CHAPTER 4

Modeling Collective Decision-making

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*What kind of mental switch is flipped that changes people's attitudes?
And what kind of switch turns chimpanzee group mates into each other's
deadliest foes? I suspect the switches operate similarly in humans and apes
and are controlled by the perception of shared versus competing interests. So
long as individuals feel a common purpose, they suppress negative feelings.
But as soon as the common purpose is gone, tensions rise to the surface.*
  —Frans De Waal, *Our Inner Ape* (London: Granta Books, 2005), 135–36.

From Power Studies to Modeling Fundamental Processes

When in the 1950s empirical studies on local power started, their main topic
was the distribution of power in local societies. It gave rise to a huge debate
about the concepts and measurement of power and influence. Ideological,
theoretical, and measurement issues colored the empirical results and made
them incomparable. The debate concentrated around two empirical local
studies in that period, the study of Hunter (1953) in Atlanta and the New
Haven study of Dahl (1958, 1961). Hunter represents the group of scholars
who believed that the United States was ruled by a power elite, a group that
was strongly inspired by the work of C. Wright Mills, best known by his later
book *The Power Elite* (Mills 1956). Dahl represents the group of scholars who
strongly believed that the United States is ruled by a plurality of groups. Starting
from these opposite perspectives in the so-called elitist–pluralist debate, their
definitions and measures of power could hardly do anything else than confirm
their view of American politics. But the main benefit of the debate is that it
revealed the necessity to reflect about different dimensions in the concepts
of power and influence and how these dimensions have to be represented in
measures.

The first important distinction concerns the question of whether power
and influence have to be defined as capacities (Hunter 1953) or as actual
effectuation (Dahl 1958, 1961). As effectuation of power and influence depends
heavily on the amount of perceived interest of the stakeholder in the problem
and the issues involved, it is important to differentiate between the two and to
define and measure power and influence as capabilities. The perceived interest

of an actor in the problem can then be characterized as the percentage or fraction of potential resources that a stakeholder will mobilize. Moreover, there are other restrictions that might hinder the actual effectuation of a stakeholder's influence.

Second, are the concepts of power and influence interchangeable, or do they refer to different phenomena? In more complex contexts, collective outcomes become binding through institutional arrangements. The formal aspects of decision-making consist of the identification of the actors who are legally or otherwise formally charged with taking the decision. This is particularly obvious in political decision-making. Such formal procedures often mean that stakeholders who have no formal right to codetermine the decision outcomes have very high stakes in those decisions. In Western democracies final decision-making is allocated to parliaments, composed of elected representatives who take the final decisions. Some political theories, such as the one of Schumpeter (1943), identify democratic decision-making with democratically taken decisions. Other theories stress that democratic procedures are only a necessary, but not a sufficient, condition for democratic decision-making (Bachrach and Baratz 1962; Lukes 1974). They stress that content and quality of decisions should be part of the evaluation of the democratic character of decisions. In their view, a decision should be based on a "balanced" weighing of different interests in a society. To arrive at such a balanced weighing, democracies recognize the right of assembly and free expression of opinion and often require certain consultations and hearings as part of the decision-making process. Particularly within this normative frame, we expect that authorities receive social approval when they weigh the intensity of interests and relative influence of different societal actors properly. Errors, particularly frequent errors, will result in serious social conflicts and poor implementation, which will reduce the likelihood of the authorities being re-elected. The power of actors in social systems is consequently not based solely on their voting power in the final decision-making stage, but also on actors' ability to have their interests reflected in the final decisions. The latter we denote *influence* (Mokken and Stokman 1976).

Third, should influence be measured as a relational variable, or as a characteristic of the stakeholder, or as a combination of the two? Influence is strongly determined by direct or indirect *access* to authorities, those actors who are formally empowered to take decisions. The increasing analytic possibilities of social network analysis gave rise to a large number of network studies to investigate power centers among large corporations (Mintz and Schwartz 1984; Stokman et al. 1985; Mizruchi 1982; Heemskerk and Fennema 2009; Windolf 2009), intellectual groups (Kadushin 1968), and between large corporations and government agencies (Mokken and Stokman 1979). On the other hand, influence also depends on *resources* of actors they can mobilize, resources to persuade authorities or to force them to take certain interests into account. One essential resource is information, particularly very specialized information. Numbers might also matter, such as the number of people a stakeholder, such as a trade union for example, can mobilize. The importance of different resources depends on the context in which the collective decision is taken. For example, a country's military resources are unlikely to be relevant when international banking regulations are being debated. The three essential elements of power

and influence in collective decision-making are, therefore, voting power in final decision-making, timely access, and resources.

Voting power, access, and resources determine the *potential power and influence* of actors. In the bargaining stage, the actual mobilization of an actor's potential influence depends on three other elements. First of all, it depends on how strongly the decision affects important goals of an actor, the *issue salience* of the decision for the actor. The other two elements are: (a) *the degree to which actors expect the outcome will deviate from their preferred outcome,* and (b) *whether their participation is expected to have a positive effect* through the mobilization of their resources (Zelditch and Ford 1994; Stokman and Stokman 1995). This implies that theories of collective decision-making cannot be based only on the three power elements of the actors, but also have to take into account their issue salience and their preference regarding the outcome. Power becomes visible only if actors have diverging preferences regarding decisions of sufficiently high salience to them. Similarly, if the status quo reflects the interests of the powerful, they are likely to prevent decision-making rather than exercise voting power and influence in the decision-making process. This phenomenon is called "non–decision making," now better known as "agenda setting" (Cobb and Elder 1972; Kingdon 1995 [1984]; Ordeshook 1992; Tsebelis 1994; and many others).

The distinction between power and influence is strongly related to the common conception of collective decision-making in many political systems, consisting of an influence stage followed by a voting stage. Achen (2006a: 86) notes that this general conception has been shared by a broad range of studies, including the work of Bentley (1967). Stokman and Van den Bos (1992) formalized this conception in their two-stage model of policy-making. At the bargaining stage, actors attempt to win support for the decision outcomes they favor most (denoted their *policy positions*). During this *bargaining stage*, actors employ a range of strategies in pursuit of this goal. As a consequence of bargaining, actors may end up supporting policy positions other than those they originally took. We refer to these new positions as actors' *voting positions*. In the second stage, *the voting stage*, the process consists of the transformation of the voting positions into one outcome that is binding for all. This implies that the processes in the two stages are fundamentally different. In the bargaining stage policy positions are transformed into voting positions; in the voting stage voting positions are transformed into binding decisions. In complex systems, a final outcome may well be based on a repeated chain of these two stages, such as a decision-making process at three levels in the government and in two chambers of Parliament.

Collective decision-making is necessary in any situation in which people wish to achieve things that can often only be achieved, or can be achieved more efficiently, with the contributions of others. This is referred to as *joint production* (Lindenberg and Foss 2011). Joint production requires collective decisions about what actions should be taken to realize shared interests: who should deliver which contributions, and how should the added value of the joint production be divided. But collective decision-making itself is also a special case of joint production, because individuals involved in such decisions are mutually dependent in making the required decisions. The joint product in

collective decision-making is a collective decision that is binding for all actors in the social system.

Consider the wide range of situations in which people take collective decisions. Families take collective decisions about how to spend and save, where to live, and about the distribution of household tasks. Management boards of businesses and nonprofit organizations take collective decisions about what strategies to implement. Public policies in democracies are collective decisions taken by groups of elected representatives, often after consultations with affected stakeholders. In all these contexts, collective decision-making is the process in which stakeholders have to transform their different preferences into a single collective decision that binds all actors within the social system. In doing so, all actors try to influence the decision outcome, including efforts of some of them to prevent decision-making for the preservation of the status quo. Seen from this perspective, not power or influence but *interest alignment* is the key to understanding collective decision-making: how diverging preferences for collective outcomes nevertheless result in one collective outcome that is binding for all. Such an analysis requires a focus on and specification of fundamental processes by which interest alignment takes place, even when we realize that actors have different capabilities to do so and differ in their perceptions of how much of their interests are at stake.

