei weitere Parteien in die Koalition aufgenommen, die für die Mehrheit nicht notwendig gewesen wären (Schofield et al., 1988). Obwohl die christlich-demokratische Partei 82 und damit mehr der 202 Sitze gewonnen hatte als die sozialistische Partei mit 57 Sitzen, wurden die Ministerien zwischen den zwei Großparteien in dieser Koalition gleich aufgeteilt (jeweils neun, die zwei weiteren Parteien erhielten jeweils zwei Ministerien).

wenn das Budget des nächsten Jahres durch eine Mehrheitsentscheidung auf verschiedene Institute innerhalb einer Fakultät aufgeteilt werden soll, dann ist durchaus denkbar, dass manche Institutsleiterinnen und Institutsleiter nicht nur ihr eigenes Institut im Blick haben, sondern auch darauf achten, das Budget fair zwischen den Instituten aufzuteilen. Hier wäre laut den hier präsentierten Ergebnissen die Erwartung, dass nur dann Dritten auch Ressourcen zugeteilt werden, wenn alle Institutsleiterinnen und Institutsleiter zu gleichen Teilen bereit sind auf eigene Ressourcen zu verzichten. Obwohl Entscheidungen von Koalitionen in solchen Situationen weniger Aufmerksamkeit von der Koalitionsforschung erhalten, sind sie im sozialen Alltag allgegenwärtig. Die Ergebnisse der Dissertation liefern die Grundlage, um in zukünftigen Studien bei genau diesen Fällen anzusetzen und die Verteilungen der abstrakten Laborsituationen mit denen aus alltäglichen Situationen zu vergleichen.

8.2. Verantwortung und Prosozialität in Koalitionsentscheidungen

Dritten Gruppenmitgliedern wird von den Koalitionsmitgliedern in allen vier Studien unter allen Versuchsbedingungen ein Teil der Ressource zugeteilt (durchschnittlich 10-18%). Dies suggeriert, dass Prosozialität auf alle Koalitionsverhandlungen einen Einfluss hat. In Abschnitt 2.3 wird abgeleitet, dass aufgrund der Verteilung von Verhandlungsmacht und Verantwortung in Verteilungsentscheidungen, die individuell, in der 2er-Linie, der 3er-Linie und im Dreieck erfolgen, jeweils unterschiedliche Verteilungen der Ressourcen zu erwarten sind.

Grundsätzlich korrelieren die individuellen Verteilungsentscheidungen mit den durchschnittlichen Koalitionsentscheidungen der Individuen in allen Studien positiv und statistisch hoch signifikant (jeweils $p < .01$). In den Studien 1 und 3 erhält ein Individuum von einer anderen Entscheidungsperson durchschnittlich etwa 20% der zu verteilenden Ressourcen. Vergleicht man die Transfers der individuellen Entscheidungen mit den Transfers der Koalitionsverhandlungen, zeigt sich, dass Dritte allerdings in allen Konstellationen der Koalitionsverhandlungen weniger Anteile an der Verteilung als durch einzelne Individuen erhalten. Anders ausgedrückt, wenn eine Person bereits im Vorhinein weiß, dass sie nicht Teil der Koalition sein wird, dann ist es für sie finanziell besser, wenn die anderen Individuen alleine über die Verteilung entscheidet, als wenn zwei Koalitionsmitglieder gemeinsam entscheiden. Insgesamt spricht dies dafür, dass der Diskontinuitätseffekt - die Beobachtung, dass Kollektive egoistischer entscheiden als Individuen - auch in Koalitionsentscheidungen auftritt.

In der 2er-Linie, der 3er-Linie und dem Dreieck variiert die Verantwortung des später von der Koalition ausgeschlossenen Individuums. Grundsätzlich ist die Verhandlungsmacht des dritten

Individuums in der Koalition von zwei anderen Gruppenmitgliedern ex post immer null, weil die zwei anderen Individuen entscheiden. Bildet sich eine Koalition, ist das dritte Individuum gleichzeitig ausschließlich auf das Wohlwollen der Koalition angewiesen. Der durch die Struktur ex ante festgelegte Exklusionsgrad des Dritten nimmt jedoch zwischen 2er-Linie (100%), 3er-Linie (50%) und Dreieck (33%) ab. Mit der höheren initialen Verhandlungsmacht steigt die Verantwortung, die dem Dritten für das Verhandlungsergebnis zugeschrieben werden kann. Es zeigt sich, dass die durchschnittlichen Transfers zum dritten Individuum von der 2er-Linie zur 3er-Linie und von der 3er-Linie zum Dreieck jeweils um mehr als 20% abnehmen. Somit gibt es Anzeichen dafür, dass es einen Zusammenhang zwischen initialer Verhandlungsmacht des Dritten und den erhaltenen Transfers gibt. Die Ergebnisse deuten im Einklang mit den Erwartungen aus Abschnitt 2.3 an, dass die Transfers zu Dritten in den Koalitionsverhandlungen umso höher sind, je geringer die Verantwortung des dritten Individuums ist. Gleichzeitig können die Ergebnisse nicht durch einen Selektionseffekt erklärt werden. Weder eigeninteressierte Individuen noch Individuen mit den Medianpräferenzen sind statistisch häufiger Teil der Koalition als andere Individuen.

