Strength-is-weakness revisited

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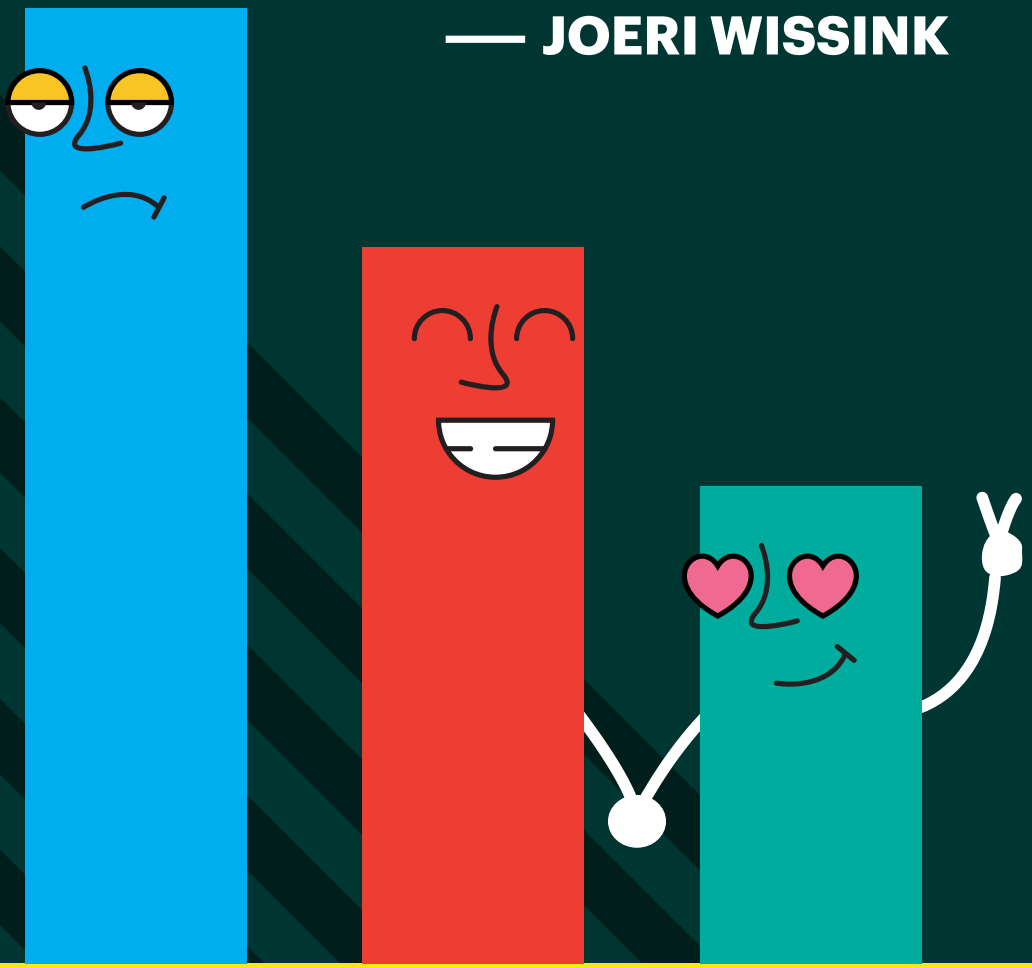
On whether, why, and when having many resources leads to exclusion from coalitions

— JOERI WISSINK



Strength-is-Weakness Revisited

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Joeri Wissink

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Strength-is-Weakness Revisited

On Whether, Why, and When Having Many Resources Leads to Exclusion from Coalitions

Proefschrift ter verkrijging van de graad van doctor aan Tilburg University
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Chapter 1

Introduction

Individuals often covet outcomes they cannot obtain by themselves. As a consequence, humans have evolved adaptations that enable them to effectively cooperate and jointly attain these goals (e.g., Cosmides & Tooby, 1992) In other words, humans have an evolved capacity to form and maintain coalitions in which members pool their resources to attain a goal. These coalitions can be seen at different levels of society: employees form (informal) coalitions to further their own goals in organizations (e.g., Stevenson, Pearce, Porter, Pearce, & Porter, 1985), political parties form governments to rule countries (e.g., Bäck & Dumont, 2008), and companies form joint ventures to increase their market share or potential (such as the large KLM, China Southern, Xiamen and Air France joint venture; https://news.klm.com/successful-joint-venture-expanded/).

A challenge when attempting to form a coalition is the decision whom to select as a coalition partner. As joint payoffs generated by a coalition need to be distributed among its members, the decision for a certain coalition partner will likely have consequences for the distribution of the payoffs. Individuals thus have an incentive—and are suggested to have evolved adaptions (e.g., Barclay, 2013; Tooby, Cosmides, & Price, 2006)—to choose a partner who will fairly share the spoils of the coalition and avoid exploitative partners who might claim a disproportionate share. This means that individuals use certain cues when selecting someone to cooperate with.

One cue that individuals seem to use when choosing a coalition partner is how many resources that partner can contribute to a coalition. A somewhat counterintuitive observation is that seemingly advantaged coalition bargainers with many resources, henceforth labeled *strong* coalition bargainers, are surprisingly often excluded from coalitions: an observation that has been labeled the Strength-is-Weakness effect (Caplow, 1956; Chaney & Vinacke, 1960; Kelley & Arrowood, 1960; Murnighan, 1978b; van Beest, Steinel, & Murnighan, 2011; van Beest, van Dijk, & Wilke, 2004b; Vinacke, 1959; Vinacke & Arkoff, 1957; Wilke & Mulder, 1971, 1974). For example, political parties with many seats may be excluded from governments in favor of parties with fewer seats (Bäck & Dumont, 2008; Warwick, 1996).

Although there are different hypotheses about the causes of the Strength-is-Weakness effect (we will describe these in detail below), we know surprisingly little about the actual process behind the effect and factors that might moderate it. For example, are strong bargainers mainly excluded due to their own behavior or do weak bargainers' perceptions and expectations play a large role as well? Does it matter how bargainers have acquired their resources? Answers to these questions will help us understand why those in a seemingly advantageous position might end up disadvantaged and provide some clues on how to prevent the disproportionate exclusion of strong bargainers.

The aim of this dissertation is to increase our understanding of processes underlying the Strength-is-Weakness effect. Although the three empirical chapters entail different research questions, a unifying factor is the focus on the distributive fairness norm of equity (Adams, 1965; Walster, Berscheid, & Walster, 1973). In coalition bargaining, this norm is translated to the use of an equitable allocation rule: bargainers should obtain a share of the payoffs that is proportionate to the resources they bring to the coalition. In Chapter 2, we replicated the Strength-is-Weakness effect in a lab setting and online, utilizing the Online Coalition Game we developed (described in Chapter 5). In the same chapter, we investigated the causes of the Strength-is-Weakness effect. Specifically, we tested whether the effect is due to the application of equity norms or whether strong bargainers may be excluded from the outset because they are expected to apply equity. In Chapter 3, we investigated why strong coalition bargainers use the equity norm: do they passively adopt this allocation rule because it is most salient to them, or do they actively select it from a range of different allocation rules? Finally, in Chapter 4, we investigated whether the Strength-is-Weakness effect decreases when resources are perceived as a more legitimate input for calculating an equitable payoff.

This introductory chapter is structured as follows. First, I discuss definitions of coalition formation. Second, I will provide an overview of empirical evidence for a Strength-is-Weakness effect. Third, I will shortly discuss dominant classic coalition formation theories. Fourth, I provide an overview and critical examination of three previously proposed explanations for why the Strength-is-Weakness effect occurs. Finally, I discuss the four unanswered questions regarding the Strength-is-Weakness that are central to this dissertation.

Definitions of coalition formation

An often used, rather broad, definition of a coalition is provided by Thibaut and Kelley (1959, p. 205): "two or more persons who act jointly to affect the outcomes of one or more other persons." For conceptual clarity, the coalitions I refer to in this dissertation adhere to the more narrow definition by Gamson (1964, p. 85): "the joint use of resources to determine an outcome of a decision in a mixed-motive situation involving more than two units." Although these two definitions share the aspect of cooperation to determine an outcome—that would otherwise be unattainable—Gamson's definition adds two main boundaries. First, it focuses solely on mixed-motive situations. Other than pure coordination settings, in mixed-motive settings, it is impossible that all involved parties maximize their payoffs through cooperation. Other than pure conflict settings, in mixed-motive settings, individuals are never better off individually than when cooperating. According to Gamson's definition, coalition formation entails situations in which there is an incentive to both compete

and cooperate; to coalesce (cooperation) in a subgroup in which not all involved parties are included (competition).

A second feature of the coalitions I focus on in this dissertation is that they entail the combination of resources of coalition members, which enables the achievement of the coalition's goal. In coalition formation research, the term *resources* refers to the input coalition bargainers bring to the table. Individuals form coalitions when they do not possess enough resources individually to attain a goal. A coalition allows them to pool their resources to reach a certain threshold. More technically, they form a *winning coalition* that reaches a *decision point*. Examples of such coalitions are political parties in a multi-party system that together reach a majority of seats in parliament in order to govern a country, and companies that combine their efforts in a joint venture to increase their potential or market share. In these settings, the resources bargainers bring to the table are the number of seats parties possess and the individual investments from companies respectively.

Another relevant definition of coalition formation is one provided by Van Beest & Van Dijk (2007, p. 165): "the process in which two or more parties negotiate about the decision to allocate payoffs to those that are included and to those that are excluded in a coalition." This definition highlights the existence of divisible *payoffs* that a coalition yields. Whereas the term resources refers to the input coalition bargainers bring to the negotiation table, the term payoffs refers to the output generated by a winning coalition. Going back to the previous examples, these payoffs can be the ministerial posts allocated to political parties in a coalition or the profits from the joint venture. Note that in this dissertation I focus on situations in which the payoffs are identical for every possible coalition (*simple* situations) rather than varying between possible coalitions. In this dissertation's discussion (Chapter 6), I will discuss the applicability of our results to these latter *multivalued* settings.

Van Beest and Van Dijk's definition also highlights the negotiation process by which prospective coalition members decide which coalition to form and how to allocate the acquired payoffs among the coalition's members. I will return to the importance of how this negotiation process is conceptualized in the section on previous evidence for the Strength-is-Weakness effect. Although I do not necessarily focus on it, a final aspect of van Beest and Van Dijk's definition is that it acknowledges that decisions made by a coalition do not only influence payoffs for those included in the coalition, but also those outside of the coalition. For the coalitions I study in this dissertation, this means that excluded parties leave the bargaining table empty-handed.

A final note regarding the types of coalitions that I study in this dissertation is that I do not limit my scope to a single setting such as a political or economic one. Although our empirical studies vary in the context that is presented to participants, our aim is to study basic processes that are applicable to a variety of coalition settings

that fit with our description. In this dissertation's discussion (Chapter 6), I will discuss how institutionalized norms or regulations such as the formateur advantage in governmental coalition formation might lead to deviations to this general processes.

Strength-is-Weakness: Empirical evidence

In this section, I will give an overview of empirical evidence for the Strength-is-Weakness effect in different settings. An important note is that these findings are often based on small sample sizes. Instead of commenting on this in the text for every study, I provide footnotes denoting the sample size on which the discussed finding is based. This allows the reader to evaluate the strength of the provided evidence.

Early theorizing

The earliest mentioning of a Strength-is-Weakness effect in coalition formation—the idea that strong[1] parties might be worse off than a coalition of weaker parties—is found in Caplow's (1956) study of triads. Although Caplow was not specific about his conceptualization of terms such as *strength* and *domination*, he assumed that members of a triad may differ in strength and that stronger members would seek to use their strength to dominate the other members and avoid being dominated themselves. He also reasoned that, under some circumstances, two members of a triad might be motivated to form a coalition and use their combined strength to dominate the third member. Importantly, Caplow not only reasoned that a coalition stronger than the third member would dominate the third member, but that the strongest member of a coalition would dominate the weaker member.

Of interest to the current phenomenon are Caplow's Type 2 and Type 5 triads (see Figure 1.1). In Type 2, party A[2] is stronger than B and C. However, combined, B and C are stronger than A, and B and C are of equal strength. Following Caplow's assumptions, individually, A will dominate both B and C. Moreover, in any coalition including A, the smaller B or C will be dominated by A. Hence, a BC-coalition will help the individually weaker B and C to dominate the individually stronger A, whereas the equal strength of B and C will keep them on equal footing. In Type 5, A prefers to dominate B or C, but probably C, C has no other choice than to be dominated, but B is predicted to steer towards a BC-coalition, as they prefer to dominate C rather than to be dominated by A.

[1] Throughout this dissertation, I use the terms *strong* and *weak* bargainers to refer to the amount of resources participants hold, not to refer to their bargaining power. If at any point, I want to refer to situations in which bargainers differ in bargaining power, I will make this explicit.
[2] Throughout this dissertation, coalition bargainers are often labeled using the letters A, B, and C.

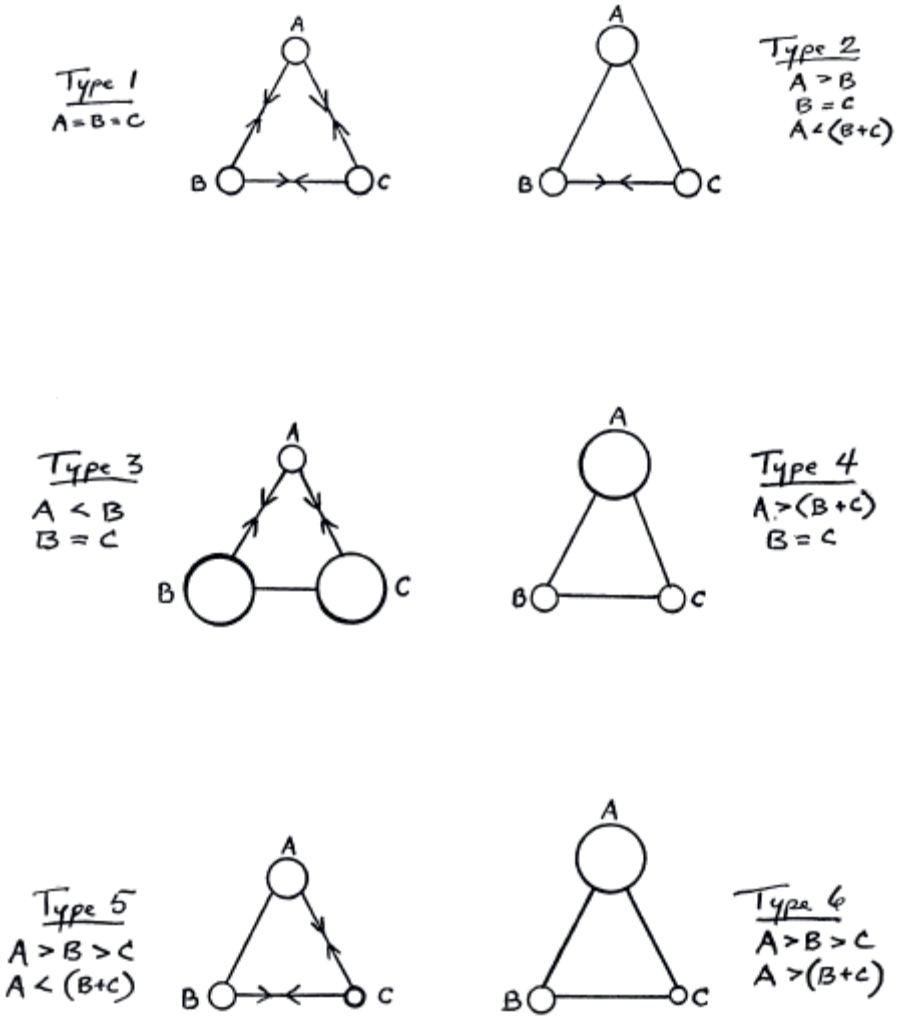

Figure 1.1. Caplow's six types of triads. Reproduced from Caplow (1956) (Public Domain).

To summarize, Caplow (1956) predicted that stronger parties might actually end up being dominated by a coalition more often than their weaker counterparts are when the strength of the weak coalition exceeds that of the strong member. Notably, Caplow did not make strong predictions about whether C would prefer an AC- or BC-coalition, as he did not specify whether it would be worse to be dominated by the strongest or second strongest party. In his further development of his theory, Caplow (1959) acknowledged this issue and reasoned it could go both ways: either parties would seek to maximize their coalition's strength or they would seek to maximize their advantage—or minimize their disadvantage—regarding their coalition partner.

Note that the answer to this question, whether C prefers a coalition with A or with B, has implications for our assumptions regarding the explanation for the Strength-is-Weakness effect. I will discuss this in our critical examination of the proposed explanations for the Strength-is-Weakness effect.

Pachisi games

The seminal Vinacke and Arkoff (1957)[3] experiment was the first to provide empirical support for the idea that individual strength might be turned into a weakness when coalitions can be formed. For this experiment, Vinacke and Arkoff made use of modified pachisi games in which participants were assigned weights—a proxy for resources—to resemble Caplow's (1956) different types of power relations. Participants could obtain points by being the first to reach the end of the pachisi track and the speed by which they did so was determined by a die-roll multiplied by their assigned weight. Participants were allowed to form a coalition by adding their weights together and dividing the points among the coalition members when one of them reached the goal.

Of special interest to this dissertation are Vinacke and Arkoff's (1957) conditions in which Caplow (1956) predicted a Strength-is-Weakness effect: games in which participant A obtained a weight of 3 and B and C both obtained weights of 2 (resembling Type 2) and the games in which participants obtained weights of 4, 3, and 2 (resembling Type 5). In these games, A's weight gives them an initial advantage as they win when everyone plays the game individually. However, formed coalitions, including the BC-coalition of the initial weak, will always outperform the third member of the triad, ensuring victory. As predicted, in both the 3-2-2 and 4-3-2 games, A's initial advantage seemed to be turned around. Added together, BC-coalitions were formed in 68% of all trials. This led to A being included in only 30% of all coalitions, whereas B and C's inclusion rates were 81% and 86% respectively. Taking into account that all parties could be part of two possible two-person coalitions, inclusion rates when choices would be random are 66.6% for all parties. Thus, A is included far less often than one would predict by chance.

Since the initial study, several other studies that have used pachisi games also found Strength-is-Weakness effects (e.g., Chaney & Vinacke, 1960; Kelley & Arrowood, 1960; Vinacke, 1959; Wilke & Mulder, 1971, 1974).[4] The study by Kelley and Arrowood (1960), however, suggests that there are limits to the Strength-is-Weakness effect. In their study, triads playing a 4-3-2 pachisi game demonstrated a Strength-is-Weakness effect in the first trials of the game, but a decline over trials so that in the last three trials the pattern of formed coalitions did not differ from chance

[3] N = 30 triads.

[4] Respective sample sizes from left to right: N = 20 triads, N = 30 triads, observed within conditions of n = 30 triads, N = 18 triads, N = 18 triads.

distributions. Although Kelley and Arrowood's reporting is far from extensive—triads play between 10 and 70 trials and only the first and last three are reported—their results suggest a learning effect that diminishes the Strength-is-Weakness effect over time.

Important to note is that in these pachisi games, the bargaining leading up to a coalition is relatively unstructured. That is, participants can propose to form a coalition to another participant at any time during the game. If this offer is accepted, the weights of the coalition members are directly added together. This also means that there is a possible first-mover advantage in which the first participant to make a somewhat attractive offer could prevent others from making offers (that might have been even more attractive). As discussed below in the section on possible explanations for the Strength-is-Weakness effect, this sequential bargaining—as opposed to situations in which everyone makes an offer at the same time—has led to speculation that differences in speed of realizing that a coalition is needed to win the game might be a driver of the Strength-is-Weakness effect.

Simple weighted majority games

Further evidence for a Strength-is-Weakness effect comes from simple weighted majority games. The largest difference between these games and pachisi games is that the decision point is always a higher number of resources than any coalition bargainer has individually. Whereas in the abovementioned pachisi games, A could obtain the payoffs individually if no coalition would be formed, simple weighted majority games necessitate the formation of coalitions for every bargainer. This also eliminates the board game aspect, leaving a situation in which bargainers' sole objective is to find a coalition partner and bargain over the allocation of payoffs within the coalition.

Using a political convention paradigm, originally developed by Gamson (1961b), Chertkoff (1966)[5] put participants in the role of a bargainer in a 4-3-2 political convention in which three participants controlled 40, 30, and 20 votes (i.e., resources) and a winning coalition holding a majority of votes could allocate 100 jobs (i.e., payoffs) between the coalition members. Although, non-surprisingly, the inclusion of the bargainer with 40 votes increased when including them increased the possibility of winning, in a condition without manipulations of probability, weak bargainers were preferred over strong bargainers and the smallest coalition was formed most often. Across four trials, similar results were found by Wilke (1968)[6], albeit not in every individual trial. A Strength-is-Weakness effect was found in political convention games conducted by Murnighan (1978b)[7] but only in conditions

[5] Observed within conditions of n = 24 triads.
[6] N = 18 triads.
[7] N = 24 quintets.

in which participants held equal pivotal power. Pivotal power refers to the number of winning coalitions bargainers can be part of and is thus an indication of available alternatives (Shapley & Shubick, 1954b). When participants differed in pivotal power, strength was a real strength as those with more resources had more alternatives, leading to higher inclusion rates. More evidence comes from a 4-3-2 simple weighted majority game framed as a simulated meeting of company stockholders, in which strong bargainers were excluded in almost all cases, except in later trials in conditions that facilitated feedback on offers (Chertkoff & Braden, 1974).[8] Finally, evidence for a Strength-is-Weakness effect was found in a political convention-like questionnaire study (Phillips & Nitz, 1968)[9] in which participants were asked which of two other candidates they would approach to form a coalition. Across 20 different configurations of votes in which all possible coalitions would be winning coalitions, participants—who were always a weak bargainer—chose the other candidate with fewest votes in at least 75% of the cases.

In more recent years, Van Beest and colleagues have employed a landowner paradigm in which participants take the role of landowners who need to form a coalition to jointly sell an area of land to a project developer (e.g., van Beest, van Dijk, & Wilke, 2004a). In some of their studies, acres (resources) were assigned to mimic Caplow's (1956) Type 2 and Type 5 triads. In these settings, in line with a Strength-is-Weakness effect, the smallest coalitions predominated (van Beest et al., 2011, 2004b).[10]

Again, it is important to comment on the bargaining protocols leading up to the forming of a coalition as these protocols influence the inferences we can make about the explanations for the existence of the Strength-is-Weakness effect. In the study by Wilke (1968) for example, bargaining was relatively unstructured. In these situations, as in pachisi games, individual differences in decision speed could influence which coalitions were formed. In the study by Chertkoff (1966), offers were made at the same time, but participants went into a separate room to bargain when they made reciprocal offers to each other, regardless of whether they offered the same allocation of the payoffs. Chertkoff and Braden (1974) used a procedure in which bargainers sent offer slips to each other and in which bargainers more explicitly accepted or rejected the offers made, which possibly led to a bit more feedback about the relative attractiveness of one's offers. Finally, Van Beest and colleagues' (van Beest et al., 2011, 2004b) landowner studies utilized the Komorita and Meek (1978) display procedure, in which all bargainers sent offers at the same time, subsequently saw all offers made (even those they were not involved in) and selected the offer they wanted to execute. A coalition was formed if all prospective members of a coalition selected the same

[8] Observed within conditions of $n = 30$.
[9] $N = 479$ participants.
[10] Observed within conditions of $n = 17$ triads and $n = 19$ triads respectively.

offer. Despite the differences between these different procedures, all of them corroborated the finding that small coalitions were formed most often, meaning strong bargainers were most often excluded.

Real-world equivalents

Finally, there are real-world equivalents of the Strength-is-Weakness effect that have been reported in literature. Frans de Waal—in his seminal study of chimpanzees (de Waal, 1982/2007)—describes how the physically strongest alpha male Luit is usurped by a coalition of two individually weaker chimpanzee males. A more systematic Strength-is-Weakness effect in humans has been observed in Western European multi-party system governments, albeit an effect that seems to affect the second-largest political party rather than the largest. As the (informal) rule in many multi-party systems is that the largest party is allowed to start coalition bargaining, this advantage often leads to the inclusion of the largest party, shifting the negative effects of having many resources to the second-largest party (Bäck & Dumont, 2008; Warwick, 1996).

Classic coalition formation theories

In the next section, I will describe and critically examine the three dominant previous explanations for the Strength-is-Weakness effect. To facilitate understanding of this overview, I will first provide a short overview of classic coalition formation theories (for extensive reviews of classic coalition formation theories, see Kahan & Rapoport, 1984; Komorita, 1984; Murnighan, 1978a).

One of the basic assumptions that is shared by most coalition formation theories is that bargainers attempt to form a coalition in which their own payoffs are maximized (cf. van Beest & van Dijk, 2007). Bargainers are assumed to do this by calculating which share of the payoffs they can reasonable obtain in each coalition, given a certain allocation rule (based on notions of distributive justice) and conceptualization of input, and attempt to form a coalition in which this share is largest. Despite this shared assumption, two rough distinctions can be made: theories differ on which allocation rules bargainers apply to determine a fair share of the payoffs, and on how differences in input are conceptualized.

Allocation rules

A prominent allocation rule is equity: the notion that an outcome is fair when one's payoff is proportional to one's input (Adams, 1965; Walster et al., 1973). In general, equity theory predicts that individuals compare their inputs and outcomes in a certain situation to the inputs and outcomes of others. Inequity, generally experienced as an aversive violation of fairness, exists when someone's ratio of

outcome to input differs to someone else's ratio. Applied to coalition formation, this notion of equity is, amongst others, reflected in Gamson's (1964) notion of a *parity norm*: the belief that one's share of the payoffs should be proportional to their relative input in the coalition.

Another view on allocation rules is provided by bargaining theory (Komorita & Chertkoff, 1973), which postulates that the allocation rules applied by bargainers differ depending on one's own relative input in a coalition. Those with a higher input favor equity, because this rule dictates that they should get a higher payoff as well. Those with a relatively little input are thought to favor an equal division of payoffs within a coalition, as the use of this rule leads to better outcomes for them than an equitable division would. Although more sophisticated than the notion that bargainers only use equity, a prediction that the two views have in common is that those with more input demand a larger share of the payoffs than those with less input.[11]

Conceptualization of input. A second distinction between classic coalition theories is *which* inputs coalition bargainers apply when calculating a fair payoff. Some theories assume that differences in input are directly related to differences in resources (Gamson, 1961a; Komorita & Chertkoff, 1973), whereas other theories assume that input should be conceptualized on the level of differences in bargaining power resulting from differences in resources (Gamson, 1964; Komorita, 1974).

Resources as input. In resource theories, resources serve what Komorita (1984) calls a *normative function*; coalition bargainers calculate a fair share of the payoffs based on the relative amount of resources they have in a coalition. According to minimum resource theory (Gamson, 1961a), bargainers apply equity norms to the amount of resources they have and bargain for a share that is proportional to their resources in a coalition. As bargainers with more resources will thus claim more than those with fewer resources, bargainers are motivated to seek out a partner with few resources to form the *cheapest winning coalition*; a coalition that is just able to attain the payoffs, but in which they maximize their relative resources, and thus share of the payoffs.

Pivotal power as input. A second conceptualization of input is not that of resources, but the power differences resulting from differences in resources. According to this perspective, resources only shape the coalition formation process when they lead to differences in *pivotal power*; when they lead to differences in the number of possible winning coalitions in which one can be included (Shapley & Shubick, 1954b). Komorita (1984) refers to this as a *strategic function* of resources. For example, consider a situation in which four individuals—I will refer to them as A,

[11] It is debatable whether bargainers apply different allocation rules. Alternatively, one could argue that strong and weak bargainers differ in their conceptualization of input: strong bargainers use resources as input whereas weak bargainers do not. Regardless, both perspectives lead strong bargainers to make higher claims than weak bargainers.

B, C, and D—hold 30, 20, 20, and 10 resources respectively, and the threshold to a winning coalition is 50 resources. In this setting, A is said to have more pivotal power (see Shapley & Shubick, 1954b) as a coalition between him and any other individual is a winning coalition, whereas B and C can only form a two-party winning coalition with A, and D has to be included in at least a three-party coalition.

According to minimum power theory (Gamson, 1964), those with more pivotal power try to leverage their advantage in number of alternatives by claiming an equitable share of the payoffs that is proportional to their pivotal power rather than to their resources. Consequently, bargainers are expected to form a coalition in which one's pivotal power is highest, because this maximizes their share of the payoff. In the abovementioned example, minimum power theory would thus predict the coalition between B, C, and D and that B and C obtain a larger share of the payoffs than D.

Strength-is-Weakness: Previous explanations

As mentioned earlier, the Strength-is-Weakness effect has been studies using different bargaining procedures. Besides this variety in procedures—and sometimes maybe due to a variety in procedures—different explanations for the existence of the Strength-is-Weakness effect haven been proposed. In this section, I will describe and critically examine these previously proposed explanations for the Strength-is-Weakness effect.

Confusion: Incorrectly equating resources with bargaining power

Based on the observed Strength-is-Weakness effect in their pachisi studies, Vinacke and Arkoff (1957) provided the first tentative explanation for the effect. According to them, people incorrectly equate differences in resources with differences with bargaining power. In their 4-3-2 and 3-2-2 games, participants did not differ in pivotal power: every two-player coalition would outperform the third party. Hence, they reasoned, rational participants would not display a systematic preference for formed coalitions and would always split the payoffs equally. The finding that weak BC-coalitions were formed most often was thus attributed to irrationality. Specifically, Vinacke and Arkoff hypothesized that, because A could win the game if no coalition was formed, "it is harder for an initially stronger member to reach the conclusion that the relative strengths are irrelevant...than for the other one or two to arrive at this interpretation" (Vinacke & Arkoff, 1957, p. 408). This thus implies that the Strength-is-Weakness effect exists because the strong themselves confuse differences in resources with differences in bargaining power and subsequently fail to initiate a coalition before their weaker counterparts do.

A similar explanation was brought forward by Kelley & Arrowood (1960), although they aimed to show that the confusion was an artefact of the difficult nature of the original study. By presenting participants with different types of triads in which

resources sometimes were and sometimes were not related to power differences, participants were likely to perceive a correlation between resources and power, even in the Type 2 and Type 5 triads. To test this notion, Kelley and Arrowood let participants play multiple rounds (between 10 and 70, $M_{\text{rounds}} = 26$) of the same 4-3-2 game with, although unclear in which way, more extensive instructions. As evidence for their argument, Kelley and Arrowood showed that the BC-coalition is favored in the first three trials, but that the incidence of formed coalitions is equalized during the last three trials.

This *confusion hypothesis*, however, has not received much support in later studies. Wilke and colleagues (Wilke, 1968; Wilke & Mulder, 1971, 1974) conducted several 4-3-2 pachisi studies and one 4-3-2 political convention game. In these studies, participants' self-reports suggest that they believed parties to be equal in bargaining power rather than that they believed resources to reflect actual strengths. Moreover, contradicting the assumptions of Kelley and Arrowood (1960), there did not seem to be a learning effect: participants did not initially report believing in power differences, which subsequently decreased over trials. Finally, it did not seem that the strongest bargainer had markedly more irrational views regarding a resources-power link. There is, however, a reason to be critical regarding the above interpretations. The format of the self-report questions is such that participants choose which statement they endorse most. Confronted by both the statement that resources are irrelevant and by the statements that small coalitions should form, and having to choose between the two statements, participants might choose the statement that sounds most rational, even though they might have engaged in irrational decision-making.

Another study that seems to speak against the confusion hypothesis is one in which none, some, or all members in a triad in a 4-3-2 and 3-2-2 pachisi games were informed that the weak bargainers can win from the strong bargainers by forming a coalition, but also that weights do not matter because each coalition is a winning coalition (Vinacke, Crowell, Dien, & Young, 1964). Speaking against the confusion hypothesis, BC-coalitions were still predominant in conditions in which participants received the extra information. Moreover, although reporting is a bit opaque, the results seem to suggest that most participants—even the uninformed ones—reported to understand that the bargainer with a weight of 4 did not actually have more power.

Finally, the confusion hypothesis' explanation for the Strength-is-Weakness effect is mainly that B and C are more likely to initiate a coalition than A. It does not make predictions about whether B or C prefer coalitions with each other or with A. Evidence from studies, however, does show that bargainers prefer coalitions with weak bargainers (e.g., Chertkoff, 1966; Phillips & Nitz, 1968). This suggests that this initial preference for weak bargainers is an antecedent for the Strength-is-Weakness effect, rather than that the cause for the effect mainly lies in the hands of the strong bargainer.

Overall, there does not seem to be much evidence for the confusion hypothesis as a main cause of the Strength-is-Weakness effect in coalition formation. Moreover, whereas the confusion hypothesis has at least some theoretical plausibility in pachisi games—in which players with more resources have an individual advantage—it is more difficult to use as an explanation for Strength-is-Weakness effects in simple weighted majority games. As these experiments necessitate the formation of a coalition in order to obtain the payoffs, it is unlikely that participants differ in how easy it is to reach the conclusion that a coalition must be formed. This is especially the case for experiments using the Komorita and Meek (1978) display protocol, in which all participants always make opening offers at the same time, which are then displayed to everyone before participants select their preferred offer, meaning that differences in initiation of bargaining are eliminated as a suspect.

Conspiracy hypothesis

A second hypothesized reason for the Strength-is-Weakness effect places the causes for the effect not in the hands of the strong bargainer, but rather in those of the weak bargainers. According to the *conspiracy hypothesis*, a term coined by Wilke and Mulder (1971, 1974), weak bargainers form a coalition against the strong bargainer because they have been handed an initial advantage. This explanation for the Strength-is-Weakness effect was inspired by a coalition formation study from E. Hoffman, Festinger, and Lawrence (1954) in which participants gained points by jointly forming squares with pieces held by members of a triad. Although participants' pieces did not differ in size, one of the bargainers (a confederate) obtained an early advantage. E. Hoffman and colleagues found that, especially when the outcome of the task was considered important and social comparison with the confederate was made easy, the two other bargainers tended to coalesce against the confederate. The suggested explanation for this is that, under these conditions, participants would be especially motivated to be equal to or surpass the advantaged person.

Wilke and Mulder (1971, 1974) argue that the above situation is comparable to 4-3-2 and 3-2-2 pachisi games. After all, if no coalition is formed, the participant with the highest weight automatically wins and the supposed way to equalize the situation would be to form a coalition against the strong bargainer. I am skeptical of this explanation for three reasons. First, as excluding the strong bargainer from a coalition puts them at a disadvantage instead of equalizing payoffs, I do not think the pachisi games are similar to the setting created by E. Hoffman and colleagues (1954). Second, Wilke and Mulder accept the conspiracy hypothesis because participants' self-reports—which I have criticized above—indicate no support for alternative explanations such as confusion and adherence to a minimum resource norm. Ruling out one explanation should not be considered evidence for another. Finally, if viable at all, I think the conspiracy hypothesis would not explain the Strength-is-Weakness

effect in simple weighted majority games. As strong bargainers cannot win in a 4-3-2 simple weighted majority game with a decision point of 5, they cannot be said to have an advantage, which would not lead to a conspiracy against them.

The use of equity norms

As mentioned in the section on classic coalition formation theories, several classic theories of coalition formation assume that bargainers use equity norms in which one's payoff should be proportional to their input. In Gamson's (1961a, 1964) minimum resource theory, this input is conceptualized as resources, meaning that those with more resources bargain for a higher share of the payoffs. This is also Gamson's explanation for the Strength-is-Weakness effect: if bargainers with more resources want a higher share of the payoffs, bargainers are better off forming the cheapest winning coalition in which one's relative input—and thus one's expected share of the output—is highest. Gamson (1964) also argues that, unlike the confusion hypothesis, this makes the Strength-is-Weakness effect a rational phenomenon: if participants with more resources ask for a higher share, bargainers who are motivated to maximize their share of the payoffs makes a rational decision when it avoids the strong bargainer. This explanation thus seems to place causes for the Strength-is-Weakness effect at both weak and strong bargainers: strong bargainers claim higher shares of the payoffs, and weak bargainers avoid them because of this.

Although the idea of the use of equity norms in coalition formation is dominant in classic coalition theories, the discussed studies in which a Strength-is-Weakness effect has been observed often lack detailed information on the mean payoffs in formed coalition. Hence, the evaluation of the use of equity norms in these experiments is difficult. A few studies, however, do show that, when included, strong bargainers obtain the largest share of the payoffs (Chertkoff, 1966; Chertkoff & Braden, 1974). Several studies that provide little information hint at unequal distributions when strong bargainers are included (Vinacke & Arkoff, 1957; Wilke & Mulder, 1974), whereas others have shown less consistent evidence for use of equity or equality (Wilke, 1968).

More, but equally sporadic, evidence for the use of equity norms leading to the Strength-is-Weakness effect comes from findings on expected payoffs. Several studies provide support for the idea that strong bargainers expect a higher payoff than their weaker counterparts (Chertkoff & Braden, 1974; Wilke & Mulder, 1971). Other studies provide evidence for the idea weak bargainers anticipate the use of equity norms and thus make their initial offers to each other rather than to the strong bargainer[12] (Chertkoff & Braden, 1974; Phillips & Nitz, 1968; van Beest et al., 2011).

[12] Note that this behavior could also be indicative of the conspiracy hypothesis, but see above section for arguments against this hypothesis.

Surprisingly, none of the presented studies in which a Strength-is-Weakness effect has been found gives enough information to deduce whether strong bargainers actually claim a higher share of the payoffs than their weaker counterparts do. As mentioned earlier, most used bargaining protocols do not require everyone to make a first offer, or to record it, meaning that often this information is not present.

Another study hints more indirectly at the idea that expected payoff steers the formation of weak coalitions. In this study, participants bargained in a 4-3-2 simple weighted majority game using a protocol in which bargainers had to explicitly reject or accept offers, which supposedly facilitated feedback on participants' offers (Chertkoff & Braden, 1974). Results showed that over time strong bargainers' expected share of the payoffs decreases, which seemed to promote their inclusion in subsequent trials. This suggests a causal chain from payoff expectations, magnitude of offers, and inclusion.

Wilke and colleagues (Wilke, 1968; Wilke & Mulder, 1971, 1974) suggest that self-reports do not match minimum resource theory. Whereas they did find many formed BC-coalitions in 4-3-2 and 3-2-2 pachisi games, participants indicated to have no clear preference for bargaining partner before bargaining. Moreover, after bargaining, they indicated to adhere more to the idea that all bargainers are equally necessary to obtain the payoffs (in line with equal pivotal power) than the idea that inputs should dictate payoff. However, as I have argued above, it is not impossible that bargainers adhered to one principle but confronted with a more rational sounding principle chose to report this option.