Joint production inevitably involves both *shared* and *conflicting interests* in the perceptions of the stakeholders (Stokman and Vieth 2005). Shared interests result from the perceived added value of the joint product; conflicting interests from the perceptions of the division of the added value and the division of the individual contributions to the joint production. We will show that the perceptions of the relative weight of shared and conflicting interests strongly affect the type of process we expect to emerge in different collective decision-making settings. This perception also determines the intensity with which people try to influence the collective decision outcome in line with their own position, versus their willingness to compromise in order to arrive at a broadly supported common position.

Interest alignment implies coalition building. The dynamics in collective decision-making processes result from the simultaneous efforts of stakeholders with different policy positions to build as large coalitions as possible around their own positions. This implies that stakeholders are willing or forced to support other positions than they started with. Most studies study just one such process, without specifying the conditions under which that process is likely to take place. Here we specify three such processes: *persuasion, logrolling,* and *enforcement*. Each of them is associated with a *specific type of network* as well. We argue that in any decision-making context *all three processes and associated networks take place simultaneously,* but that *only one of them is dominant.* We specify the *conditions* under which each is likely to be dominant and under which conditions the logrolling and enforcement processes are likely to support or undermine the persuasion process.

Characteristic of earlier studies on coalition processes is that they study only one and do not specify the conditions under which that process is likely to dominate.

So-called contagion models (Friedkin and Johnsen 1990, 1997, 1999;

Marsden and Friedkin 1993; Leenders 1995, 2002) assume that actors' opinions and attitudes in a social system depend only partially on individual characteristics, and that these opinions and attitudes are also shaped by social influence. Social influence is represented in the form of an influence network, reflecting the dyadic influence of actors on each other. Technically, spatial autocorrelation algorithms are used to capture such processes. In the social influence part of the model, a person's opinions or attitudes are modeled as the weighted mean of the opinions or attitudes of the people who have an influence relationship with that person. In the literature, a large variety of weights have been proposed, as Leenders (2002) has shown. Dynamic network models combine influence and selection effects in networks and investigate the relative impacts of the two effects (Stokman and Zeggelink 1996a; Steglich, Snijders, and Pearson 2010). Stokman and Zeggelink (1996b) and Stokman and Berveling (1998) connect these types of models with the fundamental step of aggregating the individual opinions to a collective outcome, a step the other models do not make. Moreover, they do not specify the conditions under which these processes are expected to occur.

If we consider other approaches to social exchange in the literature, we find two main alternatives. The first consists of extensions of Coleman's exchange model that incorporate networks (1972, 1990). Coleman assumed that actors have an interest in some events and control over others. By exchanging control over events in which they are less interested for control over events in which they are more interested, mutually beneficial outcomes can be achieved. The main mechanism in this model is that of a market. The model is able to predict the division of control among the actors in equilibrium. Power (and value of the events) is derived from the model, rather than being introduced in an ad hoc fashion. While the original Coleman model assumed that exchange possibilities are unrestricted, later models introduced the concept of unequal exchange opportunities by connecting Coleman's exchange model to networks (Marsden and Laumann 1977; Laumann, Knoke, and Kim 1987; Knoke et al. 1996; König 1997; Pappi and Henning 1998). In these models, structural constraints force actors to exchange with particular other actors. Moreover, the models were adapted to predict outcomes on issues on which there are only two policy alternatives (such as yes or no). Coleman's model thus became extended to outcomes of collective decision-making processes.

The second approach to exchange consists of Network Exchange Models (see, for example, Bienenstock and Bonacich 1992; Cook and Yamagishi 1992; Friedkin 1992; Markovsky, Willer, and Patton 1988; Skvoretz and Willer 1993; Willer 1999). Whereas Coleman's model is based on global equilibria, Network Exchange Models focus on network effects on exchange rates between pairs of actors. Actors' power derives primarily from the possibilities they have to exclude others from exchange. This power is defined in terms of shifts of exchange rates to an actor's own advantage. A difference between our work and work in Network Exchange Theory is that the latter deals mainly with exchanges of private goods (for an exception, see Dijkstra and Van Assen 2006, 2008a,b,c). Private goods are also the starting point for Coleman's models, and generalizations to public goods are not straightforward (Stokman and Van Oosten 1994). We, however, investigate exchanges of voting positions. Changes

in voting positions affect all stakeholders in collective decision-making and have externalities for other actors (Van Assen, Stokman, and Van Oosten 2003; Dijkstra, Van Assen, and Stokman 2008). Another important difference between our approach and studies informed by Network Exchange Theory is that the latter study given and static networks (see Willer and Willer 2000 for an exception). In contrast, we derive exchange networks from the distribution of positions and saliences of the stakeholders on the issues (see Figure 4.3).

As the processes in the bargaining stage and the voting stage are fundamentally different, *game-theoretical models* of the two stages are expected to be fundamentally different. Models of the bargaining stage formalize different views on the nature of the bargaining process, which results in shifts in actors' positions. Models of the voting stage formalize different views on the way in which the procedural rules of decision-making affect decision outcomes. There are cooperative and noncooperative models of both the bargaining stage and the voting stage. The most important difference between cooperative and noncooperative models is that agreements between stakeholders are considered to be more or less binding in cooperative models, whereas they are not in noncooperative models. As agreements in noncooperative models are not binding, actors continually evaluate proposals against the status quo and other proposals in terms of the utility they provide them. As a consequence, the status quo plays a much more dominant role in noncooperative models than in cooperative ones as a reference point for evaluating support for different proposals.

Table 4.1 summarizes the main classes of models of each of the two stages. Cooperative models of the voting stage were first dominant, starting with one-dimensional coalition models (Axelrod 1970; De Swaan 1973). These models were later extended to multidimensional models (Schofield 1976; Laver and Schofield 1990). More recently, noncooperative models for the voting stage have become dominant in the new institutional approach (Baron and Ferejohn 1989; Austen-Smith and Banks 2005). A winset is a set of possible decision outcomes that improve the utility of a required majority of decision-makers relative to the status quo. If winsets are based on a careful analysis of procedural rules, the models are known as procedural models (see Steunenberg and Selck 2006 for an overview). As procedural rules are particularly complex in the European Union, the European Union is an attractive field of application for these models (ibid.; Tsebelis 1994; Moser 1996; Steunenberg 1994; Garret and Tsebelis 1999a,b; Hosli 1993, 1997; Lane and Maeland 1995; Widgrén 1994, 1995; Tsebelis 1996; Tsebelis and Garrett 1996, 1997; Pajala 2002). These models assume that outcomes of decisions are determined by the combination of preferences of the formally empowered decision-makers and the formal institutional rules that determine the voting weights and rules of the decision-makers and the sequence of moves they can make.

TABLE 4.1

Classification of Main Types of Collective Decision-Making Models

	Cooperative models	Noncooperative models
Voting stage	Coalition	WinsetsProcedural models
Bargaining stage	PersuasionExchange	Enforcement/Challenge

Scholars have also developed both noncooperative and cooperative models of the bargaining stage. The best known noncooperative model of the bargaining stage is the Expected Utility model of Bueno de Mesquita (Bueno de Mesquita, Newman, and Rabushka 1985; Bueno de Mesquita 1994). Despite having some similarities, cooperative models of the bargaining stage differ in important respects from coalition models that have been developed in the context of the voting stage. In the latter context, coalition models' primary aim is to predict the composition of coalitions based on voting weights and decision rules. Voting weights and rules are less important at the bargaining stage than at the voting stage. Cooperative models of the bargaining stage, therefore, do not focus primarily on the composition of majority coalitions, but on the prediction of decision outcomes. These predictions depend on which of the bargaining processes dominate. Persuasion models are based on the assumption that the outcome is the one supported by all stakeholders often after being persuaded to do so with convincing arguments, whereas exchange models are based on the assumption that stakeholders try to build larger coalitions through bilateral exchanges between stakeholders or groups of stakeholders.

The focus of the present article is on cooperative and noncooperative bargaining models and their empirical applicability. There are three reasons for this limitation.