Die experimentellen Ergebnisse liefern somit auch Hinweise darauf, warum politische Parteien selten prosoziale Entscheidungen treffen. Parteien bestehen häufig aus mehreren Ebenen von Koalitionen. Eine koalierende Interessensgruppe in einer Gemeinde koaliert bspw. unter dem Schirm einer Landespartei mit Koalitionen anderer Gemeinden, die wiederum mit den Koalitionen der anderen Länder koalieren, um eine gemeinsame Partei bei nationalen Wahlen zu stellen. In den Experimenten reicht bereits eine Ebene aus, um den negativen Einfluss von Koalitionsentscheidungen auf prosoziale Verteilungsentscheidungen nachzuweisen. Bradfield und Kagel (2015) zeigen in diesem Kontext, dass sich Koalitionen auf weniger gleiche Verteilungen einigen, wenn jedes Gruppenmitglied ein eigenes Team für sich bildet und durch Einstimmigkeitsregel über die Handlungen des Teams entscheidet. Eine offene Frage zukünftiger Forschung ist, ob sich der negative Effekt über jede weitere Ebene verstärkt. Ist dies der Fall, überrascht es nicht, dass Ressourcen auf den höchsten Ebenen der Politik kaum auf dritte Parteien verteilt werden.

8.3. Kontinuierliche Koalitionsverhandlungen und Prosozialität

In Studie 3 und Abschnitt 2.3 wurde argumentiert, dass faire, dafür stabile Einigungen in kontinuierlichen Koalitionsverhandlungen von ökonomischem Vorteil für die Koalition sein können. Die experimentellen Ergebnisse zeigen in der Tat, je länger sich die koalierenden Individuen auf eine Verteilung einigen, die die Ressourcen untereinander gleich verteilen, desto höher ist der Anteil der Ressourcen an der Gesamtverteilung. Stabile ‚Zweier-Gleichverteilungen' werden am ehesten getroffen, wenn Individuen, die strategischer sind, gleichzeitig erwarten, dass die koalierenden Individuen strategischer sind. Insgesamt bildet die Zweier-Gleichverteilung damit die zweitstabilste Koalition.

Die ‚Dreier-Gleichverteilung', welche die Ressourcen auf alle drei Gruppenmitglieder gleich verteilt, ist im Durchschnitt noch stabiler als die Zweier-Gleichverteilung. Dieses Ergebnis überrascht ebenfalls nicht, da zu erwarten ist, dass die Dreier-Gleichverteilung den Kern in den Koalitionsverhandlungen bildet, wenn mindestens zwei der Individuen stark prosozial motiviert sind. Ist die Dreier-Gleichverteilung die präferierte Verteilung von zwei der drei Gruppenmitglieder, gibt es keine alternative Verteilung, die diese Individuen besserstellt und zum Abweichen von dieser Koalition verleiten könnte. In Einklang mit den theoretischen Überlegungen steigt die beobachtete Wahrscheinlichkeit von stabilen Koalitionen, die die Ressourcen auf alle drei Gruppenmitglieder gleich verteilen, mit den in Isolation gemessenen sozialen Präferenzen der Gruppenmitglieder.

Die Ressourcenanteile des dritten Gruppenmitglieds können in den Einigungen der Gruppe, in der die Verhandlungen kontinuierlich ablaufen, am ehesten mit den Ergebnissen des Dreiecks verglichen werden. Im direkten Vergleich ist der Anteil des Dritten an der Ressource in kontinuierlichen Verhandlungen im Durchschnitt um etwa 70% höher als in den einmaligen Koalitionsverhandlungen. Der Anteil der Transfers zu Dritten, die ein Drittel der Ressource übersteigen, liegt allerdings bei knapp 6% und damit etwas höher als in den anderen experimentellen Versuchsanordnungen. Wie bereits in Abschnitt 8.1 besprochen, ist die Fluktuation der Einigungen in den kontinuierlichen Verhandlungen generell etwas höher als in den anderen Versuchsanordnungen. Die Fluktuation alleine kann die stark prosozialere Ausrichtung der Verteilungen in den kontinuierlichen Koalitionsverhandlungen jedoch nicht erklären, was sich dadurch zeigt, dass der Anteil der Koalitionen, die die Ressourcen genau gleich verteilen, in den kontinuierlichen Verhandlungen ebenso höher liegt als in einmaligen Verhandlungen.

