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Een wetenschappelijke proeve op het gebied van de Beleidswetenschappen.

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Promotor:

Prof. dr. G. E. Lock

Copromotor:

Dr. A. M. A. van Deemen

Manuscriptcommissie:

Prof. C. J. van Kersbergen (voorzitter)

Prof. M. Laver (Trinity College, Ierland)

Dr. H. Pellikaan (Universiteit van Leiden)

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1. Introduction

1.1 Coalition formation

In a Western democracy, political parties usually do not govern alone since no single party gains the majority of the seats during elections. Coalition formation is therefore central to politics in multi-party systems. This means that cooperation lies at the heart of our political system. Since the system presently in place in Western democracies allows us to choose and vote for our 'favourite' party, but not for our 'favourite' coalition, it seems worthwhile to study coalition formation in an attempt to make this part of the democratic life cycle more transparent.

In a nutshell, democracy in a multi-party system should run through the following stages. In the first stage, general parliamentary elections are held. In the second stage, the elections lead to a distribution of seats over the political parties in parliament. Then the process of cabinet formation takes place. After the formation of a government, this cabinet's policy is the ingredient of the next stage. On the basis of the evaluation of the government policy, the voters determine who to vote for in the next elections.

According to a modest interpretation of democracy, the democratic control of the citizens is typically restricted to punishing bad governors and rewarding good governors at the time of the election. This notion of democracy is often referred to as a liberal interpretation of democracy and originates in Madison (Riker, 1988). Representation of the citizens by politicians they voted for lies at the heart of liberal democracy. This liberal view is often presented as the counterpart of the 'populist' interpretation of democracy with Rousseau as its inventor. In the populist view of democracy, the government should act on behalf of 'the general will of the people' in all democratic stages (Riker, 1988). In the liberal view the political parties receive a temporary mandate to govern, whereas in the populist view the parties are supposed to reflect the general will.

In a two-party system, it is easy to reward or punish political parties since the government, consisting of one party, directly reflects the voting behaviour. If the incumbent party is rewarded and keeps its majority, this party will govern and the liberal view of democracy is satisfied. Naturally the opposite also meets Madisonian standards: if the incumbent party is punished and loses its majority to the opposition, the latter party will govern.

In a multi-party system it is very well possible for political parties to 'win' the elections, but simultaneously lose the formation. Thus, a party that is rewarded by

the citizens during elections can lose office. A winning party can gain more votes than in the previous election, even become the largest party, and yet lose the formation. In this context, ‘losing the formation’ means not becoming a member of the coalition that is formed. The Social Democratic Party in the Netherlands, for instance, became the largest party in 1977, but was not included in the small majority coalition of Christian Democrats and Liberals that eventually resulted. In cases like these, even though the liberal view of rewarding and punishing governors holds for the first democratic stage, this is ultimately not translated in the composition of the government. So, since the relation between elections and coalitions and thus governmental policy - the outcome of the democratic process - is not as straightforward as one might expect, studying coalition formation is a worthwhile activity.

Naturally, many researchers have acknowledged the importance of studying coalition formation over time. Different approaches have led to different models of coalition formation. A first branch of theories dates back to the early 1960’s, when Riker presented his *Theory of Political Coalitions* (Riker, 1962). The main argument in his research is that parties do not want to enter coalitions that have more members or, to be more precise, more parliamentary seats, than necessary. If we view governing the country as the ‘catch’, it makes sense that the players want to share this catch with as few other players as possible. The earliest contribution to this set of so-called office-seeking models can be found in the *Theory of Games and Economic Behaviour* written by the creators of game theory, Von Neumann and Morgenstern in 1944 (edition 1990). These office-seeking theories, also referred to as ‘power-oriented’ theories, will be presented in a formal manner in Chapter 3. In these theories, the weight of a political party is its resource, and a rational choice for a party is a coalition with small weight (see also Gamson, 1962). In the Dutch parliamentary system, the weight is denoted by the number of seats that a political party holds in the Second Chamber, and a minimal size coalition is defined as a coalition with no more seats than necessary in order to be winning. Other definitions of ‘small’ coalitions are for instance ‘any combination of parties with just enough players to make the coalition winning - it is representing a majority in parliament - (Von Neumann & Morgenstern, 1990), or ‘winning with as few players as possible’ (Leiserson, 1968).