The first and most important reason for concentrating on bargaining models is that models of the voting stage in our view neglect one of the fundamental features of collective decision-making. As mentioned above, one of these fundamental features is that collective decision-making involves interdependencies among actors involved in joint production. Models of the voting stage ignore such interdependencies, and instead assume that decision outcomes are determined by formal decision-making procedures together with actors' preferences. In many real world decision situations, however, formal rules provide relatively scant indications of how decisions are actually taken. For instance, there are many political systems in which a decision might formally be allowed if only a simple majority of decision-makers agree, but where in practice the support of a broader majority of decision-makers is required for policy change. Such an informal unanimity norm can be observed in many organizations (among them the Council of Ministers of the European Union). In such contexts, formal procedures do not appear to determine behavior or decision outcomes, but do set the boundaries within which action takes place. Institutional rules then work like legal contracts. They provide safeguards to actors in case fundamental problems arise or other actors misbehave. Such safeguards cannot, however, always loom large in consensual decision-making systems. If actors often have to fall back on the safeguards of formal decision rules, the more the norm of consensus building will be put under pressure. The frequent use of formal rules is likely to undermine the perception that shared interests are so salient that the actors will compromise for the sake of consensus. The mere existence of the rules should give sufficient constraint to enforce agreement and compliance. This implies that the voting stage formalizes primarily the result of the bargaining process and ensures that external sanctions can be used to enforce implementation and compliance. The result of the decision outcome, then, is not determined by

the combination of preferences of the authorities and the formal institutional rules, as the procedural models assume, but by the dominant bargaining process that precedes the voting stage.

The second reason to limit the present discussion to bargaining models is that the models of the voting stage are limited to those decision situations in which there are well-developed formal rules. As described in the opening paragraph, collective decision-making also takes place in very informal settings in which there are few formal rules. Moreover, even in situations, such as national politics, in which there are formal rules, stakeholders who are not formally empowered to take decisions have huge influence. Models of the voting stage do not integrate these stakeholders into the analysis.

A third and final reason for limiting the present discussion to bargaining models is that procedural models are generally poor at predicting decision outcomes. One of the largest and most comprehensive comparative tests of the performance of bargaining and procedural models was recently conducted on decision-making in the European Union (see particularly Achen 2006b) and confirmed in Thomson's replication in the extended European Union of the twenty-five to twenty-seven members (Thomson 2011). Both studies found that bargaining models were generally much better at predicting decision outcomes across a large range of issues than were procedural models. In the European Union, the poor performance of procedural models results from the prevailing norm of consensus seeking, despite the formal possibility of supermajority voting.

Summary of Data Collection and an Empirical Example

Applying different bargaining models to complex decision-making processes requires that we describe these decision situations in a systematic and stylized way. This section gives details of what these descriptions entail, illustrated with an example. The above overview of different approaches toward collective decision-making has made clear that a full-fledged model of collective decision-making needs to contain the following elements. All models require a specification of the set of issues and the relevant set of stakeholders and authorities with their policy positions on the issues. We must also obtain estimates of concepts that are specific to certain models, such as the position of the status quo, the relative saliences of the issues for the stakeholders, the relative power of the stakeholders, which higher-ordered goals are at stake, and which priorities stakeholders attach to these goals. More details of the bargaining models referred to above are then provided. There we will introduce the three fundamental bargaining processes in collective decision-making and the models that represent them, how they are related to each other, and under which conditions they will dominate. Subsequently we will discuss and illustrate how the models are applied in practice. As an illustration, we take some data from a recent study on the 2009 Copenhagen climate negotiations.

An example. The fifteenth Conference of Parties (COP) meeting took place in Copenhagen from December 7 to 15, 2009. The aim of the conference was an agreement on measures to be taken against climate change caused by our fossil-based economy. The climate treaty of Kyoto ended in 2012. Obligations

after 2012 had to be agreed upon either in an extension of the treaty period or in a new treaty, but COP 16 and COP 17 were also unable to do so.

Two experts from the Stockholm Environment Institute specified seven issues as the main ones at stake in Copenhagen. Subsequently, they specified which countries and country groups have to be distinguished and their potential influence and salience for an overall consensus. Finally, they provided the data for each stakeholder on each issue: its position, issue salience, and potential influence. The two experts were interviewed on October 27 and 28, 2009.

Table 4.2 presents the Party Groups the experts identified and the abbreviations we use in the remainder. Stakeholders are defined as individuals or groups that have *both* sufficient power resources potentially to exert influence in the decision-making process *and* sufficient stakes in the issues to exercise their influence, directly or indirectly (for example, by anticipation of others). If a stakeholder is a group, then the members of that group agree on the desired outcome of the decision and on the importance of the issue. Furthermore, the members of that group are seen to act collectively.

Developing countries coordinate their positions within the Group of 77 (G77). At the establishment of this group in the 1960s, seventy-seven developing countries participated. The name of the group remained the same over the years, even though many new developing countries emerged and joined. Since the G77 countries are very diverse, the experts identified several subgroups within the G77 and provided data for each of the subgroups rather than for the whole G77.

Table 4.2 also presents estimates of the relative influence of Party Groups during the informal negotiation process preceding the final vote. Above, we have seen that there are fundamentally different ways in which power and influence have been measured in the literature. We usually use voting power measures, such as the Shapley-Shubik index (Shapley 1953; Shapley and Shubik 1954; Pajala 2002) or the Banzaf index (Banzaf 1965), when our analysis is confined to formally empowered authorities (as in the studies of decision-making in the European Union by Thomson et al. [2006] and Thomson [2011]). Influence reputation measures are usually applied when other stakeholders are included as well. To reach agreement in Copenhagen, the vote should be unanimous; consequently, voting power is equal for all Parties, but the differences in influence of Parties and Party Groups in the preceding negotiations are very large. We deal with many different resources—such as exclusive information, financial resources, number of persons an organization represents, superior access to authorities or other stakeholders—that are difficult to weigh in a combined measure of overall influence. Expectation status theory (Berger et al. 1977; Berger, Rosenholz, and Zelditch 1980; Berger and Zelditch 1985) has demonstrated, both in experiments and in field studies, that the ascription of status differences makes them real, that ascription is linked with performance differences. This is the strongest argument for the use of reputation-based influence measures in collective decision-making studies. As a consequence, we follow the approach of Bueno de Mesquita, Newman, and Rabushka (1985) and use expert evaluations of relative influence as our measure of influence in collective decision-making processes.

TABLE 4.2

Party Groups with Their Relative Influence and the Importance They Attach to Reaching an Overall Agreement

Party groups	Abbreviation	Relative influence	Importance attached to reaching agreement
United States of America	USA	100	10
Canada	Canada	15	40
Australia	Australia	10	50
European Union	EU	60	90
Japan	Japan	20	60
Russia	Russia	5	10
China and India	China India	95	70
Brazil	Brazil	10	60
Least Developed Countries	LDC	30	85
Alliance of Small Island States	AOSIS	30	90
G77 minus LDC, AOSIS, China, India, and Brazil.	Other G77	10	65

To reach agreement, the vote should be unanimous, but Party Groups differ in the importance they attach to reach an overall agreement (group salience). The more importance they attach to an overall agreement, the more they are willing to compromise. We asked the experts to score this on a scale from 0 (not important) to 100 (the Party Group will try to reach agreement with all means at its disposal). The expert ratings are given in the rightmost column of Table 4.2. The United States is estimated to have the greatest influence; however, it is also very little inclined to make concessions to come to a unanimous agreement. In contrast, the EU is willing to promote unanimity very strongly.

The first step involved in collecting data is the specification of the problem to be analyzed in terms of a limited number of *issues*. This is often one of the most challenging stages in the data collection procedure. Each of the issues specified must be described in two ways: first, in terms of a specific policy question on which a collective decision must be taken; and, second, in terms of a scale or continuum on which the alternative possible outcomes of this decision can be placed. Each of the issue continua is assumed to be unidimensional, and each actor involved in the decision who has an interest in the issue can be placed on a point on the continuum to represent his policy position on that issue. We assume that actors have single peaked preference functions. Thus each actor evaluates points on the continuum that lie further away from his position more negatively. This means that each actor expects to receive most value from the realization of his own position on the continuum compared with other positions, and less from alternatives located further from his own position. The two extreme positions, or endpoints, on each issue continuum are usually occupied by the most extreme positions favored by any of the actors. Intermediate positions represent more moderate positions and also possible compromise outcomes.