Auch Parteien auf nationalstaatlicher Ebene bestehen in vielen Fällen über einen langen Zeitraum. Während zwischen Parteien Ressourcen kaum prosozial verteilt werden, ist dies innerhalb von Parteien durchaus der Fall. Mershon (2001a, 2001b) untersucht für die die Democrazia Cristiana in Italien zwischen 1963 und 1979, wie die von einer Partei besetzten Ministerien innerhalb der Fraktionen verteilt werden. Enner-Jedenastik (2013) untersucht für die FPÖ, ÖVP und SPÖ in Österreich zwischen 1945 und 2008, wie die von den Parteien besetzten Ministerien über die jeweiligen Ableger in den Ländern verteilt werden. Obwohl es in den Parteien ausgereicht hätte, wenn der Bundesparteivorstand nur durch einen Teil der Fraktionen unterstützt wird, um gewählt zu werden, zeigt sich in beiden Analysen, dass die Ministerien vom Bundesparteivorstand innerhalb einer Partei in der Regel zwischen allen Fraktionen aufgeteilt werden. Es werden also Ressourcen über die kleinstmögliche Koalition hinaus auch auf dritte Fraktionen aufgeteilt, obwohl es aus Sicht rein egoistischer Präferenzen nicht notwendig wäre, solange kein Bruch der Partei provoziert wird. In Abschnitt 2.3 wurde diskutiert, wie sich die Verteilung der Ressourcen aufgrund sozialer Motive, wie konditionaler Kooperation, auf die Stabilität auswirkt. Auf Grundlage der Ergebnisse wäre eine Untersuchung des Zusammenhangs zwischen der Verteilung von Ressourcen und der Lebensdauer von Koalitionen in alltäglichen Situationen eine interessante Erweiterung.

8.4. Verteilungsprinzipien und Prosozialität in Koalitionsentscheidungen

Die Ergebnisse unterstützen die Erwartung, dass Koalitionsverhandlungen von Verteilungsnormen beeinflusst sind. Die Zweier- und Dreier-Gleichverteilung machen die Mehrheit aller Koalitionseinigungen aus. Dies ist speziell in den ersten drei Studien der Fall, in welchen die Gleichheit das einzige Fairnesskriterium ist, das dem Eigeninteresse entgegenwirkt. Im Dreieck (70.0%) und in der Gruppe (64.2%) konzentrieren sich die Einigungen häufiger auf die Fokalpunkte als in der 2er-Linie (55.0%). In der Gruppe ist die Dreier-Gleichverteilung aufgrund der Stabilität dieser Einigung am häufigsten zu beobachten. Währenddessen einigen sich die koalierenden Individuen speziell im Dreieck häufiger auf eine Zweier-Gleichverteilung. Selbst in der 3er-Linie (52.9%) fällt trotz der darin manifestierten ungleichen Machtverteilung die Mehrheit aller Einigungen auf die Zweier- und Dreier-Gleichverteilung.

Während in den ersten drei Studien das Gleichheitsprinzip im Vordergrund steht, können die Ressourcen in Studie 4, in welcher den Gruppenmitgliedern Bedarfsschwellen zugeteilt sind, auch nach dem Bedarfsprinzip verteilt werden. Im Vergleich zu den ersten drei Studien sinkt der Anteil der Gleichverteilung aufgrund der Bedarfsschwellen. Bedarfe von Dritten, die unter der Gleichverteilung liegen, haben eine geringe Auswirkung auf die Häufigkeit der Zweier- und Dreiergleichverteilung. Im Vergleich zur 3er-Linie ohne Bedarfe (24.5%) kommt die 3er-Gleichverteilung bei der 3er-Linie mit Bedarfen (23.6%) nur etwas seltener vor. Der Effekt von Bedarfen des Dritten, die über der Gleichverteilung liegen, ist dafür deutlich. Dreier-Gleichverteilungen sind bei Einigungen dieser Konstellation in nur 7% der Fälle zu beobachten, da diese den bedarfsgerechteren Einigungen weichen. Die 2er-Gleichverteilung kommt mit hohen Bedarfen des Dritten wiederum häufiger vor als in der 3er-Linie, was für eine Polarisierung der Verteilungseinigungen in Koalitionsverhandlungen spricht. Entweder werden die Bedarfe des dritten Gruppenmitglieds erfüllt oder dieses wird völlig von den Ressourcen ausgeschlossen.