In short, previous literature hints at the role of equity norms as a cause for the Strength-is-Weakness effect. Yet, direct evidence in the form of differences in magnitude of first offers by strong and weak bargainers seems to be absent due to not recording this information. Besides this lack of direct evidence, I also think there is a large logical gap in the proposed equity hypothesis. Contra Gamson (1964), I dispute the statement that the equity account is a rational pathway to the Strength-is-Weakness effect. As the effect is observed in situations in which bargainers are, at least logically, equal in terms of pivotal power and value in a coalition, both the use and expectation of proportional offers seem irrational. From a game-theoretical perspective (e.g, minimum power theory, Gamson, 1964; pivotal power theory, Shapley & Shubick, 1954b), bargainers should bargain on this functional equality and bargain for equal shares with no preference for specific coalition. Whereas acting on expected proportional offers from other bargainers seems rational, this expectation and the actual implementation of the equity norm thus seems far from rational.

Moreover, as remarked earlier by Van Beest and colleagues (van Beest & van Dijk, 2007; van Beest et al., 2004b), coalition bargainers seem to be using a mixture of self-interest and fairness rules. As suggested by bargaining theory (Komorita & Chertkoff, 1973), bargainers seem to apply fairness rules self-servingly. This means

that strong bargainers are most likely to use equity and weak bargainers are more likely to use equality, both because this is the rule that would maximize their share of the payoffs if it is accepted. If this is the case, strong bargainers have even less reason to expect their equitable offer is accepted.

Remaining questions: Outline of this dissertation

I argue that none of the three previously proposed reasons seems to provide a completely satisfying answer for why the Strength-is-Weakness effect in coalition formation occurs. The first two explanations—confusing differences in resources with differences in actual power or a conspiracy against those with an initial advantage—seem to get little support based on self-reports. Moreover, they are untenable in simple weighted majority games, because a) all bargainers should see the necessity of forming a coalition, and b) strong bargainers do not have any advantage over weak bargainers. There is some evidence supporting the third explanation, the use of the equity norm, but direct evidence is lacking. Moreover, the current evidence for this third explanation does not mesh with self-reports, nor does it explain why coalition bargainers use or expect equity norms in the first place.

The aim of this dissertation is to increase our understanding of processes underlying the Strength-is-Weakness effect and provide a tentative new theory of how the Strength-is-Weakness effect emerges. In line with what others have done before (van Beest & van Dijk, 2007; Wilke, 1985), this tentative theory is a process-oriented theory of coalition formation, in which not coalition outcomes, but the (psychological) processes that shape these outcomes are central. Hence, the focus of dissertation will be on bargaining behavior, such as initial partner selection and magnitude of first offers, and bargainers' perceptions of legitimacy and deservingness.

Below I describe some of the unanswered questions and the chapters that attempt to answer these questions.

How strong is the empirical support for the Strength-is-Weakness effect?

There are many examples of the Strength-is-Weakness effect in the existent literature (e.g., Caplow, 1956; Chaney & Vinacke, 1960; Kelley & Arrowood, 1960; Murnighan, 1978b; van Beest et al., 2011, 2004b; Vinacke, 1959; Vinacke & Arkoff, 1957; Wilke & Mulder, 1971, 1974). However, there are some reasons to conduct a replication. First, most of the abovementioned studies have utilized pachisi games. As suggested by Chertkoff (1971), the lack of standardized bargaining in this method—participants sit face-to-face and can make offers at any point—can lead to personality variables trumping the effect of variables of interest such as resources. More relevant for this dissertation, it is also unclear whether observed Strength-is-Weakness effects in these settings generalize to other settings in which confusion (e.g., Kelley &

Arrowood, 1960) and conspiring against the advantaged (e.g., Wilke & Mulder, 1971) cannot explain the results. Second, previous studies have often suffered from small sample sizes. As a consequence, sufficient statistical power is debatable and the probability of false-positives is thus relatively high (Ioannidis, 2005). Moreover, attempts to increase power through within-subjects designs in with iterated bargaining might have biased results in later trials (e.g., Kelley & Arrowood, 1960; Wilke & Mulder, 1974). Finally, most previous coalition formation studies either used no incentives or tournament incentives, which might lead to either more heterogeneity in answers (e.g., Camerer & Hogarth, 1999) or more risky behavior (e.g., Schedlinsky, Sommer, & Wöhrmann, 2016) respectively.

To address the question whether the Strength-is-Weakness effect is a robust phenomenon, we conducted two high-powered preregistered replications of the Strength-is-Weakness effect using two incentivized 5(4-3-2) interactive landowner paradigm studies. As argued above, in simple weighted majority games, such as the landowner paradigm, the strong bargainer can only win when forming a coalition. This makes it unlikely for strong bargainers to equate resources with bargaining power (against the confusion hypothesis), and makes it unlikely that weak bargainers perceive the strong bargainer as advantaged (against the conspiracy hypothesis). The results of these studies are presented in Chapter 2.

Do coalition bargainers use equity norms in coalition bargaining?

As direct evidence for the use of equity norms as a cause for the Strength-is-Weakness effect is scarce, we also aimed to find evidence for this in Chapter 2. Specifically, we focused on two possible mechanisms. First, we focused on the question whether these equity norms are directly applied, by comparing the magnitude of first offers between strong and weak bargainers: do strong bargainers claim a larger share of the payoffs than weaker bargainers do? Second, we focused on the question whether the use of equity norms is expected by weaker bargainers—leading them to make first offers to other weak bargainers rather than the strong bargainer—by looking at whom they approach in their initial offers.

Why do strong coalition bargainers use equity norms in coalition bargaining?

The third question we attempt to answer in this dissertation is why bargainers make use of equity norms in coalition bargaining. Although Chapter 2 of this dissertation seems to suggest bargainers indeed use equity norms, the fact that bargainers do so even when they understand that they actually have equal bargaining power (Vinacke et al., 1964; Wilke & Mulder, 1971, 1974) seems puzzling.

In Chapter 3, we disentangle two possible reasons for the use of these equity norms. First, in line with insights on egocentric perceptions of fairness (e.g., Babcock & Loewenstein, 1997) bargainers could passively adopt the most salient allocation

rule that is provided by the number of resources they have, without realizing this is perceived to be unattractive or unfair by their weak counterparts. On the other hand, suggested by Wilke (1985), coalition bargainers could choose the equitable allocation rule in a more strategic way to attempt maximize their share of the payoffs, in the hope that this offer is accepted.

Is having many resources always a liability?

The final question we wanted to answer is whether having many resources is always a liability. According to equity theory, equity is established when payoffs are allocated in proportion to input (Adams, 1965; Walster et al., 1973). Importantly, individuals might disagree on which inputs are relevant to the situation and thus which inputs are legitimate to use to calculate an equitable share. This raises the question whether the Strength-is-Weakness effect is in part due to a disagreement on whether resources are relevant input in which strong bargainers use resources as input, but weak bargainers think this is unjustified.

In Chapter 4, we test this hypothesis by manipulating input relevance in two different ways. According to accountability theory, a fair allocation is one in which one's share of the payoff is based on variables under one's control and not based on variables outside one's control (Konow, 1996, 2000). In Study 4.1., we thus manipulate how coalition bargainers obtain their resources: randomly or through effort. Although previous research has shown that equitable allocations are deemed more acceptable when the input of bargainers is attained through effort rather than randomness (Frohlich, Oppenheimer, & Kurki, 2004; Lee & Shahriar, 2016; Oxoby & Spraggon, 2008; Ruffle, 1998), the question is whether this would hold in situations in which it is possible to self-servingly avoid deserving others. In Study 4.2, we manipulate input relevance by creating an explicit link between input (resources) and output (payoffs), which should also increase the perception that resources are a relevant input and possible promote the approach and inclusion of strong bargainers.

How can others replicate our findings and/or conduct high-powered coalition formation studies?

There are two large challenges when conducting coalition formation research. First, large samples are often necessary, because the unit of observation is often the triad. Second, coalition formation is a complex and interactive process that is not easily substituted by non-interactive approaches such as hypothetical scenario's or strategy methods.

In Chapter 5, we present the Online Coalition Game, the open source coalition program we developed to conduct most studies in this dissertation. The Online Coalition Game addresses the above two challenges by allowing for online real-time

interactive coalition experiments. This enables researchers to sample from large online participant pools, whilst at the same time using a real-time interactive bargaining protocol.

What have we learned?

In Chapter 6, I will end this dissertation with a general discussion. In this discussion, I will summarize the findings obtained in the following chapters, evaluate the three previous explanations for the Strength-is-Weakness effect in the light of these findings, and propose a novel tentative theory on the mechanisms underlying the Strength-is-Weakness effect. Moreover, I will present new questions, providing a starting point for future research that could elucidate or expand this tentative theory.

Chapter 2

On **whether** having many resources leads to exclusion from coalitions: Replicating the Strength-is-Weakness effect

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A data package including (meta) data, analysis scripts, stimulus materials, and preregistrations is available here: https://doi.org/10.34894/JXRELG.

Abstract

A key observation in coalition formation is that bargainers with most resources are often excluded from the negotiated agreement: the Strength-is-Weakness effect. Previous studies have suffered from low sample sizes and lack of (appropriate) incentives, and have rarely focused on underlying processes. To address these issues, we conducted a cross-platform replication using the Online Coalition Game (OCG)—a novel interactive coalition game. Both in a psychology laboratory and on Amazon Mechanical Turk, we replicate the Strength-is-Weakness effect. The effect seems driven by actual and expected equitable offers; those with more resources demand a high payoff, and bargainers seek out coalition partners with few, rather than many, resources. Importantly, despite methodological differences, results from both studies are highly similar. Together, they provide evidence that having many resources can hinder inclusion in coalitions. Moreover, they demonstrate that the OCG is viable tool for conducting interactive coalition formation research across research platforms.

Transactions are often shaped by differences in how many resources interaction partners bring to the table. According to equity theory (Adams, 1965; Walster et al., 1973), individuals expect to be rewarded in proportion to their input. People often accept inequality if differences in outcomes are equitable; if they can be justified on the basis of differences in input (Tausch, Potters, & Riedl, 2013). For example, recipients in an ultimatum bargaining game accept lower offers when a larger share of the allocator's endowment is earned (Lee & Shahriar, 2016).

In situations in which it is possible to form coalitions, however, those with the highest input do not always receive better payoffs. In coalition formation, there are more than two individuals or parties of which a subset needs to combine their resources to attain a shared payoff that is subsequently distributed among the members of the formed coalition (Gamson, 1964). For example, political parties may need to combine their seats (resources) to obtain a majority in parliament to form a government and distribute the ministerial posts (payoffs). Similar to equity theory (Adams, 1965; Walster et al., 1973), classical theories of coalition formation predict that individuals or parties often try to obtain an equitable share of the payoffs generated by the coalition (Gamson, 1961a, 1964; Komorita & Chertkoff, 1973). However, the possibility of choosing between multiple prospective coalition partners often results in bargainers strategically selecting the bargaining partner with just enough resources to attain the coveted payoffs, because this maximizes the equitable share of the payoffs that they can obtain (Gamson, 1961a, 1964; Komorita & Chertkoff, 1973). This can lead to the seemingly paradoxical *Strength-is-Weakness* effect; bargainers with the most resources are often excluded from coalitions, receiving no share of the payoffs at all (Caplow, 1956; Chaney & Vinacke, 1960; Kelley & Arrowood, 1960; Murnighan, 1978b; van Beest et al., 2011, 2004b; Vinacke, 1959; Vinacke & Arkoff, 1957).

The Strength-is-Weakness effect illustrates that adding a third person can drastically change the dynamics or outcomes of an interaction. Despite this, exceptions aside (Huffaker, Swaab, & Diermeier, 2011; Swaab, Kern, Diermeier, & Medvec, 2009; van Beest et al., 2011), coalition formation has been an understudied topic the last decade. Especially considering the recent replicability crisis in psychology (see Open Science Collaboration, 2015), scrutiny of key findings seems warranted, especially if initial evidence is based on small samples (Ioannidis, 2005). To address this, we present two preregistered,[13] piece-rate incentivized replications of the Strength-is-Weakness effect, one conducted in a standard social psychology lab setting—with undergraduate psychology students—and one on the online labor market Amazon Mechanical Turk (AMT)—with AMT workers. To conduct the replication, we introduce the Online Coalition Game: a novel tool for conducting

[13] See http://aspredicted.org/blind.php?x=8bv3ku and http://aspredicted.org/blind.php?x=992i5v.

(online) three-player interactive coalition experiments, which enables researchers to conduct a large sample study on coalition formation in which at least three players interact.

The Strength-is-Weakness effect

A first mention of a Strength-is-Weakness effect can be found in Caplow's (1956) theorizing on coalitions in the triad. Caplow theorized that members of a triad may differ in strength and that strong members try to dominate weaker members. However, when the combined strength of the two weaker members would be sufficient to control the strongest member, the two weak members would form a coalition against the strong member.

Empirical evidence for a Strength-is-Weakness effect was first obtained using modified pachisi games (Chaney & Vinacke, 1960; Kelley & Arrowood, 1960; Vinacke & Arkoff, 1957). In these games, participants were part of a triad in which participants' resources were represented by a *weight*: one participant (Player A) had a weight of 3, the other two (Players B and C) both had a weight of 2. Participants would receive a monetary payoff upon reaching the last space of a pachisi board. Each turn a die was rolled and participants' pawns moved the amount of pips on the die multiplied by their personal weight. Moving individually, Player A, having a higher weight, would always win the game. However, if two players would agree on how to distribute the payoffs among themselves if one of them reached the final space, these two players would add their weights together. In these experiments, the individually strong Players A were more than often excluded from a coalition in which the individually weak Players B and C dominated with a combined weight of 4; Player A was included in only 28% of the cases, versus inclusion rates of 86% and 84% of Player B and Player C respectively (Vinacke & Arkoff, 1957).

Further support for the Strength-is-Weakness effect has been found in situations in simple weighted majority games (Komorita, 1984; Komorita & Parks, 1995) in which having more resources within a coalition does not bring additional benefit to the individual or coalition (Gamson, 1961b; Murnighan, 1978b; van Beest et al., 2011, 2004b). These situations are *simple* (Komorita, 1984), which means that the payoff is the same for every coalition, regardless of the combined resources. Moreover, in these situations, resources are *power-irrelevant* (Kravitz, 1981), meaning that all individuals have an equal number of possible winning coalitions they could be part of, regardless of their individual resources. A common structure is the 5(4-3-2) game in which a coalition needs at least 5 resources to attain the payoffs and in which every possible combination of bargainers with 4, 3, and 2 resources respectively for players A, B, and C reaches this threshold. In this situation, a coalition between the weakest members (BC coalition with 5 resources) is formed most often (Murnighan, 1991).

An important observation is that coalition bargainers in these simple, power-irrelevant situations seem to strongly depart from rationality. Without inherent value, resources should not influence a) which coalitions are formed, and b) the target and height of offers made. Consequently, in a situation with rational bargainers, each possible coalition would form equally often (1/3 of the time) and offers would not differ as a function of the amount of resources someone holds. Nonetheless, coalition bargainers seem to ascribe value to resources. Moreover, paradoxically, those with more resources are actually less often included than those with fewer resources are.

This occurrence of a Strength-is-Weakness effect is anticipated by prominent coalition theories. For example, Gamson's (1961b, 1964) *minimum resource theory* predicts the formation of coalitions with as few resources as possible. The reason for this is the *parity principle*, which, in a similar vein as equity theory (Adams, 1965), is the belief that "a person ought to get from an agreement an amount proportional to what he brings into it" (Gamson, 1964, p. 88). Having this belief, individuals are better off approaching prospective coalition partners for which an equitable share is as low as possible. Although *bargaining theory* (Komorita & Chertkoff, 1973), extends minimum resource theory by predicting that only those with more resources are likely to endorse an equitable distribution—those with fewer resources would endorse equality—this theory also predicts the formation of the smallest winning coalition (for a comprehensive review of coalition formation theories, see Kahan & Rapoport, 1984).

Reasons for replication

There are three main reasons for conducting our replications. First, the puzzling observation that parties with more resources are more frequently excluded than parties with fewer resources are has profound implications. It shows that those who are seemingly more entitled to influencing a decision end up having no influence at all. Using the example of governmental coalition formation, it means that parties that receive ample support from the electorate end up having little influence on how the country is ruled. Indeed, analyses of Western European parliamentary democracies shows that parties with most votes—provided that they are not entitled to starting negotiations—were less likely to be included in government than parties with fewer votes (Bäck & Dumont, 2008; Warwick, 1996).

Second, the Strength-is-Weakness effect is an understudied phenomenon in which the (psychological) mechanisms that give rise to the effect are still mostly unclear. Although there is ample evidence that coalition bargainers apply self-serving allocation rules (e.g., Komorita & Chertkoff, 1973; van Beest et al., 2004a, 2004b), there is no direct evidence linking the application of equity norms to the Strength-is-Weakness effect. To this aim, in the current replication, we did not only focus on outcome variables (i.e., formed coalitions and allocations), but also on variables that

hint at the underlying process. Specifically, we tested whether the Strength-is-Weakness effect was already observed in first offers; whether strong bargainers would indeed demand a higher share than weak bargainers, and whether weak bargainers' first offers would mainly be directed at one another.

Third and final, before saying more about underlying processes, we want to make sure we can actually replicate the effect itself. An illustration of why this skepticism is warranted is a large-scale replication attempt, which included the replications of 100 studies from three high-impact psychology journals in which only 39% of the effects were, replicated (Open Science Collaboration, 2015). Moreover, in previous coalition formation studies, experimenter intervention was often necessary, for example to physically collect offer slips (e.g., C. E. Miller & Wong, 1986), creating the possibility for experimenter bias. The Online Coalition Game, the program developed for the current replication, addresses this by automatizing random matching of, and interaction between, participants. Moreover, other possible researcher degrees of freedom (Simmons, Nelson, & Simonsohn, 2011) such as selective reporting and optional stopping of data collection are addressed by preregistration of both replications. In addition, a data package including (meta) data, analysis scripts, stimulus materials, and preregistrations is available on the Dutch Dataverse network: https://doi.org/10.34894/JXRELG.

Additionally, as coalition formation settings inherently contain more than two participants per observation, and the traditional laboratory has a limited pool of participants, previous studies have often suffered from low sample sizes, leading to low statistical power. Consequently, it is also more likely that previous literature contains false positive results (Ioannidis, 2005). Although this problem may be alleviated by using a within-subjects design in which participants complete multiple trials, this solution may lead to order and learning effects. For example, Kelley and Arrowood (1960) showed quite substantial changes in formed coalitions in a 5(4-3-2) game after 10 to 70 trials. In these situations, it is difficult to determine which observations are valid and which have been transformed by repeated exposure and feedback. As will be demonstrated later, the integration between oTree (Chen, Schonger, & Wickens, 2016) and Amazon Mechanical Turk (AMT) helped us obtain a substantial sample size while retaining an interactive design without the necessity of multiple trials.

Finally, previous studies have used either no incentives or tournament incentives. That is, either there was no monetary payoff related to participant's performance, or the payoff was related to participant's performance *relative* to other participants. This has possibly affected participants' bargaining behavior, on which we will elaborate after explaining the setting that we designed for this study.

The Online Coalition Game

To address the abovementioned issues, we developed the Online Coalition Game (OCG) using oTree (Chen et al., 2016); a free, open-source platform for behavioral research. The latest version of the OCG—albeit using a political instead of a landowner setting—can be found here: https://github.com/JoeriWissink/OnlineCoalitionGame. See Chapter 6 for a more detailed description of the game, its use, and adjustable parameters.

There are three benefits of using oTree. First, oTree allows for interactive studies in which many participants can be flexibly matched into separate groups, which simultaneously participate in the experiment. This allowed us to have up to four triads simultaneously interacting in our 12-cubicle lab and many more triads on AMT. Moreover, random assignment to position and interaction partner as well as the actual bargaining happened entirely without experimenter intervention. A second benefit is that oTree runs in a web browser, meaning no installation is required and data can be easily gathered online. A third benefit is that oTree has an integration with AMT. Although there are clearly benefits and challenges when conduction online interactive experiments (for a recent overview, see Arechar, Gächter, & Molleman, 2017), the AMT integration allowed us to obtain a large sample and made it easy to directly relate bargaining outcomes to actual payoffs. In the general discussion, we will compare the benefits and challenges we encountered during data collection in the lab and on AMT and critically compare the two methods of data collection.

The landowner paradigm. For the current replication, we chose to adapt the landowner paradigm developed by Van Beest and colleagues (van Beest et al., 2004a; van Beest, Wilke, & van Dijk, 2003): a simple weighted majority game (Komorita, 1984; Komorita & Parks, 1995) that simulates coalition formation in a three-player bargaining setting. In the 5(4-3-2) landowner game we used, participants took on the role of landowners who want to sell their parcel of unused land to a project developer. As the project developer wants to buy at least 5 acres, and the landowners individually only hold 4, 3, or 2 acres, two landowners need to form a coalition in order to sell their parcels of land together for a fixed price of $100,000.

The main advantage of using a simple weighted majority game such as the landowner paradigm for the current replications is that, other than in modified pachisi games (Vinacke & Arkoff, 1957), participants always need to form a coalition to obtain a share of the payoffs. This makes it easier to disentangle the possible causes of the Strength-is-Weakness effect. In modified pachisi games, the Strength-is-Weakness effect could be due to two different causes: 1) weak bargainers are faster to realize that they need to form a coalition because otherwise the strong player would win by default (see Vinacke & Arkoff, 1957), and 2) weak bargainers (expect others to) use the equity norm, making the smallest coalition more attractive. As in a simple weighted majority game no single bargainer can secure the payoffs, the first of the two

causes is eliminated, making it more likely that and observed Strength-is-Weakness effect is due to the parity norm.

Appropriate incentives

Previous studies on the Strength-is-Weakness effect have often not been incentivized. In some cases, participants negotiated about hypothetical payoffs (Chaney & Vinacke, 1960; Kelley & Arrowood, 1960; Vinacke, 1959; Vinacke & Arkoff, 1957). This might be problematic in light of findings that responses from empirical studies are less heterogeneous when they are incentivized, and that this might be due to a reduction of thoughtless responses made by unmotivated participants (Camerer & Hogarth, 1999; Smith & Walker, 1993). If the same applies to coalition studies, it might be that a portion of self-defeating offers made by strong participants in non-incentivized studies are made by unmotivated participants applying a quick heuristic such as equity. If so, an incentivized experiment should be a more conservative test of the Strength-is-Weakness as such offers should decrease.

Other experiments that did relate payoffs attained in the experiment to a real monetary payoffs used a tournament incentive; participants were reimbursed based on their performance relative to their peers rather than their absolute performance. For example, participants were simply told that *better negotiation* would lead to a higher chance of obtaining a prize of 100 Dutch guilders (van Beest et al., 2004b) or that 20% of a grade for a course depended on doing better than other participants in the same bargaining position (Murnighan, 1978b).

The reason why this tournament approach may be problematic is that individuals become more risk seeking under tournament incentives in which only a few participants gain an actual prize (Schedlinsky et al., 2016). Applying this notion to coalition formation, tournaments might incentivize participants to make risky offers in which they apply the equity norm in an attempt to maximize their payoffs. Hence, these incentives might possibly inflate a Strength-is-Weakness effect, making the use of piece-rate incentives a more conservative test of the Strength-is-Weakness effect.

Moreover, piece-rate incentives seem to create a better match between the incentives one might have in real-life coalition bargaining and the one introduced in the lab. For example, in the formation of municipal councils, party outcomes are determined by how well they negotiate within their *own* municipality, not by how well they negotiate compared to parties in *other* municipalities. To address these possible issues, we presented participants with a more straightforward piece-rate incentive scheme in which there was a fixed conversion rate between money earned in the experiment and an actual monetary bonus.

Hypotheses

First, our replications were aimed at replicating the Strength-is-Weakness effect; the observation that strong bargainers are disproportionally often excluded from coalitions compared to their weaker counterparts. Hence, we hypothesized that the weak coalition (BC-coalition with 5 acres) would be formed more often than both coalitions including the strong landowner (AB coalition with 7 acres and AC coalition with 6 acres).

Moreover, we formulated three exploratory hypotheses to gain insight in the causes of the Strength-is-Weakness effect. The first pertains to whether, in line with the application of the equity norm (Gamson, 1961a, 1964; Komorita & Chertkoff, 1973), strong bargainers make first offers in which they claim a higher share of the payoffs than weaker bargainers do. A second mechanism that we explored is whether bargainers *anticipate* a lower offer from those with most resources and, even before receiving offers, make their first offers to the other with fewer resources, rather than to the other with more resources. This prediction is based on Gamson's (1964, p. 87) notion of a parity norm not just as the *application* of the equity norm but also the *expectation* that others will "demand from a coalition a share of the payoff proportional to the amount of resources which they contribute to a coalition." Finally, we wanted to explore whether, in formed coalitions, those with more resources acquired a higher proportion of the payoffs than those with fewer resources.

In all studies, we report all measures and manipulations. No participants were excluded.

Study 2.1

As a first controlled test of the OCG, we conducted our first replication in our social psychology lab.

Method

Participants and design. For this study, we recruited 180 undergraduate psychology students (M_{age} = 19.34 years, age range 17-28, 142 females, 37 males, 1 other). Of these 180 participants, 156 could be grouped into 52 triads. Within triads, participants were randomly assigned to one of the three positions in a 5(4-3-2) landowner game: landowner A with 4 resources, landowner B with 3 resources, and landowner C with 2 resources. The 24 participants who could not be matched only made a first offer, after which they learned that they could not be assigned to a triad. As interpretations of results are the same regardless of including or excluding these 24 observations, we included them in the analyses that pertained to participants' first offers.

Having been allowed two weeks of lab time, the end of the second week was a natural stopping rule. A sensitivity power analysis conducted with G*Power (Faul, Erdfelder, Lang, & Buchner, 2007) revealed that we could detect a medium to large effect size (w = 0.43) when testing whether the distribution of formed coalitions differed from chance (i.e., equal proportions for all possible coalitions) with 80% power.

Materials and procedure.

Game structure. After giving informed consent, participants were forwarded to the OCG; an oTree version (Chen et al., 2016) of the landowner paradigm (van Beest et al., 2003). Participants read that they would take the position of one of three landowners that each owned an unused parcel of land. They were told that these landowners were landowner A (owning 4 acres of land), B (owning 3 acres of land), or C (owning 2 acres of land). They read a project developer offered to buy at least 5 acres of land for €100,000 and that any coalition of two landowners could sell their parcels of land for this price. They read a coalition would form when two participants reached a consensus on how to distribute the €100,000 between the coalition partners, and that for each €1,000 that a participant gained, they would receive a bonus of €0.10. They also read that the landowner would always pay €100,000, regardless of the size of the land sold.

Bargaining. As a bargaining procedure, we adapted the Komorita and Meek (1978) display procedure, which consisted of three phases.

Phase I. In Phase I, all participants made a coalition offer. In this offer, they a) chose whom to send the offer, and b) indicated how they would like to distribute the €100,000 between themselves and the chosen landowner in increments of €1,000.

Phase II. In Phase II, participants saw all offers that were made in Phase I. They then selected one of the coalition offers that included them. This could be either their own offer or an offer from another landowner.

Phase III. In Phase III, participants saw who selected which coalition offer. If two participants selected the same offer, the coalition would be formed and the payoffs were distributed as agreed upon by the two landowners. If no offer was selected twice, a new round started in which participants went through the same three phases. This process was repeated until two participants selected the same offer and a coalition was formed.

Comprehension check. In order to gauge whether participants understood the instructions, participants completed a multiple choice quiz (correct answers in *italics*) asking for the amount of money the project developer would pay (*€100,000* / This depends on the size of the sold land), what the payoffs would be of the landowner not included in the coalition (This depends on the offer that was accepted / *This landowner doesn't receive any money*), and which coalitions could be formed (AB & AC / AB & BC / AC & BC / *AB, AC, & BC*). If participants made a mistake, they received a

message that gave them the correct answer, and were presented with the question again until they answered correctly.

Dependent Variables. To test our hypotheses, we focused on four dependent variables.

Formed coalition. As our main goal is replicating the Strength-is-Weakness effect, our main dependent variable was the formed coalition after one or more rounds of bargaining. That is, was the coalition formed an AB-, AC-, or BC-coalition?

Allocation in formed coalitions. For each formed coalition, we investigated whether, in line with previous literature suggesting the use of the equity norm (Gamson, 1961a; Komorita & Chertkoff, 1973; van Beest et al., 2004b), those with more resources in a coalition also attained a higher share of the payoffs. As allocations were made in increments of €1,000, participants actually made offers ranging from 1 to 100. Therefore, all offers and allocations are reported in the results without the three extra zeros.

First offer – choice of bargaining partner. To investigate whether the Strength-is-Weakness effect was already apparent before participants had seen the offers of their counter parts, we analyzed to which other landowner participants make their first offer.

First offer – allocation. As first offers were made before participants learned of the offers made by their bargaining partners, we consider this allocation as reflecting most closely the participants' own preferences for a certain allocation, rather than a response to the other bargainers' offers. Testing whether those with more resources also claimed a higher share of the payoffs in their first offer is thus a second way to test the use of equity.

Results

Comprehension check. Out of 180 participants, one participant falsely indicated that the size of the sold parcels would influence the size of the payoffs, and two participants falsely indicated that the payoffs of the excluded landowner depended on the offer that was accepted. Twenty-six participants gave a wrong answer to the question which coalitions would be formed. As preregistered, we conducted analyses including all participants *and* including those who answered all questions correctly (n = 152). Only for one exploratory test did the interpretation between the two analyses differ (see footnote 14). In Study 2.2, no differences occurred.

Formed coalitions. Replicating the Strength-is-Weakness effect, a Chi-square goodness of fit test showed that BC-coalitions (n = 35; 67%) were formed more often than AC-coalitions (n = 15; 29%), and AB-coalitions (n = 2; 4%), $\chi^2(2, N = 52) = 31.89$, $p < .001$, $w = 0.78$, 95% CI_w [0.50, 1.04]. This difference remained significant when combining the AB- and AC-coalition and comparing them against the BC-coalition,

showing that the significant effect is not due to the AB-coalition being formed only twice, $\chi^2(1, N = 52) = 6.23$, $p = .01$, $w = 0.35$, 95% CI_w [0.07, 0.62]. Translating these results into inclusion rates, A was only included in 33% of all coalitions, whereas B and C were included in 71% and 96% respectively. See Table 2.1 for an overview of formed coalitions and allocations.

Allocation in formed coalitions. Because coalition members allocated a fixed payoff of $100,000, and therefore the payoffs of the two coalition members were inversely related to each other, we could measure inequality in payoffs by testing whether one of the two mean payoffs differed from $5,000. One-sample *t*-tests revealed that, in line with our expectations, bargainers with more resources always obtained a larger share of the payoffs. In AC-coalitions, A obtained a larger share than C ($M_A = 54.13$, SD = 3.91), $t(14) = 4.10$, $p = .001$, $d = 1.06$, 95% CI_d [-0.92, 3.04]. In BC-coalitions, B obtained a larger share than C ($M_B = 57.06$, SD = 4.29), $t(34) = 9.73$, $p < .001$, $d = 1.65$, 95% CI_d [0.22, 3.07]. Finally, in AB-coalitions, A obtained a larger share than B ($M_A = 55.00$, $SD = 7.07$), but as only two AB-coalitions were formed, these numbers will not be interpreted.

Average bonus per position. Exploratorily, as an alternative metric of the Strength-is-Weakness effect, we looked at the average monetary bonus participants in the different positions obtained. A one-way ANOVA revealed that we again found a Strength-is-Weakness effect, $F(2, 153) = 19.88$, $p < .001$, $\eta^2 = .21$, 95% $CI_{\eta 2}$ [0.10, 0.31]. Tukey HSD tests showed that, even though A obtained a higher payoff in the formed coalitions, the frequent exclusion clearly made the average payoffs of A ($M = 1.77$, $SD = 2.58$) lower than that of B ($M = 4.01$, $SD = 2.62$), $p < .001$, $d = 0.86$, 95% CI_d [0.46, 1.27], and C ($M = 4.21$, $SD = 0.95$), $p < .001$, $d = 1.26$, 95% CI_d [0.83, 1.68]. The average bonus of B and C did not differ, $p = .89$, $d = 0.10$, 95% CI_d [-0.28, 0.49].

Table 2.1.

Formed coalitions and mean allocations for each position in Study 2.1.

Formed Coalition	*n*	%	Mean allocation M_A	M_B	M_C	*SD*
AB	2	3.8%	55.00	45.00	-	7.07
AB	15	28.8%	54.13	-	45.87	3.91
BC	35	67.3%	-	57.06	42.94	4.29

First offers – choice of bargaining partner. Chi-square goodness of fit tests showed that most bargainers sent a first offer to the bargaining partner that owned fewest acres of land, showing a Strength-is-Weakness effect before first offers are even known. Landowners A made more first offers to C ($n = 48$) than to B ($n = 10$), $\chi^2(1, N = 58) = 24.90$, $p < .001$, $w = 0.66$, 95% CI_w [0.40, 0.91]. Likewise, landowners B made more first offers to C ($n = 56$) than to A ($n = 5$), $\chi^2(1, N = 61) = 42.64$, $p < .001$, w

= 0.84, 95% CI_w [0.58, 1.09]. Finally, landowners C also made more first offers to B (n = 55) than to A (n = 6), $\chi^2(1, N = 61) = 39.36$, $p < .001$, $w = 0.80$, 95% CI_w [0.55, 1.06]. See Table 2.2 for an overview of proposed coalitions and mean proposed allocations for each position.

First offers – allocation. In line with previous research on the use of the equity norm (Gamson, 1961a; Komorita & Chertkoff, 1973), a one-way ANOVA showed that those with more resources allocated more money to themselves in their first offers, $F(2, 177) = 165.02$, $p < .001$, $\eta^2 = .65$, 95% $CI_{\eta 2}$ [0.57, 0.71]. Tukey HSD tests showed that landowners A (M = 60.21, SD = 7.27) allocated more to themselves than landowners B (M = 57.10, SD = 5.83), p = 0.012, d = 0.47, 95% CI_d [0.10, 0.84], who in turn allocated more to themselves than landowners C (M = 42.11, SD = 4.06), $p < .001$, d = 2.98, 95% CI_d [2.46, 3.50].[14] See Figure 2.1 for the distributions of allocations for the three bargaining positions.

Table 2.2.

Proposed coalitions and mean proposed allocations for each position in Study 2.1.

	Proposed			Mean proposed allocation			
Position	Coalition	n	%	M_A	M_B	M_C	SD
A (4 acres)	AB	10	17.2%	55.90	44.10	-	5.11
	AC	48	82.8%	61.10	-	38.90	7.37
B (3 acres)	AB	5	8.2%	55.40	44.60	-	3.65
	BC	56	91.8%	-	58.21	41.79	4.55
C (2 acres)	AC	6	9.8%	57.50	-	42.50	6.12
	BC	55	90.2%	-	57.93	42.07	3.85

[14] After excluding those who failed at least one of the comprehension check questions, landowners A (M = 58.73, SD =6.52) do not significantly allocate more to themselves than landowners B (M = 57.36, SD = 5.86), p = 0.44, d = 0.22, 95% CI_d [-0.18, 0.62].

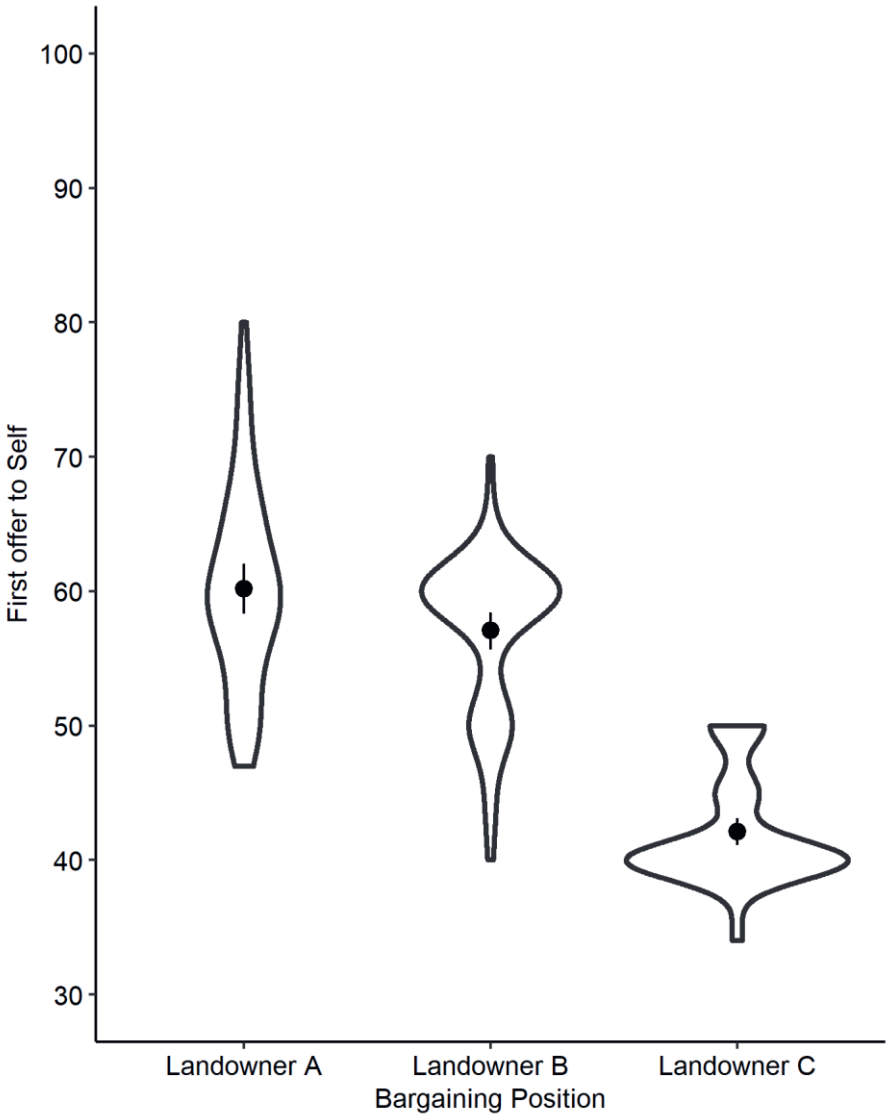

Figure 2.1. Violin plot of allocation to self by different bargaining positions in Study 2.1 with means (dot), CI^{95} (line), and probability density (width).

Discussion

In Study 2.1, we clearly replicated the Strength-is-Weakness effect; the smallest BC-coalition was formed substantially more often than both the AB- and AC-coalitions. Landowner A was only included in 33% of the formed coalitions, whereas landowners B and C were included in 69% and 96% of formed coalitions respectively.

Looking at participants' first offers provides insight into the causes of the Strength-is-Weakness effect. First, individuals apply equitable division rules; in their first offers landowners with more resources made higher allocations to themselves than those with fewer resources. This allows landowners B and C to deduce that a coalition between themselves is more profitable than a coalition with landowner A. Looking at the target of first offers, however, it seems that the basis for a Strength-is-Weakness effect is already in place *before* bargainers observed each other's first offers. In their first offer, the majority of landowners showed a preference for the bargaining partner with the least amount of resources. Although we do not have access to the reasons landowners made these choices, a parsimonious explanation is that they already expected the smallest coalition to be the most profitable coalition.