The specification of problems in terms of a limited number of issues provides a conceptual structure in which the positions of all actors can be represented. The specification of the issues should be comprehensive, in the

sense that the decisions taken on these issues should determine the main contours of the solution to the collective decision problem. The number of issues that are necessary varies from one decision-making situation to another. Usually, one to five issues are sufficient to represent all combinations of possible outcomes in even highly complex decision-making processes, but up to twenty issues have been used in some applications. The requirement of specifying a *limited* number of issues is often a useful exercise in itself, because it compels analysts to distinguish the main points from subordinate ones. Ill-defined issue specifications mean that analyses are based on incorrect representations of the political problems. Poor issue specification will result in bad model predictions.

In practice, the issues are specified using a combination of content analysis of documentation and interviews with key informants (also referred to as "subject area specialists" or "experts").

The estimation of the *policy positions* of each of the stakeholders depends on the specification of the issues as described above. If the issue does not represent a quantitative outcome (such as budget or time), the most extreme positions are usually placed at points 0 and 100 of the issue continuum. In the analysis, all issues are rescaled to a 0 to 100 continuum, based on the positions of the most extreme stakeholders. It is vital that the stakeholders are placed on the issue continua to reflect the political distances between the alternative decision outcomes they support.

The next variable that informants are asked to estimate for each stakeholder is the level of *salience* that each stakeholder attaches *to an outcome close to its policy position on the issue* (the stakeholder's *issue salience*). Note that obtaining an outcome close to the policy position on a given issue may be more important for one stakeholder than for another. In addition, any given stakeholder may attach more salience to one issue than to another. The more utility loss a stakeholder experiences resulting from a difference between its policy position and the outcome, the more likely that stakeholder will put into effect its potential power to obtain an outcome close to its policy position. The variable salience can therefore also be interpreted as a measure of the extent to which a stakeholder is *willing* to put into effect its potential power if the issue is brought up during interaction with other stakeholders.

The level of salience each stakeholder attaches to each issue is usually expressed on a scale from 0 to 1. A score of 0 indicates that the issue is of no interest whatsoever to the actor. In fact, if an actor attaches zero salience to an issue, it is not considered to be a stakeholder on that issue. A score of 1 indicates that an actor will devote all of its potential power to this issue if the issue is brought up during the course of interaction with other stakeholders. A score of 0.5 indicates that the issue is neither important nor unimportant. Taken together, the potential influence times the salience of a stakeholder determines its effective influence with regard to a certain issue.

In the literature and in practice it is often neglected that the *combination* of position and salience determines the behavior of stakeholders. These combinations are generated by the incentive structures of stakeholders. If one of the two is overlooked (in practice, often salience), serious miscalculations are inevitable.
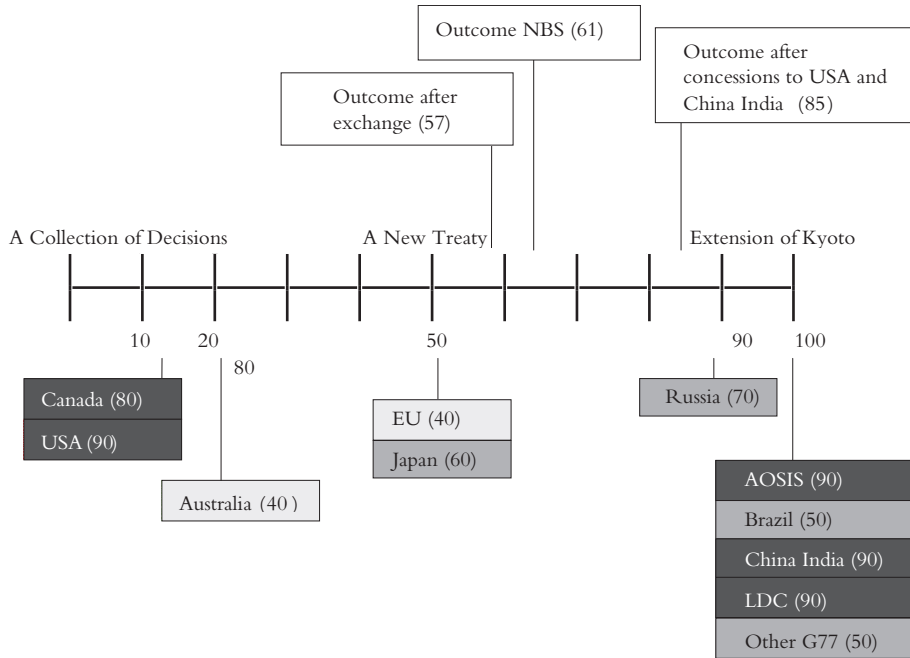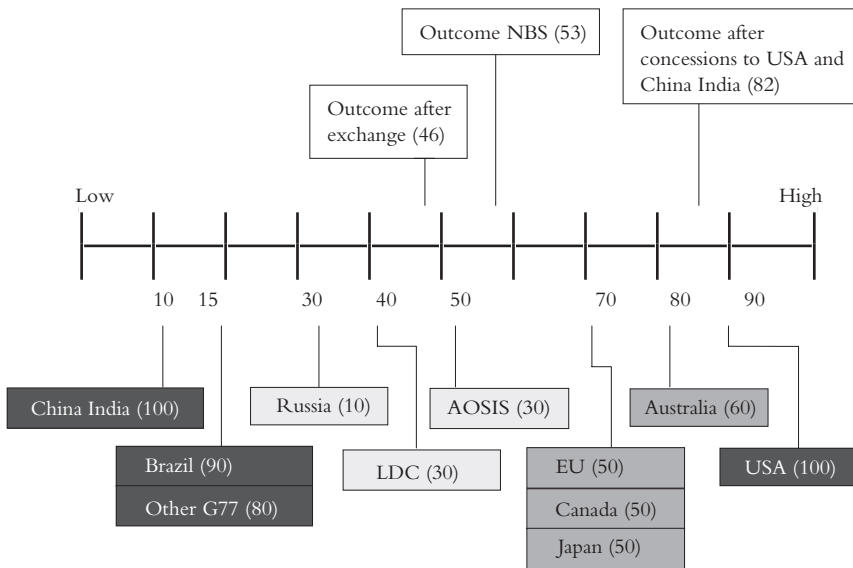
FIGURE 4.1. New Decisions vs. Extension of Kyoto (issue 1)

FIGURE 4.2. MRV CO_2 Reduction in Developing Countries (issue 2)

One of the major controversial questions in Copenhagen was whether the Kyoto Treaty had to be extended, or whether the decisions in Copenhagen had to result in a new treaty. This issue is particularly controversial, as the United States had not signed the Kyoto Treaty. The second most controversial issue concerned the measurable and verifiable contributions of China, India, and Brazil. These countries have no obligations under Kyoto, but their economic growth is now so high that they can be expected to contribute to the worldwide CO_2 emission reduction. Most of the other five issues are related to mitigation and adaptation. Mitigation concerns the reduction of greenhouse gas emissions, such as CO_2; adaptation concerns measures to circumvent or diminish damage caused by climate change.

As an illustration, we will concentrate here on the two most controversial ones and report over the others only globally. For the full report, delivered one month before the conference, we refer to Stokman 2009.

Figure 4.1 contains the data on the status of the Kyoto Treaty. Is the outcome of the Copenhagen COP an extension of the Kyoto Treaty (position 100 on the scale), a new treaty (position 50), or just a collection of decisions (position 0)? Saliences of Party Groups are given in parentheses after their acronym, ranging from 0 to 100. The salience is also represented by shades of gray. Party Groups in dark gray attach a salience of between 80 and 100 to the issue; in middle gray between 50 and 80; and in light gray below 50. Both ends of the scale are covered with dark gray Party Groups, indicating the highly controversial nature of the issue. Above the scale the outcomes we expect under different assumptions are presented. They will be discussed in more detail later.

Figure 4.2 contains the data on the MRV CO_2 Emission Reduction in Developing Countries. MRV CO_2 emission reduction refers to reductions that are *"Measurable, Reportable, and Verifiable"* (MRV). These criteria are applied to ensure measurable CO_2 emission reductions. Whereas in rich countries MRVs concern reductions in the total amount of emissions by 2020, developing countries are still allowed to increase their total emissions in order to obtain a higher welfare. MRV CO_2 emission reductions in developing countries aim to increase the CO_2-emission-free proportion in their growth, especially in sectors involving high emissions such as heavy industries, electricity, and transport. The MRV issue concerns, therefore, the commitments of developing countries to create a more sustainable economy.