Im direkten Vergleich zwischen Verhandlungen mit und ohne Bedarfen erhöhen die Bedarfsschwellen die Transfers zu Dritten um etwa 20%. Wenn die Bedarfe des Dritten die Gleichverteilung übersteigen, dann erhält das dritte Gruppenmitglied in 24% der Fälle mehr als ein Drittel der Ressourcen. Ohne die hohen Bedarfe erhält der Dritte in den anderen Versuchsanordnungen in weniger als 1% der Fälle mehr als ein Drittel der Ressourcen. Dies erklärt, warum die Anteile an der Verteilung für Dritte höher sind, wenn die Bedarfe die Gleichverteilung übersteigen. Allerdings erhöhen sich die Anteile des Dritten im Durchschnitt auch, wenn die Bedarfe unter der Gleichverteilung liegen. Niedrige Bedarfsschwellen von Dritten führen zu Transfers, die von stärker eigeninteressierten Koalitionsmitgliedern ohne Bedarfsschwellen nicht gemacht worden wären.

Die experimentellen Ergebnisse zeigen also insgesamt, dass Fokalpunkte, hier in Form von individuellen Bedarfsschwellen, die beobachteten Verteilungsentscheidungen systematisch anziehen. Die Fokalpunkte erhalten ihre Bedeutung durch die Verteilungsnorm der Bedarfsgerechtigkeit, was darauf hinweist, dass das Bedarfsprinzip die Verteilungsentscheidungen von kleinen Gruppen beeinflusst. Die Befunde liefern Evidenz dafür, dass Bedarfe in Verteilungsfragen eine wichtige Rolle spielen, selbst wenn diese in der Gruppe nicht homogen, sondern heterogen ausgeprägt sind.

9. Conclusio

Koalitionen sind allgegenwärtig in der Politik, der Ausgang von Koalitionsverhandlungen ist jedoch spieltheoretisch oft nicht eindeutig vorhersagbar. Dieses unbefriedigende Ergebnis hat eine ganze Fülle an theoretischer Forschung inspiriert (Humphreys, 2008; Linhart, 2013). Spieltheoretische Ansätze in diesem Feld basieren in der Regel auf der Annahme, dass einzelne Parteien in den Koalitionsverhandlungen versuchen, ihren Nutzen zu maximieren. Mehr als zwei Jahrzehnte der Erforschung und Systematisierung von sozialen Präferenzen verdeutlichen, dass Menschen in vielen Situationen ihren Nutzen nicht ausschließlich am größtmöglichen Profit messen, sondern mitunter auch Nutzen daraus ziehen, andere zu begünstigen (Cooper & Kagel, 2016; Konow & Schwettmann, 2016). Aus einer epistemologischen Perspektive ist es daher konsequent, soziale Präferenzen in die Analyse von Koalitionsverhandlungen einzubeziehen, wenn es darum geht, Verteilungsentscheidungen zu erklären und vorherzusagen. Ziel dieser Arbeit war, einen Beitrag mit möglichst hohem Grad internaler Validität zur Schließung dieser Forschungslücke zu leisten.

Dazu wurden vier experimentelle Studien entwickelt und durchgeführt, die vier strukturelle Aspekte von Koalitionsentscheidungen untersuchen, die sich auf drei theoretischen Ebenen auf das prosoziale Verhalten auswirken. Erstens treffen in einer Koalition mehrere Individuen gemeinsam eine Einigung. Aus einer *psychologischen* Perspektive führt dies zur Diffusion der Verantwortung zwischen den Entscheidungsträgerinnen und -trägern und dadurch zu einer geringeren Ausprägung sozialer Präferenzen. In der ersten Studie wird daher der Zusammenhang von individuellen und bilateralen Verteilungsentscheidungen untersucht. Zusätzlich kann in Koalitionsverhandlungen, in Abhängigkeit von der initialen Verhandlungsmacht, auch jenen Gruppenmitgliedern eine Mitverantwortung für den Ausgang der Verhandlungen zugeschrieben werden, die letztendlich nicht Teil der Koalition werden. Studie 2 beschäftigt sich mit der Auswirkung der Verhandlungsmacht und Verantwortung auf die Verteilungsentscheidungen der koalierenden Individuen.

Zweitens sind Koalitionen durch ihren temporären Charakter definiert. Das heißt, Koalitionen können sich jederzeit wieder auflösen und sind unter bestimmten Umständen theoretisch instabil. *Ökonomisch* kann es sich lohnen, langfristig stabile Koalitionen zu bilden, die Ressourcen in der Koalition gleich verteilen, anstatt Angebote myopisch anzunehmen, die die Koalitionspartnerin oder den Koalitionspartner womöglich nur kurzfristig ökonomisch besserstellen. Studie 3 untersucht daher die Verteilungsentscheidungen und Stabilität von Koalitionen in kontinuierlichen Verhandlungen und deren Abhängigkeit von den strategischen Fähigkeiten und Verteilungspräferenzen der Koalitionsmitglieder.