These power-oriented theories do not take into account that coalition formation may also be driven by motives other than gaining office. Two such motives are policy-oriented and ideological. With policy motives, I refer to preferences about issues that the political parties and the voters care about. An issue can be almost anything, ranging from ‘how much money the government should spend on public transportation’ to ‘how one should deal with euthanasia’. On the other hand, ideology is

defined more tightly. In this research, following the footsteps of Hinich and Munger (1994), I refer to ideology as a group of coherent issues that together form an idea about how society should be constructed and evaluated. Ideology should mean the same for both the citizens and the political parties. In this research, an important property of ideology is that it is no more and no less than a group of consistent ideas held by both the voters and politicians in one country at one moment in time. The content of ideology however does not necessarily remain stable over time and over state boundaries.

In some coalition formation theories, the ideological or policy stands of the parties are included. The theories in this branch are denoted as 'policy-seeking' or 'policy oriented' theories. Axelrod (1970) was among the first to develop a policy-seeking coalition formation theory, namely the 'conflict of interest theory'. Coalitions with as little conflict of interest as possible are most likely to be formed. Political parties are said to have little conflict of interest if their policy preferences are not dispersed. In this particular theory, coalitions are predicted that consist of parties that are adjacent on the main left-right economic scale. Leiserson (1966) and De Swaan (1973) also developed policy-seeking theories.

De Swaan's policy distance theory is among the most famous coalition formation theories and the behavioural assumptions of this theory are also deployed in the main theoretical contribution - the maximal satisfaction solution - of my research.

Another development in coalition formation theory is the introduction of actor-oriented theories. The basic idea here is that a specific actor controls coalition formation processes. Peleg (1980, 1981) introduced the dominant actor, which is powerful by her weight. This actor has the ability to control internal opposition in a winning coalition, and, moreover, has more opportunities to form winning coalitions than any other actor in the game. Another powerful actor, defined by Van Deemen (1991), is the centre player. This player owes its powerful position to its ideological position on a uni-dimensional ideological scale. The main strength of this player is her ability to keep balance on this dimension. It is the only player that can form a winning coalition with the players to its right, and simultaneously with the players to its left.

The distinction between office-seeking and policy-seeking theories has led to much discussion about the motivation of politicians and political parties, and thus the question of what they bargain about. Downs (1957) and Riker (1962) support the office-seeking view. Downs (1957, p 28) states that: "*parties formulate policies in order to win elections, rather than win elections in order to formulate policies*". De Swaan (1973) in his policy distance theory, on the other hand, argues that foremost in coalition bargaining is the will to determine government policy.

To simply assume that parties should have either office or policy motives is in my opinion naive. A truly office-seeking party would be forced to engage in policy bargaining because it would have to convince the electorate that its policy positions are worth voting for. Moreover, if this office-seeking party would ‘forget’ about its policy proposals once it holds office, this would lead to a reputation of unreliability and consequently a loss of office. On the other hand, a truly policy-seeking party cannot exist either. In order to influence policy, this party needs office. So, no matter what the ‘initial’ motivation is, political parties are both office- and policy-seeking actors.

In addition to the two main branches of coalition formation theories - office- and policy-seeking theories - and the actor-oriented theories, new developments have given rise to the development of new theories. One of the new classes of theories is concerned with the influence of system characteristics in the process of coalition formation. System characteristics can be viewed as institutional features or institutional constraints that influence coalition bargaining. Including these particular characteristics of a country could improve the quality of the general game theoretic coalition models. Examples of these characteristics can simply be formal rules such as a size requirement for a party, legislative rules, or the manner in which coalition formation proceeds in a particular country. Baron (1993) for instance applies a constraint that states that after the elections the largest party is allowed to make the first move in the formation process. The largest party can try to realize its most preferred coalition since it can propose its ‘favourite’ coalition first. Pridham (1986) discusses the influence of contextual factors in coalition formation extensively. He states that formal theories¹ *“fail to take account of a range of variables or determinants of coalitional behaviour highlighted by studies of party systems, where these have pointed towards the problems of decision-making processes in political parties. They include questions of a structural and societal nature, a recognition of the influence of party development or history as well as of internal party relationships on political behaviour”* (Pridham, 1986, p 2).

Note that historical factors are also important, such as the evaluation of the role of parties as coalition partners based on past experience. Pridham tries to take all historical, institutional, motivational, and internal party considerations into account, and then builds an inductive theory on coalition formation.