Bargaining

As described above, the dynamics in decision-making processes result from the fact that each of the stakeholders attempts to realize the policy position it favors as the outcome. The complexity of such processes derives from the fact that stakeholders often take quite different positions, have different levels of potential to influence the decision outcome, and differ from each other with respect to the intensity of their preferences. Stakeholders may attempt to build a coalition as large as possible in support of the policy positions they favor. By building such coalitions, stakeholders hope to affect the positions of the final decision-makers, the authorities, which will in turn lead to a collective outcome that reflects their interests as much as possible. Consequently, the dynamics

TABLE 4.3

Fundamental Processes, Dominant Networks, Approaches, Conditions for Processes to Dominate

Fundamental Processes	Dominant Networks	Present Not-integrated Approaches	Integrated Approach	Conditions for process to dominate
Persuasion	Information and Trust Networks	1. Contagion Models Reciprocal 2. Exchange Networks	Cooperative Nash Bargaining Solution for all relevant stakeholders	1. Reversion point very unattractive 2. Overall coalition possible/ Subcoalitions difficult to form Risk averse stakeholders
Logrolling	Negotiated Exchange Networks	3. Coleman Exchange Model 4. Network Exchange Theory	Voting Position Exchange Models (Cooperative solutions for subsets of stakeholders with positive and/or negative externalities for others)	Opposite positions and complementary interests
Enforcement	Hierarchical/ Power Networks	5. Noncooperative Models	(Noncooperative) Challenge Model	Opposite positions and noncomplementary interests

of decision-making processes are based primarily on processes through which other stakeholders are willing or forced to change their positions. Three fundamental processes can result in such shifts in positions: *persuasion, logrolling,* and *enforcement.* Udehn (1996) derives these three fundamental processes from the literature in his sociological critique of economic models of politics. Each of these is associated with its own specific interdependencies. Table 4.3 gives an overview of these three processes, the types of networks associated with these processes, which approaches in the literature are associated with which process, and the conditions under which each of the processes is expected to dominate collective decision-making. We then elaborate on each process and the different elements contained in Table 4.3. For the logrolling and enforcement processes, we will also specify the conditions under which they strengthen persuasion processes and under which conditions they undermine persuasion processes.

Persuasion

Through persuasion, stakeholders aim to change other stakeholders' initial positions, or preferences, and the levels of salience they attach to the issues that must be decided on (Stokman et al. 2000). When a stakeholder changes its position or alters the level of salience it attaches to an issue as a result of persuasion, this change constitutes a fundamental internal switch on the part of the stakeholder. Persuasion is achieved through the provision of convincing information. Persuasion strategies are particularly likely to dominate when collective decision-making based on unanimity is a strong formal or informal norm (that is, if the group consensus salience is high and includes all stakeholders).

The Nash Bargaining Solution (NBS) (Nash 1950) provides an approach with which to model persuasion as a dominant mode of interaction. One of the central conditions conducive to persuasion is that stakeholders perceive shared

interests to greatly outweigh their individual interests. When stakeholders have a strong shared interest in reaching a collective decision, failure to do so is highly undesirable, and far less desirable than any of the decision outcomes advocated by any of the stakeholders involved. This facilitates the feasibility of grand coalitions of all stakeholders, particularly when smaller coalitions are difficult to form. Under these conditions and assuming quadratic loss functions on the issue continua (implying risk-averse stakeholders), Achen (2006a) shows that the compromise model becomes a first-order approximation of the Nash Bargaining Solution. This compromise model prediction is simply the average of the stakeholders' initial policy positions, weighted by the product of each stakeholder's influence and salience.

Conditions that are conducive to persuasion can exist only when stakeholders are embedded in dense trust networks or are severely punished when they deviate from shared interests. Stakeholders need to be confident that the information they receive is sincere and not strategically manipulated. Pursuing one's own personal gains is permitted as long as this does not inflict harm on others, and as long as personal gains are compatible with shared interests. Within this context, stakeholders can be confident that the concessions they make to stakeholders who have strong interests in present issues will be compensated in future situations when their own interests are stronger. Reciprocal and generalized exchanges (Molm 1997) are therefore an integral part of decision-making by persuasion, and not of decision-making by logrolling as the name might suggest.

Stakeholders who provide information will be trusted if they have proven to be reliable in the past and if they would experience future negative consequences from providing distorted or incomplete information. This "shadow of the future" (Axelrod 1984) is more effective if providers of distorted information lose reputation, not only with respect to the recipient stakeholder but also with respect to others (Raub and Weesie 1990; Buskens 1999; Panchanathan and Boyd 2004; Nowak and Sigmund 2005). Trust will also be greater if the information is less related to the provider's central interests. These conditions for trust emerge more readily among like-minded stakeholders and among stakeholders who also meet each other in other contexts, than among stakeholders with conflicting interests. Stakeholders also tend to assign more weight to the opinion of powerful stakeholders, whereas powerful stakeholders tend to listen more to one another than to less powerful ones (Molm 1997; Stokman and Zeggelink 1996b). Large power differences, however, make it less likely that persuasion strategies will be successful. The same holds for highly polarized issues.

In contrast to persuasion, logrolling and enforcement processes typically do not affect stakeholders' initial positions or the levels of salience they attach to issues. Logrolling is a process of negotiated exchanges. The result is that stakeholders are willing to support another position on an issue that is of relatively less importance to them in exchange for support of another stakeholder on an issue that is relatively more important to them. Similarly, when enforcement is the dominant mode of interaction, stakeholders can feel forced to support another position under pressure from more powerful stakeholders or coalitions. Logrolling and enforcement are most likely if stakeholders' initial positions fundamentally differ because of the different weights they attach to

different higher-ordered goals. In such situations, arguments do not help to bring initial positions closer together. Therefore, coalitions can be built only through processes that affect the final or voting positions of stakeholders. We will consider these two processes in the next two sections.

Logrolling

Whereas information and trust networks define persuasion, negotiated exchange networks define stakeholders' exchange possibilities under logrolling. When stakeholders shift their policy positions as a result of logrolling, these shifts lead to changes in the expected outcomes on the issues involved in the exchange. Consequently, stakeholders experience gains and losses when the expected outcomes on issues move closer to or further from their initial positions. Stakeholders from two groups with opposing positions can profit from position exchange if the relative salience of the two issues for each of them is different (see Figure 4.3; Stokman and Van Oosten 1994). A position exchange is then profitable for both stakeholders.

The model of logrolling bargaining processes assumes that each stakeholder has complete knowledge of the positions, saliences, and capabilities of all other stakeholders. We further assume that all stakeholders share a common view on what the collectively optimal outcome would be on each issue when considered separately. This collectively optimum outcome is assumed to be the Nash Bargaining Solution, approximated by the average of the stakeholders' initial policy positions, weighted by the product of each stakeholder's influence and salience (see above in the section on persuasion). Position exchanges link pairs of issues and provide pairs of stakeholders opportunities for bilateral win-win situations above the NBS solutions of the issues in isolation (see Figure 4.3). They can be seen as bilateral active optimizations of the NBS. Each stakeholder potentially has a number of possible exchanges. Each stakeholder has to choose which of these potential exchanges to realize. A potential exchange is realized only if both stakeholders agree to realize it. This will happen only if neither of them has a better alternative exchange. When an exchange is realized, both stakeholders are no longer able to change position on the issue on which they have moved their position. This of course limits future exchange possibilities in the bargaining process. In other words, when stakeholders realize an exchange they enter into a binding commitment, which is what makes the logrolling model a cooperative bargaining model.