Drittens spielen für die Verteilungsentscheidungen die *sozialen* Verteilungsnormen eine zentrale Rolle. Je nachdem, welche Verteilungsprinzipien in den Koalitionsentscheidungen angewendet werden können, weichen die theoretischen Verteilungsentscheidungen stärker oder weniger stark von dem eigeninteressierten Vorhersagen ab. Um den Einfluss von Verteilungsnormen in den Koalitionsverhandlungen zu testen, wurden in Studie 4 heterogene Bedarfsschwellen operationalisiert, die es erlauben, die Ressourcen auch nach dem Bedarfsprinzip zu verteilen.

Die Resultate der Studien können in vier Hauptergebnissen zusammengefasst werden. (I) Soziale Präferenzen wirken sich zunächst vor allem auf die Ressourcenverteilung zwischen den koalierenden Individuen aus. Wenn das geltende Verteilungsprinzip die Herstellung von Gleichheit ist, dann muss die Verteilung beiden Koalitionsmitgliedern erst gleich viele Anteile der Ressource zuteilen, bevor Dritten auch Ressourcen zugeteilt werden. (II) Koalitionsentscheidungen sind aufgrund der multiplen Entscheidungspersonen und des Wettbewerbs, wenn es mehrere Koalitionsmöglichkeiten gibt, weniger prosozial ausgeprägt als individuelle Verteilungsentscheidungen. (III) Kontinuierliche Verhandlungen führen häufiger zu einer gleichen Verteilung der Ressourcen, da Koalitionen, die Ressourcen gleich verteilen, stabiler sind. (IV) Verteilungsnormen und Fokalpunkte, insbesondere in Form von Bedarfsschwellen, beeinflussen Koalitionsentscheidungen systematisch. In Abhängigkeit von der Bedarfshöhe ist die Verteilung der Ressourcen im Durchschnitt gleicher oder ungleicher ausgeprägt.

In Summe zeigen die Studien klar, dass prosoziale Motive die Koalitionsentscheidungen in den Laborexperimenten beeinflussen. Abhängig von den strukturellen Bedingungen der Koalitionsverhandlungen ist das prosoziale Verhalten stärker oder weniger stark ausgeprägt. Der Vergleich der Studien legt nahe, dass die Analyse einer konkreten Verhandlungssituation hinsichtlich psychologischer, ökonomischer und sozialer Einflussfaktoren lohnend ist, um die resultierende Verteilung der Koalitionsverhandlungen möglichst präzise vorhersagen zu können. Alle drei Dimensionen moderieren das durchschnittliche Niveau des prosozialen Verhaltens und beeinflussen dadurch die Entscheidungen über die Verteilungen in den Koalitionsverhandlungen. Können die Bedingungen genauer bestimmt werden, unter denen Dritte von den verteilbaren Ressourcen ausgeschlossen werden, kann auch die Gefahr einer Diktatur der Mehrheit über die

Minderheit (Guinier, 1994; Madison, 1945 [1787]) besser eingeschätzt werden. Letztlich können somit diese Grundlagenergebnisse dazu beitragen, institutionelle Rahmenbedingungen von Koalitionsverhandlungen gezielt anzupassen, um geltenden normativen Ansprüchen zu genügen.

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Appendix

Einwilligung der Koautorinnen und Koautoren

Statement by the co-authors

We, **Sabine Neuhofer** and **Bernhard Kittel**, as the co-authors of the paper *Offers Beyond the Negotiating Dyad: Including the Excluded in a Network Exchange Experiment*, assess and confirm the contribution of the Doctoral Candidate **Manuel Schwaninger** to the paper according to the modified Vancouver Convention as follows.

Reference: Schwaninger, M., S. Neuhofer, & B. Kittel (2019). "Offers Beyond the Negotiating Dyad: Including the Excluded in a Network Exchange Experiment". *Social Science Research* 79: 258–271.

Doctoral candidate's contribution to a paper written in collaboration with co-authors		%
CONCEPT	the idea for the research or article, framing the research question or hypothesis	33.3
DESIGN	planning the methods to generate results	33.3
SUPERVISION	oversight and responsibility for the organisation and course of the project and the manuscript	33.3
DATA COLLECTION/PROCESSING	responsibility for gathering empirical material, organising and reporting data	50.0
ANALYSIS/INTERPRETATION	responsibility for making sense of and presenting the results	50.0
LITERATURE SEARCH	responsibility for this necessary function	33.3
WRITING	responsibility for creating all or a substantive part of the manuscript	33.3
CRITICAL REVIEW	reworking the manuscript for intellectual content before submission, not just spelling and grammar checking	33.3
OTHER	for novel contributions	-

This statement was issued for the purposes of review of the doctoral theses by publications by the Doctoral Candidate Manuel Schwaninger at the Directorate of Doctoral Studies at the University of Vienna.