Budge and Keman (1990b) are also interested in constraints and other structural factors that influence coalition formation. They focus on an idea similar to issue-ownership (Budge & Farlie, 1983), namely the allocation of ministries to coalition

¹ With ‘formal theories’ Pridham (1986) refers to the other - non-institutional - deductive theories on coalition formation.

partners. Parties have pre-electoral and thus pre-coalitional preferences and alliances to particular ministries. In their article, Budge and Keman discuss the relation between specific ministries and party families and state that:

“... parties consolidate their internal negotiating position by responding to the demands of electoral support groups and of historical ideology and developing substantive preferences for ministries” (Budge & Keman, 1990b, p 180).

In *Voters, Parties and Government*, Narud (1996) also stresses the occurrence of structural constraints and further observes that there are no formal exogenous constraints on coalition bargaining in the Netherlands. Informally, the Netherlands differs from for instance Norway, because of the extreme proportionality of the Dutch system together with the ‘automatic’ demand for majority coalitions. The historical tradition of pacification can be an explanation for the occurrence of ‘over-sized’ coalitions.

This new focus on institutional constraints is attractive, but often leads to descriptive models of coalition formation. Another new trend in coalition formation research is the development of a class of multi-dimensional policy-oriented theories. These theories incorporate both office and policy motives, but differ from the policy-oriented theories presented earlier, because policy or ideological positions of parties are presented in a Euclidean metric space, and positions on more than one dimension are permitted. In this research, I shall simply refer to multi-dimensional policy-oriented coalition formation theories as spatial theories. The merit of spatial theories is that they comply with the notion that parties and voters differ from one another on more than one cleavage or issue at the same time.

Policy oriented uni-dimensional theories like Axelrod’s (1970) and De Swaan’s (1973) theory will, for reasons of clarity, not be referred to as spatial theories. The distinction is that spatial theories use Euclidean distances and thus metric positions on their dimensions, whereas uni-dimensional policy-oriented theories apply ordinal orderings of parties on one ideological or policy dimension only.

This research concentrates on coalition formation in the Netherlands. In the Dutch political system, more than one dimension is necessary to explain political competition. In the times of pacification, or pillarization, running from approximately 1917 until 1967, life in the Netherlands was organised in five religious and ideological ‘pillars’. Political parties were divided along these pillars, as was, in fact, the whole of Dutch civil society (Lijphart, 1990). Each pillar had its own schools, sports clubs and so forth. The - two-dimensional - division was based on economic status and on religious affiliation. The Catholics were organised in the catholic pillar.

The Protestants were divided into two pillars depending on whether they were reformed or not. Furthermore, there were two public - non-religious - pillars, one of them for the (socialist) working class and the other for the (liberal) 'upper class'. So, in the years of the pillarization, more than one dimension was necessary to explain voting behaviour. In the late 1960's, the system of pillarization evanesced. New parties arose and voting behaviour became less predictable. Political competition among parties in order to win votes as well as competition during coalition formation were affected by new conflicts. Inglehart referred to these 'new issues' as post-material issues as opposed to the 'bread and butter' issues of politics (Inglehart, 1977). More issues influencing politics and thus coalition formation suggest that theories that can handle more than one ideological or policy dimension are probably more suitable than theories that are unable to incorporate multi-dimensional information.

Many spatial theories of coalition formation theories have been developed in the last decades. The theories that will be studied in this research will now be introduced. All spatial theories share the 'smallest distance assumption'; this means that parties want to be members of a winning coalition that is as close as possible to the position of the party in a multi-dimensional ideology or issue space. However, remarkable differences can be found in the way these theories detect which coalition(s) comply best with this assumption. These differences are induced by the different solution concepts applied by these theories².

² It is important to realise that a payoff preference is not the same as a coalition preference. In game theoretic models, players strive for the best payoff possible, whereas, in our models of coalition formation, we need coalition preferences. The solution concepts in this research aim to predict coalitions and not payoffs. Van Deemen (1997, p 6) described this discrepancy between payoff and coalitional preferences eloquently: "Coalition formation theories formulated within the game theoretic tradition typically ignore the preferences of the players for coalitions..... Game theory starts from the idea that players have preferences with respect to payoffs and not with respect to coalitions that may be formed in order to get as much payoff as possible. Furthermore, the preferences are supposed to be exogenously given. Shifting the attention away from payoff towards coalition formation does, by itself, not necessarily lead to efforts of constructing theories in which the formation of coalition preferences is essential. The relevance of payoff preferences does not necessarily imply the relevance of coalition preferences".

1. The first theory to be discussed is the *Heart Solution*. The heart searches for median lines in the party configuration and then predicts which coalitions might be formed (Schofield, 1993a). In two dimensions, a median line is a line drawn through two party positions, for which it holds that either on or to one side of this line, these parties comprise a majority. The parties on the median lines that form the heart are more powerful than other parties; the theory predicts coalitions that consist of these parties.