Modeling position exchanges requires careful consideration of the nature of these exchanges. In particular, a choice has to be made about which exchange rate to use. Utility gains and losses result from outcome shifts on the two issues because of their position shifts and depend on the size and direction of the outcome shifts and the issue saliences of the stakeholders. The exchange rate determines the extent to which each stakeholder shifts its position. Stokman and Van Oosten (1994) use an equal utility gain for both exchange partners. This has the advantage that exchanges have the same utility for both partners, and that the exchanges can be ordered in terms of their relative attractiveness to both exchange partners. The disadvantage of the equal utility gain assumption is that it involves an intersubjective comparison of utility, which is theoretically problematic. Two alternative solutions for the exchange rate have been derived

Issue 1

A ◄- D

B   C

O_1

(Nash Bargaining Solution as expected outcome)

Issue 2

A -► D

C   B

O_2

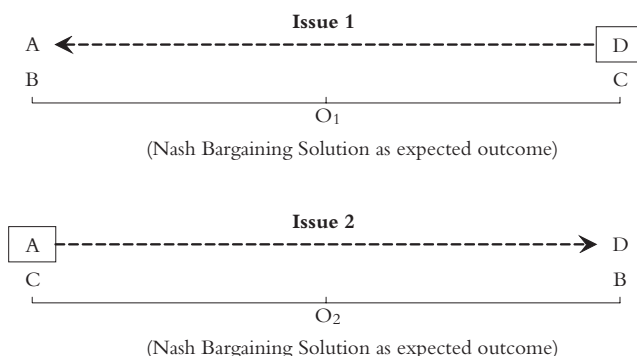(Nash Bargaining Solution as expected outcome)

FIGURE 4.3. Effects of an exchange between stakeholders of type *A* and type *D*. The arrows mean that actor *D* shifts his position on issue 1 in *A*'s direction, while actor *A* shifts his position on issue 2 in the direction of actor *D*.

that are independent of the utility scale: the Nash solution (Achterkamp 1999; Van Assen 2001), and the Raiffa–Kalai–Smorodinsky (RKS) solution (Van Assen 2001).[1] With the exception of the equal gain exchange rate, all exchange rates face the same problem of deadlock, whereby no two stakeholders prefer, and therefore realize, the same exchange.[2]

Bilateral exchanges also have important side effects or externalities with respect to other stakeholders' utility. Externalities arise when stakeholders who are not involved in an exchange are either positively or negatively affected by it. This can clearly be seen in Figure 4.3. Assume that a stakeholder of type *D* attaches relatively more salience to issue 2 than to issue 1 if we compare its saliences with those of a stakeholder of type *A*. Then, issue 2 is *D*'s demand issue and *A*'s supply issue. Position exchange between *A* and *D* implies that *A* is willing to shift its position on issue 2 in the direction of *D*, while *D* does the same on issue 1. If they do, they both shift away from *C* in the direction of *B* on both issues. In that case, *C* is punished doubly and *B* rewarded doubly, while neither of the two is directly involved in the exchange (Van Assen, Stokman, and Van Oosten 2003). Positive and negative externalities also emerge within the *A* and *D* groups if *A* and/or *D* consists of more stakeholders. An exchange of two stakeholders from the *A* and *D* groups will have positive externalities for other members in the *A* and/or *D* group if the relative saliences within each group are relatively homogeneous. Otherwise, such an exchange may well have negative externalities within the *A* and *D* groups. In the most extreme case, one *A* member may want to use issue 1 as its supply issue whereas another *A* member may want to use that issue as its demand issue.

Here, we return to the Copenhagen example. In Table 4.4, the Party Groups are ordered on the basis of their relative salience for the two most controversial issues—that is, the salience for the issue on the status of the new treaty (issue 1) divided by the salience for the issue on the MRV CO_2 reduction in developing countries (issue 2). In the last column of Table 4.4, the Party Groups are allocated to the four cells in Figure 4.3 on the basis of their positions: their placement depends on whether they are located to the left or to the right of

TABLE 4.4

Relative Saliences of Copenhagen Party Groups for the Two Most Controversial Issues and Their Positions Relative to the Expected Outcomes on the Two Issues

Party group	Relative salience for Issue 1/Issue 2	Cell
Canada	1.33	A
USA	1.20	A
Japan	1.00	A
China India	1.00	C
LDC	1.00	D
AOSIS	0.95	D
Russia	0.78	C
Australia	0.67	A
Brazil	0.67	C
Other G77	0.63	D
EU	0.50	B

NOTE: Party Groups in cell A have positions left of the expected outcomes on both issues; Party Groups in cell B left on issue 1 and right on issue 2; Party Groups in cell C right on issue 1 and left on issue 2; Party Groups in cell D right on both issues.

the expected outcome (the Nash Bargaining Solution) on each issue. As in Figure 4.3, only Party Groups with opposite positions on both issues can make exchanges—that is, Party Groups in cell A can make exchanges with those in cell D, and Party Groups in cell B with those in cell C. Cell A consists of four Party Groups and cell D of three. Cell C consists of three Party Groups, cell B of one. This results in twelve potential exchanges between the A's and D's and three between the B's and C's, making a total of fifteen potential exchanges of voting positions. Three members of cell A attach relatively more salience to issue 1 than do all Party Groups in cell D. For these A's, the first issue is the demand issue (as in Figure 4.3), and all potential exchanges go in the same direction: toward the initial position of the Party Groups in cell B. The fourth Party Group in the A cell (Australia), however, can make an exchange with Party Groups in cell D in both directions. With the Party Group Other G77 again its demand issue is issue 1, but with the Least Developing Countries (LDC) and the Alliance of Small Island States (AOSIS) Groups issue 2 is the demand issue, as the latter have a higher relative salience for issue 1 (1 resp. 0.95) than Australia (0.67). Whereas most potential exchanges between the Party Groups in cells A and D will result in a better outcome for the Party Group in cell B (the EU) and a worse outcome for the three Party Groups in cell C, the EU has potential exchanges with three Party Groups in cell C. If one or more are realized, the positions of the EU and the three Party Groups in cell C (China, India, Russia, Brazil) will all shift in the direction of the Party Groups in cell D, resulting in worse outcomes for the Party Groups in cell A. In other words, all potential bilateral exchanges will have negative externalities for at least some Party Groups, making an overall unanimous outcome less likely.

We can now specify the conditions under which logrolling based on

bilateral exchanges is compatible with cognitive interdependencies that support persuasion and consensus building. The following three conditions should hold simultaneously:[3]

1.　One of the four groups should be empty. Without loss of generality, let us assume that group *C* is empty.

2.　The relative saliences of the two groups that can exchange is such that the exchange shifts the decision outcomes in the direction of the positions of the stakeholders in the nonempty group.

3.　The relative saliences of the two groups that can exchange are such that there are no negative externalities within each of these groups. This occurs under the following condition. Without loss of generality, let us assume that a stakeholder in the *A* group attaches the highest relative salience to issue 1 compared with all other stakeholders in the *A-D* group. Under the assumption of linear decreasing utility functions around the policy positions of stakeholders, no negative externalities occur if the exchange rate is lower than the relative salience of the *A* stakeholder with the lowest relative salience for issue 1, and is higher than the relative salience of the *D* stakeholder with the highest relative salience for issue 1. This implies that negative externalities within an exchange group are unavoidable when stakeholders of one group embed some stakeholders of the other group in the ordering of the relative salience they attach to the issues.[4]

If these conditions are not met, bilateral exchanges over pairs of issues produce negative externalities for other stakeholders. Such negative externalities will harm consensus building, unless the stakeholders who experience negative externalities are compensated in other respects.[5]

Certain institutional conditions may discourage stakeholders from realizing exchanges with negative externalities and encourage them to realize exchanges with positive externalities. Some decision-making rules stipulate that outcomes must be supported unanimously. In other contexts, informal norms stipulate that unanimous support should be sought, although outcomes could formally be taken by majority voting. In both these contexts, we expect stakeholders to avoid voting position exchanges with negative externalities and to realize only exchanges with positive externalities. Exchanges with positive externalities facilitate overall consensus, as the interests of the exchanging Parties are in harmony with those of the others.

Under the condition that stakeholders avoid exchanges with negative externalities, linking issues can potentially improve the overall Nash Bargaining Solution for all stakeholders. Dijkstra, Van Assen, and Stokman (2008) incorporated this idea in a new version of the exchange model, denoted the Externality Exchange Model (EEM), and tested their model against the original model in the context of the European Union. A nonparametric test for which of the two models more often gives the best prediction shows no significant difference between the two. Relative to the original logrolling model, the predictions of the EEM model show a more substantial improvement, albeit not significant in the nonparametric test. This is a weak indication that stakeholders avoid exchanges with negative externalities in contexts in which an overall consensus is normatively promoted.