Study 2.2

We conducted our second replication on Amazon Mechanical Turk (AMT). Conducting this second study had two main goals. First, it allowed us to test the robustness of the Strength-is-Weakness effect obtained in Study 2.1 in another setting with a different participant pool. Previous comparisons between lab and AMT samples seems to suggest no large differences in results (e.g., Arechar et al., 2017; Paolacci, Chandler, & Stern, 2010). However, research also seems to indicate that AMT workers are often non-naïve participants. For example, more than half of a sample of AMT workers indicates to have participated in prisoner's dilemmas or ultimatum games (Chandler, Mueller, & Paolacci, 2014). There seems to be evidence that the Strength-is-Weakness effect decreases with more exposure to coalition bargaining games (Kelley & Arrowood, 1960). Hence, there is a possibility that, due to prior exposure to other economic games, the Strength-is-Weakness effect would be less prominent in our AMT sample.

A second goal of Study 2.2 was that it was a first online test of the OCG. Conducting online interactive experiments has its own challenges, such as constructing triads on the go and dealing with participant idleness when others are dependent on their choices (for an overview of possible issues, see Arechar et al., 2017). As such, Study 2.2 helped us weigh the benefits and challenges of conducting coalition formation research on a platform such as AMT that have the benefit of assessing a larger and more varied participant sample and compare these to lab settings where one has more control on the environment in which they participate (e.g., standardized lab cubicles). We will reflect on this comparison in the general discussion of this chapter.

Method

Besides the few changes mentioned below, the materials and procedure were identical to those of Study 2.1, as were the confirmatory and exploratory hypotheses.

Participants and design. As preregistered, we aimed for 75 triads but eventually obtained a sample of 80 triads, which, according to a sensitivity power analysis conducted in G*Power (Faul et al., 2007), allowed us to detect a medium to large effect size (w = 0.35) when testing whether the distribution of formed coalitions differed from chance (i.e., equal proportions for all possible coalitions) with 80% power.

Participants were recruited in batches of varying sizes (30 to 45 participants) to facilitate matching into triads (see matching procedure below). Participants received $2.40 for completing the hit and another $0.05 cents per $1,000 they attained in the scenario, leading to a payout of between $2.40 and $7.40.

A total of 441 participants started our study. Of these 441, 336 were matched and entered the interaction phase after which 34 participants dropped out due to idleness, causing another 62 matched participants to drop out as well. Thus, our final sample was N = 240 AMT workers, grouped in to 80 triads (M_{age} = 36.88 years, age range 19-70, 119 females, 121 males). Within these triads, participants were randomly assigned to one of the three positions in a 5(4-3-2) landowner game.

Materials and procedure. Materials and procedure were nearly identical to Study 2.1, meaning we will only mention the few changes we made. First, we translated the Dutch materials from Study 2.1 to English. Second, we changed the order of the experiment so that participants were matched after reading the instruction and completing the comprehension check instead of before. Finally, we added timers during the interaction phase of the experiment.

Matching procedure. In Study 2.2, we changed the matching procedure to address two specific challenges of running interactive studies on AMT. First, on AMT, participants starting the experiment but not finishing it are more prevalent than in the lab. As participants are interdependent once matched into a triad, this means that the dropout of one participant would lead to dropout of two matched participants. We assumed that this type of dropout would be most prevalent during the consent form, instructions, or comprehension check. By matching only participants who have already passed these phases of the study, we minimized the chance of losing matched participants due to idleness of only one participant.

Second, unlike in our lab session, we had no control over how many participants would be starting our study at the same time. For this reason, if participants could not be matched within 5 minutes after they entered the matching screen, they were given the possibility to quit the study and collect their show-up fee. Moreover, we conducted the study in batches of between 30 and 45 participants to increase the odds that all participants would start playing around the same time and thus maximize the possibility that participants could be matched with other participants.

Timers. To make sure that matched idle participants did not stall their interaction partners, we added 2-minute timers to the different pages in the interaction phase of the study. To minimize feelings of time pressure but still remind participants of the timer, these timers were only made visible after 1.5 minutes.

Results

Comprehension check. Out of our 240 participants who were matched, four participants falsely indicated that the size of the sold parcels would influence the size of the payoffs, 32 participants falsely indicated that the payoffs of the excluded landowner depended on the offer that was accepted, and 14 participants gave a wrong answer to the question which coalitions could be formed. Interpretations of all analyses did not differ when only including participants who have made no errors during the comprehension check (n = 199). Below we report analyses using all 240 participants.

Formed coalitions. Replicating the Strength-is-Weakness effect, a Chi-square goodness of fit test showed that BC-coalitions (n = 52; 65%) were formed more often than AC-coalitions (n = 22; 27.5%), and AB-coalitions (n = 6; 7.5%), $\chi^2(2, N = 80) = 40.90$, $p < .001$, $w = 0.72$, 95% CI_w [0.49, 0.93]. Again, this difference remained significant when combining the AB- and AC-coalition and comparing them against the BC-coalition, showing that the significant effect is not due to the AB-coalition being formed only six times, $\chi^2(1, N = 80) = 7.20$, $p = .01$, $w = 0.30$, 95% CI_w [0.08, 0.52]. Translating the results into inclusion rates, A was only included in 35% of all coalitions, whereas B and C were included in 72.5% and 92.5% respectively. See Table 2.3 for an overview of formed coalitions and allocations.

Allocation in formed coalitions. As in Study 2.1, one-sample t-tests showed that bargainers with more resources obtained a larger share of the payoffs (i.e., more than €50,000) in the coalitions that were formed (see Table 2.3). In AC-coalitions, A obtained a larger share than C (M_A = 54.77, SD = 6.30), $t(21) = 3.55$, $p = .002$, $d = 0.76$, 95% CI_d [-1.88, 3.39]. In BC-coalitions, B obtained a larger share than C (M_B = 55.10, SD = 6.60), $t(51) = 5.57$, $p < .001$, $d = 0.77$, 95% CI_d [-1.02, 2.57]. Finally, in AB-coalitions, A obtained a larger share than B (M_A = 52.50, SD = 2.74), but as only six AB-coalitions were formed, these numbers will not be interpreted.

Average bonus per position. Again, as an alternative metric of the Strength-is-Weakness effect, we exploratorily looked at the average monetary bonus participants in the different positions obtained. A one-way ANOVA revealed that we again found a Strength-is-Weakness effect, $F(2, 237) = 24.87$, $p < .001$, $\eta^2 = .17$, 95% $CI_{\eta 2}$ [0.09, 0.25]. Tukey HSD tests showed that, again, the average bonus of A (M = 0.95, SD = 1.31) was lower than that of B (M = 1.97, SD = 1.25), $p < .001$, $d = 0.79$, 95% CI_d

[0.47, 1.12], and C (M = 2.08, SD = 0.67), p < .001, d = 1.08, 95% CI_d [0.75, 1.42]. The average bonus of B and C did not differ, p = .80, d = 0.11, 95% CI_d [-0.20, 0.42].[15]

Table 2.3.
Formed coalitions and mean allocations for each position in Study 2.2.

Formed Coalition	n	%	Mean allocation M_A	M_B	M_C	SD
AB	6	7.5%	52.50	47.50	-	2.74
AB	22	27.5%	54.77	-	45.23	6.30
BC	52	65.0%	-	55.10	44.90	6.60

First offers – choice of bargaining partner. As in Study 2.1, landowners A made more first offers to C (n = 66) than to B (n = 14), $\chi^2(1, N = 80) = 33.80$, p < .001, w = 0.65, 95% CI_w [0.43, 0.87]. Likewise, landowners B made more first offer to C (n = 72) than to A (n = 8), $\chi^2(1, N = 80) = 51.20$, p < .001, w = 0.80, 95% CI_w [0.58, 1.02]. Finally, landowners C made more first offers to B (n = 68) than to A (n = 12), $\chi^2(1, N = 80) = 39.20$, p < .001, w = 0.70, 95% CI_w [0.48, 0.92]. See Table 2.4 for an overview of proposed coalitions and mean proposed allocations for each position.

First offers – allocation. As in Study 2.1, a one-way ANOVA showed that those with more resources allocated more money to themselves in their first offers, $F(2, 237) = 139.22$, p < .001, η^2 = 0.54, 95% $CI_{\eta 2}$ [0.27, 0.45]. Tukey HSD tests showed that landowners A (M = 61.95, SD = 9.32) allocated more to themselves than landowners B (M = 55.21, SD = 7.22), p < .001, d = 0.81, 95% CI_d [0.48, 1.13], who in turn allocated more to themselves than landowners C (M = 41.85, SD = 6.44), p < .001, d = 1.95, 95% CI_d [1.57, 2.33]. See Figure 2.2 for the distributions of allocations for the three bargaining positions.

Table 2.4.
Proposed coalitions and mean proposed allocations for each position in Study 2.2.

Position	Proposed Coalition	n	%	Mean proposed allocation M_A	M_B	M_C	SD
A (4 acres)	AB	14	17.5%	54.29	45.71	-	5.14
	AC	66	82.5%	63.88	-	36.12	9.22
B (3 acres)	AB	8	10.0%	50.37	49.63	-	9.16
	BC	72	90.0%	-	55.83	44.17	6.76
C (2 acres)	AC	14	17.5%	54.29	45.71	-	5.14
	BC	66	82.5%	63.88	-	36.12	9.22

[15] Again, non-parametric tests lead to the same interpretation.

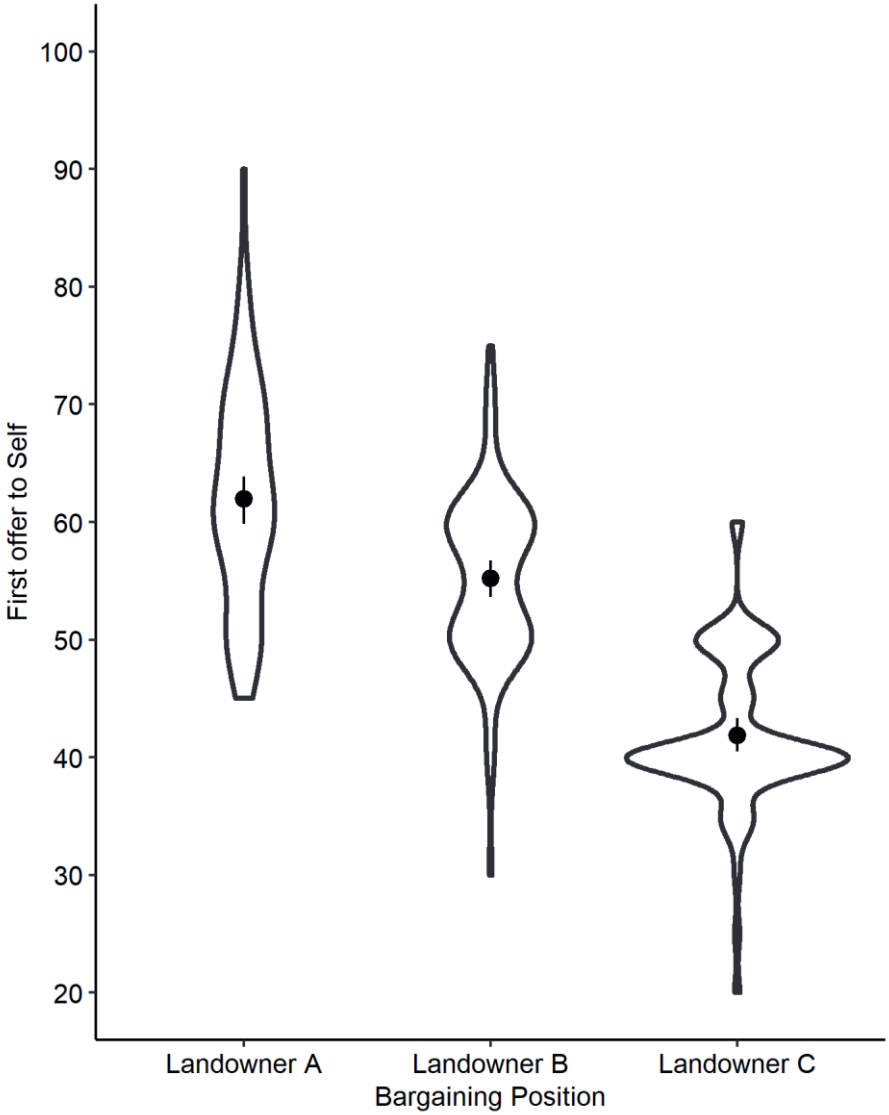

Figure 2.2. Violin plot of allocation to self by different bargaining positions in Study 2.2 with means (dot), CI^{95} (line), and probability density (width).

Discussion

In Study 2.2, the Strength-is-Weakness effect was again successfully replicated; the BC-coalition was formed substantially more often than the AB- and AC-coalitions. Landowner A was included in 35% of all formed coalitions, whereas B and C were included in 72.5% and 92.5% respectively.

Moreover, as in Study 2.1, causes for the effect can again be found in both the allocation of payoffs in the first offer and the first choice of bargaining partner. Landowners A allocated more to themselves than landowners B, which allocated more to themselves than landowners C. Moreover, participants again seemed to prefer the bargaining partner with the least amount of resources.

Comparison Study 2.1 and Study 2.2

To test whether results from the lab (Study 2.1) and AMT (Study 2.2) differed from each other, we conducted additional analyses. First, a chi-square test of independence showed that there was no systematic relationship between type of sample and formed coalitions, $\chi^2(2, N = 132) = 0.74$, $p = 0.69$, $w = 0.07$, 95% CI_w [< 0.01, 0.21]. Second a 2 (Study: 1 vs. 2) by 3 (Position: A vs. B vs. C) ANOVA on first allocation to self, shows, that only bargaining position predicted participants' first offers, $F(2, 414) = 114.90$, $p < .001$, $\eta^2 = .58$, 95% $CI_{\eta 2}$ [0.28, 0.42]. There was no main effect of study, $F(1, 414) = 2.08$, $p = .15$, $d < .01$, 95% CI_d [-0.19, 0.20] nor was there an interaction effect between study and position, $F(2, 414) = 2.30$, $p = .10$, $\eta^2 < .01$, 95% $CI_{\eta 2}$ [< 0.01, 0.03]. Finally, the proportion of participants who did not make errors in our comprehension check did not differ substantially between our lab (84%) and AMT (83%) sample.

General discussion

In two studies, one using a psychology undergraduate laboratory setting and one using Amazon Mechanical Turk (AMT), we successfully replicated the Strength-is-Weakness effect in coalition formation. In line with previous literature (Caplow, 1956; Chaney & Vinacke, 1960; Gamson, 1964; Kelley & Arrowood, 1960; Murnighan, 1978b; van Beest et al., 2011, 2004a; Vinacke & Arkoff, 1957), coalition bargainers with more resources were disproportionately excluded from coalitions. In addition, we provided new insights in causes of the Strength-is-Weakness effect. Analyses of first offers and partner choice suggest that bargainers both utilized and expected the use of the equity norm. Those with more resources claimed a higher share of the payoffs, making themselves less attractive than those with fewer resources. Additionally, those with fewer resources approached each other from the outset, suggesting that they anticipate a better deal from one another than from someone that holds more resources.

Theoretical implications

Besides replicating the Strength-is-Weakness effect, our studies corroborate coalition formation theories that highlight the importance of resources in the coalition formation process. Two notable examples are minimum resource theory (Gamson,

1961a) and bargaining theory (Komorita & Chertkoff, 1973) which both predict that coalition bargainers aim to form the smallest possible winning coalition and that those with more resources—following the equity norm—try to secure a larger share of the payoffs than those with fewer resources. The results from the current replication cannot be explained by coalition formation theories that assume that bargaining is shaped by the number of possible coalitions bargainers can be part of (e.g., minimum power theory, Gamson, 1964; weighted probability model, Komorita, 1974). In the current replications, all landowners had an identical number of possible coalitions they could be part of, namely two. Hence, an account purely based on bargaining opportunities cannot explain why some coalitions are formed more often, nor why some bargainers claim or receive a higher share of the payoffs.

Practical implications

The current studies addressed several issues that might have plagued previous studies of the effect. First, integrating the oTree (Chen et al., 2016) landowner game with AMT allowed us to collect sufficient triads for a high-powered study of the effect. A post hoc power analysis using G*Power (Faul et al., 2007), indicates that the probability of finding the observed effect sizes (w = 0.78 and w = 0.72), given the effect exists, exceeds 0.99. Second, our use of piece-rate incentivizes addressed the possibility of increased variance in responses due to no incentives at all (Smith & Walker, 1993), and the possibility of risky high offers driving the effect in the presence of tournament incentives (Schedlinsky et al., 2016). Finally, preregistration and automation of all the experiment's procedures minimized researcher degrees of freedom.

An encouraging finding is the high similarity between results of our two studies, despite methodological differences and differences in participant characteristics. Whether Amazon Mechanical Turk (AMT) produces valid results has been debated: effects established in the lab have generally been replicated in an online setting (e.g., Arechar et al., 2017; Paolacci et al., 2010), but there have also been concerns about participant attention and non-naivety (Chandler et al., 2014). In our study, however, differences between a relatively isolated lab cubicle and a possibly distracting environment for AMT workers did not seem to result in a different understanding of the game. Moreover, despite the likely experience AMT workers have with economic games, this did not lead to markedly different results. Finally, the addition of timers and the difference in timing of matching did not seem to have a noticeable effect on bargaining behavior.

Benefits and challenges of the lab and AMT

The above comparison implies that both the lab and AMT settings are equally fit environments for coalition formation research. However, conducting interactive

research in the lab and on AMT both have their own benefits and challenges. Below we discuss a few benefits and challenges that may help researchers to realize the trade-offs when choosing one of the two samples.

Speed of data collection and sample size. In terms of speed of data collection, AMT is clearly the superior option. For Study 2.1, we managed to collect 52 triads in 10 workdays. For Study 2.2, we collected our 80 triads within a few hours spread across three days. Moreover, whereas we were close to the limits of our lab participant pool, the effective sample size one can acquire through AMT is estimated at 7,300 participants (Stewart et al., 2015).

Cost inefficiency due to participant attrition. In our two replications, participants who dropped out due to idleness were not paid and did not contribute to cost inefficiency. Participants who could not be matched within five minutes or participants whose interaction partner dropped out did receive a base fee, but did not produce complete data. Hence, the latter two led to cost inefficiency. In the lab, 13% of our sample did not produce complete data but still received the show-up fee, compared to 35% on AMT, showing that our AMT study was less efficient. This difference can mainly be attributed to participants who were unable to be matched. This was likely exacerbated due to starting AMT sessions without knowing how many participants would show up. Previous online interactive research that made participant register for a study that would take place at a later time attained an attrition rate of only 7%, meaning that AMT could possibly be even more efficient than a lab setting (Gallo & Yan, 2015).

Consequences of misunderstanding the instructions. Despite our efforts to make the instructions as clear as possible, some participants got stuck due to giving responses in an incorrect format (i.e., they wrote offers in thousands instead of leaving out the three extra zeroes). In the lab, participants had ample time to discover their mistake. On AMT, however, participants only had two minutes to complete the page, meaning some could not correct this mistake in time, dropping out of the experiment along with their interaction partners. Fortunately, only 12 out of 336 matched participants made this mistake. Possibly, imposing a stricter comprehension check before the actual interaction phase could eliminate this mistake.

Whereas the above list of dimensions is far from exhaustive, it shows that there are distinct benefits and challenges to conducting interactive studies in the lab and online. However, we think that the benefit of having a large sample outweighs the loss of control that leads to inefficiency. Moreover, it is clear that some of this inefficiency might be alleviated by 1) using a different recruitment method, and 2) imposing stronger comprehension checks.

Limitations and future research

An implication of the current research is that having more can actually come with higher costs. The current research, however, has only demonstrated this notion in a simple situation in which having a larger coalition does not lead to a higher shared payoff. There is, albeit scarce, some evidence that in multivalued situations (i.e., when a coalition's payoff increases with an increased number of combined resources, Komorita, 1984) a too strong focus on obtaining an equitable share of the payoffs can also lead to exclusion (Komorita, Aquino, & Ellis, 1989). Future research could be aimed at discerning when the added value of having more resources is high enough to offset the larger share one with more resources would demand and when it is not.

An important implication of the Strength-is-Weakness effect is that it suggests that those with more resources disproportionally suffer the consequences of exclusion. Research on belonging shows that individuals have a fundamental need to belong and social exclusion threatens this need, leading to negative psychological consequences (Baumeister & Leary, 1995; Williams, 2007). An interesting next step would be to investigate whether being excluded from a coalition leads to similar need threat as being socially excluded. If so, this would show that excluded bargainers—often the strong bargainer—suffer a second loss besides leaving empty-handed.

Future implementation of the Online Coalition Game. With the two presented studies, we have shown that the OCG is a viable way of conducting interactive coalition formation research. Below, we provide two examples of how future research could implement additional oTree features to address further research questions regarding the Strength-is-Weakness effect.

Chat rooms. Previous research has shown that different channels of communication can influence which coalitions are more likely to be formed; public communication channels foster the formation of large coalitions, whereas private channels foster minimum winning coalitions (Swaab et al., 2009). Future research could implement oTree's built-in chat function to investigate whether communication channels affect the prevalence of the Strength-is-Weakness effect. For example, it is possible that allowing strong bargainers to communicate their bargaining intentions to the weak bargainers diminishes the tendency for weak bargainers to direct their first offers to each other from the outset, which in turn may possibly lower the occurrence of the Strength-is-Weakness effect.

Resources based on effort. In our studies, participants were randomly allocated to different positions. Previous research shows that claims based on equity are more likely to be accepted when resources are earned than when they are randomly allocated (Konow, 2000; Tausch et al., 2013). An interesting question is whether participants with more resources will be more readily included when they exerted effort to acquire these resources compared to when they were randomly

allocated. This question could be addressed by utilizing oTree's compatibility with Javascript and program a real effort task and allocate participants to a position based on their performance on the task.

Different context. In the current studies, we have implemented the landowner paradigm (van Beest et al., 2003), which is one possible operationalization of a simple weighted majority game. Researchers could frame a simple weighted majority game in a political setting (e.g., a political convention game; Gamson, 1964) or organizational setting (Polzer, Mannix, & Neale, 1998; Swaab et al., 2009). Although we do not expect any strong differences in results—the Strength-is-Weakness effect has also been found in a political convention game (Murnighan, 1978b)—a systematic comparison might reveal subtle differences in bargaining behavior and expectations.

Conclusion

In thus chapter, we presented two preregistered, piece-rate incentivized replications of the Strength-is-Weakness effect in coalition formation using the Online Coalition Game—a novel online interactive coalition game—in both a lab setting and using an Amazon Mechanical Turk (AMT) sample. Besides replicating the effect, the results seemed to suggest that both the use of equitable division rules such as the parity norm (Gamson, 1964) and expectation that others will apply these rules shape the effect. Although conducting online interactive studies online brings its own challenges, a comparison between the results of the two replications shows that results do not strongly differ between the two settings. Moreover, AMT addresses the necessity of larger sample sizes in coalition formation studies in which the triad is the unit of analysis. As such, the current research does not only provide evidence for the existence of a Strength-is-Weakness effect, but also shows that the Online Coalition Game is a promising tool for conducting future (online) coalition formation research.

Chapter 3

On **why** having many resources leads to exclusion from coalitions: Passive adoption or active selection of self-serving allocation rules?

Based on: Wissink, J., van Beest, I., Pronk, T., & van de Ven, N. (in press). What causes the Strength-is-Weakness effect in coalition formation?: Passive adoption or active selection of self-serving allocation rules. *European Journal of Social Psychology.*

A data package including (meta) data, analysis scripts, stimulus materials, and preregistrations is available here: https://doi.org/10.34894/7F3ZNY.

Abstract

In coalition formation, bargainers with many resources are often excluded from coalitions (the Strength-is-Weakness effect). Literature suggests this effect is driven by strong bargainers using self-serving allocation rules that backfire, as they prefer equity to equality (while weak bargainers prefer the opposite). Four studies test 1) whether this is actually the case and 2) whether strong bargainers attempt to make a fair offer but solely consider an equitable allocation or whether they consider both equity and equality but selfishly choose equity as an allocation rule. We find the Strength-is-Weakness effect even when equality rules are made salient, strengthening the idea that the strong bargainers actively select equity as their framework for fairness to attempt to maximize their payoffs. The studies, however, cast doubt on whether this is the sole cause of the Strength-is-Weakness effect. We found that strong bargainers are likely avoided because they are *expected* to bargain self-servingly, making the weak bargainers seek out each other.

People often form coalitions to reach goals that cannot be attained individually. Examples are political parties that form governments, workers that form unions, and companies that engage in joint ventures. A seemingly paradoxical finding is that those adding most resources to a coalition are surprisingly often excluded; an observation called the *Strength-is-Weakness* effect (Caplow, 1956; Chaney & Vinacke, 1960; Gamson, 1964; Kelley & Arrowood, 1960; Murnighan, 1978b; van Beest et al., 2011, 2004a; Vinacke & Arkoff, 1957).

Although the cause of the Strength-is-Weakness effect has not been directly studied, literature hints that it might lie in the use of allocation rules rooted in distributive fairness principles (Gamson, 1961a; Komorita & Chertkoff, 1973). A prominent fairness principle is equity, which dictates that individuals should be rewarded in proportion to their input (e.g., Adams, 1965; Walster et al., 1973). This use of equity is often seen in coalition formation: those with more resources often try to obtain a higher share of the payoffs a coalition brings (e.g., Gamson, 1961b, 1964; van Beest et al., 2004b; Warwick & Druckman, 2006). Moreover, people use allocation rules self-servingly: those with more resources prefer an equitable division of payoffs, whereas those with fewer resources prefer an equal division (Komorita & Chertkoff, 1973; van Beest et al., 2004b). These tendencies make those with more resources less attractive as a coalition partner than those with fewer resources, often leading to exclusion of the former.

An unanswered question is *why* these coalition bargainers apply an allocation rule that is clearly self-defeating. One possible explanation is that bargainers are motivated to apply an allocation rule that is deemed fair by their counterparts but that their specific bargaining position biases their perception of what the appropriate allocation rule is. They could passively adopt the most salient allocation rule without adequately considering alternative allocation rules. For example, those with more resources could utilize the equity norm without adequately considering the use of an equal allocation rule. Another explanation is that bargainers' use of allocation rules is guided by a selfish active selection of allocation rules: bargainers could attend to multiple allocation rules but actively choose the allocation rule that seems to yield a higher payoff.

To address this research question, we conducted four studies in which we created coalition bargaining settings where equality was made as salient as—or even more salient than—proportionality/equity. We found that in this setting, the self-defeating application of the equity norm by bargainers with most resources persisted. This suggests that the Strength-is-Weakness effect cannot be explained by an attempt to make a fair offer that fails due to the passive adoption of the allocation rule that is most salient, but instead by an active selection between multiple allocation rules (equity or equality) in a (failed) attempt to increase one's payoff. We first provide an

overview of relevant literature on coalition formation and the Strength-is-Weakness effect, before turning to our studies.

Coalition formation and the Strength-is-Weakness effect

Coalition formation can be found in many layers of society. Political parties form governments, companies combine resources in joint ventures, and employees form informal coalitions within an organization. A formal definition of coalition formation is "the joint use of resources to determine the outcome of a decision in a mixed-motive situation involving more than two units" (Gamson, 1964, p.85). This means that, first and foremost, a party needs to be included in a coalition to use their resources (e.g., money, seats) to influence the outcome that is at stake (e.g., the allocation of profits or influence on policy). Those excluded from a coalition may not share in the payoffs the coalition yields or may even be (negatively) affected by the decision without having any influence themselves (van Beest et al., 2003). Moreover, coalition members need to reach a consensus on how to allocate the payoffs generated by the coalition.

Which coalitions are formed and how payoffs are allocated is for a large part influenced by the resources coalition bargainers bring to the bargaining table. Often there is a minimum number of resources (a *decision point*) that needs to be held by a coalition in order to attain the coveted payoffs (Komorita, 1984). For example, in governmental coalition formation parties often have to form a majority coalition, meaning that political parties need to find coalition partners with whom they capture at least 51% of the total votes.

Intuitively, one might assume that having many resources is advantageous when trying to form a coalition. However, having many resources does not always equate to having more bargaining opportunities and, depending on whether or not this is the case, having more resources can either be a strength or a liability (Murnighan, 1978b; van Beest et al., 2004a). If having more resources leads to having more alternatives, this can lead to more bargaining power and a higher likelihood of being included in a coalition (Gamson, 1964; Murnighan, 1978b; Shapley & Shubick, 1954a). If, however, the number of resources parties hold do not dictate their alternatives, having more resources leads to a seemingly paradoxical phenomenon in which those with most resources are disproportionally excluded from coalitions, an observation dubbed the Strength-is-Weakness effect (Caplow, 1956; Chaney & Vinacke, 1960; Gamson, 1964; Kelley & Arrowood, 1960; Murnighan, 1978b; van Beest et al., 2011, 2004b; Vinacke, 1959; Vinacke & Arkoff, 1957).[16]

The Strength-is-Weakness effect shows that having many resources than others can have large consequences. Those who, based equity norms, expect to have

[16] We limit our scope to simple situations (as opposed to multi-valued situations, see Komorita, 1984) in which the number of resources does not influence the size of the payoffs of a coalitions.

more influence may end up having no influence at all. In governmental coalition formation, it might mean that the largest parties actually turn out to have little to no influence on policy. This idea is supported by studies of Western European parliamentary democracies, showing that parties with a higher seat share—but without a first mover advantage—are less likely to be included in governmental coalitions than parties with fewer seats (Bäck & Dumont, 2008; Warwick, 1996).

Better insight into the mechanisms behind the Strength-is-Weakness effect might help to explain why it occurs or perhaps even what people can do to prevent it. Although previous research has uncovered several factors that moderate the extent to which a Strength-is-Weakness effect occurs (e.g., Messe, Vallacher, & Phillips, 1974; van Beest et al., 2004b), to our knowledge no research has directly investigated the underlying mechanisms behind the Strength-is-Weakness effect. The presented research is a first step in uncovering the underlying causes of the Strength-is-Weakness effect by pitting two possible reasons for the effect against each other: a passive adoption of focal self-serving allocation rules or an active choice of these allocation rules in an attempt to maximize payoffs. To be able to better explain these two accounts, we will first describe the experimental situations in which the Strength-is-Weakness effect has typically been studied.

Prior findings on the Strength-is-Weakness effect

Coalition bargaining and outcomes—such as the Strength-is-Weakness effect—are often studied using coalition games such as modified pachisi games (Vinacke & Arkoff, 1957), political convention games (Gamson, 1961b), and landowner games (van Beest et al., 2003). Although differing in context, these games share the same structure. Multiple bargainers individually do not have enough resources to attain an outcome alone hence, a subset of bargainers need to form a coalition to attain the payoffs together.[17] To do so, bargainers need to negotiate on how they will distribute the payoffs among the members of the coalition.

A typical game in which the Strength-is-Weakness effect has been studied is the 4(3-2-2) game. In this game, three bargainers—A with 3 resources, B with 2 resources, and C with 2 resources—attempt to form a coalition with at least 4 combined resources by bargaining about the distribution of 100 points or dollars. Despite the structural equivalence of all three bargaining positions, bargainers with more resources—henceforth referred to as strong bargainers—are less often included than weak bargainers—those with fewer resources (Chaney & Vinacke, 1960; Gamson, 1964; Kelley & Arrowood, 1960; Murnighan, 1978b; van Beest et al., 2011,

[17] In the modified pachisi game, the bargainer with most resources can attain the payoffs alone. In the classic demonstration of the Strength-is-Weakness effect, this, however, only happened in two out of 180 observations (Vinacke & Arkoff, 1957).

2004b; Vinacke, 1959; Vinacke & Arkoff, 1957).[18] In the classic demonstration of the Strength-is-Weakness effect, the strong bargainer A was included in only 28% of the cases, versus weak bargainer's inclusion rates of 86% and 84% (Vinacke & Arkoff, 1957).

What causes the Strength-is-Weakness effect?

A likely cause of the Strength-of-Weakness effect is provided by bargaining theory (Komorita & Chertkoff, 1973). This theory postulates that coalition bargainers strive to maximize their payoffs by applying self-serving allocation rules when bargaining for their share of the payoffs. For strong bargainers this is the equity norm, in which all coalition members get a share of the payoffs that is proportional to their resources. For weak bargainers this is the equal allocation rule, in which every coalition member gets an equal share of the payoffs. Although both rooted in conceptions of fairness, these rules are used self-servingly; one that provides higher payoffs is preferred over one that provides lower payoffs. In the 4(3-2-2) game with divisible payoffs of $100 this means that strong bargainers with 3 resources, having 60% of the resources in a coalition with one weak bargainer with 2 resources, use a 60-40 allocation (i.e., $60 for themselves, $40 for the other) as a reference point, whereas weak bargainers use a 50-50 split as a reference point, regardless of the coalition they attempt to form. Even though bargaining theory does not claim that every bargainer strictly applies these rules, these differences in reference points are assumed to steer offers closer to proportionality for strong bargainers and closer to equality for weak bargainers. In situations in which more resources convey neither a power difference nor an increase in the coalition's payoff, it is clear that weak bargainers would rather form a small coalition and obtain an equal share of the payoff than forming a larger coalition in which the other coalition member demands a larger share.

Although bargaining theory predicts that, over multiple negotiations, strong bargainers' offers are increased in an attempt to attract weak bargainers (Komorita & Chertkoff, 1973), the theory is silent on why—when having more resources does not equal having more bargaining opportunities—strong bargainers do not make equal offers to begin with. The current research pits two possibilities against each other.

The first possibility is that bargainers attempt to make an offer that is deemed fair by the other bargainer but *passively* adopt the allocation rule that is most salient to them. Strong bargainers thus might myopically focus on equity and simply fail to consider different allocation rules. Strong bargainers could thus fail to realize that their proportional offers are perceived as unfair and would change their behavior if the situation would enable them to look beyond the focal allocation rule provided by

[18] Remember that the terms strong and weak refer to the amount of bargainers hold, not to their bargaining power. In all our studies, the pivotal power (see Shapley & Shubick, 1954b) bargainers hold is equal.

their bargaining position. This idea is consistent with literature on egocentric interpretations of fairness, which suggest that—due to biased information processing—individuals often adopt notions of fairness that benefit themselves (Babcock & Loewenstein, 1997; DeScioli, Massenkoff, Shaw, Petersen, & Kurzban, 2014; Loewenstein, Issacharoff, Camerer, & Babcock, 1993; Loewenstein & Moore, 2004; Messick & Sentis, 1979).

A second possibility is that strong bargainers do take multiple allocation rules into account, but that they *actively* select an allocation rule that would maximize their payoff if their offer would be accepted. This active selection of allocation rules is implied by Komorita and Chertkoff (1973) in their formulation of bargaining theory. They state that the extent to which bargainers use or deviate from their self-serving allocation rule should vary in response to less or more pressure to reach an agreement. In other words, coalition bargainers actively change their allocation rules depending on how profitable they think the making that offer will be. Extrapolating this notion to situations in which we find a Strength-is-Weakness effect, it could be that strong bargainers in coalition formation do not passively adopt the most salient allocation rule they are myopically focused on, but actively select proportionality over equality, hoping that it will be accepted by their lower-resource counterparts and subsequently increase their payoffs. If this is the case, they might simply overestimate the likelihood that weak bargainers will accept their offer.

Following this line of reasoning, introducing an intervention that minimizes the opportunity for a passive adoption of a salient equity norm addresses the question why strong bargainers' make self-serving offers that supposedly lead to the Strength-is-Weakness effect. If strong bargainers start from either a position in which *no* specific allocation rule is particularly salient, or a situation in which *another* allocation rule (i.e., equality) is more salient, but still make lower offers than weak bargainers, this provides evidence for the idea that strong bargainers are aware of multiple allocation rules and actively select the equity norm in an attempt to maximize their payoffs. However, if in these situations, strong bargainers temper their demands to match those of weak bargainers, this provides evidence for the idea that, usually, strong bargainers passively adopt the salient equity norm, but change their behavior once this passive adoption is made difficult.

Overview of studies

The presented studies minimize the opportunity of a passive adoption of equity deviating from previous research in which participants are assigned to a bargaining position. In Studies 3.1 and 3.4 we did this by not assigning participants at all so that they could read and process the instructions from a viewpoint that was unbiased by a salient allocation rule, after which participants selected their bargaining position themselves. A similar intervention used by Loewenstein, Issacharoff,

Camerer, & Babcock (1993) has been shown to decrease biased information processing and subsequent self-defeating bargaining behavior. In their simulated settlement of a tort case, participants who were assigned a role of plaintiff or defendant after reading the case files showed less biased information retrieval, a less biased estimate of what a judge would award, and less bargaining impasse, than participants who read the case file whilst knowing their role in the upcoming negotiation. In Study 3.2 we took this intervention even further by assigning participants to either a strong or weak position—to make a different allocation rule salient—and allowing them to switch to another bargaining position.

If the use of self-serving allocation rules is usually driven by passive adoption of the equity norm, we expected that strong bargainers who first viewed the bargaining situation from a neutral or alternative perspective should make fewer self-serving offers to match those of weak bargainers. After all, they have initially had either no salient or an alternative salient allocation rule. In contrast, if participants who select or switch to the strong position ask for a more proportional share, claiming a larger share than weak bargainers, this would imply that strong bargainers are aware of multiple allocation rules, but actively apply the one they think benefits them.

Furthermore, the current setup also allows us to gauge participants' preferences for specific bargaining positions. From previous research we know that those in strong positions are often worse off than those in weak positions are. However, to our knowledge, no previous research has investigated which bargaining positions individuals prefer and are thus likely to self-select into advantageous or disadvantageous bargaining positions. Moreover, if the majority of participants would self-select into strong positions, we would interpret this as additional evidence for the active selection account: participants would not only select a self-serving allocation rule but also select a bargaining position that allows them to maximize the outcome of this allocation rule.

Additionally, the current research more directly investigates the assumption that self-serving offers from strong bargainers are a mechanism driving the Strength-is-Weakness effect. Although bargaining theory (Komorita & Chertkoff, 1973) suggests that the smallest coalition is most often formed because weak bargainers rather split the payoffs equally than to accept a proportional offer from strong bargainers, this assumption has not been directly tested. Therefore, in Study 3.3 we investigate whether strong bargainers are indeed predominantly excluded from coalitions because they make proportional offers or whether they are excluded regardless of whether their offers are self-serving or egalitarian.

Finally, in Study 3.4, we tested the entire process in an interactive, incentivized coalition game. This allowed us to measure the aspects tested in Study 3.1 to 3.3 (i.e., preference for position, use of allocation rules, and subsequent inclusion

in—or exclusion from—coalitions) in a single study in which coalition bargaining has actual monetary consequences.