2. A second theory focuses on *Protocoalition Formation*. This theory is a dynamic version of the smallest distance hypothesis (Grofman, 1982). Two parties that are closest to one another will form a protocoalition. If these two parties represent a majority of the seats in parliament, this coalition is predicted. If not, the next two closest parties or a party and the protocoalition - depending on which reciprocal combination is closer - can join one another and form a new protocoalition. This process of forming protocoalitions continues until a winning coalition is formed.

3. Another spatial theory that will be discussed is the *Winset Theory*. This theory applies the smallest distance hypothesis, but has a different point of departure than the other spatial theories in this research, since parties are here assumed to bargain about the distribution of the main ministerial portfolios (Laver & Shepsle, 1996). The space is the jurisdiction space of the state secretaries and therefore bargaining is on portfolios instead of more general ideological positions.

4. The fourth spatial theory is the *Competitive Solution* (McKelvey et. al, 1978). This theory starts from the smallest distance hypothesis and selects viable coalitions. All sets of winning coalitions are compared one by one. A coalition is viable if there is no other coalition for which it is true that all critical players prefer the latter coalition. Critical players are players that are members in both coalitions under consideration.

5. The last spatial theory that will be discussed in this study is a new solution concept. The *Maximal Satisfaction Solution* also starts from the smallest distance hypothesis. Parties' preferences are based on distances between parties and coalitions, and this solution concept searches for the coalition with the highest collective utility. This is innovative, since it is not common to start from a notion of collective - as opposed to individual - preferences.

This last group of theories will be central to this research. In an attempt to clarify politics and in particular coalition formation, the main theories from the models above will be presented and the cardinal question that will be addressed is whether spatial theories perform better than those in the other three classes. In the next section, this research question will be elucidated and the main research topics will be introduced. In the last section of this chapter, the outline of this book will be presented.

1.2 Research Topics

Many theories on coalition formation - including the theories that will be studied here - are modelled within the field of game theory and are 'formal'-deductive in nature. These models are the opposite of so-called inductive models, where universal statements are inferred from singular statements, or in other words, where universal statements are obtained through 'learning by experience'. If something happens five times, inductive models 'predict' that it will also occur the sixth time.

Deductive models work the other way around. Based on (singular) statements, conclusions are drawn by means of logical deduction. These conclusions, which are also called predictions, are deduced from the theory and can be tested, i.e. falsified. The domain of the prediction - the deduced statement - can logically never extend the domain of the statement from which it is deduced. A formal theory is a set of coherent logically derived statements. Empirical science adds to this theory the system of experience. Therefore, in an empirical theory - like theories on coalition formation -, *"it must be possible for an empirical scientific system to be refuted by experience"* (Popper, 1975, p 41).

Game theory is a set of tools used to model strategic interaction and will in this research be applied to model coalition formation. In the case of coalition formation, the strategic interaction is between political parties attempting to make a binding agreement, i.e. to form a coalition. The theory of cooperative games and in particular that of coalitional games provides us with a set of elements that facilitates a common ground for studying coalition formation.

The latest development in the field of coalition formation is the appearance of both institutional theories and spatial theories. Institutional theories mostly add formal and informal constraints to the theories on coalition formation rather than introducing alternative theories. Since these theories lead to descriptive or inductive approaches, they can not easily be compared with other formal theories of coalition formation. Moreover, institutional theories are sometimes so descriptive - see Section 3.5.1 - that they can hardly be refuted. In this research, the goal is to compare deductive theories of coalition formation that are at least in principle fit to also be applied to other multi-party systems. Therefore, emphasis will be put on the other recent development in coalition formation, namely the spatial coalition formation theories. The following research question will be addressed in this study:

Do spatial coalition formation theories perform better empirically than non-spatial coalition formation theories?

Naturally, before addressing this question, a thorough theoretical introduction of the theories should be given. First, non-spatial theories will be presented and after that, spatial theories. The emphasis on spatial theories versus non-spatial theories seems to be meaningful. Despite the growing number of spatial theories, this class of theory has not been evaluated theoretically or empirically in a systematic way yet. The classes of theory that will be examined are the office-seeking theories, the uni-dimensional policy-seeking theories, the actor-oriented theories, and the spatial theories.

Note that in this research, uni-dimensional policy oriented theories are not included in the class of spatial theories since they do not apply metric Euclidean distances. Furthermore, even though the aim of this research is to evaluate the different classes of coalition formation theories, obviously individual theories will also receive attention.