Enforcement

When collective decision-making is driven by power processes, enforcement, not persuasion, is the dominant mode of interaction among the stakeholders (see Table 4.3). Stakeholders try to build as large a coalition as possible behind their own policy position by showing that they have sufficient power to enforce a decision and/or to block other alternatives. Solutions to substantive problems are not sought by arguments but by showing that there is sufficient support to enforce the decision on the basis of the formal procedures and/or informal power arguments. When enforcement is the dominant mode of interaction, stakeholders may shift their positions because they feel compelled to do so, not because they are convinced to do so. To the extent that a stakeholder's issue salience is lower than that of stakeholders who support another position, and the power of those other stakeholders is greater, that stakeholder may be inclined to give up its initial position. Stakeholders may avoid costs by conceding on an issue that is only marginally related to their own interests.

When enforcement occurs, decision outcomes can be seen as the result of a noncooperative game in which no binding agreements are made (Bueno de Mesquita, Newman, and Rabushka 1985; Bueno de Mesquita 1994, 2002). In his computer simulation model, a challenge to a stakeholder's position is more likely to be successful if the stakeholder to whom the challenge is directed attaches less salience to the issue than does the challenger, and if the support for the challenged stakeholder's position is lower than the support for the challenging stakeholder's position. In the model, these two aspects dominate the determination of which stakeholders will challenge which other stakeholders. Each stakeholder makes this choice in relation to each of the other stakeholders. Based on the challenges made, each stakeholder has a set of cards in its hands that represent the challenges made and received. If a stakeholder received challenges, that stakeholder has to draw the one that is best. The result is either conflict (if the stakeholder made a challenge to the other as well) or a forced position change. These position changes create a new decision-making setting (iteration in the computer simulation model). In that new setting, the stakeholders repeat the choice process. This continues until none of the stakeholders move (substantially) or until all stakeholders take the same position.

If enforcement dominates decision-making about organizational policies, hierarchy dominates over arguments also in the preparatory stage of decision-making. In such a situation, the goals of the organization are likely not primarily seen as shared goals, but as the goals of and set by the top of the organization. Such a setting leads to a cognitive interdependence model in which personal relationships are seen primarily in the light of their hierarchical place and ordering. In other words, power networks dominate the outcomes of collective decision-making processes.

Again, as bilateral negotiated exchanges may well be compatible with consensus or even enhance consensus building (in the presence of large positive and the absence of negative externalities), it is unlikely that persuasion on the basis of high shared interests will long survive without clear institutional rules and clear responsibilities that are derived from them.[6] They connect joint production with external sanction (legal) systems to enforce cooperation,

resulting in sufficient trust that noncooperative individuals can effectively be sanctioned or even fired. Enforcement of cooperation is also important for the timely and correct implementation of collective decision-making. Recent EU studies have investigated such effects on implementation of distances between decision outcomes and policy positions of Member States and the European Commission and of consensus among Member States in the Council (see, among others, Falkner et al. 2005; Zhelyazkova and Torenvlied 2009; König and Luetgert 2009; Steunenberg 2010; Thomson 2009, 2010).

If cognitive interdependencies are linked to norms that decisions should be based on consensus, institutional rules work like legal contracts. As mentioned before, they provide safeguards to stakeholders in case fundamental problems arise or other stakeholders misbehave. However, the more often you have to fall back on them, the more the norm of consensus building will be under pressure.

Building sufficient support for a specific outcome may lead to a preferable outcome, but it may also lead to disturbed relations. Some stakeholders may not be interested in a specific outcome, but in any outcome as long as it is supported by all stakeholders. Other stakeholders may be interested solely in an outcome close to their policy position, even when it implies a lot of opposition and turmoil.

From this perspective, each stakeholder can be perceived to have at least two objectives while intervening in decision-making. The first objective is to minimize the distance between the outcome and the policy position of the stakeholder on the issue. The second objective is to minimize the variance of the positions of all stakeholders or the subgroup of stakeholders with whom the stakeholder is associated. Earlier, we denoted the first issue salience and the second group consensus salience. The two objectives can be modeled by using an aggregate utility function in which both objectives are combined. This can be realized by applying the Cobb-Douglas function with two weights, one being the issue salience and the second the group consensus salience.

The three bargaining processes: transitions and testing dominance

It is interesting to study and model transitions from one dominant process of decision-making to another. This is the subject of future research in which both Lindenberg's theory about frame switches (Lindenberg and Frey 1993; Lindenberg 1998, 2000) can be helpful, as well as Esser's model building on shifts in the definition of situations (Esser 1997, 2000).

The dominance of the three types of networks (persuasion, logrolling, enforcement) in the context of the European Union was evaluated on the basis of the accuracy of the three corresponding models.

To determine the dominance of the three types of processes (persuasion, logrolling, enforcement) in the context of the European Union, the accuracy of each model is determined by the distance between the model-predicted outcomes and the actual outcomes on the issue scales (for the EU 2001 extension, see Stokman and Thomson 2004: 19; for the EU after the extension, see Thomson 2011). Models based on cooperative solutions that include the positions of all EU decision-makers give the best predictions. *Unanimity, wherever possible*, is a very strong norm in the EU, even when decision outcomes

supported by only a qualified majority of actors are possible (see also Mattila and Lane 2001). Decision outcomes in the EU tend to take into account actors' essential interests, wherever possible, and actors avoid harming the essential interests of others (Schneider, Finke, and Bailer 2010). This implies that persuasion networks dominate in the European context. Negotiated exchange networks do not often support consensus building in the European Union because of the high negative externalities involved. Given the dominant norm of consensus building, this type of network is not dominant in the European context, as shown by its worse predictions than the persuasion model. Dijkstra, Van Assen, and Stokman (2008) show, however, that negotiated exchanges that avoid negative externalities indeed contribute to overall consensus building in the European Union. Power networks do not dominate European Union decision-making either: noncooperative procedural and bargaining models do even worse. We therefore conclude that, also in the European context, procedures do not determine behavior, but set the boundaries within which action takes place.

The reader should be aware that the inferences about European Union decision-making can be made only by a comparative analysis of the three processes and corresponding networks.

Strategic Intervention in Decision-making

The methodology of data collection and the dynamic analysis of the bargaining processes through computer simulation have not only been validated in scientific research but are also applied in commercial projects as a successful tool for strategic intervention (see Stokman et al. 2000 for two examples). Whereas in scientific applications the main aim is the prediction of outcomes and the determination of the dominant process, applied projects usually aim either to arrive at decisions close to the client's position with sufficient support to be viable, or to arrive at a common position in stakeholder dialogues and mediation. The approach can be applied fruitfully both in contexts where organizational strategies have to be determined and where organizational strategies have to be implemented. Stokman et al. (ibid.) elaborates strategic moves for all three bargaining processes. Here we will illustrate just one such move in the context of our example of the Copenhagen climate conference in December 2009.

The question of whether consensus could be reached in Copenhagen depended on two perceptions of the Party Groups. The first perception concerns the severity of the expected climate changes as a consequence of greenhouse gas emissions owing to currently unsustainable industrial production. The second is evaluating the importance of a worldwide agreement between the Parties in order to realize the transition to a more sustainable production. If both perceptions are strong and can be shared by all Party Groups, failing to reach a unanimous agreement will be seen as highly undesirable, even less desirable than a weak compromise. If this were the case, unanimity was expected to be reached in the end, even when the Party Groups fundamentally disagree on a number of issues. For each issue, the expected outcome will then be close to the mean of the Party positions on the scale, weighted by their influence and

salience, the approximation of the Nash Bargaining Solution, as we have seen earlier. Table 4.2 shows, however, that certain Party Groups do not attach much importance to reaching an agreement. The EU, the least developed countries, and AOSIS want to reach an agreement, but others such as the United States and Russia do not. This implies that the NBS is unlikely to be a good predictor for the outcomes on this issue.

The expected outcomes, but also the variation of the positions can change fundamentally if Party Groups exchange voting positions by linking the issues with each other. The degree of agreement *after the exchange process* increased substantially for five of the seven issues, but remains low for the two most controversial issues—namely, the state of the decisions in Copenhagen as new or as an extension of Kyoto (Issue 1; Figure 4.1), and the size of MRV CO_2 reduction in advanced developing countries, such as China, India, and Brazil (Issue 2; Figure 4.2). In other words, the basis for agreement improves fundamentally, but two issues will continue to cause problems.