In all our studies, we report how we determined our sample size, all manipulations and all dependent variables. A data package including (meta) data, analysis scripts, stimulus materials, and preregistrations is available here: https://doi.org/10.34894/7F3ZNY Preregistration of Study 3.2 can be found here: http://aspredicted.org/blind.php?x=te4qh9.

Study 3.1

Study 3.1 was the initial test of our research question whether strong bargainers passively adopt the equity norm or actively select it. We presented participants with a hypothetical 4(3-2-2) coalition bargaining scenario in which three bargainers—one strong bargainer with 3 resources and two weak bargainers with each 2 resources—bargained for inclusion in a two-party coalition and the subsequent allocation of €100. In order to provide an unbiased viewpoint from which information about the bargaining setting could be processed, similar to Loewenstein et al. (1993), participants attained a bargaining position only after they had read all instructions. They then selected one of the three bargaining positions and made a first offer one of their counterparts.

If the Strength-is-Weakness effect is mainly driven by a passive adoption of the equity norm, starting from a neutral position—opposed to starting from an assigned position—should reduce proportional first offers. Consequently, there should be no difference in allocations between self-selected strong and weak bargainers. If, conversely, the Strength-is-Weakness effect is caused by an active selection of the equity norm, as in prior research, strong bargainers should allocate more to themselves than weak bargainers.

Moreover, we reasoned that the selection of bargaining positions would provide additional insight. If the majority of participants would select the strong position—and make lower offers to other bargainers than weak bargainers do—this suggests that individuals actively select this position because it rationalizes allocating more to themselves.

Method

Participants and design. For this study, 204 Dutch psychology undergraduate students (M_{age} = 19.43 years, age range 17-26, 161 females, 43 males) were recruited in our laboratory. The study was embedded in an hour-long session for which participants received course credit. Using maximum lab time allowed per session, we collected data for two weeks. Sensitivity analyses conducted with G*Power (Faul et al., 2007) revealed that this sample size allowed us to detect a small

to medium effect size (w = 0.22) when testing for a preference for bargaining positions, a small to medium effect size (d = 0.38) when testing for differences in allocations, and a medium to large effect size (w = 0.36) when testing for weak bargainers' preferences for small or large coalitions—all with 80% power.

Materials and procedure.

Game structure. Participants read a scenario in which we asked them to imagine that they were one of three individuals—A with 3 votes, B with 2 votes, or C with 2 votes[19]—about to negotiate how to allocate €100. They also read that *any coalition of two bargainers* could secure the payoffs of €100 and that payoffs could only be allocated between members of the coalition. Next, they read that bargaining is done by sending offers to another bargainer regarding the allocation of the €100. If all opening offers were rejected, no coalition would be formed and a new bargaining round would start by making new offers.

Comprehension check. Next, participants completed a multiple choice quiz (correct answers in *italics*) asking 1) which coalitions could be formed (*AB, AC, and BC* / AB, AC, BC, and ABC), 2) the minimum number of votes necessary to secure and allocate the sum of money (2 votes or more / 3 votes or more / *4 votes or more*), and 3) the amount of money to be allocated (€40 / €50 / *€100*). Participants received feedback on whether they had answered all questions correctly or whether they had made at least one mistake and, in both situations, received the correct answers.

Choice of bargaining position. Next, participants selected the bargaining position they wanted occupy. To ensure participants had an overview of the situation, they saw a table containing everyone's number of votes, possible coalition partners, and possible coalitions.

Opening offer. Finally, participants indicated: 1) to which other bargainer they wanted to make an opening offer, and 2) their proposed allocation (out of the €100, how much did they propose to keep for themselves and what to give to the other bargainer).

Results

Comprehension check. Nine out of 204 participants gave at least one wrong answer. Having made errors was unrelated to choice of bargaining position, $\chi^2(2, N = 204) = 2.30$, $p = .32$, $w = 0.11$, nor did statistical interpretation of all subsequent analyses differ when excluding those who had made errors. For the sake of completeness, analyses were conducted on the full sample.

Choice of bargaining position. A total of 144 (70.5%) participants preferred position A, the strong position with 3 votes, 26 (12.7%) preferred position B, and 34

[19] In the instructions, these positions were referred to as position M, K, and P. For simplicity, the letters A, B, and C will be used throughout this chapter.

(16.7%) preferred position C; the weak positions with 2 votes each. A Chi-square goodness of fit test shows that these proportions differed significantly from 0.33, the expected proportion when participants would be indifferent to each position and would have chosen one randomly, $\chi^2(2, N = 204) = 127.88$, $p < .001$, $w = 0.79$. See Table 3.1 for chosen positions, coalition partners selected to make the first offer to, and the proposed allocations.

Table 3.1.

Chosen positions, proposed coalitions and average proposed allocations in Study 3.1.

			Proposed			Mean proposed allocation			
Position	*n*	%	Coalition	*n*	%	M_A	M_B	M_C	*SD*
A (3 votes)	144	70.6%	AB	67	46.5%	59.34	40.66	-	10.32
			AC	77	53.5%	57.27	-	42.73	8.05
B (2 votes)	26	12.7%	AB	0	0%	-	-	-	-
			BC	26	100%	-	50.00	50.00	4.90
C (2 votes)	34	16.7%	AC	4	11.8%	49.00	-	51.00	6.38
			BC	30	88.2%	-	48.83	51.17	5.68

Allocation of payoffs. Strong bargainers ($M = 58.24$, $SD = 9.20$) allocated more money to themselves than weak bargainers did ($M = 50.65$, $SD = 5.33$), $t(181.26) = 7.36$, $p < .001$, $d = 1.13$. Moreover, we can visually compare the distributions of allocations by strong and weak bargainers by looking at the width of the violin plots in Figure 3.1 (the width indicates the probability density of the distribution, i.e. the predicted distribution in the population). As can be seen, weak bargainer's allocations are relatively straightforward: they display a preference for the 50-50 allocation. Strong bargainers showed more variation in their offer. Two common strategies stand out a preference for 1) 50-50 and 2) 60-40 offers.

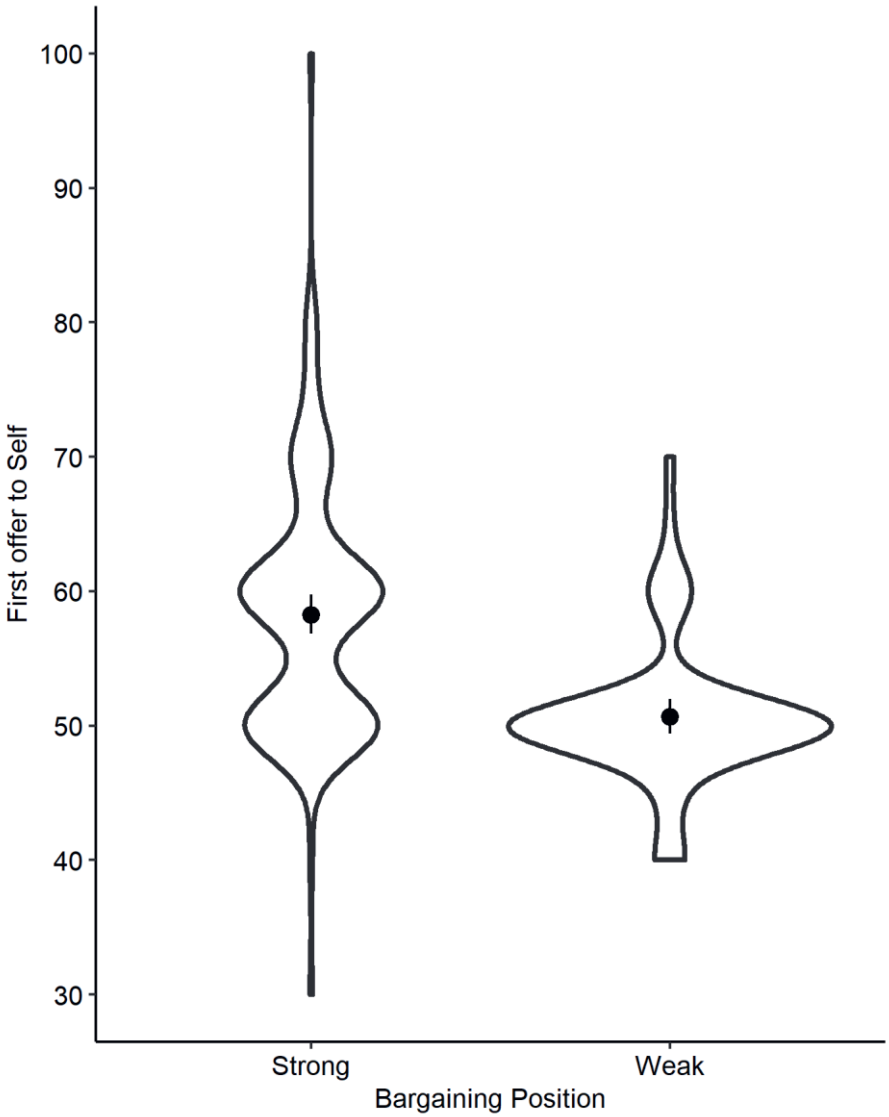

Figure 3.1. Violin plot of allocation to self by different bargaining positions in Study 3.1 with means (dot), CI^{95} (line), and probability density (width).

Choice of bargaining partner. A large majority of the weak bargainers made an offer to the other weak bargainer: 56 out of 60 weak bargainers made an offer to the other weak bargainer, $\chi^2(1, N = 60) = 45.07$, $p < .001$, $w = 0.87$.

Discussion

The results of Study 3.1 suggest that the Strength-is-Weakness effect is driven by active selection of the equity norm rather than a passive adoption of the most salient allocation rule. Despite starting from a neutral position—which minimized the salience of particular allocation rules—strong bargainers allocated more money to themselves than weak bargainers did. More support for this active selection account comes from the finding that the strong position is preferred over weak positions. Individuals seem to choose a bargaining position strategically because they think it will somehow benefit them.

Additionally, the results from Study 3.1 suggest an additional pathway to the Strength-is-Weakness effect. The vast majority of weak bargainers make their first offer to the other weak bargainer. This suggests that, aside from strong bargainers who might be excluded due to their unattractive offers, some of them might be excluded from the outset due to the initial attraction between weak bargainers.

Finally, an interesting finding is that, even though strong bargainers allocated more to themselves on average, a substantial number made an equal rather than a proportional offer. We will address this finding in Study 3.3.

Study 3.2

In Study 3.2, we tested the robustness of our findings. Instead of placing participants in a neutral position, as we did in Study 3.1, we assigned participants to a strong or weak position, but then allowed them to switch to a different position prior to making their opening offer. This eliminated an alternative explanation for our findings from Study 3.1. Although participants in Study 3.1 had a neutral position before choosing a bargaining position, a possibility is that those who coveted the strong positon immediately imagined themselves in that position. Consequently, those choosing a strong position might have already passively adopted the equity norm from their imagined bargaining position. In Study 3.2, we eliminated this possibility by assigning participants to the weak position. Following the assumptions of bargaining theory (Komorita & Chertkoff, 1973), participants assigned to a weak position should be more likely to adopt an equal allocation rule as a reference point for subsequent bargaining.

Our intervention in Study 3.2 thus provided a stricter test of our research question. If participants initially assigned to a weak position would choose to switch to a strong position and make a proportional offer—despite the initial salience of the equal allocation rule the weak position elicited—this would be additional support for the idea that strong bargainers' self-serving offers are actively selected in an attempt to maximize payoffs. If, on the other hand, strong bargainers' self-serving offers are usually due to a passive adoption of a salient allocation rule, we would expect that the

initially weak bargainers who decide to switch positions would use equality rather than equity, as initially equality would be the salient allocation rule.

Finally, as in Study 3.1, we interpreted switching from a weak to a strong position as indicative of the active selection account. If those assigned to a weak position switch to a strong position more often than those from a strong position switch to a weak position—and make lower offers than those who remain in the weak position—this suggests that they switch to this position because it rationalizes more demanding first offers.

Method

Participants and design. For this study, 452 US based respondents (M_{age} = 34.8 years, age range 18-69, 183 females, 266 males, 3 other) were recruited via Amazon Mechanical Turk in exchange for $1. Based on a pilot study (see Appendix A) we expected that only a few participants would switch from a strong to a weak position. Hence, we determined our sample size so that there would be enough participants in the remaining three cells (Switch to Strong, Stay Weak, and Stay Strong) to detect a d = 0.4 between conditions using Tukey HSD. According to Brooks & Johanson (2011), this required cell sizes of n = 127. Based on the pilot study we expected that about 50% of participants who were assigned to a weak position would switch to a strong position. To account for fluctuations in switching behavior and participant dropout, we set up Qualtrics to assign 2/3 of participants to a weak position (2 votes) and 1/3 to a strong position (3 votes).

Materials and procedure.

Game structure and assigned position. As in Study 3.1, participants imagined that they were one of three individuals—A with 3 votes, B with 2 votes, or C with 2 votes[20]—about to negotiate how to allocate $100. In the *Weak Assigned* condition (n = 307), individuals learned that they were C and had 2 votes. In the *Strong Assigned* condition (n = 145) individuals learned that they were A and had 3 votes. They received the same instructions relating to the game's structure as in Study 3.1. Next, participants saw a table displaying each individual's amount of votes, their possible coalition partners, and their possible coalitions. To prompt participants to reflect on the bargaining situation from the perspective of the assigned position, they could only continue to the following screen after 30 seconds.

Comprehension check. Individuals answered the same questions as in Study 3.1, as well as two additional questions asking how many votes they had themselves (2 / 3 / 4) and how many votes the other two individuals had (both hold 2 votes / one

[20] In the stimulus materials, we referred to positions M, K, and P, instead of A, B, and C. For standardization, in Study 2, participants were always assigned to position M. In the Weak Assigned condition, M had 2 votes, K had 2 votes and P had 3 votes. In the Strong Assigned condition, M had 3 votes and K and P both 2 votes.

holds 2 and one holds 3 votes / both hold 3 votes). Again, after completion, participants received feedback and the correct answers.

Choice of bargaining position. Next, participants chose either to retain their assigned position or to switch to one of the other two positions. Whilst making this decision, participants saw the same table as before the quiz.

Opening offer. Finally, participants indicated: 1) to which other bargainer they wanted to make an opening offer, and 2) their proposed allocation of the €100.

Results

Switching. A total of 158 of 307 (51%) initially weak participants switched to a strong position, versus 16 of 145 (11%) initially strong participants who switched to a weak position. A Chi-square test of independence shows that this difference is statistically significant, $\chi^2(1, N = 452) = 68.00$, $p < .001$, $w = 0.39$. This, again, shows a clear preference for strong over weak positions. Because of the low number of participants switching from a strong to a weak position, the remaining analyses were conducted on the remaining three conditions: Stay Weak ($n = 149$),[21] Switch to Strong ($n = 158$), and Stay Strong ($n = 129$). See Table 3.2 for chosen positions, preferred coalition partners, and proposed allocations.

[21] The Stay Weak condition includes 11 participants who were assigned to a low-resource position (position C) but switched to another low-resource position (position B). Note that excluding these participants would not have changed the interpretations of the reported results. Anecdotally, an explanation given by a participant when given the option to provide a remark seems to suggest that switches were made out of aesthetic reasons: the participant wanted to stay in a weak position but changed to a position that was labeled with the first letter of their name.

Table 3.2.

Chosen positions, proposed coalitions and proposed allocations in Study 3.2, split by assigned position.

Assigned Position	Final Position	*n*	%	Proposed Coalition	*n*	%	Mean proposed allocation M_A	M_B	M_C	*SD*
Strong	A	129	89%	AB	67	52%	52.91	47.09	-	11.71
(*n* = 145)	(3 votes)			AC	62	48%	53.63	-	46.37	11.29
	B	8	5.5%	AB	4	50%	45.25	54.75	-	10.18
	(2 votes)			BC	4	50%	-	41.25	58.75	11.81
	C	8	5.5%	AC	4	50%	59.40	-	40.50	19.00
	(2 votes)			BC	4	50%	-	53.75	46.25	4.79
Weak	A	158	51%	AB	69	44%	54.09	45.91	-	11.27
(*n* = 307)	(3 votes)			AC	89	56%	57.37	-	42.63	13.36
	B	11	4%	AB	6	55%	45.00	55.00	-	13.78
	(2 votes)			BC	5	45%	-	54.00	46.00	5.48
	C	138	45%	AC	38	28%	51.05	-	48.95	8.55
	(2 votes)			BC	100	72%	-	51.73	48.27	5.75

Comprehension check. Out of 436 participants, 101 gave at least one wrong answer. Although this looks like a high number, only 9.6% made more than one error and all participants received feedback on what the correct answers were. Having made errors was unrelated to being in one of the three remaining conditions, $\chi^2(2, N = 436) = 3.25$, $p = .20$, $w = 0.09$, nor did statistical interpretation of all subsequent analyses differ when excluding those who had made errors. For the sake of completeness, analyses were conducted on the full sample

Allocation of payoffs. A one-way ANOVA comparing mean proposed allocations to oneself between the three conditions revealed a main effect of condition, $F(2,433) = 16.95$, $p < .001$, $\eta^2_p = .07$. Tukey HSD tests showed that those who switched from a weak to a strong position ($M = 55.94$, $SD = 12.56$) allocated more to themselves than those who stayed in a weak position ($M = 48.91$, $SD = 7.09$), $p < .001$, $d = 0.68$, and also allocated more to themselves than those who stayed strong ($M = 53.26$, $SD = 11.47$), albeit non-significantly, $p = .09$, $d = 0.22$. Finally, those who stayed strong allocated more to themselves than those who stayed weak, $p = .002$, $d = 0.46$.See Figure 3.2 for a violin plot showing the means, confidence intervals and distributions of allocation to oneself in each of the three conditions.

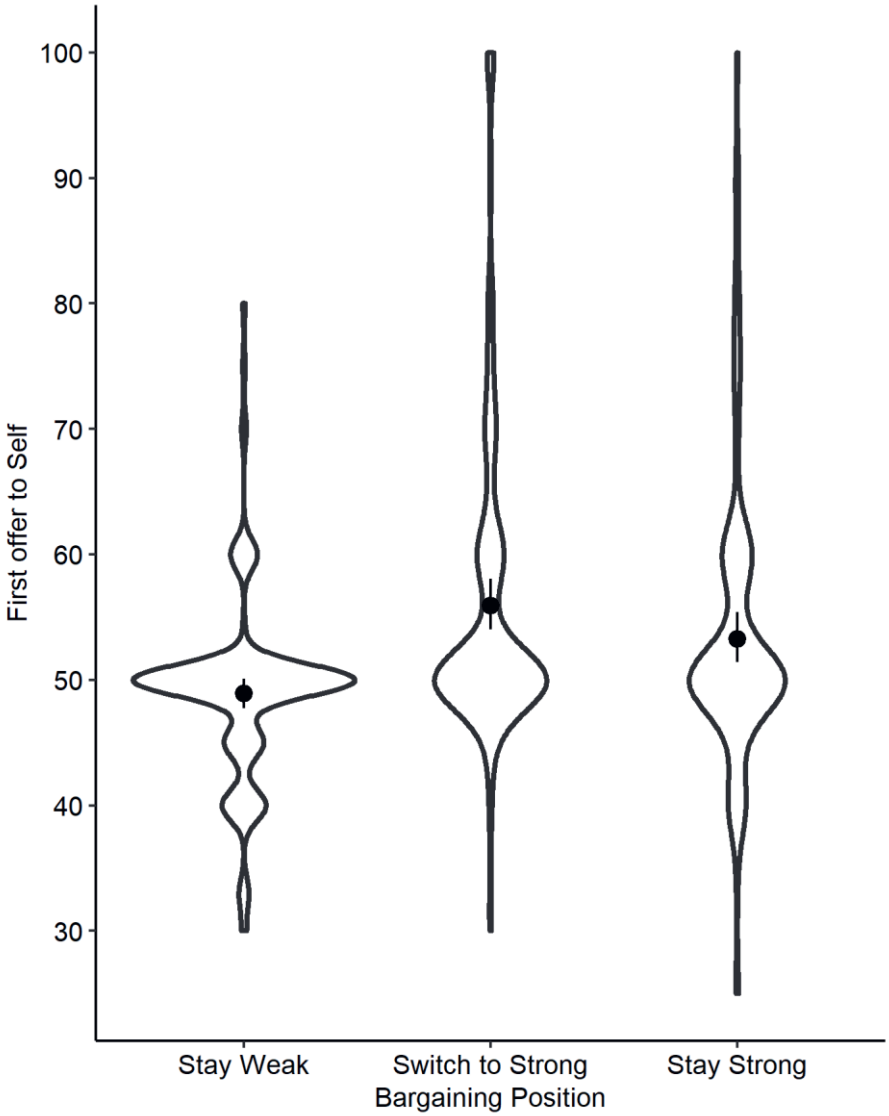

Figure 3.2. Violin plot of allocation to self by three cells in Study 3.2 with means (dot), CI^{95} (line), and probability density (width).

Choice of bargaining partner. Similar to Study 3.1, the majority of those switching to a weak position made an offer to the other weak bargainer: specifically, 105 out of 149 weak bargainers made an offer to the other weak bargainer, $\chi^2(1, N = 149) = 24.97$, $p < .001$, $w = 0.41$.

Discussion

Study 3.2 provided additional support for the idea that proportional offers made by strong bargainers are due to selfish selection of the equity norm rather than a failed attempt to make a fair offer by passively adopting the equity norm. First, those switching from a weak to a strong position asked for a higher share of the payoffs than those staying in a weak position. Even though the equal allocation rule should initially be equally salient in both abovementioned groups, this salience did not impede the now strong bargainers to ask for a higher share of the payoffs than those staying in the weak position. This implies that the strong bargainers' tendency to propose self-serving offers is unlikely to be caused by a passive selection of equity, but more likely a selfish selection of the seemingly most beneficial allocation rule.

Second, about half of the initially weak bargainers switched to a strong position, substantially more than the 11% of strong bargainers who switched to a weak position. This strengthens the notion of an active selection account, in which individuals seem drawn to positions from which they can rationalize a large claim on the payoffs of the coalition.

Study 3.3

In Study 3.3, we investigated our assumption that the Strength-is-Weakness effect mainly exists due to strong bargainers' use of equity and weak bargainers' rejection of these offers. In Study 3.1 and 3.2 we found that strong bargainers make more equal offers than expected on the basis of bargaining theory (Komorita & Chertkoff, 1973). In Study 3.1, 35% of strong bargainers made equal offers. In Study 3.2, 52% of participants who stayed strong and 59% of those who switched to a strong position made an equal offer. In Study 3.3, we investigated if strong bargainers are included more often when they make equal offers rather than the proportional offers. Is 'strength' only a weakness when one behaves as a dominant coalition partner (i.e., makes a proportional offer), or is 'strength' even a weakness when one behaves as an attractive coalition partner (i.e., makes an equal offer)? As weak bargainers and strong bargainers both compete for inclusion in a coalition—and weak bargainers often propose an equal allocation—the critical test is as follows: if both strong and weak bargainers use an equal allocation rule, which offer is most likely to be accepted?

On the one hand, there is reason to believe that the offer from the weak bargainer will be accepted more often. Previous literature shows that individuals are more positive and cooperative towards similar others, even when this similarity is superficial (Tajfel & Turner, 1979). As the two weak bargainers are more similar to each other than to the strong bargainer, this might make the weak bargainers more likely to form a coalition. On the other hand, it is possible that the strong bargainer's offer will be preferred. The observed avoidance of strong bargainers by weak bargainers suggests that they are expected make less attractive offers than weak

bargainers. If, counter to this expectation, strong bargainers ask much less than expected, this could signal generosity. This resonates with attribution theory (Jones & Davis, 1965); actions seemingly made out of a selection of several options and that seem *out-of-role* (e.g., an egalitarian offer from a strong bargainer) are seen as more reflective of individuals' dispositions than actions that seem to be less freely chosen and more *in-role* (e.g., an egalitarian offer from a weak bargainer).

In Study 3.3, we assigned individuals to a position with 2 votes in the same coalition scenario used in Studies 1 and 2. In the *Strong Equal Offer* condition participants learned that both the strong (with 3 votes) and weak (with 2 votes) bargainer proposed to keep \$50 and give \$50 to the participant. In the *Strong Proportional Offer* condition participants learned that the strong bargainer proposed to keep \$60 and give \$40 to the other participant, and that the other weak bargainer offered an equal split. Participants then indicated which offer they would accept, enabling us to use the acceptance rates of offers as an indicator of which offers by which bargainers are most successful in the formation of coalitions.

Method

Participants and design. For this study, 402 US based respondents (M_{age} = 35.13 years, age range 19-70, 173 females, 228 males, 1 other) were recruited via Amazon Mechanical Turk in exchange for \$0.60. Participants were randomly assigned to one of two conditions: the *Strong Equal Offer* condition, in which both bargaining partners made the same (equal) offer, and the *Strong Proportional Offer* condition, in which the strong bargaining partner made a proportional offer and the weak bargaining partner made an equal offer. According to a power analysis conducted in G*Power (Faul et al., 2007) we needed 200 participants to detect of a small to medium effect (w = 0.2) with 80% power in the Strong Equal Offer condition. To create equal cell sizes we aimed for a total of 400 participants.

Materials and procedure. Participants imagined being C, a bargainer with 2 votes, negotiating how to allocate \$100 with A (3 votes) and B (2 votes). In both conditions, participants received offers from bargainers A and B. In the *Strong Equal Offer* condition (n = 200), both bargaining partners made them a 50-50 offer. In the *Strong Proportional Offer* condition (n = 202), the weak bargainer made them a 50-50 offer and the strong bargainer made them a 60-40 offer. Participants then selected the offer they wanted to accept. Finally, to explore whether perceived generosity or similarity indeed steered participants' choices, we asked them to explain their choice in one or two sentences.

Results

Selected offer. A chi-square test of independence indicated that there was a statistically significant difference in selected offers between conditions, $\chi^2(1, N = 402) = 120.79$, $p < .001$, $w = 0.55$. When the strong bargainer made a 60-40 offer, a large majority selected the weak bargainer's offer: only 13.5% accepted the strong bargainer's offer. Conversely, when both strong and weak bargainers made a 50-50 offer, this preference flipped: 67.3% now accepted the strong bargainers' offer.

Reasons for selected offer. The reasons participants gave for selecting the offer were coded by the first author. Of interest to us was whether choices in the *Strong Equal Offer* condition were guided by perceived generosity or similarity. Results showed that 5 (3.6%) participants accepted the strong bargainer's offer because they perceived it to be generous. Of those choosing the weak bargainer's offer, 14 (21.2%) indicated choosing it due to the perceived similarity between the other weak bargainer and themselves. The largest response category, however, was that participants accepted the strong bargainer's offer because they had more votes (50.7%).

Discussion

First, it becomes clear from Study 3.3 that having many resources and making proportional demands clearly yields worse outcomes than having fewer resources and proposing an equal split: 50-50 offers from weak bargainers were accepted much more often than 60-40 offers from a strong bargainer. This supports the idea that when strong bargainers make proportional offers, this leads to a Strength-is-Weakness effect.

Second, a comparison between the acceptance rates of strong and weak bargainers who both propose an equal split reveals that strong bargainers who make this offer actually become more attractive than the weak bargainers making the same offer; 50-50 offers from a strong bargainer were twice as likely to be accepted than weak bargainers' 50-50 offers. The reasons given by participants why they accepted this offer did not provide a clear-cut reason for this attraction. Nevertheless, we speculate that strong bargainers are generally avoided because they are expected to use the equity norm. When, counter to these expectations, strong bargainers make more egalitarian offers, this general avoidance seems not only to dissipate but replaced by a preference for the strong bargainer. This resonates with attribution theory, which postulates that out-of-role behavior is seen as more reflective of one's disposition than in-role behavior (Jones & Davis, 1965). It is thus possible that the unexpected strong bargainers' egalitarian offers are perceived as reflective of their generous nature, whereas the expected egalitarian offers from weak bargainers are simply attributated to them following a salient allocation rule. Moreover, given that

the answers to our open question reveal that individuals to a certain extent seem to value a larger coalition, it could be that they actually prefer the idea of a larger coalition, but only when this coalition yields a payoff similar to what a weak bargainer would offer.

Study 3.4

In Studies 3.1 to 3.3 we found that a) individuals preferred strong positions, b) strong bargainers often made less attractive offers than weak bargainers—even when no allocation rule was especially salient or equality was more salient, in line with the idea that proportionality is actively selected and not passively adopted—and c) these offers were often rejected. In Study 3.4, we conducted an incentivized, interactive experiment programmed in oTree (Chen et al., 2016, see also Chapter 5 of this dissertation) to test the entire process. Participants were matched in groups of three bargainers, one participant chose a bargaining position out of one strong position (3 resources) and two weak positions (2 resources), the other two were assigned the two remaining positions, and the three participants bargained for a real monetary bonus. This allowed us to test whether—when there are actual stakes—participants starting from a neutral position still use the strong position to make a proportional offer (or at least a less attractive offer than the weak bargainer), which subsequently leads to their exclusion.

Method

Participants and design. For this study, 150 US based respondents (M_{age} = 34.97, age range 21-99, 59 females, 90 males, 1 other) were recruited via Amazon Mechanical Turk in exchange for a base fee of $2.40. Participants were randomly matched into triads and one participant was randomly selected to select a strong (3 resources) or weak (2 resources) position, the other two participants were randomly assigned to the remaining two positions. According to power analysis conducted in G*Power (Faul et al., 2007), we needed 40 observations to find the d = 1.01 we found in Study 3.1—assuming a similar distribution of selected positions—for the allocation to self between strong and weak bargainers. To account for fluctuations we decided to sample 50 triads meaning 50 participants who have selected a position and made an offer from this self-selected position.

Materials and procedure.

Game structure. In Study 3.4, participants participated in an interactive landowner game (van Beest et al., 2003) programmed in oTree (Chen et al., 2016). Structurally, this game was similar to the hypothetical settings from Studies 3.1 to 3.3. The difference is that participants take the role of a landowner who has a parcel of either 3 (landowner A) or 2 acres (landowner B and C) of land. A project developer

wants to buy a minimum of 4 acres of land for $100,000 and landowners need to form a coalition to sell their parcels of land together. For each $1,000 obtained in the game, participants received a real bonus of $0.05, meaning a $5 bonus was distributed among the coalition members.

Comprehension check. Participants completed a multiple choice quiz (correct answers in *italics*) about: 1) the price offered for at least 4 acres of land (*Always $100,000*/This depended on the parcel of land sold), 2) the payoffs for the excluded landowner (This depends on which offer is accepted/*This landowner does not receive any money*), and 3) the permitted coalitions (AB and AC/AB and BC/AC and BC/*AB, AC, and BC*). They could only continue after having given the correct answers.

Choice of bargaining position. Next, participants were randomly grouped into triads. In each triad, one participant selected one of the three positions: A (with 3 acres of land), B (with 2 acres of land), or C (with 2 acres of land). The other two participants were randomly assigned to the two remaining positions. Participants who could not be grouped within 5 minutes (n = 72) could not continue and received their base fee.

Bargaining. Participants bargained in one or multiple rounds, which existed of three phases. In phase I, every landowner made an offer to one of the other landowners on how to allocate the $100,000 between the two of them (in increments of $1,000). In phase II, all landowners saw all offers made by themselves and the other two landowners, and selected the offer they wanted to execute. In phase III, all landowners saw which offers were selected. If two landowners selected the same offer, the proposed coalition was formed and the $1,000 was allocated as agreed upon. If no offer were selected twice, a new round of bargaining would begin. This continued until a coalition was formed.

Results

Comprehension check. Out of 150 participants, 21 participants gave at least one wrong answer. Of the 50 participants who could select their position, 11 participants gave at least one wrong answer. Having made errors was unrelated to choice of bargaining position, $\chi^2(2, N = 50) = 1.54$, $p = .46$, $w = 0.18$, nor did statistical interpretation of all subsequent analyses differ when excluding those who had made errors. For the sake of completeness, analyses were conducted on the full sample.

Choice of bargaining position. Of the 50 participants who selected a bargaining position 26 (52%) selected position A (3 acres), 20 (40%) selected position B (2 acres), and 4 (8%) selected position C (2 acres). Although this was a significant departure from random selection, $\chi^2(2, N = 50) = 15.52$, $p < .001$, $w = 0.56$, this significant difference disappeared after combining positions B and C, which are equivalent positions in terms of acres, $\chi^2(1, N = 50) = 0.08$, $p = .78$, $w = 0.04$. Contrary to the previous studies, the strong position was thus not preferred above the weak

position. See Table 3.3 for chosen positions, chosen coalition partners, and proposed allocations.

Table 3.3.

Chosen positions, proposed coalitions and average proposed allocations in Study 3.4.

			Proposed			Mean proposed allocation			
Position	*n*	%	Coalition	*n*	%	M_A	M_B	M_C	*SD*
A (3 acres)	26	52%	AB	21	80.8%	56.33	43.67	-	6.59
			AC	5	19.2%	55.00	-	45.00	18.03
B (2 acres)	20	40%	AB	0	0%	-	-	-	-
			BC	20	100%	-	50.95	49.05	8.06
C (2 acres)	4	8%	AC	0	0%	-	-	-	-
			BC	4	100%	-	51.25	48.75	2.50

Allocation of payoffs. As in previous studies, we were interested in differences in first offers between weak and strong bargainers. Moreover, having both self-selected and assigned participants in this sample allowed us to make a comparison between the two groups. If self-selected strong bargainers made higher offers than assigned strong bargainers did, this would be evidence for the passive adoption of salient allocation rules account, as it would indicate an increase in attractive offers when such a passive adoption is impossible. On the other hand, similar offers between the two groups would be evidence for the idea that strong bargainers actively select a proportional allocation rule, as their offers would be equally self-serving when a proportional allocation is salient and when it is not.

A 2 (Position: Weak vs, Strong) by 2 (Means of attaining position: Assigned vs. Chosen) ANOVA revealed no significant interaction, $F(1,146) = 0.36$, $p = 0.55$, $\eta^2_p < .01$, nor a significant main effect of means of attaining position, $F(1,146) = 2.46$, $p = 0.12$, $d = 0.42$. Corroborating the previous studies, strong bargainers ($M = 54.54$, $SD = 8.93$) allocated more money to themselves in their first offers than weak bargainers ($M = 49.44$, $SD = 7.14$), $F(1,146) = 14.41$, $p < .001$, $d = 0.66$. As can be seen in Figure 3.3, again, weak bargainers seemed to mainly focus on an equal distribution, whereas many strong bargainers either made a proportional or equal first offer.

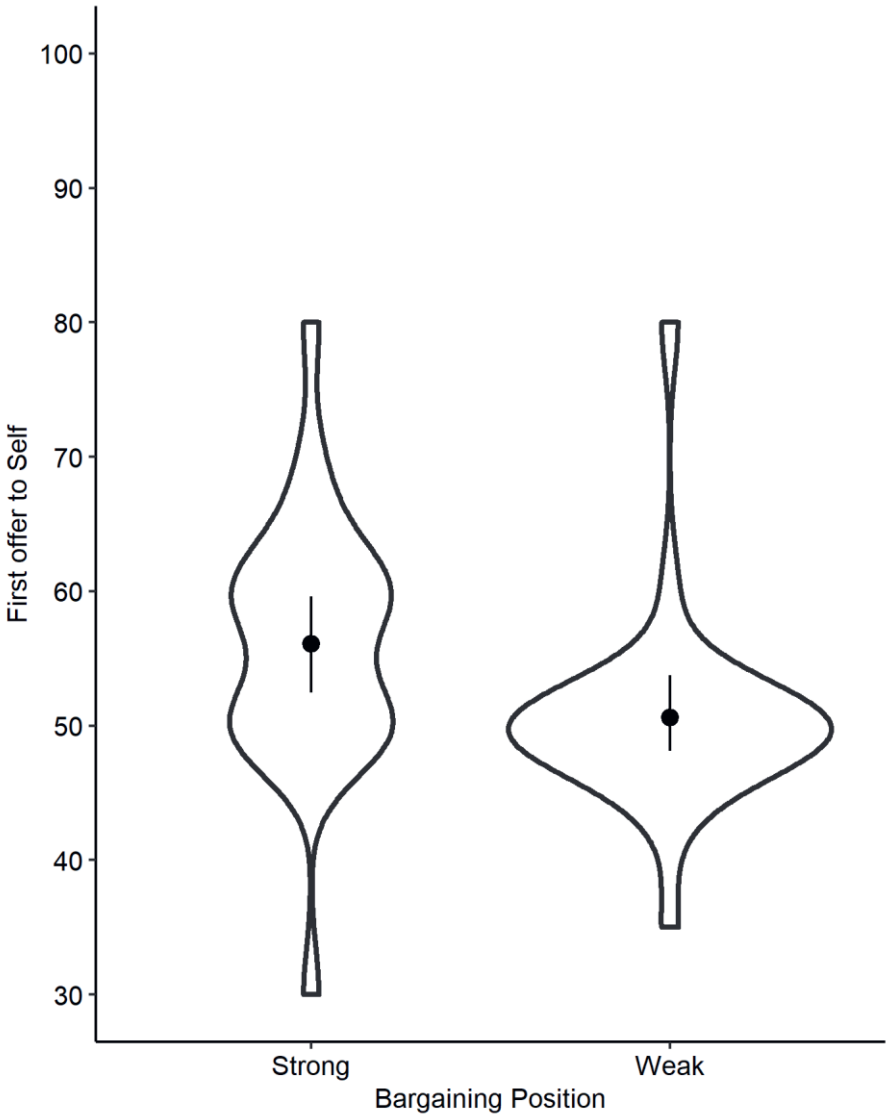

Figure 3.3. Violin plot of allocation to self by different bargaining positions in Study 3.4 with means (dot), CI^{95} (line), and probability density (width).

Choice of bargaining partner. Out of the 100 weak bargainers—both self-selected and assigned—87 made a first offer to the other weak bargainer, $\chi^2(1, N = 100) = 54.76$, $p < .001$, $w = 0.74$. This again points out that strong bargainers are disadvantaged from the outset.

Formed coalitions. Replicating the Strength-is-Weakness effect, a Chi-square goodness of fit test showed that BC-coalitions ($n = 34$; 68%) were formed more often

than AC-coalitions (n = 4; 8%), and AB-coalitions (n = 12; 24%), $\chi^2(2, N = 50) = 28.96$, $p < .001$, $w = 0.76$. To illustrate how these results support the Strength-is-Weakness effect: A was only included in 32% of all coalitions, whereas B and C were included in 92% and 76% respectively.

Payoff. Finally, the payoff between strong (M = 49.06, SD = 8.21) and weak (M = 50.18, SD = 5.51) coalition bargainers who were included in a coalition did not differ, $t(17.66) = 0.52$, $p = .61$, $d = 0.14$. In other words, in the limited cases that a strong bargainer did manage to be included, their 'strength' in resources did not lead to an increase in payoffs. See Table 3.4 for mean allocations per formed coalition.

Table 3.4.

Average payoffs in formed coalitions per coalition and position.