Popper (1975, p 71) states that formal theories are systems of statements consisting of axioms and theorems that meet four fundamental requirements:

- * the axioms in the theory should be internally consistent, i.e. free from contradiction,
- * the system of axioms should be independent, i.e. no axiom should be deducible from other axioms within the theory,
- * the set of axioms should be sufficient, i.e. all axioms necessary are in our theory, and
- * all axioms should be necessary.

With respect to the theoretical part of this research it is sufficient to observe that all theories that will be empirically tested, except for De Swaan's (1973) policy distance theory, comply with these requirements. As I said, most institutional theories are not formal theories and are thus hard to confront with these requirements. Therefore, institutional theories will not be discussed extensively and will not be tested empirically. All other theories in this study are formal theories and should comply with the requirements above.

The choice of the specific theories studied in this research is further elaborated upon in the introduction to the third and fourth chapter. For now, it is sufficient to know that not all theories ever created can and will be studied here. For the office- and policy-seeking theories the selection is quite straightforward. Those theories are selected that have had much impact in the field of coalition formation. The choice of spatial theories is more complicated. One important criterion is that the solution concepts of the theories should predict coalitions. Theories that indicate policy positions of 'good' coalitions, or predict payoff structures, will not be investigated in this study.

An empirical theory can be falsified. Therefore, the research question focuses on the empirical testing of the theories. Popper (1975, Ch. 6) also designed criteria for testing empirical theories. He distinguishes ‘the degree of falsifiability’ and ‘the degree of compatibility with empirical evidence’. The first criterion takes into account how many logically conceivable outcomes are ruled out by the theory. A theory, which is highly falsifiable, is considered better than a theory with a lower degree of falsifiability. But naturally not only the degree of falsifiability informs us about the empirical quality. The degree of compatibility with empirical evidence is also of great importance. A highly falsifiable theory that always predicts the wrong coalition is not considered a ‘good’ theory, and would not be preferred to a less falsifiable theory with perfect compatibility to empirical evidence. Both degrees will be measured in the empirical part of this research. For evaluating the empirical quality of a coalition formation theory, one of the tools that will be applied is prediction efficiency. With this tool, both the degree of falsifiability and the compatibility with empirical evidence are measured.

In Popper’s terms, scientific progress is the ongoing process of testing theories whereby ‘bad’ theories are rejected and ‘good’ theories are retained. Popper states that once a hypothesis has been proposed and tested it should not be dropped out without good reason. *“A good reason may be for instance: replacement of the hypothesis by another which is better testable; or the falsification of one of the consequences of the hypothesis”* (Popper, 1975, p 54).

Lakatos (1970), a student of Popper’s, also studied rules on the foundation of scientific theories and starts from the following idea: even when a theory is not completely compatible with empirical evidence it will not be rejected before another, ‘better’ theory emerges. Moreover, unlike Popper, Lakatos allows auxiliary hypotheses that improve the existing theory, or in other words, a theory can be saved from ‘disproof’ by the formulation of auxiliary hypotheses.

In this context, Lakatos proposes to study ‘research programmes’ and states that these programmes are required for scientific growth. A research programme consists of a theory together with auxiliary assumptions and a heuristic. Literally: *“the negative heuristic specifies the ‘hard core’ of the programme which is ‘irrefutable’ by the methodological decision of its protagonists; the positive heuristics consists of a partially articulated set of suggestions or hints on how to change, develop the ‘refutable variants’ of the research programme, how to modify, sophisticate, the ‘refutable’ protective belt”* (Lakatos, 1970, p 135).

In this research, Lakatos’ view of science and emphasis on so-called research programmes and his rules for scientific progress will be followed. This view enables us to compare the two groups of empirical theories, the spatial and non-spatial theories

on coalition formation. In the course of evaluating the theories, attention will be drawn to both the degree of falsifiability and the compatibility with empirical evidence as defined by Popper. But, instead of replacing ‘bad’ theories that are not completely compatible with empirical evidence, we allow some deviance and compare the research programmes.

In order to address our research question, which focuses on the empirical testing of theories, the empirical range of this research should be defined. This means selecting cases, obtaining data and defining the main concepts such as a political party and a coalition.