Another reason why it is not expected that this exchange process will result in an overall agreement is that, over all simulated exchanges between Party Groups, the positive externalities are greater than the negative ones only for the EU, Russia, and some developing country groups. All other Party Groups perceive higher negative externalities than positive ones, which is the second reason for the main conclusion that *the interests of the Party Groups are not sufficiently aligned to arrive at an overall agreement by simply exchanging positions. Two issues remain controversial and require another solution. There are simply not enough complementarities between interests to reach an overall agreement.*

The next question is then whether there are instruments to increase the complementarities of interests of the Party Groups in Copenhagen in such a way that an overall agreement can be achieved. A strategy for such an outcome is based on two small changes in the data on the basis of solid reasoning. Issue 1 is a problem mainly for the United States, which never ratified the Kyoto Treaty. If the new decisions are classified as an extension of the Kyoto Treaty, the U.S. House and Senate ratification of the Copenhagen agreement implies a ratification of the Kyoto Treaty. Moreover, after eight years of the Bush administration, the United States cannot easily catch up. Consequently, the U.S. will not likely sign a treaty that implies ratification of the Kyoto Treaty. On the other hand, China and India have high stakes in having a Copenhagen agreement as an extension of the Kyoto Treaty, as rich countries can realize their emission reduction obligations with projects in their countries. The MRV CO_2 free reduction in the growth (Issue 2) is especially important to China and India, as they are willing to realize such a component in their growth but are not willing to make binding agreements to do so.

A possible solution could be to accept nonobligatory intentions in both cases, but to put the realizations of CO_2 reduction of these countries in the Copenhagen Treaty. Such a double arrangement considerably reduces the salience of the United States in Issue 1 and the salience of China and India in Issue 2, which can be investigated by a considerable reduction of the two saliences in the data. The salience of the U.S. on Issue 1 is reduced from 90 to an arbitrarily chosen value of 70 or lower, such as 50. Simultaneously, the salience of 100 of China and India on Issue 2 is also reduced to 50.

These changes reduce the variances of positions on all seven issues substantially enough to expect overall consensus. The results are stable as long as the salience of the United States is reduced to 70 or lower for Issue 1 and that of China and India to a value of 90 or lower on Issue 2. Doing so provides us with very stable results. *Now, after bilateral exchanges, sufficient agreement is realized on all issues to arrive at a complete agreement. This prediction was made in November, one month before the start of the Copenhagen Conference and turned out to be the sole solution for something like an agreement in Copenhagen* (see Stokman 2009 for details).

Conclusions

Starting from the idea that collective decision-making is a special case of joint production, required in any situation in which individuals are mutually outcome dependent, we hope to have shown that the topic is of much wider importance than in simply the political sphere. Collective decision-making is at the heart of any collaboration, whether that is in small informal groups or in complex organizations or in political systems. Placing collective decision-making in this perspective, one's attention is immediately drawn to the relative salience of the shared versus the conflicting interests that is of such importance in any joint production. We hope also to have shown convincingly that in the domain of collective decision-making this ratio strongly determines the type of dominant process and the likelihood of arriving at common positions, even when formal institutions do not require reaching them. The chosen perspective also shifts the attention from formal rules toward informal rules, without underestimating the importance of the formal rules for the evolution and effectiveness of the informal rules. If, then, outcomes cannot be seen as the result of the interplay of formal institutions and preferences, we almost automatically have to shift our focus toward the informal processes preceding the final vote. Notwithstanding the elegance of neoinstitutional models and the extra insights they have generated, they seem not to be able to predict outcomes of decision-making processes in reality. Models that represent informal bargaining processes seem to do much better in this respect. This does not imply that formal institutions are neglected in such models. On the contrary, formal institutions and the voting rights and rules that are based on them are, first of all, required to make outcomes binding for social systems. In addition, they codetermine power and influence distributions in social systems, codetermining which stakeholders have to be included in the analysis. Finally, they connect collective decision-making processes to external sanction systems, without which informal processes are likely soon to degenerate, as stakeholders will not have formal sanctions to enforce cooperation and norm-conforming behavior.

In this article, we have specified three main bargaining processes and the conditions that each of them is likely to dominate in decision-making processes. Moreover, we have specified under which conditions logrolling and enforcement processes are likely to support or undermine persuasion processes. Finally, we have tried to develop an integrative set of models for all processes, enabling both a comparative analysis of the expected outcomes under each

of the processes and a strategic analysis of how to align the different processes in such a way that they support each other. It is this combination that makes the approach valuable both for scientific analysis and strategic intervention in decision processes. The largest project in which this approach is applied is the Decision-Making in the European Union (DEU) project (Thomson et al. 2006; Thomson 2011). In the Forum Section of *European Union Politics,* Mattila (2012: 459) concluded independently: "In many respects the DEU project has led EU studies to a new level. It was the first project of its scale to analyse the EU's decision-making system with a systematic rational choice approach." If we have valid and reliable estimates of the main issues at stake and the positions, saliences, and influence of the relevant stakeholders, rational models are able to provide far-reaching insights and conclusions. This does not imply, however, that the positions and saliences of the stakeholders are based on rational considerations only, focused on an optimal outcome for each stakeholder. A theoretical derivation of these data requires a more complex model of man (see, for example, Lindenberg and Steg 2007).

Nevertheless, there is more to do. We are presently particularly working on two lines of further development.

First, the models can be improved by incorporating not only the issue salience of the stakeholders but also their group consensus salience. Stakeholders aim not only at outcomes close to their policy position but also at outcomes that receive support from either all stakeholders involved or the stakeholders they want to align with. We have indicated that the Cobb-Douglas function can be used for the simultaneous optimalization of these two goals, taking into account the relative saliences for both goals.

Second, a further elaboration of persuasion models requires a further elaboration of the relationships between instrumental (issues) and higher ordered goals. In such an elaboration, both differences in priority of the higher ordered goals and differences in cognitive perceptions of the relationships between issues and goals have to be integrated with the collective decision-making models as treated in this article.

Notes

1. There is a strong link between our work and Network Exchange Theory because the exchange-resistance solution used in Network Exchange Theory (see, for example, Willer, Markovsky, and Patton 1989; Skvoretz and Willer 1993; Szmatka and Willer 1995) is also derived from the game theoretical RKS solution (Heckathorn 1980).

2. Stokman and Van Oosten's exchange model has been tested in several contexts, ranging from complex negotiations between employers' organizations and trade unions (Rojer 1996; Akkerman 2000), urban politics (Berveling 1994), European Union decision-making (Arregui, Stokman, and Thomson 2006), and the international climate conference in Copenhagen (Stokman 2009). We have published the outcomes for the Copenhagen study not only in advance but also at four other occasions at the beginning

of the negotiations. The first time, in 1996, Rojer and Stokman gave the predictions of outcomes on sixteen issues in a forthcoming negotiation process in the Dutch metal industry to a lawyer. They announced publicly that these predictions would be revealed at a press conference at the end of the negotiation process. Three times, in 2002, 2007, and 2009, predictions were published at the start of coalition negotiations between Dutch political parties. In all three cases, more than 80 percent of the outcomes were correctly predicted within strict, previously specified boundaries. (See http://www.stokman.org/news-related%20activities.htm.)

3. The proof is given in Dijkstra, Van Assen, and Stokman 2008.

4. If such an exchange is possible, another condition may limit the size of the exchange. For none of the actors, the distance between the expected outcome and their position on the demand issue should be larger after exchange than before (Dijkstra, Van Assen, and Stokman 2008).

5. Van Assen, Stokman, and Van Oosten (2003) define measures with which the positive and negative externalities of bilateral exchanges for other stakeholders can be computed. In their approach, exchange is considered as a *cooperative two-person game*. That is, in the derivation and the calculation of the measures it is assumed that actors not involved in the exchange do not affect the exchange rate of the exchange under consideration.

6. For the interaction between informal cooperation and sanctioning systems, see, among others, Yamagishi 1986; Ostrom, Walker, and Gardner 1992; Fehr and Gächter 2002; and Rockenbach and Milinski 2006.

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