Signed: ______________________

PRINT NAME: Sabine Neuhofer

Date: 29.01.2021

Signed: ______________________

PRINT NAME: Bernhard Kittel

Date: 27.1.2021

Statement by the co-authors

We, **Bernhard Kittel** and **Sabine Neuhofer**, as the co-authors of the paper *The Impact of Need on Distributive Decisions: Experimental Evidence on Anchor Effects of Exogenous Thresholds in the Laboratory*, assess and confirm the contribution of the Doctoral Candidate **Manuel Schwaninger** to the paper according to the modified Vancouver Convention as follows.

Reference: Kittel, B., S. Neuhofer, & M. Schwaninger (2020). „The Impact of Need on Distributive Decisions: Experimental Evidence on Anchor Effects of Exogenous Thresholds in the Laboratory". *Plos One* 15(4): 1–14.

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This statement was issued for the purposes of review of the doctoral theses by publications by the Doctoral Candidate Manuel Schwaninger at the Directorate of Doctoral Studies at the University of Vienna.

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<u>Statement by the co-authors</u>

We, **Jan Sauermann** and **Bernhard Kittel**, as the co-authors of the paper *Making and Breaking Coalitions: Strategic Sophistication and Prosociality in Majority Decisions*, assess and confirm the contribution of the Doctoral Candidate **Manuel Schwaninger** to the paper according to the modified Vancouver Convention as follows.

Reference: Sauermann, J., M. Schwaninger, & B. Kittel (2021). "Making and Breaking Coalitions: Strategic Sophistication and Prosociality in Majority Decisions". *Under Review* in European Journal of Political Economy.

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CONCEPT	the idea for the research or article, framing the research question or hypothesis	33.3
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OTHER	for novel contributions	-

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I confirm that Manuel Schwaninger is permitted to use the following journal articles in his dissertation:

- Schwaninger, M., S. Neuhofer, & B. Kittel (2019). “Offers Beyond the Negotiating Dyad: Including the Excluded in a Network Exchange Experiment”. *Social Science Research* 79: 258–271.
- Kittel, B., S. Neuhofer, & M. Schwaninger (2020). „The Impact of Need on Distributive Decisions: Experimental Evidence on Anchor Effects of Exogenous Thresholds in the Laboratory”. *Plos One* 15(4): 1–14.
- Sauermann, J., M. Schwaninger, & B. Kittel (2021). “Making and Breaking Coalitions: Strategic Sophistication and Prosociality in Majority Decisions”. *Under Review* in European Journal of Political Economy.

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Academic employment

Nov 2020 - Ongoing	Research Associate, Mannheim Centre for European Social Research, project “RISKOPIA: Coping with Uncertainty in Representative Democracy”, https://www.mzes.uni-mannheim.de/d7/en/people
Mar 2015 - Oct 2020	Research Associate, Department of Economic Sociology, University of Vienna, DFG/FWF project “Need-Based Justice and Distribution Procedures”, https://soc.univie.ac.at/en/about-us
Jul 2019 - Jan 2020	Contractor, Institute for Advanced Studies (IHS), IHS research project 19026-20 „6. Österreichischer Familienbericht - LOS 17 ‚Anreizsetzung über familienpolitische Maßnahmen hinaus‘“
Apr 2019 - Sep 2019	Research Associate, Department of Public Economics, Helmut Schmidt University, https://www.hsu-hh.de/finanzwissenschaft/team
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Jul 2014 - Dec 2015	Laboratory and Management Assistant, VCEE (Vienna Center of Experimental Economics), https://vcee.univie.ac.at/people

Research stays

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Jun 2017 - Jul 2017	Guest Researcher at the Cologne Center of Comparative Politics, University of Cologne, Cologne, Germany
May 2017	Guest Researcher at Kyoto Sangyo University, Kyoto, Japan

Publications

Articles in refereed journals

- Kittel, B., S. Neuhofer, & M. Schwaninger (2020). The Impact of Need on Distributive Decisions: Experimental Evidence on Anchor Effects of Exogenous Thresholds in the Laboratory. *PLOS One*, 15(4), 1-14.
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Contributions to edited volumes