The ideal setting for testing coalition formation in parliamentary systems is studying all cases of coalition formation in all multi-party systems. Alternatively, one can take a random sample from this set. Even though both options seem good strategies, they are problematic because multi-dimensional spatial coalition formation theories need data on more than one ideological dimension, and as will be concluded in the remainder of this section, this causes difficulties. It goes without saying that for reliable testing of the spatial theories, a good data set with policy or ideological positions of political parties is necessary.

One data set, which seems suitable for this purpose is the Manifesto data set. This data set is based on content analysis of party manifestos of political parties in a large number of multi-party systems. Content analysis can be defined as “*a research technique for the objective, systematic and quantitative description of the manifest content of communication*” (Berelson, 1952, p 18). In the Manifesto data set, party manifestos of the main political parties in twenty countries from 1945 until 1988 are analysed. Scores on 54 (and later 56) issues - subdivided in seven policy domains - are given. The Manifesto data set will be used in this research. The manifestos of elections after 1988, in the Netherlands and other countries, are also analysed and added to the original data set.

The types of data and correspondingly the type of data-analysis affect the selection of cases. The Manifesto coding-scheme results in scores of parties on more than fifty issues. Since it is preferable to reduce the number of dimensions (issues), these data should be analysed in order to find the party positions on the main ideological or policy dimensions. The method for analysing the manifesto data that will be used most in this research is multi-dimensional scaling. In general, multi-dimensional scaling is a technique that enables a researcher to find a hidden structure in the data. In my opinion, data analysis of this kind requires substantial knowledge about the

political system and the political culture of the countries involved. Therefore, studying all cases or taking a random sample of all possible cases of coalition formation available in the Manifesto data set, is problematic. This leads to the decision to select only one country for the empirical analysis.

Obviously, the next step is the selection of a particular country. This country should be an established stable democracy with a multi-party system. Most Western European countries, with the exception of Great Britain where one-party governments usually rule, satisfy this requirement. The country that will be used for testing the theories in this research is the Netherlands. The Netherlands is a stable democracy with a multi-party system and also has a high number of effective parties (Laakso & Taagepera, 1979). A large amount of effective parties means that the political system is rather fragmented. This makes coalition formation interesting, because many combinations of parties can form winning coalitions. The Netherlands is often included in empirical research on coalition formation, both in studies where a large number of countries are included, as well as in studies with one or a few empirical examples (De Swaan, 1973; Van Roozendaal 1992; Browne & Dreijmanis, 1982; Schofield, 1993a). Further, the political culture of the Netherlands is characterised by Keman (1994) as 'moderate pluralism with strong fragmentation'; a country with a comparatively high number of parties, and by Schofield (1993a) as 'a fragmented system with a strong core party'. Even though the characterisations are not identical, both authors regard the Dutch system as open to many bargaining possibilities for coalitions, which makes it an interesting case. The last reason for choosing the Netherlands is that as a Dutch political scientist I am better acquainted with the Dutch political system and its political culture than with the political system and -culture of other countries.

The next decision, namely which coalition formations should be selected, is for a great deal determined by the availability of data on party positions. Even though coalition formation in the Netherlands can be studied from approximately 1917, since at that moment pacification politics start and universal suffrage is on its way, the empirical research focuses on cabinet formation after World War II. For spatial theories, party positions on more than one dimension are needed. Even though it is easy to find data for the power-oriented theories over the 1917-1945 period, there are no reliable data on policy positions for these years. Therefore, this period will not be included here.

The theories that require most information - spatial theories - set the boundaries for the empirical part of this study. The Manifesto data set determines which years and which parties will be included in the analysis. The justification for using the

Manifesto data in this research will be given in Chapter 4. In the empirical confrontation of coalition formation theories, coalition formation after World War II will be studied, and only parties that are 'significant' according to the Manifesto Research Group are included in the analysis. Naturally, for the 'less demanding' theories, it is possible to include more parties and more cabinet formations, but this would not be helpful since the aim of this research is not to test as many coalition formations as possible, but to compare the different classes of theories. For a fair comparison, the same parties and the same coalition formations will be considered for every class of theories. This is also the reason for including the classical theories in this research, despite the fact that they, unlike spatial theories, have been tested before. Testing all theories in this research with the same data and the same parties will lead to a valid comparison of the classes of theories.

The last issue that needs to be addressed is which particular coalitions from the period 1946-1999 should be included in the empirical test. Only coalition formation directly following general elections will be studied. The coalitions that are formed after a breakdown of a cabinet in between elections are not included, because for these coalitions the same situation obtains in terms of number of seats of parties and their ideological or policy positions. It is not unfair to assume that ideological or policy positions might have changed after the breakdown of the cabinet, but since the positions of the parties will be derived from analysing the manifestos, there are no new data available on the positions of parties without elections.