Formed			Mean proposed allocation			
Coalition	n	%	M_A	M_B	M_C	SD
AB	12	24%	50.42	49.58	-	6.20
AC	4	8%	45.00	-	55.00	12.10
AB	34	68%	-	48.82	51.18	4.62
BC	12	24%	50.42	49.58	-	6.20
AC	4	8%	45.00	-	55.00	12.10
BC	34	68%	-	48.82	51.18	4.62

Discussion

The results of Study 3.4 largely corroborated the results of Study 3.1 and 3.2. Strong bargainers again allocated more to themselves than weak bargainers, regardless of whether their position was chosen or assigned. Moreover, weak bargainers again more often approached weak bargainers than strong bargainers. Contrary to Study 3.1 and 3.2, strong and weak positions were preferred equally in Study 3.4. Many who chose the strong position, however, did not make an attractive offer to the weak bargainers. Together, this suggests that a substantial portion of our sample still actively selected a self-serving allocation rule, as self-selected strong bargainers made higher demands than weak bargainers—and similar demands to those assigned to a strong position—despite their neutral starting position without a single salient allocation rule.

Taken together, the results from Study 3.4 strengthen the idea that strong bargainers are excluded both due to expected and actual self-interested bargaining. First, strong bargainers made lower first offers than weak bargainers did. Second, 22 out of 50 strong bargainers made a first offer which was at least equally attractive as the offers made by weak bargainers, but only 16 strong bargainers ended up included. This suggests that some strong bargainers may be excluded due to self-defeating

offers, whereas others are already excluded despite their—more generous—offers. On the one hand, this seems at odds with the results from Study 3.3, which suggested that strong bargainers who make equal offers are more attractive than weak bargainers who make the same offers. However, of all 100 weak bargainers, only 13 made a first offer to the strong bargainer, suggesting that weak bargainers' initial attraction—presumably due to expected use of allocation rules—overrides this increased attraction.

General discussion

The Strength-is-Weakness effect in coalition formation is the observation that individuals who have most resources are often excluded (Caplow, 1956; Chaney & Vinacke, 1960; Gamson, 1964; Kelley & Arrowood, 1960; Murnighan, 1978b; van Beest et al., 2011, 2004a; Vinacke & Arkoff, 1957). The current studies have investigated a likely cause of this Strength-is-Weakness effect—the use of proportional allocation rules by strong bargainers—and the question *why* they use these allocation rules. In this chapter, we have proposed two possible reasons. A first possible reason is that bargainers passively adopt the allocation rule that is made most salient by their bargaining position, thereby overlooking allocation rules that are more likely to be accepted by their counterparts. A second possible reason is that strong bargainers do consider multiple allocation rules, but actively select an allocation rule that would maximize their payoffs if their offer were accepted.

Overall, the results from our studies support the second explanation. In Studies 3.1, 3.2, and 3.4, we found that strong bargainers allocated a larger share of the payoffs to themselves than weak bargainers, and, especially in Study 3.1 and Study 3.4, a substantial portion of strong bargainers used a proportional allocation rule. This pattern of results was obtained despite the fact that participants started from a neutral viewpoint from which no allocation rule should have been particularly salient (Study 3.1 and Study 3.4), and even when they started from a weak position in which the equal allocation rule should have been more salient (Study 3.2). This indicates that strong bargainers' self-serving allocations are unlikely due to a passive adoption of the proportionality rule, as an equal allocation could be equally salient (Study 3.1 and Study 3.4) or even more salient (Study 3.2). On the contrary, it suggests that strong bargainers take into account multiple allocation rules and actively select the one they think would benefit them the most.

Although beyond the scope of this chapter, an interesting question that remains is why strong bargainers think that making a proportional offer would benefit them. Why would they assume these offers would be accepted? One possibility is that—although we repeatedly told participants that any two-party coalition was possible—the strong position induced a feeling of power. In line with previous research (Fiske & Dépret, 1996; Galinsky, Magee, Inesi, & Gruenfeld, 2006), it might be

that this illusory feeling of power inhibited taking the perspective of weak bargainers and a subsequent overestimation that they would accept these offers. Another possibility is that bargainers overestimated the probability that they can turn to the other bargainer—possibly with a more attractive offer—when their first offer is not accepted, and that this perceived alternative increased their initial offer (see Pinkley et al., 2019 on illusory alternatives).

What causes the Strength-is-Weakness effect?

Results from Study 3.3 support the idea that when strong bargainers make proportional offers, they are likely to be excluded from coalitions. Moreover, in Studies 3.1, 3.2, and 3.4, strong bargainers' offers were clearly lower than those of weak bargainers were. A closer look at our results, however, cast doubt on the assumption that these lower offers are the sole mechanism underlying the Strength-is-Weakness effect. Given that a) a sizable proportion of strong bargainers made equal offers, b) Study 3.3 suggest that these offers should be very conducive for forming coalitions, and c) more strong bargainers in Study 3.4 were excluded than expected solely based on their first offers, it seems that Strength-is-Weakness effect is not only driven by the use of proportional allocation rules.

If self-serving allocations are not the sole cause of the Strength-is-Weakness effect, what could be an additional cause? Looking at weak bargainers' inclination to make opening offers to other weak bargainers, it seems some strong bargainers are already disadvantaged before having had an opportunity to make a generous offer. This suggests that the Strength-is-Weakness is not only driven by *actual* self-serving offers from strong bargainers, but also by the offers that weak bargainers *expect* them to make. That is, before anyone has made an offer, weak bargainers might already form expectations about the kind of allocations others will favor. Given that people often expect others to mainly propagate their own self-interest (D. T. Miller, 1999), weak bargainers might expect others to make self-serving offers. This expectation is a likely reason for weak bargainers to seek out other weak bargainers with whom they expect to obtain an equal rather than a proportional share. Even when a strong bargainer, against expectations, turns out to make an attractive offer, weak bargainers may have a tendency to stick to the small coalition they aimed for rather than switching their attention to the strong bargainer. One reason might be that participants simply feel committed to carrying out the coalition offer they proposed themselves. Another explanation could be that moving away from a mutually proposed coalition might be perceived to be risky. Bargainers do not know if they might have the same option in subsequent bargaining rounds and sticking to their original choice—which is often reciprocated by the other strong bargainer—might be less risky.

Theoretical implications

Besides providing insight in the Strength-is-Weakness effect, the current studies also provide general insights on the use of allocation rules in coalition formation. Different theories on coalition formation (for an overview, see Komorita, 1984) aim to predict which coalitions will form and how payoffs are allocated on the basis of certain allocation rules. Both minimum resource theory and bargaining theory predict that strong bargainers use proportional allocation rules, thereby making higher demands than weak bargainers, who—depending on theory—should use either proportional or equal allocation rules (Gamson, 1961a; Komorita & Chertkoff, 1973).

Whereas we indeed found that weak bargainers predominantly use equal allocation rules and strong bargainers on average make higher demands than weak bargainers do, strong bargainers used both proportional and equal allocation rules. These findings presuppose more heterogeneity in the use of allocation rules at the initial stages of coalition bargaining than prior theories have assumed. Although beyond the scope of this chapter, an interesting question for future research is which individual differences predict whether a strong bargainer uses equality or proportionality. Are, for example, selections of allocation rules guided more by different concerns for others, such as SVO (van Lange, 1997), or by cognitive capabilities such as perspective taking (Davis, 1983) or overconfidence (Neale & Bazerman, 1985)?

Limitations

A possible limitation is that we used a one-shot situation in which the amount of resources one has is related to neither bargaining power nor the size of the payoffs. There is evidence that the Strength-is-Weakness effect might diminish after multiple bargaining trials (Kelley & Arrowood, 1960) and situations in which those with more resources bring more money to the table (Komorita et al., 1989). Our focus, however, was on understanding situations in which Strength-is-Weakness effects are observed, not on identifying situations in which Strength-is-Weakness effects occur. Moreover, studies conducted in the realm of governmental coalition formation—which are clearly iterative situations and in which a larger coalition could be beneficial in terms of stability—do show evidence for both the use of proportional allocation rules (Warwick & Druckman, 2006) and exclusion of larger parties (Bäck & Dumont, 2008; Warwick, 1996), suggesting this might not always inhibit a Strength-is-Weakness effect.

Another possible limitation is that we relied only on the 4(3-2-2) game in which one bargainer has 3 resources and two others have 2 each. A possible disadvantage of using this game is that one could also argue that the strong bargainer not only has more resources but is also unique and that this could account for

participants' preferences for this position. To rule out this alternative explanation we ran a study (N = 76) in which participants selected a position in a 5(4-3-2) game, in which three bargainers had 4, 3, and 2 resources respectively (see Appendix A). Like the 4(3-2-2) game, in this game, resources and alternatives are not correlated and a Strength-is-Weakness effect has been previously observed (Chaney & Vinacke, 1960; Kelley & Arrowood, 1960; Vinacke, 1959; Vinacke & Arkoff, 1957). The crucial difference is that in this game all three positions are unique. Again, the majority (75%) of all participants chose the position with most resources, ruling out that our earlier findings are driven by a need for uniqueness rather than a preference for having most resources. Moreover, the finding that the two weak bargainers are now dissimilar in votes but still make offers mostly to each other (74%) strengthens the idea that attraction between weak bargainers is due to expected bargaining behavior, rather than due to similarity.

Conclusion

The four studies presented here suggest that one presumed driving force behind the Strength-is-Weakness effect—the use of self-serving allocation rules by strong bargainers—persists in situations in which a passive adoption of this allocation rule cannot explain the effect. This suggests that strong bargainers actively select the proportional allocation rule in an attempt to maximize their payoffs. Furthermore, the studies cast doubt on whether the use of self-serving allocation rules is the main cause of the Strength-is-Weakness effect. First, we see that many weak bargainers make first offers to each other. Second, many strong bargainers apply equal allocation rules which—whilst making them more attractive—does not seem to dampen the Strength-is-Weakness effect. A likely second mechanism behind the Strength-is-Weakness effect is thus that weak bargainers expect strong bargainers to bargain self-servingly, leading to an initial attraction between weak bargainers. Together, these results suggest that strong bargainers who use their 'strength' in resources as basis to claim a higher share of the payoffs—or those who are expected to do so—are very likely to end up excluded from a coalition.

Chapter 4

On **when** having many resources leads to exclusion from coalitions: Resources as (ir)relevant input and the Strength-is-Weakness effect

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Abstract

A key observation in coalition formation is that bargainers with many resources—*strong* bargainers—are often excluded from coalitions: the Strength-is-Weakness effect. Previous literature shows this is driven by (anticipated) high demands from strong bargainers, who (are expected to) claim an equitable share of the payoff, making them less attractive as coalition partners. We argue that the Strength-is-Weakness effect is contingent on whether resources are perceived to be relevant input (i.e., whether they are perceived to be a legitimate basis to calculate an equitable payoff). In two coalition bargaining experiments we increase input relevance by making participants earn resources (Study 4.1) and explicitly linking resources and payoffs (Study 4.2). We found evidence that input relevance increases attempts to include strong bargainers, but mixed evidence on whether this materializes into actual inclusion. Possibly, bargainers' persistent self-serving perceptions of input relevance lead to disagreements between weak and strong bargainers, preventing strong bargainers from being included

In many situations, individuals or groups lack the resources to attain an outcome by themselves. In these situations, they need to pool their resources; they need to form a coalition. Gamson (1964, p. 85) defines a coalition as "the joint use of resources to determine the outcome of a decision in a mixed-motive situation involving more than two units." For example, in multi-party government systems, individual political parties generally lack the seats to form a government and need to form a coalitional government combining their seats. Another example is companies engaging in joint ventures in order to increase their potential or market share.

Two key questions in coalition formation research are which coalitions are formed and how the payoffs a coalition yields are allocated. According to classical coalition formation theories such as minimal resource theory (Gamson, 1961a, 1964) and bargaining theory (Komorita & Chertkoff, 1973), the most important predictor is how many resources an individual or party has. Assuming that individuals apply equity norms and uphold the belief that "…a person ought to get from an agreement an amount proportional to what he brings into it" (Gamson, 1964, p. 88), these theories predict that individuals aim to form a coalition with as few resources as possible. After all, if someone who brings many resources to a coalition is entitled to a high share of the payoffs, approaching a coalition partner with fewer resources might lead to better outcomes. The resulting exclusion of bargainers with many resources has been labeled the Strength-is-Weakness effect (Caplow, 1956; Chaney & Vinacke, 1960; Gamson, 1964; Kelley & Arrowood, 1960; Murnighan, 1978b; van Beest et al., 2011, 2004a; Vinacke & Arkoff, 1957).[22]

A caveat of previous literature is that the Strength-is-Weakness effect has been found in studies in which resources have been randomly allocated to participants rather than acquired through effort, and in which there is no explicit relationship between the resources and payoffs. Following insights from accountability theory (Konow, 1996, 2000), and equity theory (Adams, 1965; Walster et al., 1973) and its related coalition formation theories (Gamson, 1961a; Komorita & Chertkoff, 1973), we reason that in these situations resources are unlikely to be a legitimate basis for an equitable allocation. Hence, bargainers with many resources might be excluded because they demand an equitable share, a claim that is seen as undeserved by their counterparts. In this chapter, we investigate whether bargainers with many resources are included more often when exerted effort determines the amount of resources they hold (Study 4.1) and when there is an explicit link between the amount of resources participants hold and the share of the payoffs they are responsible for (Study 4.2). In these situations, coalition bargainers might—besides

[22] Note that we focus on simple situations in which payoffs do not vary between coalitions. See Komorita (1984) for an overview of different coalition formation settings.

having economic motives to avoid those with many resources—feel that those with many resources deserve an equitable payoff and thereby inclusion in the coalition.

The Strength-is-Weakness effect

The notion that coalition bargainers apply equity norms and that this can be detrimental to larger parties has been corroborated by several field-studies looking at governmental coalition formation in Western European democracies (Bäck & Dumont, 2008; Warwick & Druckman, 2006; Warwick, 1996). Most direct evidence, however, comes from lab studies utilizing simple weighted majority games (Komorita, 1984). In these simple weighted majority games, participants receive an amount of resources that is insufficient to obtain a monetary payoff alone. Participants can pool their resources in a coalition to obtain the payoffs together, but need to reach a consensus on how to allocate this payoff between themselves. For example, in a 5(4-3-2) simple weighted majority game, three participants receive 4, 3 and 2 resources respectively, and need to form a coalition with at least 5 resources. In this situation, participants with 4 resources have as many bargaining alternatives as the other two (namely two) and including them does not convey any advantage to their partners. On the contrary, following the earlier mentioned equity norms, they (are expected to) claim a larger share of the payoffs than the other bargainers. Consequently, the seemingly strong bargainers often end up being excluded from the formed coalition (Murnighan, 1978b; van Beest et al., 2011, 2004a; Vinacke & Arkoff, 1957).

Fairness and disagreement in coalition formation

Besides economic motivations to maximize one's payoffs, fairness motivations also play a large role in which coalitions are formed. Taking a social utility approach to coalition formation, Van Beest and colleagues (for a review, see van Beest & van Dijk, 2007) showed that coalition bargainers—besides valuing their own outcomes—derive utility adhering to fairness norms. We propose that, as part of this concern for fairness, coalition bargainers evaluate whether other bargainers deserve the share of the payoffs they claim. As participants with many resources—hereafter referred to as *strong* bargainers[23]—are expected to ask for a higher share due to the use of the equity norm (Gamson, 1961a, 1964), the pivotal question is whether those with few resources—hereafter referred to as *weak* bargainers—agree with the strong bargainers' use of this equity norm. The observation that strong bargainers are often excluded from coalitions suggests that weak bargainers often disagree.

[23] Remember that the terms strong and weak bargainers are misnomers, as they are not reflective of true bargaining power. However, for the sake of continuity with previous literature, we retain these terms.

A possible reason for this disagreement has been described by Adams (1965): which inputs are considered relevant[24] in determining whether an exchange is equitable is highly subjective. In coalition formation, it seems that strong bargainers are more inclined to treat resources as relevant inputs than weak bargainers do, meaning that they will also disagree on how to fairly allocate the payoffs. This resonates with bargaining theory (Komorita & Chertkoff, 1973) which presupposes the use of different allocation rules by strong and weak bargainers, and the notion of egocentric interpretations of fairness (e.g., Babcock & Loewenstein, 1997), in which bargainers consider allocation rules that benefit themselves as the fairest rules. We propose that when bargainers disagree on the relevance of resources, strong bargainers are likely (expected) to make equitable offers and that these offers—whether actual or expected by weak bargainers—will lead weak bargainers to coalesce. We also propose that when it is clear to all bargainers that resources are relevant input this legitimizes the use of the equity norm by strong bargainers, promoting the inclusion of strong bargainers and thus decreasing the Strength-is-Weakness effect.

In two studies, we manipulated two aspects of resources that should increase their input relevance: the extent to which resources are acquired through effort, and whether there is an explicit link between the amount of resources participants hold and the share of the payoffs they are responsible for. This allows us to test whether the Strength-is-Weakness indeed decreases when input relevance increases. Below, we discuss the two aspects in order.

Accountability theory and effort

A first indicator of whether input is relevant is provided by accountability theory (Konow, 1996, 2000). Accountability theory postulates that a fair allocation is one in which income varies in relation to *discretionary* variables—variables under one's control, such as effort—and not *exogenous* variables—variables outside of one's control. In other words, bargainers are entitled to an equitable share of payoffs when they have worked for their resources, not when these are randomly acquired. In line with this idea, allocators in ultimatum bargaining games or dictator games make more unequal offers when they have exerted effort to either earned either their position as allocator or endowment rather than when these have been determined exogenously (Cherry, 2001; E. Hoffman, Mccabe, & Smith, 1996; E. Hoffman & Spitzer, 1985). More important to the current research question, when an advantage has been earned, these equitable allocations are also implemented by parties that do not benefit from

[24] Note that Adams' use of the word 'relevant' refers to bargainers' perceptions of whether it is legitimate to use a certain characteristic as input to calculate an equitable payoff. This use of this word is in no way related to the term 'power-relevance' which was coined by Kravitz (1981) to indicate whether differences in resources lead to differences in bargaining power.

equity, meaning people are willing to forgo money in order to give others what they are entitled to (Frohlich et al., 2004; Lee & Shahriar, 2016; Oxoby & Spraggon, 2008; Ruffle, 1998).

Effort in coalition formation. Although scarce, there is some evidence that earning resources in coalition formation increases its perceived relevance as input. In a study by C. E. Miller and Wong (1986), participants who were led to believe that they earned their resources based on their performance on a test of business knowledge made more equitable allocations of a coalition's payoff than participants who received their resources randomly, meaning that those with more resources received more when these resources were earned. This study, however, focused on multi-valued games in which coalitions with more resources yield a higher payoff than smaller coalitions. Hence, strong bargainers were already often included, meaning this study did not allow a test of whether strong bargainers were included more often when resources were earned.

One study that hints that making participants earn resources decreases the Strength-is-Weakness effect is described by Messe, Vallacher and Phillips (1974). In their study, participants bargained in a 5(4-3-2) pachisi coalition game. In the earned condition, participants earned 4, 3, or 2 resources by working on an unrelated task for 2, 1.5, and 1 hour respectively. In the control condition in which resources were not earned a Strength-is-Weakness effect occurred; only 2 out of the 6 coalitions in this condition were large coalitions. In the earned condition, however, all 6 coalitions were large coalitions. Aside from the fact that this result warrants a high-powered replication, it is relevant to note that strong bargainers were instructed to work for a longer period rather than voluntarily exerting more effort. Consequently, the amount of resources participants had were outside of their control, whereas, according to the accountability principle (Konow, 1996, 2000), control is a prerequisite for relevant input. Moreover, Leventhal and Michaels (1969) found that individuals calculate input by evaluating work done relative to the amount of time allotted, meaning that time worked in itself does not equal amount of input. It is thus unclear whether strong bargainers were more often included as a restitution for lost time taken by the experimenter than due to a well-deserved reward.

Another study that tested whether earning resources decreases the Strength-is-Weakness effect is described by Wilke and Pruyn (1981). In their study, resources were purportedly assigned by comparing scores on an intelligence test. Although this manipulation decreased the Strength-is-Weakness effect, it is debatable whether this difference is due to differences in perceived deservingness alone. Participants were told that coalition members would engage in another intelligence test in which their score would be shared. The question is whether large coalitions were not formed because they apparently consisted of the most intelligent—rather than most

deserving—participants. Moreover, it is open to debate whether scores on an intelligence test reflect effort rather than ability.

In Study 4.1, we provide a cleaner test of the effect of earned resources on inclusion of strong bargainers. In this study, we used a real-effort slider task in which time was held constant and where differences in resources were related to performance in the task. Moreover, payoffs were the same for each possible coalition, meaning inclusion of strong bargainers cannot be attributed to motives to maximize one's share of the payoff, but only to a desire to give others what they deserve.

A relationship between resources and payoffs

A second factor of which we propose that it increases the relevance of bargainers' input is when there is a clear relation between one's input and contribution to the payoffs. A basic assumption of equity theory (Adams, 1965; Walster et al., 1973) and related coalition formation theories such as minimum resource theory (Gamson, 1961a, 1964) and bargaining theory (Komorita & Chertkoff, 1973), is the existence of an implicit or explicit relationship between one's input and their claim on a share of the payoffs. In the latter two theories, this relationship between in- and output is assumed to be the driving force behind coalition bargaining; participants seek out certain coalition partners because they infer preferences on how to allocate the payoffs from the amount of resources that bargainers hold.

In coalition settings that resemble simple weighted majority games, however, this relationship is far from explicit. Often, participants are informed that there is a payoff, without an explanation where it came from or how the resources bargainers hold relate to this payoff. If bargainers with more resources are not responsible for creating a larger share of the payoffs, it is likely that their resources will not be seen as relevant input and that their (expected) proportional claims are seen as illegitimate. If, however, it would be clear that those with more resources were also responsible for generating a larger part of the payoffs, resources might be viewed as relevant. In turn, this might enhance the perception that strong bargainers deserve a larger part of the payoffs and hence deserve to be included.

In dyadic settings, there is some evidence for the notion that when one's input directly determines the payoffs, these payoffs will be allocated more equitably than when payoffs are fixed (Cherry, 2001; Frohlich et al., 2004; Konow, 2000; Lee & Shahriar, 2016; Oxoby & Spraggon, 2008; Ruffle, 1998). For example, when recipients increased payoffs by correcting spelling errors, dictators allocated more money to the recipient than when the payoffs were fixed (Frohlich et al., 2004).

In coalition formation, to our knowledge, the only settings in which bargainers differentially contribute to the payoffs are multivalued coalition bargaining settings (see Komorita, 1984). However, in these settings coalitions with more

resources yield a higher payoff than coalitions with fewer resources. Hence, it is difficult to determine whether strong bargainers are included based on their relevant input or because including them yields a larger payoff than including a weak bargainer.

To be able to disentangle the two motives, Study 4.2 added a condition in which participants with more resources contributed more to the overall payoffs rather than only to the coalition in which they are included. As the same budget is also available to smaller coalitions, an increase in the inclusion of strong bargainers cannot be accounted for by a motivation to maximize payoffs. Hence, in this setting, increased inclusion of strong bargainers most likely reflects an increased perception that strong bargainers deserve to be included.

Relevant input and the Strength-is-Weakness effect

Based on previous literature, we think it likely that the Strength-is-Weakness effect is partly due to a disagreement on whether resources are relevant input. In line with the notion of egocentric interpretations of fairness (e.g., Babcock & Loewenstein, 1997), bargainers with more resources should be more inclined to treat resources as a relevant input than those with fewer resources, leading to disagreement. We argue that either letting participants earn their resources through effort or creating a direct relationship between resources and payoffs creates a shared perception of resources as relevant input, which should in turn lead to a decrease in the Strength-is-Weakness effect.

Hypotheses

Our focal hypotheses relate to a higher involvement and subsequent inclusion of strong bargainers when resources are perceived to be relevant input than when they are not.

We propose that—in line with a social utility approach to coalition formation in which coalition bargainers are guided by fairness concerns (van Beest & van Dijk, 2007)—weak bargainers will think strong bargainers are more deserving of a share of the payoffs when resources are perceived to be relevant input than when they are not. We hypothesize that this increased perception of deservingness will translate into an increased number of first offers to strong bargainers when resources are earned compared to when they are not. This leads us to formulate the following hypotheses:

H1a: Weak bargainers are more likely to make their first offers to strong bargainers when resources are earned than when they are received randomly.
H1b: Weak bargainers are more likely to make their first offers to strong bargainers when there is an explicit relationship between resources and payoffs than when there is no such relationship.

A recent replication of the Strength-is-Weakness effect (See Chapter 2) has revealed that the preponderance of first offers to weak bargainers is a primary cause of the Strength-is-Weakness effect. We hypothesize that the predicted increase in first offers to strong bargainers when resources are perceived to be relevant input (H1a, H1b) will promote the formation of coalitions in which the strong bargainer is included, leading to the following hypotheses:

H2a: Strong bargainers are more likely to be included when resources are earned through effort than when they are received randomly.
H2b: Strong bargainers are more likely to be included when there is an explicit relationship between resources and payoffs than when there is no such relationship.

Our final hypotheses relate to bargainers' proposed allocations. According to the accountability principle (Konow, 2000) bargainers should be even more likely to apply the parity norm (Gamson, 1964)—which is rooted in equity theory (Adams, 1965; Walster et al., 1973)—when resources are perceived to be relevant input. This leads us to formulate the following hypotheses:

H3a: Strong bargainers claim a higher share of the payoffs in their first offer when they have earned their resources than when they have randomly received them.
H3b: Strong bargainers claim a higher share of the payoffs in their first offer when there is an explicit relationship between resources and payoffs than when there is no such relationship.

A data package including (meta) data, analysis scripts, stimulus materials, and preregistrations is available here: https://doi.org/10.34894/FCLGKP. Both studies and their hypotheses have been preregistered (Study 4.1: http://aspredicted.org/blind.php?x=q6bd7t; Study 4.2: http://aspredicted.org/blind.php?x=ep4k8t). Moreover, for both studies we report all manipulations, measures and—where applicable—exclusion criteria.

Study 4.1

To test H1a, H2a, and H3a we utilized a 5(4-3-2) simple weighted majority game in which participants took on the role of a bargainer for a political party with either 4, 3 or 2 seats. Participants were told that they needed to form a coalition that holds at least 5 seats, in order to form a municipal government and be able to distribute the council's budget of $90 million among the coalition members. In the Random Resources condition, we randomly assigned participants to the different positions. In the Earned Resources condition, participants earned their amount of

seats based on their relative performance on real-effort slider task (see method section below).

Method

Participants and design. Our preregistered sample size was calculated using G*Power (Faul, Erdfelder, Lang, & Buchner, 2007). For 80% power for a two-tailed *z*-test for independent proportions, in which we estimated that the percentage that the strong bargainer would be included would be 35% in the random condition and at least 50% in the effort condition, we needed at least 170 triads per condition.

Our sample consisted of 1023 Amazon Mechanical Turk workers (M_{age} = 35.88 years, age range 18-72, 425 females, 591 males, 2 other) which were grouped into 341 triads. Participants received $1.80 for completing the task and another $0.05 cents per $1 million they attained in the bargaining scenario, leading to a payout of between $1.80 and $6.30.

Participants were randomly assigned to one of two between-subjects conditions: a Random Resources condition in which participants' resources were randomly assigned (n = 510 = 170 triads) and an Earned Resources condition in which participant received their resources based on performance on a real-effort slider task (n = 513 = 171 triads).

Materials and procedure.

General instructions. Participants read that they would take on the role of a bargainer for a political party, with the goal of being included in the municipal government of a new municipality and thereby obtaining a share of the budget.

Participants then received information on how their party obtained their seats. Participants in the Random Resources condition read that parties received their number of seats on the basis of a random draw. Participants in the Earned Resources condition read the amount of seats was determined on the basis of how many citizens of the municipality voted for the party. Campaigning would be simulated by a slider task participants who performed better on the slider task would earn more seats for their party than participants who performed worse.

After this, participants received information on the three phases of bargaining (see below). Next, participants in the Earned Resources condition completed a test round of the slider task. After this, we matched participants into triads. Participants in the Random Resources condition were randomly assigned to Party A (with 4 seats), Party B (with 3 seats), and Party C (with 2 seats). Participants in the Earned Resources condition first completed the slider task determining their bargaining position.

Slider task. The slider task we employed was based on the real-effort slider task developed by Gill and Prowse (2019). In each of three rounds, participants saw 21 sliders on one screen and had 30 seconds to position as many sliders as possible in the middle. After three rounds, participants who correctly positioned the most sliders

were assigned to Party A (4 seats), participants who came in second were assigned to Party B (3 seats), and participants who performed worst were assigned to Party C (2 seats).[25]

Final instructions. Finally, all participants read how many seats everyone had and that a coalition with at least 5 seats (i.e., every two-party coalition) could form a municipal government and distribute $90 million among the coalition members. At this moment, we also informed participants that they would obtain a real bonus of $0.05 for every $1 million budget they obtained in the bargaining situation.

Comprehension check. In order to gauge whether participants understood the instructions, participants completed a multiple choice quiz (correct answers in *italics*) asking for the size of the budget to be allocated (*€90 million* / This depends on the size of the coalition), what the payoffs would be of the party not included in the coalition (This depends on the offer that was accepted / *This party doesn't receive any money*), and which coalitions could be formed (AB & AC / AB & BC / AC & BC / *AB, AC, & BC*). If participants made a mistake, they received a message that gave them the correct answer, and were presented with the question again until they answered correctly.

Perceived control. To check whether our manipulation produced the intended perception of control over participants' input—which, according to accountability theory (Konow, 1996, 2000) is necessary to make it a relevant input—participants rated the extent to which they felt they had control over the amount of resources they obtained on a scale from 1 (No control) to 7 (Full control).

Bargaining. Participants then proceeded to the bargaining phases. As a bargaining procedure we adapted the Komorita and Meek (1978) display procedure which consisted of three phases, which was recently adapted to an online version (See Chapter 5) using the open source software oTree (Chen et al., 2016).

Phase I. In Phase I, all participants in a triad made a coalition offer. In this offer, they a) chose whom to send the offer, and b) indicated how they would like to distribute the €90 million between themselves and the chosen bargainer in increments of €1 million.

Phase II. In Phase II, all participants saw all offers made in Phase I. They then selected one of the coalition offers that included them. This could be their own offer or an offer from another bargainer.

Phase III. In Phase III, participants saw who selected which coalition offer. If two participants selected the same offer, the coalition formed and the payoffs were

[25] In both studies, participants assigned to position A (Study 4.1: $M = 34.43$, $SD = 8.08$; Study 4.2: $M = 32.26$, $SD = 8.66$) had clearly completed more sliders, than participants assigned to positions B (Study 4.1: $M = 25.22$, $SD = 7.09$; Study 4.2: $M = 22.00$, $SD = 7.60$) which had completed more than C (Study 4.1: $M = 15.81$, $SD = 8.79$; Study 4.2: $M = 12.53$, $SD = 8.86$), showing that an actual difference in effort led to their assigned positions.

distributed as agreed upon by the two bargainers. If no offer were selected by both prospective members of the coalition, a new round would start in which participants went through the same three phases. This process was repeated until two participants selected the same offer and a coalition would be formed.

Manipulation check – Method of acquiring seats. After bargaining, participants answered a few final questions. First, as a manipulation check, we asked whether participants had obtained their seats through performance on a slider task or randomly.

Deservingness of inclusion. To check whether earning resources increased the perception of resources as relevant input, we asked participants to which extent they agreed with the statement that parties with more seats deserved to be in the coalition more than parties with fewer seat on a scale from 1 (Strongly disagree) to 7 (Strongly agree).

Results

Checks.

Comprehension check. Of all participants, 62.3% correctly answered all questions. Note that only 7% made more than one mistake and that participants who made a mistake were explained what the correct answer was. Participants to select the right answer before they could continue the study. As preregistered, we conducted all analyses twice: once including all participants (reported in main text) and once excluding those who did not answer all questions correctly. When interpretations differed, we reported this in footnotes.

Manipulation check – Method of acquiring seats. Most participants correctly reported how they obtained their amount of seats: 93% in the Random Resources condition and 97% in the Earned Resources condition.

Perceived control. To test whether our manipulation successfully enhanced the perceived control over acquiring seats, we conducted a 2 (Condition: Random Resources vs. Earned Resources) x 3 (Bargaining position: A vs. B vs. C) ANOVA on the perceived control over resources. First, we found a main effect of condition, $F(1, 1017) = 268.76$, $p < .001$, $d = 1.35$. As intended, participants who earned their resources in the slider task ($M = 4.52$, $SD = 1.62$) perceived more control over how many seats they had than those who randomly acquired their seats ($M = 2.22$, $SD = 1.80$). There was no main effect of bargaining position, $F(2, 1017) = 1.98$, $p = .14$, $\eta^2 < .01$. We did find an interaction effect, $F(2, 1017) = 11.86$, $p < .001$, $\eta^2 = .01$. As can be seen in Table 4.1, bargainers in the Random Resources condition did not differ in perceived control, but differences did exist in the Earned Resources conditions. The more resources participants had earned, the more they felt they had had control over it. Importantly, even those with 2 resources perceived more control over their resources when they had earned it than when they had randomly received them.

Table 4.1.

Perceived control by position in Random Resources and Earned Resources conditions (Study 4.1).

Resource Condition	Position	M	*SD*
Random	A (4 seats)	2.34[a]	1.91
(*n* =510)	B (3 seats)	2.29[a]	1.87
	C (2 seats)	2.01[a]	1.61
Earned	A (4 seats)	5.27[b]	1.21)
(*n* = 513)	B (3 seats)	4.57[c]	1.48
	C (2 seats)	3.71[d]	1.72

Note: Different superscripted letters indicated significant differences (Tukey HSD, all *p*s < .01).

First Offers. See Table 4.2 for an overview of the frequency of proposed coalitions and proposed mean allocations per condition.

Table 4.2.

Frequency of proposed coalitions and mean proposed allocation in Study 4.1.

	Resource	Proposed			Mean proposed allocation			
Condition	Position	Coalition	*n*	%	M_A	M_B	M_C	*SD*
Random	A	AB	101	59.4%	52.33	37.67	-	9.84
(*n* = 510)	(4 seats)	AC	69	40.6%	56.45	-	33.55	9.00
	B	AB	90	52.9%	45.23	44.77	-	8.51
	(3 seats)	BC	80	47.1%	-	51.89	38.11	8.78
	C	AC	86	50.6%	50.14	-	39.86	12.14
	(2 seats)	BC	84	49.4%	-	49.15	40.85	9.43
Earned	A	AB	103	60.2%	49.81	40.19	-	5.89
(*n* = 513)	(3 seats)	AC	68	39.8%	56.96	-	33.04	9.85
	B	AB	106	62.0%	45.67	44.33	-	9.41
	(2 seats)	BC	65	38.0%	-	52.31	37.69	10.03
	C	AC	102	59.6%	49.43	-	40.57	14.39
	(2 seats)	BC	69	40.4%	-	48.87	41.13	12.21

Note. Each coalition allocated $90 million between the coalition members.

Target of first offer. As preregistered, we tested whether more first offers were made to bargainer A by bargainers B and C in the Earned Resources than in the Random Resources condition, using a two-tailed exact *z*-test of independent proportions. In line with H1a, bargainers B and C made significantly more first offers

to bargainer A in the Earned Resources condition (n = 208, 60.8%) than in the Random Resources condition (n = 176, 51.8%), z = 2.38, p = .02, OR = 1.45.

Proposed allocation. As preregistered, to investigate whether bargainers proposed more equitable allocations in the Earned Resources than the Random Resources condition, we conducted a 3 (Bargaining position: A vs. B vs. C) x 2 (Condition: Random resources vs. Earned resources) ANOVA on proposed allocations in the first offer made. Against H3a, results did not show an interaction between bargaining position and condition, $F(2, 1017) = 0.64$, $p = .53$, $\eta^2 < .01$, nor a main effect of condition, $F(1, 1017) = 1.39$, $p = .24$, $d = 0.05$.

We did, however, find a main effect of bargaining position, $F(2, 1017) = 72.37$, $p < .001$, $\eta^2 = .11$. Tukey HSD tests showed that bargainer A (M = 53.33, SD = 9.11) claimed more than bargainer B did (M = 47.74, SD = 9.85), $p < .001$, $d = 0.59$, who in turn claimed more than bargainer C did (M = 40.57, SD = 12.25), $p < .001$, $d = 0.64$.

Outcomes. See Table 4.3 for an overview of the incidence of formed coalitions and mean payoffs obtained by bargainers within these coalitions.

Table 4.3.

Formed coalitions and mean allocations in Study 4.1.

Resource Condition	Coalition	n	%	Mean allocation M_A	M_B	M_C	SD
Random	AB	50	29.4%	48.56	41.44	-	4.46
(171 triads)	AC	48	28.2%	51.46	-	38.54	7.36
	BC	72	42.4%	-	47.49	42.51	5.95
Earned	AB	58	33.9%	47.38	42.63	-	4.80
(170 triads)	AC	57	33.3%	54.30	-	35.70	9.84
	BC	56	32.7%	-	50.41	39.59	9.55

Note. Each coalition allocated $90 million between the coalition members.

Formed coalitions. To test whether our manipulation reduced the Strength-is-Weakness effect, we first tested for the existence of a Strength-is-Weakness effect within the two conditions. To do this, we conducted two separate exact binominal tests comparing the actual proportion of coalitions including bargainer A with the expected inclusion of A if all coalitions were formed equally often (as A is a member of two of the three possible coalitions, this is two-thirds). In the Random Resources condition, we found the expected Strength-is-Weakness effect: A is included in 57.6% of all coalitions, which is significantly lower than the two-thirds we would observe when all coalitions were formed equally often, p = .01, OR = 0.68.[26] In the Earned Resources condition, we did not find a Strength-is-Weakness effect: bargainer A is

[26] This effect became non-significant when only including participants who passed all comprehension checks, p = .08, OR = 1.11. However, note that this analysis was conducted on only 38 participants.

included in 67.3% of all coalitions, which does not significantly differ from equal formation of coalitions, $p = .94$, $OR = 1.03$. Against H2a, our preregistered two-tailed *z*-test for independent proportions, however, did not reveal a significant difference between the two proportions, $z = 1.83$, $p = .07$, $OR = 1.51$.

Allocation in formed coalitions. To explore whether our manipulation influenced the received payoffs for bargainers included in a coalition, we conducted a 2 (Condition: Random Resources vs. Earned Resources) x 3 (Bargaining Position: A vs. B vs. C) ANOVA on obtained payoffs. We obviously found no main effect of condition, $F(1, 676) = 0.60$, $p = .44$, $d = 0.00$, as the size of the budget is identical in the two conditions. We did find a main effect of bargaining position, $F(2, 676) = 36.59$, $p < .001$, $\eta^2 = .08$.When included, bargainer A ($M = 50.43$, $SD = 7.48$) obtained a higher share of the payoffs than bargainer B ($M = 45.70$, $SD = 7.37$), $p < .001$, $d = 0.64$, who in turn obtained more than bargainer C ($M = 39.33$, $SD = 8.56$), $p < .001$, $d = 0.80$.