- Hagauer, H., B. Kittel, & M. Schwaninger (2019). Fairness in Bargaining: How Self-Selected Frames Affect the Fairness of Negotiation Outcomes. In: Debus, M., Tepe, M. & Sauermann, J. (eds.), *Jahrbuch für Handlungs- und Entscheidungstheorie 11*, Wiesbaden: Springer, 3-31.
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Scientific reports

- Kocher, M., M. Schwaninger & F. Spitzer (forthcoming). Anwendungsmöglichkeiten verhaltensökonomischer Erkenntnisse in der österreichischen Familienpolitik. *Österreichischer Familienbericht*.
- Mazal, W., S. Dörfler, B. Greiner, B. Kittel, R. Sausgruber, M. Schwaninger, & F. Spitzer (2020). *Verhaltensökonomie und Familien – Mögliche Anwendungen für Väterbeteiligung und die Vereinbarkeit von Familie und Erwerb*. Familie und Beruf Management GmbH.

Working papers and ongoing research projects

- Sauermann, J., M. Schwaninger, & B. Kittel (2021). Making and Breaking Coalitions: The Influence of Strategic Sophistication and Prosociality. *Under Review* in European Journal of Political Economy.
- Schwaninger, M. (2020). Sharing with the Powerless Third: Other-Regarding Preferences in Dynamic Bargaining. *Revise and Resubmit* in Journal of Experimental Economics.
- Traub, S., M. Schwaninger, F. Paetzel, & S. Neuhofer (2020). Recognition of Needs in a Dictator Game. *Manuscript.*
- Kittel, B., S. Neuhofer, M. Schwaninger, & G. Jang (2017), Solidarity with Third Players in Exchange Networks: An Intercultural Comparison. *FOR2104 Working Paper Nr. 2017-21.*
- Needs-Based Justice: Transparency and Recognition (joint work with B. Kittel and S. Neuhofer).
- Social Relationships and Need-based Justice (joint work with B. Kittel and R. Szendrö), https://www.socialscienceregistry.org/trials/4987.
- Risk Preferences and Outcome Bias in the Delegation Process (joint work with M. Debus and M. Mühlböck).

Conference and workshop presentations

- 14th Nordic Conference, Kiel, https://www.ifw-kiel.de/de/institut/veranstaltungen/konferenzen/14th-nordic-conference-on-behavioral-and-experimental-economics/, Sep 2019
- EPSA Conference 2019, Belfast, https://www.epsanet.org/conference-2019/, Jun 2019
- DVPW 2018, Frankfurt, https://www.dvpw.de/kongresse/dvpw-kongresse/dvpw2018/, Sep 2018
- Theem 2018, Thurgau, https://www.twi-kreuzlingen.ch/event/theem-2018/, Apr 2018
- GfeW Jahrestagung 2017, Kassel, http://www.gfew.de/tagungen.php, Sep 2017
- EPSA Conference 2017, Milan, http://www.epsanet.org/conference-2017/, Jun 2017
- GfeW Jahrestagung 2016, Gießen, http://www.gfew.de/tagungen.php, Sep 2016
- Workshop on Laboratory Experimental Sociology, Vienna, https://vcee.univie.ac.at/events/workshops/, Jun 2016
- Workshop der FOR2104 2016, Delmenhorst, http://bedarfsgerechtigkeit.hsu-hh.de/aktuelles/workshop-der-for2104, Feb 2016

Teaching experience

- Quantitative Data Analysis I (lecture for B.A. students), University of Vienna, SS 2020
- Public Economics and Behavioral Economics (lecture for M.Sc. students), Helmut Schmidt University, SS 2019
- Experiments in the Social Sciences (lecture for B.A. students), University of Vienna, SS 2017/18
- Fair Sharing? (course for elementary school students), Kinder-Uni, SS 2016
- Mathematics (tutor for high school students), IFL Nachhilfeinstitut, 2013-2015

Grants

- KWA grant, University of Vienna, Sep 2017
- C-Seb Junior Start-Up grant, together with Jan Sauermann, University of Cologne, Nov 2017