At the time of writing, manifesto data are not yet available for the 1998 coalition formation. Therefore, data on policy or ideological dimensions of political parties for 1998 had to be obtained in a different manner. A computer-coded content analysis of the 1998 party manifestos produces these data.

Unfortunately, in methodological terms, the results of the empirical testing do not allow for general conclusions, since only coalition formation in the Netherlands is studied. But the results for the Netherlands are of course valuable as such. The Dutch system is a good case for studying coalition formation and the empirical results do provide us with information about the quality of the different classes of coalition formation theories.

1.3 Plan of the Book

In *Chapter 2*, the origins of the models on coalition formation will be explained. This chapter starts with a description of game theory and thus with the tool that will be used to study coalition formation. Also, models of party competition that actually precede coalition formation will be introduced. Bargaining for votes and bargaining in order to get into a winning coalition follow similar terms. For instance, the parties use their policy or ideological positions in order to receive as many votes as possible, and later use these positions in coalitional bargaining. This consideration is especially interesting for spatial coalition formation theories, since, in this chapter, different kinds of spatial party competition models are introduced.

Chapters 3 and *4* contain the main theoretical contribution of this research. First, a classification of coalition formation theories will be presented, and next the theories will be studied in consecutive order. In *Chapter 3*, the first class of theories that will be presented is that of office-seeking theories, followed by uni-dimensional policy-seeking theories, actor-oriented theories and subsequently institutional theories. The last part of this chapter provides comments on these theories and discusses the exclusion of the class of institutional theories, which do not meet the requirements for a formal theory, from the empirical research.

The last class of theories, namely spatial theories of coalition formation, will be studied in *Chapter 4*. Within this group of theories, a new solution concept called the Maximal Satisfaction Solution will be introduced. For this class of theories, a detailed computational example will be provided, since spatial theories are more complex than the other theories in this research. Finally, comments on these theories will be given.

The Dutch political system and the main procedures for coalition formation in the Netherlands are discussed at the beginning of *Chapter 5*. In this context the role of the Queen in the Dutch constitutional democracy will also be elaborated on.

Next, the choices that precede the empirical testing are dealt with. Data on party positions on more than one ideological or policy position are necessary for a test of spatial theories. The data selection procedure and the choice for the Manifesto data set will be evaluated, and the Manifesto data set will be compared with other possible data sources.

In the following sections, the input for the empirical test - the policy or ideological positions of the parties - is obtained. This is quite complex, since the manifesto data are not gathered to obtain information about policy positions but about policy

saliency, which influences the choice for a data reduction method, and also since different theories need different kinds of input.

First, party positions are obtained for the largest part of the empirical research by multi-dimensional scaling of the manifesto data. This procedure gives the political parties positions on two latent dimensions, and the space will be interpreted by a property-fitting method. The party positions on these two dimensions that are obtained by multi-dimensional scaling are available for 1945 until 1994, and are used for testing all spatial theories except for the Winset theory.

Another data reduction procedure, called Reliability analysis, will be introduced next. The Winset theory requires party positions on specific dimensions, i.e. the dimensions representing ministerial portfolios. The positions on the latent dimensions that are obtained by multi-dimensional scaling do not fit the policy fields represented by the main portfolios. Therefore, reliability analysis will be used to create scales that do represent the jurisdictions of the portfolios.

In order to test the last case of coalition formation in the Netherlands, the 1998 formation, new data are needed. The manifesto data set for that year was not yet available for which reason the introduction of another source of data became necessary. So, for this year, word lists were constructed and a computer-coded content analysis of the 1998 manifestos performed.

At the end of this chapter, data on policy positions of parties - or more correctly party positions on latent dimensions based on policy scores - are available and the empirical comparison of the different classes of theories can start.

The research question, which is do spatial theories empirically outperform non-spatial coalition formation theories, will be addressed in *Chapter 6*. The greater part of this chapter will be devoted to simply computing which coalition(s) would be predicted by the theory under consideration and comparing this prediction with the empirical evidence, i.e. the coalition that was actually formed. This leads to a success rate for every theory, viz. the number of times that the coalition formation theory predicts the correct coalition divided by the total number of cases. The total number of cases is the number of coalition formations that are tested in this research. This does provide information about the compatibility of the theories with empirical evidence, but it does not deal with the degree of falsifiability.