We also found an interaction effect, $F(2, 676) = 6.35$, $p < .01$, $\eta^2 = .01$.[27] Tukey HSD tests (see Table 4.4) revealed that in both conditions bargainer A obtained a higher share of the payoffs than bargainer B, who obtained a higher share than bargainer C. Moreover, both bargainer A and B seem to obtain a similar share in the Random Resources as in the Earned Resources condition. Bargainer C, however, obtained a lower share in the Earned Resources than in the Random Resources condition.

Table 4.4.
Share of payoff when included in coalition by position in the two conditions (Study 4.1).

Resource Condition	Position	*M*	*SD*
Random	A (4 seats)	49.98[a]	6.20
	B (3 seats)	45.01[b]	6.15
	C (2 seats)	40.93[c]	6.81
Earned	A (4 seats)	50.81[a]	8.43
	B (3 seats)	46.45[b]	8.44
	C (2 seats)	37.63[d]	9.85

Note: Different superscripted letters indicated significant differences (Tukey HSD, all *p*s < .05).

Process variables. Finally, we present analyses on process variables, showing participants' perception of the bargaining situation and its effects on their bargaining behavior.

[27] This interaction effect became non-significant when only including participants who passed all comprehension checks, $F(2,433) = 1.74$, $p = .18$, $\eta^2 = .01$.

Deservingness of inclusion.[28] As preregistered, we tested whether our manipulation led to an increase in the perception that it is fair to include those with more resources by conducting a 2 (Condition: Random Resources vs. Earned Resources) x 3 (Bargaining position: A vs. B vs. C) ANOVA on the perception that strong bargainers deserve to be included. First, we again found a main effect of condition, $F(1, 1012) = 24.65$, $p < .001$, $d = 0.48$, showing that participants who earned their resources (M =4.48, SD = 1.77) thought it was more fair to include those with more resources than participants who randomly obtained their resources (M = 3.60, SD = 1.89).

We also found a main effect of position, $F(2, 1012) = 6.24$, $p < .001$, $\eta^2 = .01$. Tukey HSD tests showed that bargainer A (M = 4.50, SD = 1.87) (self-servingly) indicated higher agreement with the statement that it is fair to include those with more resources than bargainer B (M = 3.86, SD = 1.82), $p < .001$, $d = 0.35$ and bargainer C (M = 3.77, SD = 1.88) did, $p < .001$, $d = 0.39$. There was no significant difference in endorsement between bargainer B and bargainer C, $p = .81$, $d = 0.05$. There was also no interaction effect, $F(2, 1012) = 0.51$, $p = .60$, $\eta^2 < .01$.

Predicting first offers. To explore whether perceptions of control over resources and perceived deservingness of inclusion of large parties predicts to whom weak bargainer make offers (0 = Weak bargainer, 1 = Strong bargainer) we conducted a logistic regression. As can be seen in Table 4.5, both perceived control over resources and the perception that larger parties deserve to be included positively predicted making an offer to the strong rather than weak bargainer.

Table 4.5.
Logistic regression predicting participants' target of first offer (Study 4.1).

			95% CI for Odds Ratio		
Variable	*b* (SE)	Wald (p)	Lower	OR	Upper
Constant	-1.06 (0.19)	-5.34 (< .001)	0.23	0.35	0.51
Perceived control over resources	0.14 (0.05)	3.15 (< .01)	1.05	1.15	1.26
Perception that large parties deserve to be included	0.23 (0.05)	4.91 (< .001)	1.15	1.26	1.39

Note: $R^2 = .08$ (Cox & Snell), .10 (Nagelkerke). Model $\chi^2(2) = 54.98$, $p < .001$.

Discussion

In Study 4.1, we found evidence that acquiring resources through effort has the potential to increase the inclusion of strong bargainers. When coalition bargainers had acquired their resources through effort (rather than through random assignment), a) bargainers were more likely to think large parties deserve to be

[28] Five participants did not a provide response to this variable.

included and b) strong bargainers actually received more first offers. Moreover, we found a Strength-is-Weakness effect in the Random Resources condition, but not in the Earned Resources condition. The inclusion rates of the strong bargainer, however, did not differ significantly between the two conditions. Finally, we found no systematic differences in proposed allocations and actual obtained payoffs of included parties between the two conditions, suggesting that bargainers make use of similar allocation rules in the two conditions and the crucial difference between the two conditions is which parties are approached.

Interestingly, both perceptions of control over resources and perceptions that strong bargainers deserve to be included were higher in the Earned Resources condition than in the Random Resources condition, but these perceptions were still biased in a self-serving manner. This suggests that even when resources are seen as a more relevant input by all bargainers, strong and weak bargainers still seem to be to some extent in disagreement on the extent to which resources should shape bargaining and its outcomes.

Study 4.2

Results from Study 4.1 suggested that strength becomes less of a weakness when resources are earned through effort (in the Earned Resources condition we no longer found a Strength-is-Weakness effect). However, there was no benefit to being strong: strong bargainers were not included more often than chance level. In Study 4.2, we investigated whether our second manipulation of input relevance—an explicit link between resource and payoff—would further increase the inclusion of strong bargainers, making strength in resources a strength in terms of inclusion. Specifically, we tested whether an explicit link between resources and payoff—versus no link—increases first offers to strong bargainers (H1b), increases inclusion of strong bargainers (H2b), and increases the claims made by strong bargainers in their first offers (H3b).

In Study 4.2, we again utilized the 5(4-3-2) simple weighted majority game. The baseline condition was identical to the Earned Resources condition from Study 4.1, but for clarity we renamed this the Fixed Budget condition: participants acquired their resources through the real-effort slider task, but the payoffs were a fixed $90 million. In the Earned Budget condition, participants' contribution to the payoffs was contingent on the resources they had acquired through the same slider task. Specifically, Party A ostensibly contributed $40 million, Party B $30 million, and Party C $20 million. Although the total payoffs were also $90 million, these payoffs were now presented as a result of participants' effort rather than a fixed budget.

Method

As Study 4.2 was highly similar to Study 4.1, we will only discuss the changes in detail.

Participants and design. Our preregistered sample size was calculated using G*Power (Faul et al., 2007). Wanting to achieve 80% power for a one-tailed *z*-test independent proportions in which we estimated that—based on the inclusion rate of Study 4.1—the percentage that the strong bargainer would be included would be 67% in the Fixed Budget condition and would increase to at least 80% in the Earned Budget Condition, we needed at least 142 triads per condition.

Our final sample consisted of 858 Amazon Mechanical Turk workers (M_{age} = 35.71 years, age range 18-78, 351 females, 495 males, 2 other, 10 did not provide data) which were grouped into 286 triads. Participants received $2.64 for completing the task and another $0.05 cents per $1 million they attained in the scenario, leading to a payout of between $2.64 and $7.14.

Participants were randomly assigned to one of two between-subjects conditions: a Fixed Budget condition in which the municipality's budget was a fixed $90 million ($n$ = 426 = 142 triads) and an Earned Budget condition in which Parties A, B, and C ostensibly contributed $40 million, $30 million, and $20 million respectively (n = 432 = 144 triads).

Materials and procedure. Instructions were mostly identical to the Earned Resources condition in Study 4.1. The only difference was that participants in the Earned Budget condition read that the combined efforts of the three parties determined the municipality's budget. The more effort a party exerted, the more they contributed to the budget of the municipality. Participants completed the same slider task and comprehension check as in Study 4.1.

Perceived control over budget size. To test whether our manipulation indeed led to an increase in the perception that each participant was responsible for part of the budget, we asked participants to which extent they felt they had control over the size of the municipalities budget on a scale from 1 (No control) to 7 (Full control).

Manipulation check – Contribution to the budget. After bargaining and answering the same deservingness question as in Study 4.1, as a manipulation check, we asked how participants contributed to the budget of the municipality (*Parties with more seats contributed more*/They did not contribute to it at all. The budget was fixed).

Motivations. To explore the motivations of participants we asked them to which extent they were motivated to: 1) Maximize their own outcomes, 2) Minimize harm to other bargainers, and 3) Make sure that every bargainer got what they deserved, all on a scale from 1 (Not at all) to 7 (Very much). Although we did not have strong predictions, we were interested whether motivations to maximize resources

were highest in the Fixed Budget condition and whether motivations to ensure that everyone gets what they deserve were higher in the Earned Budget condition.

Results

Checks.

Comprehension check. Of all participants, 55.4% correctly answered all question. Note that only 3.3% made more than one mistake. Participants who made a mistake were explained what the correct answer was and had to select the right answer before they could continue the study. As preregistered, we conducted analysis twice: once including all participants (reported in main text) and once excluding those who did not answered all questions correctly. When interpretations differed, we reported this in footnotes.

Manipulation check – Contribution to budget. In the Fixed Budget condition, 66.2% correctly indicated that budget was fixed. In the Earned Budget condition, 77.9% correctly indicated that those with more seats had contributed more. Although unplanned, due to this high failure rate we decided to conduct additionally analyses excluding those who failed the manipulation check. We report results from analyses done on this subset when its interpretations differ from analyses on the entire sample.

Perception of control over budget size. To test whether those who ostensibly contributed to the budget size perceived to have had more control over the budget size, we conducted a 2 (Condition: Fixed Budget vs. Earned Budget) x 3 (Bargaining position: A vs. B vs. C) ANOVA on the perceived control over budget size. First, we found a main effect of condition, $F(1, 852) = 15.67$, $p < .001$, $d = 0.17$. Participants in the Earned Budget condition ($M = 3.95$, $SD = 1.69$) indicated to have more control over the size of the budget than participants in the Fixed Budget condition ($M = 3.65$, $SD = 1.72$). There was no main effect of bargaining position, $F(2, 852) = 0.29$, $p = .75$, $\eta^2 < .001$.

We again found an interaction effect, $F(2, 852) = 5.39$, $p < .01$, $\eta^2 = .01$. As can be seen in Table 4.6, Tukey HSD tests reveal that bargainers in the Fixed Budget condition did not differ in the extent to which they perceived control over the budget. Moreover, only bargainer A reported having more in control in the Earned Budget than Fixed Budget condition. Additionally, bargainer A in the Earned Budget condition reported having more control than bargainer B and C in both conditions.[29]

[29] Only including those without comprehension check errors, we found the same overall pattern of results. A minor difference is that in the Earned Budget condition, bargainer B ($M = 3.71$, $SD = 1.58$) felt more in control than bargainer C ($M = 2.76$, $SD = 1.39$), p = .01, $d = 0.22$.

Table 4.6.
Perceived control by position in the Fixed Budget and Earned Budget conditions (Study 4.2).

Budget Condition	Position	M	*SD*
Fixed	A (4 seats)	3.72[a]	1.75
(*n* =426)	B (3 seats)	3.57[a]	1.60
	C (2 seats)	3.68[a]	1.82
Earned	A (4 seats)	4.51[b]	1.55
(*n* = 432)	B (3 seats)	3.79[a]	1.63
	C (2 seats)	3.55[a]	1.74

Note: Different superscripted letters indicated significant differences (Tukey HSD, all *p*s < .01).

Conducting the analysis on those who passed the manipulation check, we found that all bargainers reported having more control over payoffs in the Earned Budget than in the Fixed Budget condition. We found a main effect of position, $F(2, 608) = 7.56$, $p < .001$, $\eta^2 = .02$, bargainer A ($M = 3.92$, $SD = 1.80$) reported more in control than B ($M = 3.51$, $SD = 1.60$), $p = .02$, $d = 0.26$, and C ($M = 3.00$, $SD = 1.59$), $p < .001$, $d = 0.36$. Bargainer B and C's perception of control did not differ, $p = .53$, $d = 0.11$. We found a main effect of condition, $F(1,608) = 22.22$, $p < .001$, $d = 0.46$, participants in the Earned Budget condition ($M = 3.69$, $SD = 1.67$) reported more control than those in the Fixed Budget condition ($M = 3.42$, $SD = 1.74$). We did not find an interaction effect, $F(2, 608) = 1.78$, $p = .17$, $\eta^2 < .01$.

First Offers. See Table 4.7 for an overview of the incidence of proposed coalitions and proposed mean allocations per condition.

Table 4.7.

Proposed coalitions and mean proposed allocation in Study 4.2.

Budget		Proposed			Mean proposed allocation			
Condition	Position	Coalition	*n*	%	M_A	M_B	M_C	*SD*
Fixed	A	AB	85	59.8%	51.25	38.75	-	7.71
(*n* = 426)	(4 seats)	AC	57	40.1%	57.04	-	32.96	11.00
	B	AB	93	65.5%	46.14	43.86	-	7.79
	(3 seats)	BC	49	34.5%	-	52.41	37.59	10.00
	C	AC	97	68.3%	52.02	-	38.98	15.25
	(2 seats)	BC	45	31.7%	-	47.40	42.60	13.97
Earned	A	AB	113	78.5%	52.00	38.00	-	8.32
(*n* = 432)	(3 seats)	AC	31	21.5%	55.65	-	34.35	8.04
	B	AB	108	75.0%	45.54	44.46	-	8.17
	(2 seats)	BC	36	25.0%	-	52.03	37.97	7.35
	C	AC	102	70.8%	51.01	-	38.99	9.49
	(2 seats)	BC	42	29.2%	-	46.76	43.24	12.22

Note. Each coalition allocated $90 million between the coalition members.

Target of first offer. As preregistered, we tested whether more first offers were made to bargainer A by bargainers B and C in the Earned Budget than in the Fixed Budget condition, using a one-tailed exact z-test of independent proportions. In the Earned Budget condition, 210 (72.9%) first offers were made to A, compared to 190 (66.9%) offers in the Fixed Budget condition. Against H1b, this difference, was not significant, $z = 1.57$, $p = .06$, $OR = 1.33$.

Conducting the analysis on those who passed the manipulation check, the results were in line with H1b: significantly more first offers were made to strong bargainers in the Earned Budget condition ($n = 167$, 75.2%) than in the Fixed Budget condition ($n = 102$, 59.0%), $z = 3.44$, $p < .001$, $OR = 2.11$.

Proposed allocation. As preregistered, to investigate whether bargainers proposed more equitable allocations in the Earned Budget than the Fixed Budget condition, we conducted a 3 (Bargaining position: A vs. B vs. C) x 2 (Condition: Fixed Budget vs. Earned Budget) ANOVA on claimed share of the budget in first offers. Against H3b, there was no interaction between bargaining position and condition, $F(2, 852) = 0.13$, $p = .88$, $\eta^2 < .001$, nor a main effect of condition, $F(1, 852) = 0.40$, $p = .53$, $d = 0.03$.

We did find a main effect of bargaining position, $F(2, 852) = 58.59$, $p < .001$, $\eta^2 = .12$. Tukey HSD tests showed that bargainer A ($M = 53.17$, $SD = 8.98$) claimed more than bargainer B ($M = 46.58$, $SD = 9.05$), $p < .001$, $d = 0.73$, who in turn claimed more than bargainer C ($M = 40.18$, $SD = 12.85$), $p < .001$, $d = 0.58$.

Outcomes. See Table 4.8 for an overview of the incidence of formed coalitions and mean payoffs obtained by bargainers within these coalitions.

Table 4.8.
Formed coalitions and mean allocations in Study 4.2.

Budget Condition	Coalition	*n*	%	Mean allocation M_A	M_B	M_C	*SD*
Fixed	AB	49	34.5%	48.49	41.51	-	7.64
(142 triads)	AC	40	28.2%	53.05	-	36.95	11.12
	BC	53	37.3%	-	49.85	40.15	4.93
Earned	AB	51	35.4%	48.73	41.27	-	6.00
(144 triads)	AC	47	32.6%	54.04	-	35.96	6.97
	BC	46	31.9%	-	50.07	39.93	6.46

Note. Each coalition allocated $90 million between the coalition members.

Formed coalitions. First, we conducted two exact binomial tests comparing the actual proportion that bargainer A is included with the expected inclusion of A if all coalitions were formed equally often (as A is a member of two of the possible three coalitions, this is two-thirds). These analyses showed no Strength-is-Weakness effects—nor Strength-is-Strength effects—in the Fixed Budget condition (62.7% inclusion rate), $p = .33$, $OR = 1.68$,[30] nor in the Earned Budget condition (68.1% inclusion rate), $p = .79$, $OR = 2.13$.

Moreover, our preregistered one-tailed *z*-test for independent proportions shows that, against H2b, there is no significant difference in formed coalitions between the Fixed Budget and Earned Budget condition, $z = 0.87$, $p = .19$, $OR = 1.27$.[31]

Conducting the analysis on those who passed the manipulation check, we found a Strength-is-Weakness effect in the Fixed Budget condition (strong included 20 times, 48.8%), $p = .02$, $OR = 0.95$, but no Strength-is-Weakness nor Strength-is-Strength effect in the Earned Budget condition (strong included 50 times, 75.8%), $p = .11$, $OR = 3.13$. Moreover, in line with H2b, we found that strong bargainers in this subset are included significantly more often in the Earned Budget than in the Fixed Budget condition, $z = 2.85$, $p < .01$, $OR = 3.28$.

Allocation in formed coalitions. To explore whether the presence or absence of a direct link between resources and payoffs influenced received payoffs for bargainers included in a coalition, we conducted a 2 (Condition: Fixed Budget vs.

[30] Only including those without comprehension check errors, we found a Strength-is-Weakness effect in the Fixed Budget condition: bargainer A was included in 13 coalitions (39.4%), $p = .01$, $OR = 0.65$. Do note that this analysis was conducted on only 33 triads.
[31] Only including those without comprehension check errors, we found a significantly higher inclusion rate of bargainer A in the Earned Budget (70.6%) than in the Fixed Budget condition (39.4%), $z = 2.09$, $p = .02$, $OR = 3.69$.

Earned Budget) x 3 (Bargaining Position: A vs. B vs. C) ANOVA on obtained payoffs. As the size of the budget was identical in the two conditions, we obviously did not find a main effect of condition, $F(1, 566) = 0.41$, $p = .52$, $d = 0.00$. We did find a main effect of bargaining position, $F(2, 566) = 69.02$, $p < .001$, $\eta^2 = .17$. When included, bargainer A ($M = 50.92$, $SD = 8.30$) obtained a higher share of the payoffs than bargainer B ($M = 45.65$, $SD = 7.59$), $p < .001$, $d = 0.66$, who in turn obtained more than bargainer C ($M = 38.35$, $SD = 7.65$), $p < .001$, $d = 0.96$. We did not find an interaction effect, $F(2, 566) = 0.50$, $p = .60$, $\eta^2 = .001$.

Process variables.

Deservingness of inclusion.[32] As preregistered, we tested whether our manipulation led to an increase in the perception that it is fair that those with more resources should be included. For this, we conducted a 2 (Condition: Fixed Budget vs. Earned Budget) x 3 (Bargaining Position: A vs. B vs. C) ANOVA on the perception that large parties deserve to be included. We did not find a main effect of condition, $F(1, 848) = 0.31$, $p = .58$, $d = 0.07$ ($M_{Fixed} = 4.68$, $SD_{Fixed} = 1.73$, $M_{Earned} = 4.78$, $SD_{Earned} = 1.64$).

We did find a main effect of position, $F(2, 848) = 5.85$, $p < .01$, $\eta^2 = .01$. Tukey HSD tests showed that bargainer A ($M = 5.12$, $SD = 1.60$) more strongly than bargainer B ($M = 4.58$, $SD = 1.66$), $p < .001$, $d = 0.33$ and bargainer C ($M = 4.49$, $SD = 1.72$), $p < .001$, $d = 0.38$, endorsed the statement that it is fair to include those with more resources. There was no significant difference in endorsement between bargainer B and bargainer C, $p = .80$, $d = 0.05$. There was also no interaction effect, $F(2, 848) = 0.08$, $p = .92$, $\eta^2 < .001$.

Motivations.[33] As preregistered, to test whether motivations differed between conditions, we conducted a MANOVA on the three questions concerning motivation during bargaining. This analysis revealed that there was no overall difference for the three motivations between the two conditions, $F(3, 848) = 0.67$, $p = .57$, Pillai's Trace < 0.01. See Table 4.9 for means and standard deviations for the three motivations per condition.

[32] Six participants did not provide responses to this variable.
[33] Eight participants did not provide responses to this variable.

Table 4.9.
Means and SDs for motivations per condition (Study 4.2).

	Fixed Budget		Earned Budget	
Motivation	*M*	*SD*	*M*	*SD*
Maximize outcomes	5.42	1.49	5.51	1.35
Minimize harm	4.06	1.86	4.04	1.83
Make sure get what deserve	4.72	1.78	4.80	1.60

Predicting first offers through perceptions. To explore whether perceived control over budget and perceived deservingness of inclusion of large parties predicts to whom weak bargainers make offers (0 = Weak bargainer, 1 = Strong bargainer) we conducted a logistic regression. As can be seen in Table 4.10, perceived control over budget did not predict target of first offer. The perception that larger parties deserve to be included positively predicted making an offer to the strong rather than weak bargainer.

Table 4.10.
Logistic regression predicting participants' target of first offer (Study 4.2).

			95% CI for Odds Ratio		
Variable	*b* (SE)	Wald (p)	Lower	OR	Upper
Constant	0.001 (0.29)	0.01 (1.00)	0.57	1.00	1.75
Perceived control over resources	-0.01 (0.06)	-0.18 (< .01)	0.88	0.99	1.11
Perception that large parties deserve to be included	0.20 (0.06)	4.49 (< .001)	1.09	1.22	1.36

Note: R^2 = .02 (Cox & Snell), .03 (Nagelkerke). Model $\chi^2(2) = 13.18$, $p = .001$.

Predicting first offers through motivations. As preregistered we tested whether the different motivations predicted to whom weak bargainers make offers (0 = Weak bargainer, 1 = Strong bargainer) by conducting a logistic regression. As can be seen in Table 4.11, motivations did not predict the target of first offer.[34]

[34] When only including participants who passed the comprehension check, the motivation to make sure that others get what they deserve predicted making offers to the strong rather than weak bargainer, $b = 0.21$, $SE = 0.08$, $z = 2.49$, $p = .01$.

Table 4.11.

Logistic regression predicting participants' target of first offer by motivation (Study 4.2).

			95% CI for Odds Ratio		
Variable	*b* (SE)	Wald (p)	Lower	OR	Upper
Constant	-0.06 (.46)	-0.14 (.89)	0.38	0.94	2.33
Maximize outcomes	0.04 (.06)	0.69 (.49)	0.92	1.04	1.18
Minimize harm	0.04 (.06)	0.63 (.53)	0.92	1.04	1.17
Make sure get what deserve	0.10 (.06)	1.59 (.11)	0.98	1.11	1.25

Note: R^2 = .01 (Cox & Snell), .02 (Nagelkerke). Model $\chi^2(3) = 5.70$, $p = .13$.

Discussion

At first glance, Study 4.2 did not provide support for our hypotheses. We did not find a decrease in the Strength-is-Weakness effect when we increased the input relevance of resources by explicitly linking them to the payoffs. Moreover, bargainers with more resources made higher claims—and obtained a larger share of the payoffs—than bargainers with fewer resources, but this was not exacerbated in the Earned Budget condition.

When we excluded participants who failed the manipulation check, the results were much more in line with our hypotheses. When there was an explicit relationship between resources and payoffs, strong bargainers received more first offers (H1b) and were included more often in coalitions (H2b), compared to when there was no such relationship. The observation that the shift in first offers is mainly due to a decrease in first offers to strong bargainers in the Fixed Budget condition—and that the majority of manipulation check failures occurred in this condition—suggests that at least part of these excluded bargainers made first offers to strong bargainers due to an erroneous belief that they had contributed more to the payoffs.

In Study 4.2, we again found evidence for the existence of self-serving biases. Strong bargainers again feel that strong bargainers are more deserving of inclusion than their weaker counterparts do, suggesting again that participants are more likely to acknowledge the effect of our manipulation when it is in their own favor.

General discussion

In this chapter, we tested the proposition that the inclusion of strong bargainers in coalitions is partly determined by whether their resources are perceived to be relevant input (i.e., how legitimate it is to use their resources as input to calculate an equitable payoff). Across two studies, we found some evidence that increasing the input relevance of resources is conducive to (attempts at) including bargainer with many resources. In Study 4.1, we found that making participants earn resources through effort leads to more first offers to strong bargainers than when

resources are assigned randomly. We also found a Strength-is-Weakness effect in the Random Resources condition, but not in the Earned Resources condition. This difference, however, was not statistically significant (p = .07). In Study 4.2, we found mixed results based on which participants we include in our analyses. When including all participants, we did not find support for our hypotheses. When excluding participants who failed our manipulation check, however, we found that creating an explicit relationship between resources and payoffs promotes both first offers to and inclusion of strong bargainers.

A striking observation in both studies is that the main difference between the conditions lies in which bargainers are approached by weak bargainers: an increase of first offers to strong bargainers. The behavior of strong bargainers in terms of how much money they demand in their offers does not differ between conditions: strong bargainers propose more or less equitable allocations, regardless of the source of resources and its link to payoffs. This corroborates our proposition that inclusion of strong bargainers does not depend on strong bargainers' (invariant) treatment of resources as relevant input—using them to calculate an equitable payoff—but whether weak bargainers agree or disagree that this behavior is warranted.

Our studies also provide a more general insight in the role of resources in coalition formation. An ongoing debate in coalition formation research is whether resources or bargaining power is more predictive in which coalitions are formed. Whereas theories based on resources (e.g., Gamson, 1961a; Komorita & Chertkoff, 1973) predict the existence of a Strength-is-Weakness effect, theories based on bargaining power—such as pivotal power theory (Shapley & Shubick, 1954b) and minimum power theory (Gamson, 1964)—propose that resources should only influence formed coalitions and payoffs when they lead to differences in bargaining power. First, counter to predictions from power theories, we found that, when differences in resources are due to randomness, coalitions are not formed equally often. Second, we found that first offers and payoffs are strongly determined by the resources bargainers hold: those with more resources claim and receive a larger share of the payoffs when included in a coalition. An important realization is thus that coalition bargaining is strongly influenced by the amount of resources bargainers hold, even when differences in resources do not translate into differences in bargaining power.

Self-serving biases and misperceptions

The fact that we found stronger evidence for an increase in perceptions concerning input relevance and an increase in first offers to strong bargainers than actual inclusion of strong bargainers might lie in the self-serving perceptions coalition bargainers seem to entertain. In both studies, strong bargainers reported perceiving more control and were more likely to say they deserve to be included. It thus seems

that strong bargainers are generally more likely to see resources as relevant input than their weaker counterparts do; a disagreement that might be a barrier against the inclusion of strong bargainers. This resonates with research showing that bargainers show egocentric biases in perceptions of fairness and that these biases lead to bargaining impasses (e.g., Babcock & Loewenstein, 1997). We speculate that strong bargainers might actually be included more often when these perceptions are less self-servingly biased.

Another insight provided by our data is that participants seem to read more into differences in resources than seems to be there. Taking a closer look at our manipulation check from Study 4.2, we found that more errors occurred in the Fixed Budget condition than in the Earned Budget condition. This suggests that a substantial proportion of participants in the Fixed Budget condition seem to assume that resources and payoffs are related in situations in which they are not. This is compatible with previous literature on the Strength-is-Weakness effect which emphasizes that a large part of coalition formation is the process of participants making sense about what kind of situation they are in and acting upon these (possibly incorrect) perceptions (Psathas & Stryker, 1965). Besides providing theoretical insights, the notion that participants misattribute certain qualities to resources also has practical relevance: besides using salient instructions, researchers should make sure appropriate manipulation checks are in place, and maybe even more stringent comprehension checks to filter out participants who hold erroneous views of the bargaining situation.

The magnitude of the Strength-is-Weakness effect

A surprising finding was that the Strength-is-Weakness effect in the Random Resources condition in Study 4.1 was smaller than expected based on previous literature. Whereas we found that strong bargainers were included in 57.6% of the coalitions in this condition, in Chapter 2 we found that strong bargainers were included in only 34% of the cases. There are several possible reasons for this difference. First, the context in which we studied the Strength-is-Weakness effect in Chapter 2 is the landowner paradigm (van Beest et al., 2004b), in which participants take on the role of a landowners selling their parcels of land together, with differences in parcel size being the difference in resources. Whereas participants might not think those with more parcels are more deserving of inclusion, participants in the current studies might already have the perception that those who have a large electorate are naturally more deserving of inclusion. This fits with the convention that, in many countries with a multi-party system, the largest party is often given the leading role as *formateur*—the party starting negotiations—which increases the probability that they are included (Bäck & Dumont, 2008; Warwick, 1996). Future research could compare

the two settings to investigate whether the inclusion of strong bargainers indeed differs between them.

Another reason for the difference in the magnitude of the Strength-is-Weakness effect might lie in the difference in wording regarding the source of the resources. To clearly manipulate the lack of input relevance in the Random Resources condition, we made it very clear that resources were received on the basis of a random draw. In the replication in Chapter 2, the source of differences in resources was more ambiguous. It is possible that, in the Random Resources condition, our explicit mentioning of the source of resources led to a higher shared perception about input relevance—and hence less disagreement—whereas there was more room for self-serving interpretations when the source of resources was more ambiguous, leading to more disagreement and thus a stronger precedent for the Strength-is-Weakness effect. Future studies could compare settings in which it is made clear that differences in resources are due to effort, due to randomness, or in which the sources is more ambiguous. Our prediction is that the Strength-is-Weakness effect is largest in the ambiguous condition, smaller in the random condition and absent in the effort condition, and that there would be a significant difference between the ambiguous and effort conditions.

Conclusion

In two studies we investigated whether increasing the input relevance of resources in coalition formation (i.e., how legitimate it is to use their resources as input to calculate an equitable payoff)—either by making resources earned or having an explicit relationship between resources and payoffs—decreases the Strength-is-Weakness effect. Overall, we found some evidence that increased input relevance increases first offers to strong bargainers, that perceptions regarding the relevance of resources predict first offers to strong bargainers, but that these perceptions are biased in a self-serving manner. Finally, we have mixed evidence on how these perceptions and first offers translate to inclusion in formed coalitions. In Study 4.1 we replicated the Strength-is-Weakness effect when resources were acquired randomly, and found weak evidence that earning resources reduced this effect. In Study 4.2, we found evidence that an explicit relationship between resources and payoffs promotes first offers to strong offers and their inclusion, but only when excluding bargainers who failed our manipulation check. Together, these results suggest that perceptions of input relevance do promote attempts to include strong bargainers, but that a persistent disagreement concerning this relevance might bar the actual inclusion of strong bargainers.

Chapter 5

The Online Coalition Game: A tool for online interactive coalition formation research

Based on: Wissink, J. van Beest, I., Pronk, T., & van de Ven, N. (2020). The Online Coalition Game: A tool for online interactive coalition formation research. Manuscript under review.

Abstract

In this chapter, we present the Online Coalition Game (OCG): an open access tool written on the open access research platform oTree that enables high-powered interactive coalition formation experiments. Besides containing a tutorial on conducting studies using the OCG, we discuss two previous implementations. With these examples, we demonstrate that online use of the OCG provides the benefits of large sample sizes and fast data collection, whilst leading to valid and robust findings. Moreover, we show that small changes in the experimental set-up offer interesting opportunities to expand coalition formation theory by including insights from, amongst others, literature on bargaining, ostracism, communication, and vice versa

The Online Coalition Game: A tool for online interactive coalition formation research

Coalition formation is a ubiquitous phenomenon. Coalitions can be seen at different levels of society: employees form (informal) coalitions to further their own goals in organizations (e.g., Stevenson et al., 1985), political parties form governments to rule countries (e.g., Bäck & Dumont, 2008), and companies form joint ventures to increase their market share or potential (such as the large KLM, China Southern, Xiamen and Air France joint venture; https://news.klm.com/successful-joint-venture-expanded/).

Despite this ubiquity, coalition formation research—a booming field from the 50s until the 80s of last millennium—has not received much attention in contemporary social psychological theorizing. One reason for this decline may be the relative complexity of conducting these studies in which more than two participants interact in real time, combined with the increased awareness of needing large sample sizes to achieve sufficient statistical power. The latter may be exacerbated in coalition formation research, where the coalition that is formed is often the unit of analysis, and a group of at least three participants is needed for one observation. Despite the emergence of platforms that allow online real-time interactions between participants (e.g., Balietti, 2017; Chen et al., 2016; Hawkins, 2015; Pettit, Friedman, Kephart, & Oprea, 2014), up until now, there has been no openly available application that allows for online real-time coalition formation experiments.

To address this issue, we have developed the Online Coalition Game (OCG): an application for conducting (online) interactive coalition formation research written for the open access platform oTree (Chen et al., 2016). Using the OCG allows researchers to conduct high-powered coalition formation experiments in which participants bargain online and in real-time about inclusion in a coalition and the division of the payoffs generated by a coalition. Moreover, making small changes in the experimental set-up of the OCG offers interesting opportunities to expand coalition formation theory by including insights from, amongst others, literature on bargaining, ostracism, communication, and vice versa.

The rest of this chapter is structured as follows. First, we will describe the two major coalition formation procedures we have implemented in the OCG. Next, we will give a short overview of oTree and explain how to use it to conduct a study using the OCG. After this, we discuss the results of two projects. One project demonstrates the validity of using the OCG online by showing the robustness of a key finding in coalition formation—the Strength-is-Weakness effect (e.g., Vinacke & Arkoff, 1957)—and compares results in a traditional lab at a university and via Amazon Mechanical Turk (https://www.mturk.com) sample. We also present one project that demonstrates how a simple change in the OCG allowed us to investigate the effect of a moderator on established coalition formation findings and simultaneously extended accountability theory (Konow, 1996, 2000) to coalition formation settings. Finally, we discuss some future possible implementations of the OCG, for example to study

threats to the need to belong due to exclusion (Baumeister & Leary, 1995; Williams, 2007) or phantom BATNAs (Best Alternative to a Negotiated Agreement) (Pinkley et al., 2019). In Appendix B, we describe how different configurations of parameters make variations possible. In Appendix C, we describe the most important output variables.

Experimental coalition formation protocols

Coalition formation has been defined as "the joint use of resources to determine the outcome of a decision in a mixed-motive situation involving more than two units" (Gamson, 1964, p.85). It thus entails situations in which at least three individuals (or groups) strive to attain an outcome that they cannot attain individually, but in which individual gains cannot be maximized when all individuals cooperate. Hence, whereas in dyadic bargaining situations, the focal questions are is often *whether* and *how* bargainers reach a negotiated agreement, in coalition formation situations the focal question often is *who* reaches an agreement and who ends op excluded from it.

In order to experimentally study these questions, coalition researchers have devised simple weighted majority games (see Komorita, 1984) such as the political convention (Gamson, 1961b) and landowner paradigms (van Beest et al., 2004a). Although they differ in context, these paradigms share the same structure: participants receive an amount of resources that is insufficient to obtain a monetary payoff by themselves, but which allows them to form coalitions in which their pooled their resources are sufficient to obtain the payoff together. Importantly, they do need to form a consensus on how to allocate this payoff among the members of the coalition.

The simplest simple weighted majority game is one in which three participants each have one resources, and need to form a coalition with at least 2 resources to be able to allocate a sum of money—a game referred to as a 2(1-1-1) simple weighted majority game. Often, however, bargainers differ in resources, such as in the common 5(4-3-2) game, in which three participants receive 4, 3, and 2 resources respectively, and need to form a coalition with at least 5 resources. The way bargainers negotiate with each other, however, differs across different bargaining protocols. The OCG implements two dominant bargaining protocols for three-person coalition formation studies: the one-step Komorita and Meek (1978) display procedure and the more dynamic Kahan and Helwig (1971) procedure. This enables researchers to replicate classic (e.g., Komorita & Meek, 1978; Murnighan, 1978a) as well as newer (e.g., van Beest et al., 2004b) coalition formation studies or adjust these protocols according to the needs of the study. Another reason for choosing these two protocols is that in both situations the participants make initial offers at the same time, meaning that initial offers,which are independent of each other, are collected

from all participants. In these cases, bargaining results cannot be accounted for by differences in speed of decision-making.

One-step protocol

The Komorita and Meek (1978) display procedure is one-step coalition bargaining protocol, meaning that when all members of a prospective coalition agree on how to allocate the payoffs the coalition is immediately formed. This bargaining protocol consists of three phases.

In Phase I, all participants make a coalition offer. This offer consists of two things: a) with whom they want to form a coalition, and b) how they want to allocate the payoff in this coalition. Coalitions can only be formed—and thus proposed—if a specified threshold is reached. For example, in the 5(4-3-2) simple weighted majority game, bargainers—for convenience labeled A, B, and C—hold 4, 3, and 2 resources respectively and the threshold is 5 resources, meaning that every coalition (AB, AC, BC, and ABC) can reach this threshold and can thus be formed.

See Figure 5.1 for the screen participants see when making an offer. In this example, we see the screen for bargainer A in a 5(4-3-2) simple weighted majority game. Note that in this example, the big ABC-coalition is prohibited, but the OCG has the option to allow its formation (see Appendix B on how to configure this).

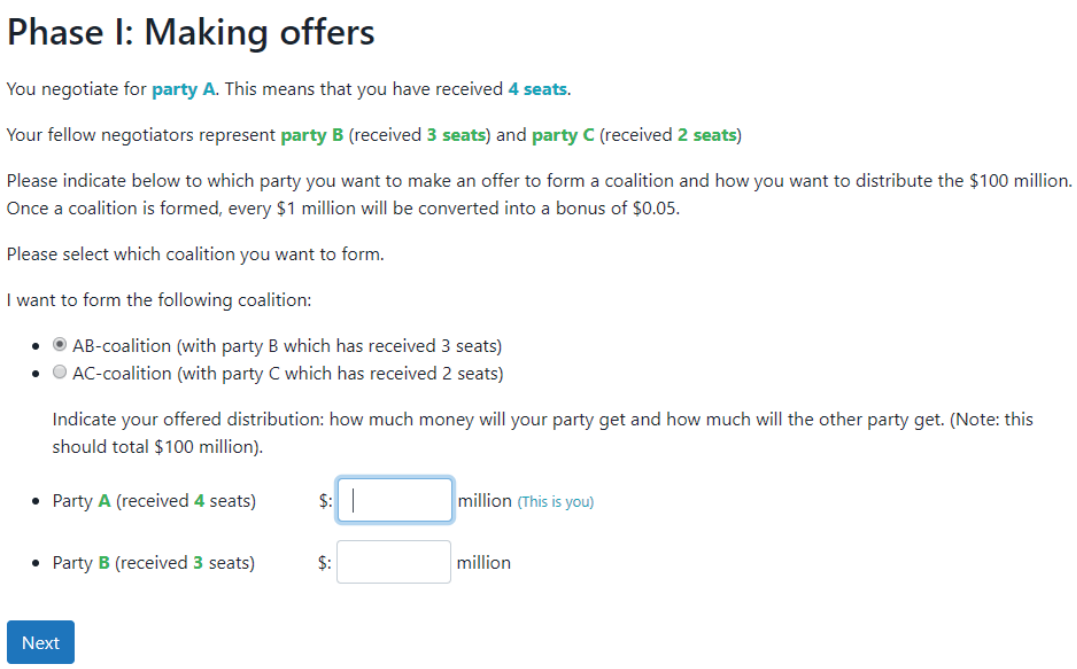

Figure 5.1. Screenshot showing Phase I of bargaining using the OCG.