Zusammenfassung

Koalitionen sind ein politisches Instrument, das Individuen erlaubt als Mehrheit Entscheidungen zu treffen. Koalierende Individuen können somit ihre Interessen vertreten, während sie andere Gruppenmitglieder von der Entscheidung ausschließen. Unter der Annahme von Eigeninteresse werden Ressourcen durch Koalitionen daher aus koalitionstheoretischer Sicht sehr ungleich verteilt. Jüngere Befunde aus der Verhaltensforschung deuten jedoch darauf hin, dass Menschen auch prosozial motiviert sind und Verteilungen empirisch meist gleicher beobachtet als theoretisch vorhergesagt werden. Unklar ist bisher allerdings, wie prosoziale Präferenzen mehrerer Individuen in Koalitionen aggregiert werden, d.h. wie diese interagieren und sich auf die Entscheidung über die Verteilung von Ressourcen auswirken. Bspw. impliziert die Hypothese, dass sich Ressourcenanteile Dritter proportional zu den sozialen Präferenzen der koalierenden Individuen erhöhen, einen theoretischen Widerspruch, da dies die Ungleichheit unter den Koalitionsmitgliedern potenziell erhöht. Darüber hinaus sind Koalitionen per Definition zeitlich begrenzt und finden im Kontext einer Gruppe statt. Die spezielle Entscheidungsstruktur von Koalitionsverhandlungen wurde vor dem Hintergrund von prosozialen Motiven bisher nicht systematisch untersucht. In dieser Dissertation werden soziale Präferenzen daher in die theoretische Modellierung integriert und der Einfluss der Entscheidungsstruktur auf das prosoziale Verhalten wird in Koalitionsverhandlungen in vier Studien experimentell geprüft.

Die erste Studie beschäftigt sich mit der Aggregation sozialer Präferenzen in Koalitionsverhandlungen. Die drei weiteren Studien überprüfen jeweils die Auswirkung der Verhandlungsstruktur, des fortlaufenden Zeithorizonts und der Bedarfsnorm auf die Verteilungsergebnisse. Studie 1 zeigt, dass soziale Präferenzen die Verteilungsentscheidungen nicht linear, aber dennoch systematisch beeinflussen, wenn man deren Interaktion berücksichtigt. Studie 2 repliziert den Befund, dass die strukturelle Verhandlungsmacht eines Individuums dessen Anteil an der verteilbaren Ressource erhöht, zeigt jedoch ebenfalls, dass Individuen mit höherer initialer Verhandlungsmacht weniger Ressourcen zugeteilt werden, wenn diese selbst nicht Teil der Koalition sind. Studie 3 findet, dass Koalitionen, die Ressourcen gleich verteilen, eine erhöhte Stabilität aufweisen und Ressourcen in kontinuierlichen Verhandlungen dadurch insgesamt gleicher verteilt sind. Studie 4 zeigt, dass neben der Gleichheitsnorm auch die Bedarfsnorm die Verteilungen beeinflusst. In Summe zeigen die Studien, dass Verhandlungsergebnisse von Koalitionen deutlich besser erklärt werden können, wenn der Zusammenhang zwischen den strukturellen Bedingungen und prosozialen Motiven miteinbezogen wird. Die Arbeit dient somit dem erweiterten Verständnis der Bedingungen, unter denen eine Tyrannei der Mehrheit über die Minderheit erwartet werden kann.

Distributional Preferences in Coalition Bargaining

Extended Abstract

A coalition is a political instrument which enables individual actors to make decisions by majority rule. In a coalition, members can further their interests while excluding other actors from the agreements. Thus, assuming self-interested preferences, coalition theory predicts that coalitions distribute none of the available resources to actors outside the coalition. More recently, evidence from behavioral research suggests that many individuals hold prosocial preferences and distribute resources more evenly than predicted by public choice approaches. So far, however, it is unclear how social preferences of multiple actors aggregate in coalitions, i.e. how social preferences interact and affect the distribution of resources. The hypothesis that the payoff shares distributed to third actors increase proportionally to the social preferences of the individual coalition partners is contradictory. In fact, reducing inequalities between a coalition member and third actors can potentially increase the inequality among the coalition members. In addition, coalitions are defined by a limited time frame and include two or more actors. There is a lack of substantial literature examining how this decision-making structure affects prosocial motives in coalition agreements. The aim of this dissertation is to incorporate social preferences into coalition bargaining models and to examine the influence of the decision-making structure on prosocial behavior through four experimental studies.

The first study deals with the aggregation of social preferences in coalition bargaining. The other studies examine the impact of the bargaining structure, the continuous time horizon, and the needs principle on the bargaining outcomes. The first study shows that social preferences influence the bargaining outcomes systematically, when accounting for the interaction of social preferences. The second study replicates the finding that an actors' structural bargaining power translates into higher payoff shares, but also shows that actors with higher initial bargaining power receive lower payoff shares if they do not form part of the coalition. The third study finds that coalitions that distribute resources equally are more stable, which implies that the outcomes are more evenly distributed in continuous negotiations. The fourth study shows that needs, when operationalized, set an important norm which influence coalition agreements. Altogether, accounting for the relationship between structural conditions and social motives significantly enhances the understanding of coalition agreements and the resulting distribution of resources. Therewith, this thesis refines our comprehension of the conditions under which we should anticipate the tyranny of the majority over the minority.