In Phase II, participants see all offers that were made in Phase I. Participants then select one of the coalition offers that includes themselves. This could be either their own offer or an offer from another participant. Note that it is possible that participants have made the exact same offers in Phase I (e.g., B and C both propose a BC-coalition and the exact same equal split of the payoffs). In this case, this offer is displayed only once but it is indicated which participants have proposed this offer.

See Figure 5.2 for the screen participants see when choosing an offer. In this example, we see the screen for bargainer B. In the previous phase, A has offered to form a coalition with C in which A proposed to allocate the payoffs so that A gets $60 million and C gets $40. Bargainers B and C both propose a BC-coalition, but B proposes to get $55 million and let C get $45 million, whereas C proposes an equal split of the payoffs. Note that the shown possibility to not select any coalition at all is an option that can be turned on or off (see Appendix B).

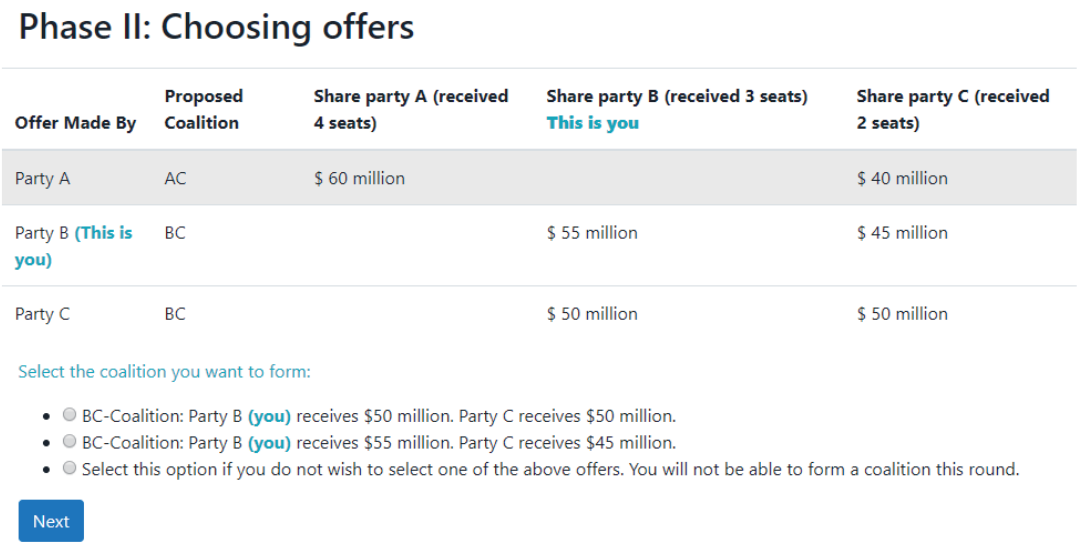

Figure 5.2. Screenshot showing Phase II of bargaining using the OCG.

In Phase III, participants see who has selected which coalition offer. If all members of a proposed coalition have selected this offer, this coalition is formed and the payoffs are distributed as agreed upon by the members of the coalition. If no coalition is selected by all prospective members, a new round starts in which participants go through the same three phases. This process is repeated until a coalition is formed or when the last round, specified by the experimenter, is reached.

See Figure 5.3 for the screen participants see when offers are chosen and a coalition has been formed. In this example, both B and C have selected B's offer,

meaning B gets $55 million and C gets $45 million. Only A has selected the self-made AC-offer and ends up excluded from the negotiated deal.

Phase III: A coalition has been successfully formed!

A coalition has been successfully formed. This coalition is highlighted.

Below you can see which offers have been selected.

Proposed Coalition	Share party A (received 4 seats)	Share party B (received 3 seats)	Share party C (received 2 seats) This is you	Proposed By	Selected By
AC-coalition	$ 60 million		$ 40 million	Party A	Party A
BC-coalition		$ 50 million	$ 50 million	Party C (This is you)	
BC-coalition		$ 55 million	$ 45 million	Party B	Party B Party C (This is you)

Next

Figure 5.3. Screenshot showing Phase III of bargaining using the OCG.

Alternative offers protocol

As a second bargaining protocol, we implemented the protocol from Kahan and Helwig (1971). Phase I and Phase II are identical to the ones used in the one-step procedure described above. After this, however, a few more steps are added, allowing those at risk at exclusion from a coalition to make an alternative offer, making the bargaining more dynamic than in the one-step procedure.

In Phase III, participants see whom selected which coalition offer. If no offer is selected by all prospective members, a new round starts in which participants go back to phase I. If a coalition offer is accepted by all its prospective members, this does not directly lead to a coalition but to a *tentative* coalition. This means that the coalition is not binding, until the members of this tentative coalition confirm their preferences in Phase V.

In Phase IV, the coalition bargainer that is not in the tentative coalition has the opportunity to make an alternative offer to one of the bargainers in the tentative coalition. In this way, they may be able to tempt one of the bargainers to break away from the tentative coalition. If the earlier mentioned ABC-coalition is allowed, there is no excluded bargainer, meaning that no counter offer is made. However, all bargainers will still need to ratify this coalition (or choose not to).

In Phase V, members of the tentative coalition have the option to ratify the tentative coalition and allocate the payoffs as agreed. However, the bargainer who has obtained an alternative offer may choose this alternative offer as well (or no offer at all, if this option is enabled). If this alternative offer is selected, the coalition proposed in the alternative offer becomes the new tentative coalition and another alternative offer can be made. This process will be repeated until a coalition is ratified or when the last round, specified by the experimenter (see Appendix B), is reached.

Conceptual overview of oTree

The OCG is programmed to run on oTree (Chen et al., 2016), an open source platform that enables researchers to conduct real-time interactive experiments in the lab and over the internet. The reason for this is that oTree's architecture makes it highly suitable for interactive bargaining. Whereas an in-depth tutorial of oTree is beyond the scope of this tutorial (see https://otree.readthedocs.io/en/latest/ for extensive documentation), we provide a conceptual overview here.

Sessions and subsessions

When conducting an experiment, multiple participants are recruited in one *session*. In this session, participants may complete multiple tasks that have their own applications (apps). Every app included in the session will have their own *subsession*. For example, when conducting a study using the OCG, participants usually go through two subsessions: first, they read the introduction (subsession 1) after which they bargain (subsession 2). More subsessions can be added if desired, for example one with a post-bargaining questionnaire or another bargaining protocol.

Participants, players, and groups

When participants start a session, they can be identified throughout the entire session by a *participant* code. The word *player* refers to a role a participant takes while bargaining. In the OCG, *player* refers to the three different bargaining positions bargainers can have: A, B, and C. When participants are matched to interact with each other, they are put together in a *group*. In the OCG, three participants will form a *group* of three *players*.

Pages and waitpages

A (sub)session consists of different *pages* and *waitpages*. These are the different screens participants go through when completing a session. *Pages* refer to screens in which participants have to do something, be it reading a text, making an offer, or answering some questions. *Waitpages* are pages on which participants wait until all members of one group arrive on this page. These *waitpages* are used when

input from all participants is needed for a next step in the application. In the OCG, there are *waitpages* in between the different phases in the bargaining protocol. For example, participants cannot go to the selection of offers (Phase II) until all participants have made their offer. *Waitpages* can also be used to match *players* in a *group*. The first *page* of the two OCG bargaining apps are such a *waitpage*.

Hierarchy of objects

The above objects (*session, subsession, group, players,* and *pages)* are all nested. In a *session* there can be multiple *subsessions*, which contain *groups*, which contain *players*, who go through multiple *pages* and *waitpages*. This also means that it is relatively easy to conduct a certain computation for all *players* in a *group* or for all *groups* in a session. See the conceptual overview section in the oTree documentation for more technical details.

Conducting a study using the Online Coalition Game

In this section, we provide a step-by-step overview on how to conduct an (online) study using the Online Coalition Game as well as provide some tips on best practices. For in-depth documentation on each step described below, see the oTree documentation: https://otree.readthedocs.io/en/latest/.

Installing the Online Coalition Game

After installing oTree (see oTree documentation), and starting a new project, download the Online Coalition Game here: https://github.com/JoeriWissink/OnlineCoalitionGame. Copy the folders *Online_Coalition_Game, Online_Coalition_Game_Alternative_Offer, Online_Coalition_Game_Introduction,* and *Online_Coalition_Game_ _Alternative_Offer_Introduction* to your project folder and copy and paste the *SESSION_CONFIGS* from the *settings.py* file into your own *settings.py* file.

Setting up a server

Although studies can be tested on local devices, use of a web server is necessary for conducting an online study. The easiest way to do this is hosting the study on Heroku—a cloud hosting provider (https://www.heroku.com/). Another possibility is setting up a dedicated server. See the oTree documentation for more information.

Configuring a session

Experimenters interact with the server using an *admin* interface. Launching a new session can be done at the *Sessions* page. Here one of the sessions configured in

the *settings.py* file located in your oTree project folder can be launched. In this file, we have already preset two session configurations under *SESSION_CONFIGS*, one using the one-step protocol and one using the dynamic protocol. Both include an *Instructions* subsession before the *Bargaining* subsession. It is also possible to add a session configuration under *SESSION_CONFIGS*. Moreover, the session can be configured in the admin *Sessions* page after selecting one of the session configurations. See Appendix B: Configuring the Online Coalition Game for a description of the different parameters of the OCG.

Number of participants per batch

Part of configuration a session is indicating how many slots to open for participants. When using an online platform such as Amazon Mechanical Turk (Mturk), we recommend collecting data for a single experiment in multiple batches of around 30 participants. We have noticed that substantially larger batches increase the differences in starting times between participants, making matching into triads more difficult. With too small batches, participant dropout might lead to too few participants to match. Also make sure to open up about double the amount of slots in oTree than number of HITs on Mturk. When participants start a study but do not finish it, they will take up a slot in oTree, but if a HIT is not returned in a specified time, a new HIT will be opened by Mturk. Enough open slots in oTree should be available to accommodate participants who accept one of these new HITs.

Reaching participants

After having created a session, access to the experiment can be given by distributing the session URLs found under the *Links* tab. When conducting a study on Mturk, the *Session-wide link* can be shared in the HIT. When conducting a lab session it might be easier to use stable URLs for each lab computer. In this case, a session can be launched, and configured, on the *Rooms* page in the admin interface instead of the *Sessions* page and the links to these stable URLs can be placed on the lab computer desktops. As oTree is totally URL based, all participants need is an internet capable electronic device.

NB: Whereas the experiment functions well across platforms and browsers, we encountered an exception in which a real-effort slider task did not function properly on Internet Explorer and Microsoft Edge. Using JavaScript, we managed to detect participants using these browsers and prompted them to use another browser (see Appendix B).

Monitoring participants

After having launched a session, participants' progress can be monitored under the *Monitor* tab. This tab shows how many participants are currently in the session and where they are in the session.

Introduction subsession

Due to the real-time nature of the OCG, we recommend starting a session with an introduction subsession in which participants are not yet matched. As there will be online participants who start a session but will not finish it, immediately matching participants will increase the chances that one participant in a group will make it impossible for the other (matched) participants to continue. By matching after the introduction subsession, only participants who have already read the first instructions will be matched increasing the chance that only active participants are grouped. In the two preset session configurations, we have added the instructions in a first subsession prior to the bargaining subsession.

Matching page

Once participants are forwarded to the actual OCG app, they will reach a matching page. Once three participants are on this page, they will be matched into a triad and continue. To make sure participants do not wait indefinitely, it is possible to add a time limit to the matching page by enabling *leave_matching* and setting the time limit by configuring *leave_timer* (see parameters below) after which participants will go to the end of the study and receive the base fee.

Participant idleness/dropout

After participants are matched, idleness of one participant could potentially stall the advancement of other participants in the same group. To counteract this, we added timers to all pages between the matching and the formation of a coalition. The time limit can be set by adjusting the *timeout_time* parameter when configuring the session (see parameters below). When participants have not completed a page within the allotted time, they will be kicked from the program. Participants within the same triad of this kicked participant will be forwarded to the end of the experiment where they can obtain their participation fee.

Paying participants

When participants are finished, they are forwarded to a screen displaying a randomly generated completion code, which they can enter when submitting their HIT on Amazon Mechanical Turk. This code also allows linking their HIT to the bonus they are entitled to receive.

Downloading data

After data is collected, it can be downloaded in the *Data* tab of a session or the general *Data* page displaying all sessions. See Appendix C for an overview of the most important outcome variables.

Previous implementations

Validation of the OCG and replication of the Strength-is-Weakness effect

The first implementations of the OCG were two replications of the Strength-is-Weakness effect in coalition formation, one in the lab and one on Mturk (studies and results described in Chapter 2 of this dissertation, data package available here: https://doi.org/10.34894/JXRELG. The Strength-is-Weakness effect is the observation that coalition bargainers with many resources are disproportionally often excluded from coalitions (e.g., Vinacke & Arkoff, 1957). In other words, bargainers with many resources are often excluded from a coalition, as the players in the two low-resource positions form a coalition. This project served as the first high-powered replication of the effect. Due to the unavailability of access to a large online population previous studies either had a small sample size (leading to questionable statistical power), or had to use within-subjects design (which might be problematic due to suggested learning effects (e.g., Kelley & Arrowood, 1960).

In this project, we used the one-step procedure from Komorita and Meek (1978) in a 5(4-3-2) game in a landowner setting (van Beest et al., 2004b) in which player A had 4 acres of land, B had 3 acres and C had 2 acres and in which two participants needed to form a coalition with at least 5 acres of land in which they agreed on how to divide the $100,000 the landowner paid them (of which every $1,000 was converted to a real bonus of $0.05). We conducted a study with the OCG in both a lab setting at a university and one via Mturk.

As three possible coalitions could be formed, a Strength-is-Weakness effect would mean that the formation of coalitions would deviate from a distribution in which all three coalition would be formed in one-third of the cases—with a disproportionate amount of BC-coalitions, excluding the bargainer with the most resources. Our lab sample of 156 psychology undergraduates (52 triads) had 80% power to find a medium to large effect size of $w = 0.43$ and we found an effect size of 0.78. The BC-coalition was formed in 67% of the cases, the AC-coalition in 29% and the AB-coalition in only 4%, $\chi^2(2, N = 52) = 31.89$, $p < .001$. In the Mturk sample of 240 US Americans (80) triads we had 80% power to find a medium to large effect size of $w = 0.35$ and obtained an effect size of $w = 0.72$. The BC-coalition was formed in 65% of the cases, the AC-coalition in 27.5% and the AB-coalition in only 7.5%, %), $\chi^2(2, N = 80) = 40.90$, $p < .001$.

The comparison between the lab sample and the Mturk sample also allowed us to validate the use of the program across different platforms. As both studies yielded highly similar results that were in line with previous literature—and comprehension across both studies was similar: in the lab 84% answered all comprehension checks correctly versus 83% on Mturk—these first uses of the OCG suggest that it leads to robust and valid results, both offline and online. Moreover, the online data collection was clearly showed to be a more time-efficient method: in the lab, we collected 52 triads in 10 weekdays, whereas we collected 80 triads online in just a few hours spread across three workdays.

Besides the benefits, conducting online interactive research brings its own challenges (see Arechar et al., 2017). The main challenge we encountered in this project was matching participants and handling dropout. We paid a participation fee to participants who waited but did not get matched and to participants who dropped out due to an idle participant they were matched to. These participants did not provide data but did constitute 35% of our sampled participants. Note that the above percentage is likely dependent on various factors, such as the minimum amount of time participants need to wait on the matching waitpage (in this study 5 minutes), the maximum amount of time participants have on one page when matched (in this study 2 minutes, see Appendix B for an explanation on how to set timers), and familiarity with the interface. As an example of the latter, in this study, 12 participants—and thus also their 24 matched participants—got stuck due to trying to make offers incorrect format and thus dropped out due to the time limit. In the current version of the OCG, we have added a mandatory practice offer to avoid this issue.

Adding moderators and extending accountability theory

Our second implementation demonstrates how a simple change in the configuration of the OCG allowed us to test a moderator of the Strength-is-Weakness effect whilst at the same time broadening the scope of accountability theory (Konow, 1996, 2000). In this project, we manipulated how bargainers attained their resources: through random assignment or through a real-effort slider task (study and results described in detail in Chapter 4 of this dissertation, data package available here: https://doi.org/10.34894/FCLGKP.

According to accountability theory, one's fair allocation should "vary in proportion to the relevant variables that he can influence (e.g., work effort but not according to those that he cannot reasonably influence (e.g., a physical handicap)" (Konow, 2000, pp. 1973–1974). Ample research shows that people are in favor of equitable allocations based on earned input but not based on randomly received input (e.g., Frohlich et al., 2004; Lee & Shahriar, 2016; Oxoby & Spraggon, 2008; Ruffle, 1998). Our hypothesis was that this phenomenon extends to inclusion in coalitions: when bargainers have attained their resources by exerting effort, bargainers with

more resources—who generally ask for an equitable share based on their resources—are approached and included more often than bargainers with more resources that have randomly received their resources, despite the possibility of avoiding these bargainers and opting for a cheaper coalition.

To test this, we again used an incentivized 5(4-3-2) game and one-step protocol embedded in a scenario in which participants bargain for municipal parties that have 4, 3, and 2 seats respectively and in which 5 seats were necessary to distribute allocate the budget of $90 million (with each $1 million being converted to a $0.05 bonus). In a Random Resources condition (170 triads), participants were randomly assigned their resources. In the Earned Resources condition (171 triads), participants who performed better on a real-effort slider task obtained more resources than those who performed worse (see Appendix B for instructions on how to implement the slider task). More first offers were made to those with more resources when resources were earned (60.8%) than when they were randomly received (51.8%), %), $z = 2.38$, $p = .02$, $OR = 1.45$. There was, however, no strong evidence that bargainers with the most resources were included more often when resources were earned (67.3%) than when they were assigned randomly (57.6%), $z = 1.83$, $p = .07$, $OR = 1.51$. Answers on a post-bargaining questionnaire complemented this data from first offers and formed coalitions, thereby suggesting a possible explanation for these outcomes. Perceptions that bargainers with more resources deserve to be included (measured on a 7-point scale) were higher in the Earned Resources condition ($M = 4.48$, $SD = 1.77$) than in the Random Resources condition ($M = 3.60$, $SD = 1.89$), $F(1, 1012) = 24.65$, $p < .001$, $d = 0.48$. However, these perceptions were always higher for the bargainers with most resources themselves ($M = 4.50$, $SD = 1.87$) than for those with 3 resources ($M = 3.86$, $SD = 1.82$), and 2 resources ($M = 3.77$, $SD = 1.88$), $F(2, 1012) = 6.24$, $p < .001$, $\eta^2 = .01$. This suggests that bargainers with most resources did receive more first offers in the Earned Resources condition because they were considered deserving of inclusion, but that their own (even more inflated) sense of deservingness led them to bargain in a self-interested way that did not promote actual inclusion.

Future avenues

The second project described above demonstrates that the OCG enables the extension of theories to coalition formation settings, which allows a focus on the dynamics of inclusion and exclusion. Besides the possibility of incorporating real-effort slider tasks, the availability of a computerized coalition formation task opens interesting up interesting avenues for research. For example, using the oTree chat functions can be used to further study the role of communication channels in coalition bargaining (e.g., Swaab et al., 2009).

Moreover, varying whether an inclusive coalition including all participants can be formed (see Appendix B on how to configure this) could inform about dynamics regarding inclusion and exclusion. As such, the OCG could be used to investigate whether exclusion from the bargaining table leads to similar threats to the need to belong as social exclusion typically does (Baumeister & Leary, 1995). Perhaps such exclusion hurts even if it is financially beneficial (similar to €yberball studies, van Beest & Williams, 2006), and people make suboptimal coalition offers in order to avoid exclusion. Moreover, whereas we know a lot about the consequences of exclusion (see Williams, 2007), the OCG could complement this research by studying processes leading to inclusion and exclusion.

The OCG could also be used to further investigate the effect of phantom BATNAs (Best Alternative to a Negotiated Agreement) (Pinkley et al., 2019; Pratkanis & Farquhar, 1992). In dyadic studies, BATNAs are often a static, predetermined payoff that participants get if they are not able to reach a negotiated outcome. Phantom BATNAs, on the other hand, are uncertain alternatives that may or may not materialize. Within the coalition formation framework, the bargainer a participants do not send an offer to could be seen as a phantom BATNA, someone to make an offer to if one's preferred coalition turns out to be less profitable than expected. As such, phantom BATNAs could be conceptualized in terms of bargaining alternatives by manipulating the number of resources bargainers hold and the number of resources a coalition needs to have to access the payoffs. Whereas research on phantom BATNAs shows that having more opportunities leads to higher power perceptions and higher bargaining performance (Pinkley et al., 2019), these hypotheses could be tested in the realm of coalition formation in which driving a hard bargain may lead to exclusion.

Finally, the OCG framework could be extended to, for example, conduct experiments with more than three bargainers, or to conduct multivalued studies in which different coalitions yield different payoffs. Although this is not possible within the current version of the OCG, programming enthusiasts with knowledge of Python, HTML and Django, should be able to build these features on top of the existing code.

Conclusion

In this chapter, we presented the Online Coalition Game: an open access tool enabling high-powered interactive coalition formation research. We demonstrate that online use of the OCG provides the benefits of large sample size and fast data collection, whilst leading to valid and robust findings. Moreover, we show that small changes in the experimental set-up offer interesting opportunities to expand coalition formation theory by including insights from, amongst others, literature on bargaining, ostracism, communication, and vice versa.

Chapter 6

General discussion

Individuals often form coalitions to attain outcomes they cannot attain individually. An ill-understood observation is that strong coalition bargainers, bargainers with many resources, are surprisingly often excluded from coalitions (Caplow, 1956; Chaney & Vinacke, 1960; Kelley & Arrowood, 1960; Murnighan, 1978b; van Beest et al., 2011, 2004b; Vinacke, 1959; Vinacke & Arkoff, 1957; Wilke & Mulder, 1971, 1974). The aim of this dissertation is to further the understanding of the processes underlying this Strength-is-Weakness effect.

To better understand the Strength-is-Weakness effect, we first investigated its prevalence. Are strong bargainers actually often excluded? Are there situations in which they are less often excluded or even most often included? Second, a shared property of the three empirical chapters in this dissertation is the focus on the use of equity norms by coalition bargainers. Do people actually apply these equity norms? If so, why do they use them?

The structure of this discussion is as follows. First, I will give an overview of the findings from this dissertation's studies, thereby answering the above questions. Second, I will evaluate the three previous explanations—confusion theory, the conspiracy hypothesis, and the use of equity norms—in the light of the obtained findings. Third, I will integrate the obtained findings and propose a tentative new theory of how the Strength-is-Weakness effect emerges. After this focus on the Strength-is-Weakness effect, I will elaborate on broader theoretical and practical implications of the obtained findings. Finally, I will address some limitations and remaining questions that can be addressed in future research.

Overview of findings – Answers to questions

How strong is the empirical support for the Strength-is-Weakness effect?

The Strength-is-Weakness effect is an often-documented phenomenon. A limitation of previous studies, however, is that they often contained very small sample sizes, leading to low statistical power and thereby increasing the probability of false positives (Ioannidis, 2005). Moreover, it is unclear to which extent the Strength-is-Weakness effect has been an artefact of the most often used experimental paradigms and/or protocols (e.g., Kelley & Arrowood, 1960).

To address these issues, we conducted two high-powered replications. Using the Online Coalition Game (OCG) we have developed, participants bargained in a 5(4-3-2) landowner paradigm in which bargainer A had 4, B had 3, and C had 2 resources. Results from these two replications provide evidence that the Strength-is-Weakness effect is a robust phenomenon. Both in our psychology student lab setting (Study 2.1) and using an Amazon Mechanical Turk sample (Study 2.2), the majority of formed coalitions were BC-coalitions (i.e., coalitions between the bargainers with 3 and 2 resources). Strong bargainers were included in 33% and 35% of formed coalitions

respectively. This inclusion rate is about 30% lower than would be expected when all coalitions would be formed equally often (66.6%).

Evidence for a Strength-is-Weakness effect is also provided by results from two other studies in this dissertation. In Study 3.4, participants bargained in a 4(3-2-2) landowner paradigm. In this study, strong bargainers were included in 34% of formed coalitions. In Study 4.1, participants bargained in a 5(4-3-2) simple weighted majority game in which bargainers negotiated for inclusion in (and access to the budget of) a municipal council. In this study, strong bargainers were included in 57.6% of formed coalitions, a percentage that again was statistically different from 66.6%.

Do coalition bargainers use equity norms in coalition bargaining?

The assumption that bargainers use equity when deciding how to allocate payoffs—and that this leads to Strength-is-Weakness effects—is at the center of classic coalition theories (e.g., Gamson, 1961a; Komorita & Chertkoff, 1973). This means that bargainers with more resources are postulated to expect and demand a higher share of the payoffs generated by a coalition. Direct evidence for this assumption, however, remains scarce. The main reason for this is that coalition theories have been typically tested at the level of coalition outcomes (formed coalitions and allocations within these coalitions) and not at the level of coalition processes, such as first offers. Consequently, there is little evidence that the Strength-is-Weakness effect is due to the use and/or expectation of equity norms in actual bargaining.

In Chapter 2, we focused on two ways in which equity norms could lead to a Strength-is-Weakness effect. First, we looked at the *application* of equity norms, by looking at differences in the magnitude of opening offers between bargainers with different resources. In both Study 2.1 and Study 2.2—and all other studies in this dissertation in which we could test this effect—we found that bargainers with more resources on average proposed to keep more for themselves in their first offers than bargainers with fewer resources did. This was not only the case for the strongest bargainers (with 4 resources), but bargainers with 3 resources also proposed to claim more for themselves than bargainers with 2 resources did. These same differences were found in final allocations in the formed coalitions in Studies 2.1, 2.2, 4.1, and 4.2: those with more resources on average obtained a higher share of the payoffs than those with fewer resources. Given that this behavior incentivizes weak bargainers to form the cheapest winning coalition, it is reasonable to assume a causal relationship between differences in magnitude of offers and the Strength-is-Weakness effect.

A second way the notion of equity norms could lead to a Strength-is-Weakness effect is through *expected* use of equity norms. If weak bargainers expect strong bargainers to bargain for a higher share of the payoffs than other weak

bargainers, they are incentivized to avoid strong bargainers from the outset. To investigate whether this is the case, we analyzed to whom bargainers make their first offer. Across many studies in this dissertation (Studies 2.1, 2.2, 3.1, 3.2, and 3.4[35]), we indeed found that most first offers were made to the other bargainer who had the fewest resources. A further finding that supports the notion that equity norms are expected comes from Study 3.3. In this hypothetical study, a strong and a weak bargainer made a first offer to weak bargainers who did not have the opportunity to make an offer themselves. In this setting, we found that the hypothetical strong bargainers were indeed avoided when they made equitable offers, but were actually preferred as coalition partners when they proposed an equal split of the payoffs. This suggest that strong bargainers are usually avoided because they are expected to make unattractive offers, but that when strong bargainers have the opportunity to counter this expectation timely, they are in fact included quite often.

Why do strong coalition bargainers use equity norms in coalition bargaining?

In Chapter 2, and supported by studies from other chapters, we established that coalition bargainers adhere to—and expect the use of—equity norms. Previous theorizing does not explain *why* strong bargainers apply equity norms, especially in a setting in which differences in resources do not lead to differences in bargaining power. In Chapter 3, we tested two alternative accounts against each other. The first was the *passive adoption* account. According to this account, strong bargainers, in line with bargaining theory (Komorita & Chertkoff, 1973), take equity as a starting point in their reasoning. Subsequently, in a similar vein as findings on egocentric interpretations of fairness (Babcock & Loewenstein, 1997), bargainers engage in biased reasoning due to their bargaining position. Consequently, they fail to consider the likely fairness principle preferred by the weak bargainers, namely equality. A second hypothesized account was the *active selection* account in which strong bargainers consider both equality and equity but, as hinted at by Wilke (1985), make equitable offers strategically in the hopes of increasing their obtained payoffs.

In Studies 3.1, 3.2, and 3.4 we assigned participants to either no position at all—after which participants could choose their own position—or assigned participants to the weak bargaining position—after which they could choose whether or not to switch to a strong bargaining position. In the former setup, viewing the bargaining position from no position at all, participants should not be able to passively adopt equity. In the latter, participants assigned to the weak bargaining position should even initially adopt the principle of equality, because this is the fairness principle that should be triggered by thus position (see Komorita & Chertkoff, 1973).

[35] Study 3.3 did not allow us to test this effect. In Chapter 4, we only expected this preference for weak bargainers in the control condition of Study 4.1. A too strong emphasis on random allocation of resources might be the reason why we did not find it here (see Remaining questions section in this discussion).

Regardless, we found that, on average, strong bargainers still claimed a higher share for themselves than weak bargainers did. Based on these results, we concluded that strong bargainers are more likely to actively choose to apply equity whilst bargaining instead of passively adopting equity because it is the most salient allocation rule.

Is having many resources always a liability?

In Chapter 2 and Chapter 3, we have found support for the notion that having many resources in power-irrelevant settings (i.e., in which bargainers differ in resources but have the same pivotal power) is detrimental to one's inclusion in a coalition. A fourth central question in this dissertation was whether this is always the case.

The role of relevant input. In Chapter 4 we focused on what Adams (1965) calls *relevance* of input. Input relevance refers to the perception that the input is perceived to be a legitimate basis to calculate an equitable payoff. Adams argued that when people disagree on whether input is relevant, they also disagree on whether an allocation of payoffs based on this input is fair. Based on this notion, we reasoned that the Strength-is-Weakness effect would also be impacted by perceptions of input relevance. That is, if strong bargainers (are expected to) apply equity norms, this is likely to be accepted more by weak bargainers when they perceive resources to be relevant versus when they find them irrelevant.

In Chapter 4, we manipulated input relevance of resources in two ways. In Study 4.1, we manipulated whether resources were acquired through randomness or through performance of a real-effort slider task, which according to accountability theory (Konow, 1996, 2000) should lead to a perception of input relevance in the latter condition. In Study 4.2, we increased relevance of resources by making an explicit link between input (i.e., resources) and output (i.e., payoffs); strong bargainers contributed more to the overall payoffs than weaker bargainers did.[36] Our main hypotheses were that an increase in input relevance should lead to an increase in first offers to and inclusion of strong bargainers.

We found partial evidence for these two hypotheses. In Study 4.1, strong bargainers who earned their resources were seen as more deserving of inclusion in a coalition and were more often approached. Moreover, we found a Strength-is-Weakness effect when resources were randomly attained and no Strength-is-Weakness effect when resources were earned. However, the difference in inclusion rate of strong bargainers between the two conditions, was not statistically significant (p = .07). In Study 4.2, we found no differences in first offers to and inclusion of strong bargainers between the two conditions. However, when analyzing a subset in which we excluded the large number of participants who failed the manipulation check—i.e.,

[36] Note that strong bargainers contributed more the general payoffs for everyone and not only to a coalition including the strong bargainers.

participants who indicated that resources and payoffs were linked in the condition in which they were not and vice versa—we did find an increase in both first offers to and inclusion of strong bargainers.

Interestingly, although this provides tentative evidence that strong can be included more often when resources are perceived to be relevant input, in no situation did the Strength-is-Weakness flip over to a Strength-is-Strength effect in which the inclusion rate of strong bargainers exceeds 66.6%. These results thus suggest that the original disadvantage of strong bargainers is so large that attempts to make them more attractive seem to make them at most equally attractive as weak bargainers rather than more attractive.

The role of perceptions. Another important insight provided by the results from Chapter 4 is the role perceptions of the bargaining situation play in determining who gets included in a coalition. Weak bargainers' perceptions that strong deserved to be included—which was heightened in our experimental conditions—predicted first offers to strong (vs. weak) bargainers. Moreover, in line with accountability theory (Konow, 1996, 2000), the extent to which weak bargainers felt the amount of resources they held was controllable—which was heightened in the effort condition—also predicted first offers to strong bargainers. Chapter 4 also showed the consequences of biased or even wrongful perceptions of the bargaining situation. Both abovementioned perceptions were biased in a self-serving way: strong bargainers indicated that resources were more controllable than weak bargainers said they were, and found themselves more deserving on inclusion than their weaker counterparts did. We suspect that these self-serving perceptions foster disagreement over appropriate payoff allocations, keeping strength in resources from becoming a real strength in terms of inclusion. Finally, results from Study 4.2 suggest that people can have downright incorrect perceptions about the bargaining situation and that that these incorrect perceptions can lead to unexpected behavior. They suggest that a proportion of participants in the control condition incorrectly perceived a link between resources and payoffs and that this wrongful perception led to more offers to strong bargainers.

Making attractive offers (timely). Other situations in which strength in resources is less of a weakness is in settings in which strong bargainers can (timely) make attractive offers. In Study 3.3, we found that equitable offers from strong bargainers were often rejected, but equal offers from strong bargainers were more often accepted over equal offers from weak bargainers. This finding, however, needs a disclaimer. In study 3.3, participants simultaneously received two hypothetical offers: one from a strong and one from a weak bargainer. The offer participants accepted would be executed immediately. That these offers are so successful here but apparently less so in the interactive bargaining studies suggests the following. Weak bargainers often make first offers to other weak bargainers because they expect

strong bargainers to apply equity norms. This initial attraction between weak bargainers might then function as a commitment to forming that coalition, or a safe option, from which opting out might be perceived to be risky. Consequently, weak coalitions might form despite an equally good (or even better) offer from a strong bargainer. This thus suggests that strong bargainers should not only make attractive equal offers to promote their own inclusion in a coalition, but that they should do it in a timely fashion, before weak bargainers have a chance to find each other.

Beyond power-irrelevant and simple settings. The focus of this dissertation has been on simple situations (i.e., with a fixed payoff for every coalition) with power-irrelevant resources (i.e., in which bargainers differ in resources but have the same pivotal power). To conclude this section, I will use insights from previous research to comment on whether strong bargainers are more likely to be included when resources are power-relevant or in multivalued settings in which payoffs vary between formed coalitions.

We can reasonably assume that strength is less of a weakness when resources are power-relevant. On the basis of theories like minimum power theory (Gamson, 1964) and the weighted probability model (Komorita, 1974), bargainers with more bargaining alternatives are more likely to be included in a coalition, simply because they are more necessary for the successful formation of coalitions than parties with lower pivotal power. This notion has been empirically supported (Murnighan, 1978b).

In multivalued settings, coalitions including strong bargainers yield a higher payoff than smaller coalitions. In such settings, including a strong bargainer might be beneficial, as long as the higher share claimed by a strong (versus a weak) bargainer is sufficiently offset by the increase of the total payoffs. This notion finds support in a coalition bargaining study in which three bargainers always contributed 60, 40 and 20 points respectively to the payoffs but in which their resources differed across conditions (Komorita et al., 1989). In this study, the bargainer with the most resources was included more often when their relative strength in resources was not that large (i.e., in a 19-15-11 game) but was not included more often when it was large (i.e., in a 27-15-3 game). This suggests that choosing a coalition partner can be a trade-off between the absolute payoffs they bring to a coalition and the amount of payoffs they are suspected to claim in a coalition.

Evaluation of previous explanations

Above, I gave an overview of the most important findings from this dissertation. In this section, I will evaluate the three previously proposed explanations for the Strength-is-Weakness effect in the light of these findings.

The confusion hypothesis

The first previous explanation for the Strength-is-Weakness effect was the confusion hypothesis (e.g., Kelley & Arrowood, 1960; Vinacke & Arkoff, 1957). According to this explanation, strong bargainers are often excluded because they fail to realize the formation of a coalition is necessary to attain the coveted payoffs. As weak bargainers realize this quicker, they are more likely to initiate bargaining and thus form a coalition, excluding the strong bargainer. The assumption made is thus that only strong bargainers, and not weak bargainers, confuse differences in resources with differences in pivotal power. Hence, strong bargainers should be the only one whose behavior deviates from the rational perspective that all bargainers are equal.

In all our studies, however, we found that all three bargainers deviate from this rational perspective. First, the majority of both strong and weak bargainers, instead of only the former, make their first offers to the other bargainers with fewest resources. Second, not only the strong bargainer claims a higher share of the payoffs than the other bargainers do; in situations in which bargainer B has more resources than bargainer C, the former claims a larger share than the latter. The notion that strong bargainers are responsible for their own exclusion because they understand the situation differently than the other bargainers thus does to receive support.

Conspiracy theory

The second previously proposed explanation for the Strength-is-Weakness effect was conspiracy theory (e.g., P. J. Hoffman et al., 1954; Wilke & Mulder, 1971). According to this conspiracy theory, weak bargainers view the strong bargainer's position as an initial (unearned) advantage. The assumption is that exclusion of strong bargainers is seen as a way to offset this initial advantage.

One result from this dissertation that meshes with this perspective is that weak bargainers are initially attracted to each other. Moreover, the finding that this initial attraction is attenuated when the distribution of resources is determined through effort, does suggest that fairness and deservingness play a role in the Strength-is-Weakness effect. Given that there is no actual advantage of being a strong bargainer in our studies, however, conspiracy theory has a hard time explaining why strong bargainers are excluded. Moreover, as conspiracy theory lays the cause of the Strength-is-Weakness effect in the hands of weak bargainers, it also fails to explain why strong bargainers also try to form a coalition with the weakest bargainer instead of being indifferent between the other bargainers.

The use of equity norms

The third explanation that has been proposed for the existence for the Strength-is-Weakness effect is the use of equity norms (Gamson, 1964). According to

this perspective, strong bargainers are avoided because they claim a higher share of the payoffs, or are at least expected to do so. The avoidance of strong bargainers is thus seen as a rational decision, driven by a motivation to maximize one's own payoffs.

In the studies presented in this dissertation, we have found much support for the use of equity norms. Bargainers with many resources claim a higher share of the payoffs than bargainers with fewer resources do. Moreover, initial offers are directed at those with fewer resources to avoid those whom are expected to make the largest claim. Finally, we found that strong bargainers increased their inclusion rate when they could timely make equal offers. We thus found evidence for the (expected) use equity norms and some evidence for their causal role in the Strength-is-Weakness effect.

Previous theorizing on equity and the Strength-is-Weakness effect, however, fails to explain the entirety of the Strength-is-Weakness effect. First, it fails to explain *why* strong bargainers use equity in the first place, especially in settings in which having more resources does not lead to more pivotal power or an increase of the coalition's payoff. Second, it does not specify under which conditions—and thus why—strong bargainers' proposals to allocate the payoffs equitably are rejected.

What causes the Strength-is-Weakness effect? - Towards a new theory

In this section, I will use insights from the studies conducted in this dissertation and from theories on partner selection in biological markets to propose a new tentative theory on the underlying causes of the Strength-is-Weakness effect.

The strategic use of equity norms

First, I propose that the Strength-is-Weakness effect is partly caused by a conscious, yet misguided, choice by strong bargainers to apply equity norms when formulating their opening offer. Conscious, because this behavior persists when other allocation rules are highlighted. Misguided, because strong bargainers seem to mispredict the consequences of this decision. In a way, confusion hypothesis' assumption that strong bargainers do not have a rational perception of the bargaining situation is correct. However, this misperception does not seem to lie in perceptions of power, but the perception that their equitable offers will be accepted.

An open question is why strong bargainers think their offers are acceptable in the first place. A suggestion comes from literature on partner selection in biological markets. According to this perspective (e.g., Barclay, 2013), individuals can make themselves attractive through competitive generosity; by offering more benefits to a prospective bargainer than their competitors. However, a high 'market value' (i.e., the ability to confer benefits to a partner) is proposed to offset this necessity for

competitive generosity. In other words, high quality partners are attractive in themselves and thus do not have to advertise themselves. This raises the possibility that strong bargainers in coalition formation overestimate their market value and thus attractiveness to others and hence fail to engage in outbidding their competitors. Results from Study 3.3 suggest that strong bargainers may have a higher market value than weak bargainers when both make similar (attractive) offers, but strong bargainers might not realize that this only is the case when a large connotation of being strong—making equitable offers—is taken out of the equation. However, the observation that strong bargainers even make these self-serving offers in the studies from Chapter 3 suggests that strong bargainers themselves do not have to think that power-irrelevant resources hold much value. It rather seems that strong bargainers hope resources carry some signaling value, and that the resulting attractiveness permits them to make self-serving offers.

(Ir)relevance of resources

This use of equity norms is only part of the mechanisms leading to the Strength-is-Weakness effect. The second contributor seems to be a disagreement between strong and weak bargainers on whether resources are relevant input for calculating an equitable share of the payoffs. Looking at the differences and similarities between the control conditions and experimental conditions in the studies reported in Chapter 4, two things stand out. First, the observed pattern of first offers did not differ as a function of input relevance. Regardless of input relevance condition, on average, strong bargainers claimed a higher share of the payoffs than weak bargainers did. Second, weak bargainers' approach of strong bargainers increased in conditions in which resources were made more relevant. This suggests that strong bargainers always behave as if resources are relevant input, but that weak bargainers only accept this (expected) behavior when resources are actually relevant. However, self-reported perceptions of input relevance and deservingness suggest that, even when resources are more relevant, biased perceptions may foster lingering disagreement, stopping strength in resources becoming strength in terms of inclusion.

The tentative verdict

Taking the abovementioned mechanisms together, I propose that both strong and weak bargainers contribute to the emergence of a Strength-is-Weakness effect. Weak bargainers contribute to the effect because they seek out other weak bargainers, especially when the relevance of resources is absent or ambiguous. The reason for this behavior is that they expect strong bargainers to claim a larger share of the payoffs than weaker bargainers and they can maximize their own payoffs by avoiding them. When they perceive resources to be more relevant, however, they try to include

strong bargainers, because they perceive them to be more deserving of an equitable share of the payoffs.

Strong bargainers contribute to the effect by making unattractive, equitable offers, even when the relevance of resources is absent or ambiguous. Strong bargainers do not make these offers because they think that these offers are the most attractive. Rather, strong bargainers overestimate the impact of their resources on the other bargainers. They understand that having many resources does not bring direct advantages, but nevertheless hope resources carry some signaling value, making them attractive as bargaining partners. Strong bargainers' perceptions of the situation thus are not biased in the sense that they think they are more advantaged, but towards thinking that others think they do.

Moreover, I propose that disagreement between strong and weak bargainers regarding input relevance and subsequent deservingness contributes to the Strength-is-Weakness effect. Strong bargainers are likely to ascribe input relevance to resources or at least act as if resources are relevant. Conversely, weak bargainers are likely to discount the relevance of input. Consequently, strong bargainers are likely to make equitable offers that are perceived to be illegitimate by weak bargainers. Moreover, weak bargainers may be unlikely to approach strong bargainers whom they expect to make these illegitimate offers.

Finally, I propose that the Strength-is-Weakness effect might also occur despite attractive offers from strong bargainers. Weak bargainers often make first offers to each other, before they have observed the first offers from the other bargainers. These first, reciprocal offers may function as a commitment that leads to the formation of a weak coalition, despite attractive offers from strong bargainers. The reciprocal first offers may also make the weak coalition a safe default option, which is likely to materialize if further pursued. A deviation from this perceived default option might be perceived to be riskier, promoting the formation of a weak coalition.

Broader theoretical implications

Besides providing insights on the Strength-is-Weakness effect, the findings from this dissertation also have broader theoretical implications.

Resources versus pivotal power

Findings from this dissertation contribute to a classic debate in coalition formation literature: whether coalition outcomes can be predicted by differences in resources or differences in pivotal power (e.g., Gamson, 1964; Kravitz, 1981; van Beest et al., 2004a). In this dissertation, bargaining behavior and outcomes could be predicted based on the power-irrelevant resources participants held. Hence, this provides support for theories that conceptualize input as resources, such as minimum resource theory (Gamson, 1961a) or bargaining theory (Komorita & Chertkoff, 1973).

It provides support for the idea that resources have a normative function: that they provide "a standard or frame of reference for a fair or equitable division of the reward in a coalition" (Komorita, 1984, p. 193). This does not mean that pivotal power, resulting from differences in resources, does not also shape coalition formation outcomes. It is, however, important to realize that, in the absence of differences in pivotal power, differences in resources provide psychological meaning on the basis of which coalition bargainers make decisions that steer coalition outcomes.

Note that I do not suggest a return to classic coalition formation theories focusing mainly on the explanatory power of resources and bargaining alternatives. When testing these classic theories, the dominant approach has been to manipulate the configuration of resources and test the fit between predicted coalitions and payoffs, based on the assumptions of several theories, and the observed coalitions and payoffs. Such an approach has several limitations. One of these limitations is that such an input-output perspective leads to a black box regarding the mediating processes. As others have done before me (Komorita & Parks, 1995; van Beest & van Dijk, 2007; Wilke, 1985), I advocate for a process-oriented approach theory to coalition formation research in which psychological, rather than structural, factors and their consequences for coalition behavior and outcomes are studied. This dissertation has contributed to this ideal by investigating the (psychological) processes leading to the Strength-is-Weakness effect by manipulating factors pertaining to psychological processes and/or measuring the processes, such as perceptions of deservingness and salience of allocation norms.

Strategic and 'real' fairness in coalition formation

The results from the studies reported in this dissertation also relate to a broader discussion on whether bargainers are steered by actual concerns for fairness or whether fairness principles are employed strategically (e.g., van Dijk, Leliveld, & van Beest, 2009; van Dijk & Tenbrunsel, 2005). There is evidence that individuals apply fairness strategically (e.g., Camerer & Thaler, 1995; Pillutla & Murnighan, 1995), for example by seeming to allocate payoffs equally in an Ultimatum Bargaining Game, while in fact the allocated chips are worth twice as much for themselves (e.g., Kagel, Kim, & Moser, 1996; van Dijk & Vermunt, 2000, Study 1). Other research, however, has reported behavior in which participants seemingly benefit others without any ulterior motives. Examples are non-zero offers in dictator games (Kahneman, Knetsch, & Thaler, 1986; van Dijk & Vermunt, 2000, Study 2), in which there is no repercussion for unfair allocations, and the formation of costly oversized coalitions if this prevents others from incurring disproportionate losses (van Beest, van Dijk, de Dreu, & Wilke, 2005; van Beest et al., 2003).

In the studies presented in this dissertation, we have found evidence for strategic and 'real' fairness behavior. Strong bargainers' adherence to equity norms

seems to be strategic: even when the principle of equality is highlighted, strong bargainers adhere to the equity principle, suggesting that this is a strategic decision rather than a misinformed attempt to make a fair offer. Conversely, the increased approach of strong bargainers by weak bargainers when resources are earned indicates a less self-serving notion of fairness. This behavior suggests coalition behavior based on an assessment on how deserving one is of certain outcomes, even if this means approaching a bargainer that is likely to ask for a higher share of the payoffs.

This dissertation thus lends support for a balanced view on self-interest and fairness, in which, in line with classic theorizing, bargainers form coalitions that maximize their payoffs given a certain fairness principle (e.g., Gamson, 1964; Komorita & Chertkoff, 1973), but in which bargainers also evaluate and value the outcomes of others. Our findings are thus in line with the social utility approach to coalition formation, which postulates that coalition bargainers derive utility from their own and others' outcomes (van Beest & van Dijk, 2007). Whereas this approach has mainly focused on the notion that bargainers are averse against harming each other, the current results complement this view by showing that coalition bargainers evaluate how deserving bargainers are of certain outcomes and act on the basis of this evaluation, even if this means obtaining a smaller share of the payoffs.

Extending accountability theory

Findings in this dissertation also show that accountability theory can be extended from situations in which the main question is *how* to allocate payoffs, to situations that add the question with *whom* payoffs will be shared. Accountability theory states that the application of equity norms is deemed acceptable when the input for an equitable calculation is based on input that is within one's control, such as effort, but not input that is outside one's control, such as random windfalls or a handicap (Konow, 1996, 2000). A logical extension of this theory to coalition formation would predict a higher inclusion of strong bargainers when resources are earned through effort versus when they would have been assigned randomly. However, the possibility to select the person to share the payoffs with could lead to more self-interested avoidance of strong bargainers. Although the evidence we provided for an actual increase in inclusion of strong bargainers was not very strong, strong bargainers were approached more often when they have attained their 'advantage' in resources through effort rather than through randomness. This suggests that coalition bargainers are sensitive to input relevance when deciding which coalition they want to form.

The role of (mis)perceptions in coalition formation

A final important insight provided by the results from this dissertation's studies is the important role of (mis)perceptions of the bargaining situations in shaping coalition formation. Whereas this role of (mis)perceptions has been recognized by scholars (e.g., Kelley & Arrowood, 1960; Psathas & Stryker, 1965; Wilke & Mulder, 1971), the focus has largely been on perceptions regarding resources and pivotal power. Based on our findings, however, the objects of these (mis)perceptions seem to be one's attractiveness as a bargaining partner, input relevance, and deservingness rather than resources and pivotal power. Although structural aspects of the bargaining situation may be understood similarly by strong and weak bargainers, self-serving biases regarding more person-focused variables seem to have the potential to create disagreement leading to Strength-is-Weakness effects. A striking example of this notion is the observation that strong bargainers perceived the amount of resources one has to be more controllable than weak bargainers (Study 4.1). This suggests that basic biases such as attributing successes to oneself and failures to external factors (e.g., Sobel, 1974) have the potential to distort the effect of input relevance and thus perceived deservingness in a coalition bargaining settings.

This also has implications for researchers studying coalition formation processes. Especially Study 4.2 shows the importance of installing appropriate manipulation checks to control for misperceptions of the presented bargaining situation. Although certain biased perceptions might be persistent—and actually the topic under investigation—misperceptions regarding the manipulated variables can distort the effect of manipulations. In Study 4.2, it seems that this was the case for our manipulation of relationship between resources and payoffs, because a large proportion of participants also reported seeing this relationship in the control condition. Besides trying to create unambiguous manipulations, an additional challenge seems to be to create effective manipulation checks and preregister exclusion criteria.

Practical implications - Interventions

A finding that is central to this dissertation is that coalition bargainers who have many resources are very often excluded from coalitions. Whereas this might not be a problem when this means excluding exploitive bargainers, strong bargainers seem excluded more often than warranted based on the first offers. In these cases, discrimination based on resources seems unfair to those who happen to have more of them. Moreover, in some situations, such as governmental coalition formation, potential coalition members are representatives and resources are dictated by the support of their constituency. In these situations, excluding strong bargainers means excluding the representative that speaks for the largest proportion of voters, something that seems counter the ideal of a representative democracy.

There might thus be situations in which a more level playing field for all coalition bargainers is desirable. Below I will discuss several interventions that might accomplish this. As both strong and weak bargainers are partly responsible for the emergence of a Strength-is-Weakness effect, interventions aimed at reducing it should be aimed at both strong and weak bargainers.

Changing perceptions

One of the interventions aimed at strong bargainers concerns changing their perceptions of the bargaining situation. Importantly, previous studies have shown that interventions aimed at changing coalition bargainers' perceptions that all bargaining positions are equal (Vinacke et al., 1964) or aimed at highlighting that there are multiple distributive fairness principles (Chapter 3 of this dissertation) are unsuccessful in decreasing the Strength-is-Weakness effect. A tentative conclusion of this dissertation is that strong bargainers make unattractive offers because they think they are attractive partners in themselves who can get away with these offers. If this is the case, interventions should be aimed at preventing strong bargainers from overestimating their own attractiveness, for example by highlighting that weak bargainers are likely to see their large amount of resources as a threat rather than an asset.

Likewise, interventions could be aimed at decreasing weak bargainers' focus on the resources of the other bargainers. Whereas resources do predict the magnitude of first offers, a large proportion of strong bargainers make attractive, egalitarian offers, meaning that exclusion based on resources is not always warranted. Moreover, previous research suggests that the ability to provide feedback on offers can decrease self-serving offers (Chertkoff & Braden, 1974), meaning that rejecting strong bargainers offers but giving them a second chance may prove fruitful.

Another practical implication of the current work is that the existence and magnitude of a Strength-is-Weakness effect may be contingent on how (un)ambiguous the source one one's resources is. Following our extension of accountability theory (Konow, 1996, 2000), the perception that one has acquired many resources through effort should increase the probability that others are willing to include them in a coalition. Possibly, disagreement regarding input relevance, and thus the Strength-is-Weakness effect, may be lower in settings in which the process of acquiring resources is transparent (e.g., in a fair election in which there is a clear relation between acquired votes and seats) than in situations in which the source of resources is less traceable. A practical implication is thus that it might pay off for strong coalition bargainers to change the other bargainers' perceptions of input relevance by highlighting the effort they have exerted to be in their 'advantaged' position. Hence, communicating that one is a common person that has toiled hard to achieve their position seems to be a better strategy than claiming that this was an easy feat for a

superhuman such a oneself. Of course, given the self-serving biases discussed earlier, the question is whether others will believe this or downplay this effort.

Structural interventions

Another practical implication of the current dissertation is that inclusion of strong bargainers can be promoted when they can timely announce their egalitarian intentions. As such, institutionalized norms as giving the largest party the first opportunity to start bargaining might promote their inclusion. Non-experimental evidence for this notion can be found in governmental coalition formation. Analyses of this type of coalition formation in Western European democracies shows that parties that have most seats in parliament often become the one to start negotiations (i.e., the *formateur*) and that this formateur status promotes inclusion in the governmental coalition (Bäck & Dumont, 2008; Warwick, 1996).

Another intervention that might be successful in promoting the inclusion of strong bargainers is by making bargaining as public as possible. Previous studies have shown that bargaining in public (vs. private) channels promotes the formation of inclusive coalitions including all bargaining partners (Swaab et al., 2009). The current findings suggest that initial offers between weak bargainers could promote the formation of weak coalitions, despite later attractive offers from strong bargainers. Making coalition bargaining a public event including all coalition bargainers might work against initial commitments, creating a more level playing field. However, the question is whether this intervention is tenable or whether weak bargainers would still approach each other through backroom politics.

Limitations and remaining questions

The research conducted in this dissertation was aimed at uncovering the underlying processes leading to the Strength-is-Weakness effect in coalition formation. In the process, multiple follow-up questions have also been uncovered.

Why do strong bargainers actively select the equitable allocation rule?

In this dissertation, we found little evidence for the notion that strong coalition bargainers passively adopt equity norms without thinking beyond this most salient notion of distributive fairness. Based on this, I speculate that strong coalition bargainers actively select this notion of distributive fairness over the notion of equality because they think it will help them achieve higher payoffs. I also speculate that this might be due to strong bargainers' overestimation of their own market value or attractiveness. However, as I have mentioned in Chapter 1 whilst discussing previous findings, absence of one explanation should not be taken as direct evidence

for another explanation. Hence, follow-up research is necessary to verify my speculations.

A possible way to study the question of whether strong bargainers overestimate their market value could be to look at whether they show stronger signs of expectancy violation when their offers are rejected, or when they are excluded, than weak bargainers do. After all, the more attractive individuals think they are, the more surprised they should be when they are rejected. An unobtrusive way of measuring this expectancy violation is through pupillometry: previous research has established that pupils involuntarily dilate in response to these expectancy violations (Preuschoff, 't Hart, & Einhäuser, 2011). Hence, observing pupil dilation of strong and weak bargainers after rejection could shed more light on their own perceived attractiveness. This type of process-tracing research could be a next step in the development of process-oriented coalition formation theories.

Why do weak bargainers stick to their first reciprocal offers?

Results from this dissertation suggest that the Strength-is-Weakness effect partially exists because weak bargainers initially make first offers to other weak bargainers. They do this because they expect less attractive, equitable offers from strong bargainers. However, it also seems that weak bargainers choose each other as coalition partners, despite having received attractive offers from strong bargainers. When strong and weak, however, make equally attractive offers and the recipients have not made an offer themselves, strong bargainers are preferred as a coalition partner (see Study 3.3). Based on this apparent discrepancy, I speculate that this formation of weak coalitions, despite attractive offers from strong bargainers, is due to the initial offers from weak bargainers to each other. Future studies could investigate whether this is indeed the case and what the underlying mechanism exactly is. Does a first offer function as a commitment from which bargainers do not want to deviate? Or do reciprocal offers between weak bargainers signal that pursuing this coalition is a safe bet from which deviating is a risky decision?

When do strong bargainers apply the fairness principle of equality?

This dissertation provides support for the use of equity norms by strong bargainers. A surprising finding, however, was that offers made by strong bargainers were more heterogeneous than expected based on previous theories. Specifically, we found that a large proportion of strong bargainers made equal offers. Notably, these offers were made more often in Study 3.1 and Study 3.2 than any other study. A question that thus rises is in which circumstances strong bargainers decide to select the notion of equality and make equal offers to a prospective coalition partner

One speculated cause for the difference in equal offers between different studies might be the differences in configuration of resources between the 4(3-2-2)

game used in Chapter 3, and the 5(4-3-2) game used in other chapters. On the one hand, the equal positions of bargainer B and C in the 4(3-2-2) game could draw attention to the idea that all bargainers are actually equal, making equality the more appropriate norm to use. On the other hand, it could also be the case that strong bargainers match the opening offers they expect from weak bargainers. In the 4(3-2-2) game, both equality and equity predict 50-50 offers by weak bargainers, and it might be that some strong bargainers match these expected offers because they think it will increase their chance of inclusion.

Note, however, that the studies in Chapter 3 differed from others in more ways than the configuration of resources. Most studies in Chapter 3 were of a hypothetical nature and without any monetary consequences for the participants, whereas the other studies were all incentivized interactions. Hence, an alternative explanation for the observed differences might be that individuals respond more egalitarian in situations in which they have nothing to gain or lose, but become more self-serving when there is real money at stake. Another limitation of the studies presented in Chapter 3, is that I did not conduct a factorial experiment in which I compared offers made in a control condition with offers made in the presented intervention conditions. Based on a comparison between first offers made by strong and weak bargainers, we concluded that our intervention did not change bargaining behavior, as strong bargainers made more self-serving offers than weak bargainers did. However, lacking a factorial design, we cannot fully exclude the idea that our interventions are the cause of the abundance of equal offers in Chapter 3. Moreover, based on our studies, we cannot rule out that the option to select a bargaining position or switch bargaining position has had unexpected side effects. Hence, additional studies are necessary to disentangle the factors that could explain when strong bargainers make equal, rather than equitable, allocations.

What determines the magnitude of the Strength-is-Weakness effect?

One result that stood out in this dissertation is the finding that the magnitude of the Strength-is-Weakness differed across conditions. Whereas the inclusion rate of strong bargainers was 33% and 35% in Study 2.1 and Study 2.2, the inclusion rate in the control condition of Study 4.1 was 58%. One aspect of Study 4.1 that might account for this fact is that, due to our aim to have a clear manipulation of earned resources, we emphasized the random nature of resources in the control condition. Possibly, this strong cue of irrelevance of resources highlighted that there was no reason for strong bargainers to apply equity norms. Although strong bargainers did ask for a higher share than weak bargainers did, this emphasis on irrelevant resources might have prompted a proportion of weak bargainers to believe that there would be no danger in approaching strong bargainers, promoting the formation of coalitions including strong bargainers.

On the basis of this, I speculate that the magnitude of Strength-is-Weakness effect would be highest in settings in which no information about input relevance is given. In these situations, there is ample room for self-serving interpretations of input relevance or suspicions about others' self-serving interpretations. When information about input relevance is less ambiguous, this wiggle room is diminished, which should result in fewer perceptions and behaviors leading to the Strength-is-Weakness effect. Finally, the magnitude of the Strength-is-Weakness effect should be smallest when information unambiguously signals that resources are relevant input. Future studies could test whether the ambiguity of cues relating to input relevance indeed determine the magnitude of the Strength-is-Weakness effect.

Which emotions play a role in shaping the Strength-is-Weakness effect?

In this dissertation, and previous theorizing on the Strength-is-Weakness effect, the focus has been on the cognitive processes. Future research could be aimed at uncovering the role of emotions in the Strength-is-Weakness effect.

Given our findings on earned versus randomly received resources, a good first candidate for this research is the emotion of envy. According to modern theories of envy (Lange, Weidman, & Crusius, 2018; van de Ven, Zeelenberg, & Pieters, 2009), envy can take two distinct forms: benign envy, which promotes raising oneself to the level of the envied one, and malicious envy, which promotes taking the envied one down to one's own level. Moreover, whereas benign envy is related to appraisals of a deserved and controllable advantage, malicious envy is related to appraisals of an undeserved advantage due to factors beyond one's control (van de Ven, Zeelenberg, & Pieters, 2012). An interesting possibility is that situations in which resources are earned promote benign envy, and that approaching strong bargainers might be a way to bring oneself close to the level of the envied bargainer, whereas situations in which resources are unearned trigger malicious envy, and excluding strong bargainers might be a way of taking them down.

Are self-serving perceptions in coalition bargaining conscious or unconscious?

Another remaining question is whether the self-serving biases observed in our studies are unconscious biases or whether they are a conscious way of rationalizing self-serving behavior. In Chapter 3, we reasoned that the use of equity norms in first offers was an active (and thus conscious) decision. For the perceptions of control over resources, input relevance and deservingness in Chapter 4, however, this assessment is a bit more difficult. On the one hand, it seems possible that weak bargainers actually perceived to have less control over resources than strong bargainers did. On the other hand, however, under- or overstating the controllability of resources could be an indirect way of highlighting the (il)legitimacy of using the

equity norm, depending on whether this is in or against one's favor. Future research could be aimed at trying to disentangling these two explanations.

What are the consequences of being excluded from a coalition?

This dissertation has investigated the antecedents of exclusion from a coalition. Little, however, is known about the *consequences* of being excluded from a coalition. It would, for example, be interesting to investigate whether exclusion from the bargaining table leads to similar threats to the need to belong and coping behavior as social exclusion typically does (Baumeister & Leary, 1995; Williams, 2007). Moreover, future studies could investigate whether exclusion is perhaps also more painful for strong bargainers than for weak bargainers. This could be the case because strong bargainers might think they are more attractive and hence expect the exclusion less.

Closing remarks

The aim of this dissertation was to provide more insight into the mechanisms underlying the Strength-is-Weakness effect. The obtained insights provide the ingredients for a tentative process-oriented theory regarding the causes of the Strength-is-Weakness effect. First, it seems that the Strength-is-Weakness effect is largely caused by the (expected) use of equity norms by strong bargainers, and that these equity norms are strategically employed as a justification for obtaining a large share of the coalition's payoff. Second, the extent to which this (expected) use of equity norms is accepted by weak bargainers seems to hinge on whether resources are perceived to be relevant input; whether they are a legitimate basis for an equal allocation. Finally, this perception of relevance seems to depend both on cues provided by the situation and on self-serving perceptions of input relevance based on bargaining position.

The Strength-is-Weakness effect in coalition formation is a phenomenon that has intrigued, and puzzled, researchers for several decades. Now, almost 65 years after the classic Vinacke and Arkoff paper, the puzzle has not yet been fully solved. With this dissertation, however, I am confident to have identified and correctly placed some of its pieces. Moreover, I hope that that the novel tentative theory presented in this dissertation, as well as future research conducted using the OCG, helps frame the bigger picture and facilitates future puzzling

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Appendix A

Supplemental Materials to Chapter 3

Appendix A

Pilot Study

This study serves as a pilot study for Study 3.2. The pilot study suffered from a few issues, which led us to believe the results might not be reliable, making Study 3.2 a replication of this initial study. First, the sample size was initially determined to have sufficient power to detect a difference in switching between the assigned conditions. Hence, the study suffered from lack of power to detect a difference between the allocations of bargainers in the different positions. Second, the large difference in switching between strong and weak bargainers led to unequal sample sizes, which exacerbated this power issue. To address these issues, we ran a second, high-powered and preregistered study (see AsPredicted #3054, http://aspredicted.org/blind.php?x=te4qh9) which is reported in Chapter 3 as Study 3.2.

Method

Materials and measurements were identical to those used in Study 3.2, apart from a few exploratory variables. For full description of all materials, see Study 3.2.

Participants and design. For this study, 100 US based respondents (M_{age} = 33.5 years, age range 19-68, 37 females, 63 males) were recruited via Amazon Mechanical Turk in exchange for $1.56. They were randomly assigned to one of two between-subjects positions: a weak position (n = 51) or a strong position (n = 49).

Exploratory measures.

Certainty of switching choice. After choosing to switch to another position or retain the assigned position, participants indicated how certain they felt about their decision whether or not to switch positions on a scale ranging from 1 (*Not at all certain)* to 7 (*Very certain*).

Estimated probability offer acceptance. After participants made their allocation, they indicated on a slider what their estimated probability (0-100%) was that the opening offer would be accepted.

Rationale for position choice. In an attempt to identify unknown reasons to select certain bargaining positions, participants were asked an open-ended question why they chose the position they did. This, however, did not lead to new insights and the reasons are not reported here.

Results

Switching. A total of 23 of 51 (45%) initially weak participants switched to a strong position, versus 4 of 49 (8%) initially strong participants who switched to a weak bargaining position. A chi-square test of independence shows that this difference is statistically significant, $\chi^2(1, N = 100) = 17.30$, $p < .001$, $w = 0.42$. Due to the extremely small group that switched from a strong to a weak position, the

remaining analyses were conducted on the remaining three conditions: Stay Weak (n = 28), Switch to Strong (n = 23), and Stay Strong (n = 45).

Comprehension check. Out of all remaining 100 participants, 20 gave at least one wrong answer. Having made errors was unrelated to being in one of the three remaining conditions, $\chi^2(2, N = 96) = 2.48$, $p = .29$, $w = 0.16$. For the sake of completeness, all participants were retained in all analyses.

Allocation of payoffs. A one-way ANOVA comparing allocation to self between those who stayed in a weak position (M = 51.11, SD = 10.09), those who switched to a strong position (M = 56.74, SD = 11.44), and those who stayed in a strong position (M = 52.89, SD = 8.76), d = 0.38) revealed no significant difference between the three groups, $F(2,93) = 2.14$, $p = .12$, $\eta^2_p = .04$.

Choice of bargaining partner. Of the 28 participants who stayed in a weak position, 25 made an offer to the other low-resource bargainer, $\chi^2(1, N = 28) = 17.29$, $p < .001$, $w = 0.78$.

Exploratory analyses.

Certainty of switching choice. A one-way ANOVA showed that there were no differences in certainty between those who switched to a strong position (M = 5.78, SD = 1.38), those who stayed in a weak position (M = 6.07, SD = 1.12), and those who stayed in a strong position (M = 6.07, SD = 1.16), $F(2, 93) = 0.49$, $p = .61$, $\eta^2_p = .01$.

Estimated probability offer acceptance. A one-way ANOVA showed that there were no differences in the estimated probability that one's offer would be accepted between those who switched to a strong position (M = 73.16, SD = 22.31), those who stayed in a weak position (M = 70.86, SD = 17.65), and those who stayed in a strong position (M = 67.30, SD = 21.00), $F(2, 93) = 0.61$, $p = .55$, $\eta^2_p = .01$.

5(4-3-2) Study

This study is intended to rule out uniqueness as a reason for choosing the strong bargaining position. See general discussion of Chapter 3.

Method

Participants and design. For this study, 76 US American respondents (M_{age} = 38.3 years, age range 20-72, 39 females, 37 males) were recruited via Amazon Mechanical Turk in exchange for $1.56. Sample size was calculated with G*Power (Faul et al., 2007) to be able to detect a medium to large effect size (w = 0.36) when testing for a preference for bargaining positions with 80% power.

Materials and procedure. Since the procedure was almost identical to that of Study 3.1, only differences to this procedure will be mentioned here.

Game structure. Participants chose a position in a 5(4-3-2) political convention game in which they could choose between position A (4 votes), B (3 votes),

and C (2 votes). Again, participants were told that any coalition of two individuals would suffice to attain and allocate a sum of $100.

Certainty of position choice. After choosing their bargaining position, participants indicated how certain they felt about their choice on a scale ranging from 1 (*Not at all certain)* to 7 (*Very certain*).

Estimated probability offer acceptance. After participants made their allocation, they indicated on a slider what their estimated probability (0-100%) was that the opening offer would be accepted.

Reservation price. Participants indicated their reservation prices by indicating, for each other bargainer, how much they would minimally accept in order to agree to form a coalition.

Rationale for position choice. Participants were asked an open-ended question why they chose the position they did. Again, these answers did not provide new insights and are not reported here.

Motivation. Participants indicated, on a scale ranging from 1 (*Not at all*) to 7 (*Very much*), to which extent they were motivated to maximize their own payoffs, maximize the difference in payoffs, minimize the difference in outcomes, and obtain equal payoffs (items adapted from van Beest, Steinel, & Murnighan, 2011). Due to low reliability of the scale ($\alpha = .49$), the items were analyzed separately.

Results

Comprehension check. Out of all 76 participants, 10 made at least one mistake in the quiz. Errors were unrelated to choice of position, $\chi^2(2, N = 76) = .44$, $p = .80$, $w = 0.08$. For completeness, all participants were retained in the analyses.

Choice of position. The majority of participants chose the bargaining position with most resources. Fifty-seven participants (75%) chose position A, 13 participants (17%) chose position B, and 6 participants (8%) chose position C. A Chi-square goodness of fit test shows that these proportions differed significantly from 33%, the expected percentage when participants would be indifferent and would have chosen a position randomly, $\chi^2(2, N = 76) = 60.34$, $p < .001$, $w = 0.89$.

Due to the small number of participants choosing positions B and C, we grouped them together as weak bargainers for all subsequent analyses. Yet, due to the relatively low sample and cell sizes, we interpret the results from these analyses with caution.

Certainty of position choice. An independent-samples *t*-test shows that strong bargainers ($M = 6.16$, $SD = 1.07$) felt more certain about choosing their position than weak bargainers ($M = 5.32$, $SD = 0.95$), $t(74) = 3.06$, $p = .01$, $d = .83$.

Choice of bargaining partner. A Chi-square goodness of fit test shows that weak bargainers more often made an offer to the other weak bargainer ($n = 14$) than to the strong bargainer ($n = 5$), $\chi^2(1, N = 19) = 4.26$, $p = .04$, $w = 0.47$.

Allocation of payoffs. An independent samples *t*-test shows that strong bargainers (*M* = 55.33, *SD* = 11.26) did not claim significantly more than weak bargainers (*M* = 56.05, *SD* = 14.90), *t*(74) = -0.22, *p* = .83, *d* = -.06.

Estimated probability offer acceptance. An independent samples *t*-test shows that strong bargainers (*M* = 73.91, *SD* = 19.41) estimated the probability that their offer would be accepted to be higher than weak bargainers (*M* = 61.32, *SD* = 17.97), *t*(74) = 2.49, *p* = .01, *d* = 0.66.

Motivation. Due to low reliability of the scale (α = .49), the items were analyzed separately. Independent samples *t*-tests showed that strong and weak bargainers did not differ in any motivation (*p*s between .14 and .92).

Reservation price. An independent samples *t*-test shows that mean reservation prices of strong bargainers (*M* = 52.33, *SD* = 11.39) were higher than that of weak bargainers (*M* = 46.74, *SD* = 6.68), *t*(74) = 2.02, *p* = .046, *d* = 0.54.

Appendix B

Configuring the Online Coalition Game

Appendix B

When starting a session of the online coalition game, there are a number of parameters that can be configured.

Protocol

Which bargaining protocol is used is determined by the chosen session configuration. To use the one-step protocol use *Online Coalition Game One-Step Protocol* and for the more dynamic alternative offer protocol use *Online Coalition Game Dynamic Protocol.*

Player resources and decision point

Configuring *resources_player_A, resources_player_B,* and *resources_player_C* determines the amount of resources the different bargainers in a triad hold. With *decision_point*, a threshold can be set, determining which coalitions can form a coalition. NB: While setting the resources and decision point, take into account that the OCG does not support situations in which a participant cannot be part of any coalition.

Grand coalition

Setting *grand_coalition* to True will enable the formation of a three-player coalition including all three participants. Setting it to False will only permit two-player coalitions.

Total payoff

Configuring *total_payoff* will set the size of the payoffs participants bargain for. Note that only integers are accepted.

Payoff conversion

Configuring *payoff_conversion* sets the conversion rate from obtained payoff to bonus payment.

Incentives

When *incentives* is set to True, participants will receive information about the conversion rate and earned bonus. If set to False, this information is left out. NB: Make sure to set *USE_POINTS* to False in *settings.py* to correctly display the bonus in terms of money.

Base fee

Configuring *base_fee* sets the amount of money participants receive for reaching the end of the game, either after forming a coalition, having waited long

enough at the matching page, or dropping out due to an interaction partner being kicked.

Select none

When *select_none* is set to True, participants will have the option to choose no coalition offer at all in Phase II: Selecting offers. When it is set to False, this option is not available.

NB: When using the dynamic bargaining protocol and grand coalitions are allowed, setting *select_none* should be set to True to give bargainers an option to retreat from a tentative ABC-coalition.

Timeout time

Configuring *timeout_time* sets the amount of seconds participants are allowed to spend on each page between the matching and the formation of a coalition.

Earned

When *earned* is set to True, participants will obtain their bargaining position based on their relative performance on three rounds of a real-effort slider task. Within a triad, the participant that completed most sliders obtains position A, the participant that came in second position B, and the one that came in last position C. When *earned* is set to False, participants will randomly obtain one of the three positions. When used, a test round is added to the instructions.

NB: The sliders do not work well when using Internet Explorer or Microsoft Edge. To prevent participants with these browsers from taking the study, a script has been added to the first page of the introduction apps prompting participants to use a different browser.

Slider time

Configuring *slider_time* sets the amount of seconds participants will have to complete as many sliders in each of the three rounds.

Comprehension check

When *comprehension_check* is set to True, participants will receive three comprehension questions concerning the setting.

Leave matching

When *leave_matching* is set to True, participants will be forwarded from the matching page to the end of the study after the time limit set in *leave_timer*. NB: Using

this function requires a landing app in which the following code is added to the last page in views.py (as done in the two introduction apps of the Online Coalition Game):

```
def before_next_page(self):
import time
        self.participant.vars['wait_page_arrival'] = time.time()
```

Leave timer

Configuring *leave_timer* sets the amount of seconds participants wait to be grouped before being forwarded to end of the study.

Number of rounds

In the OCG, the number of rounds—configured with *num_rounds* in *Online_Coalition_Game\models.py* or *Online_Coalition_Game_Alternative_offer\models.py,* not via the session configuration—determines the maximum number of rounds participants have to form a coalition. When a coalition is formed, the remaining number of rounds will be skipped. When a coalition is not formed within the number of rounds set, participants will be forwarded to the end of the experiment.

Appendix C

Output variables of the Online Coalition Game

Appendix C

After an experiment, oTree provides a large dataset with one row per participant and many variables for each round. Below, we outline the key variables necessary to understand the bargaining process and outcomes.

Table C.1.

Output variables from the Online Coalition Game.

Variable name	Stores
position	Player position (A, B, or C)
proposed_coalition	Name of the coalition proposed in Phase I
allocate_to_player_A/B/C	Proposed allocation to players A, B and C
selected_coalition_name	Name of the selected coalition in Phase II
tentative_selected_coaltion_name.	Name of the selected coalition in Phase II (dynamic protocol)
selected_coalition_allocation_A/B/C	Allocations of the selected offer
tentative_selected_coalition_allocation_A/B/C	Allocations of the selected offer (dynamic protocol)
counter_proposed_allocation	Alternative offer (dynamic protocol)
counter_allocate_to_player_A/B/C	Allocations of the alternative offer
ratify_coalition	Participants' choice to ratify the tentative coalition or select the alternative offer
money	Obtained share of the budget
completion_code	Participant's completion code
formed_coalition_name	Name of the formed final coalition
payoff_A/B/C	Final payoffs of participants
proposed_coalition_player_A/B/C	Proposed coalitions of players
allocation_A_to_B	Proposed allocation of player A to player B
selected_coalition_name_player_A/B/C	Name of the selected coalition in Phase II
tentative_selected_coalition_name_player_A	Name of the selected tentative coalition in Phase II (dynamic protocol)
selected_coalition_allocation_A_player_B	Allocation to player A in the coalition selected by player B

tentative_selected coalition_allocation_ A_player_B	Allocation to player A in the coalition selected by player B (dynamic protocol)
tentative_formed_coalition_name	Name of formed tentative coalition (dynamic protocol)
counter_proposed_coalition_name	Name of the proposed alternative coalition (dynamic protocol)
counter_proposed_allocation_to_player_A/B/C	Proposed allocation in the alternative offer (dynamic protocol)
ratify_coalition_A/B/C	Choice of players to ratify tentative coalition or choose the alternative offer (dynamic protocol)
new_tentative_formed_coalition_name	Name of the new tentative formed coalition (dynamic protocol)
new_tentative_payoff_A/B/C	Allocations in the new tentative payoff (dynamic protocol)
round_begin	Phase at which the round begins (dynamic protocol)
round_end	Phase at which the round ends (dynamic protocol)
participant.code	Unique participant ID in a session
group.code	Unique group ID in a session
session.code	Unique session ID

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Een promotietraject is een transformatief proces. Losse flarden gedachten transformeren van onderzoeksvragen naar hypothesen. Losse projecten, studies en manuscripten transformeren uiteindelijk naar een proefschrift. En aan het eind van het traject transformeer ik van MSc naar PhD.

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STRENGTH-IS-WEAKNESS REVISITED

— JOERI WISSINK