For this reason, the prediction efficiency of the theories will also be computed. The prediction efficiency measures the number of times that a coalition is correctly predicted, divided by the total number of predicted coalitions by a specific theory. Note that the number of predicted coalitions is often higher than the number of coalition formations, since many coalition formation theories predict a set of coalitions.

This measurement tool combines the degree of falsifiability with the degree of compatibility with empirical evidence. Still, both measurement tools are rather descriptive and, since it would also be interesting to find out whether the theories perform better than a random chance distribution of possible coalitions, another statistical test will be done. This test is based on simulations of coalition formation. The null hypothesis states that the probability based on simulation predicts the same number of historical, i.e. correct, coalitions as the theory. The chance probability in the simulation model is the chance that a theory would predict correctly; it is the number of predicted coalitions divided by the number of possible winning coalitions. The alternative hypothesis states that the number of historical coalitions selected by the theory is higher than that of probability selection. Naturally, it should be the case that coalition formation theories with a high success-rate and prediction efficiency more often reject the null hypothesis.

In the final chapter of this study, first a summary will be given, followed by the conclusions. There, the question *'Do spatial coalition formation theories perform better empirically than non-spatial coalition formation theories'* will be answered. After having dealt with this question, I shall briefly discuss the contribution of this research to the field of political science and add suggestions for further research.

2. Game Theory and Spatial Modelling

2.1 Introduction

The theory of games is a set of formal analytical tools that can help us understand conflict of interest. Any kind of decision-making based on strategic interaction can be studied with game theory. Whether this interaction is economical, for instance: what price should I ask for my goods and how much can I sell for this price, or political, whom should I vote for, does not matter. The main idea is that we have individuals who make decisions in a strategic environment. The theory of games will be presented in the first section of this chapter. In this section, also the main assumption of game theory, which is individual rationality, will be introduced. Next, the difference between cooperative- and non-cooperative games is discussed. After that, spatial voting games will be introduced. These spatial voting games will be used in Chapter 4 to study spatial theories of coalition formation.

Spatial theories of coalition formation are based on a spatial notion of party competition. Party competition precedes cabinet formation. One model of party competition, known as the Michigan School, focuses on party identification (Butler & Stokes, 1974; Campbell, et al., 1960). In this model, mostly individual characteristics of the voters such as social class are explanatory for party identification and thus voting behaviour. Another model of party competition forms the foundation for spatial theories of coalition formation. This spatial model of party competition is based on issue preferences or ideological preferences of the voters and the positions of parties. The first contributor to the spatial theory of voting - although from an economic perspective - was Hotelling (1929), who developed a theory on spatial competition. Downs (1957) and Black (1958) translated this spatial competition concept into politics. The history and main assumptions of the classical spatial theory of voting will be presented in the third section.

Thinking 'spatially' has not ended in 1958; new findings and alternative spatial models have been developed and will be presented in Section 2.3. The most important deviation from the classical model is the directional model. In the classical model, voters choose and parties compete in terms of Euclidean distance, whereas in the directional model the direction of a policy position and the intensity of this position determine the competition. This and a second alternative model - the linkage model - will be presented in Section 2.3.2.

In the fourth and last section a short summary of this chapter will be given.

2.2 Game Theory and the Spatial Voting Game

Starting point of and most famous research on game theory is the *'Theory of Games and Economic Behavior'*. Von Neumann and Morgenstern set down the roots for game theory in this work in 1944. Game theory models strategic interaction between individuals. A game consists of players that have to make choices based on preferences over possible outcomes. The strategic interaction refers to the fact that what is best for player A may depend on the action of player B. Consider for instance the sale of a car. The salesman wants the highest price possible; the potential buyer wants the car for the lowest price possible, has no information about what other potential buyers are willing to pay, and could bid too little, ending up without the car she wants. A political party drawing up a programme can be described as a political game. The party wants as many voters as possible but is in strategic interaction with other parties, and like other parties, does not know what voters will do. A 'real' parlour game like Poker can also be modelled with game theory.

Luce and Raiffa (1957, p 5) state that a game consists of the following elements: *"There are n players each of whom is required to make one choice from a well defined set of possible choices, and these choices are made without any knowledge as to the choices of the other players. Given the choices of each of the players, there is a certain resulting outcome, which is appraised by each of the players according to his own peculiar tastes and preferences"*.

A player in game theory can be any kind of actor; a person, a multinational cooperation, a political party or a state. In this research on coalition formation, the actors are political parties that strategically interact with each other. These parties are considered to be unitary actors. Furthermore, in game theoretic modelling an actor is required to act rationally. This covers two demands: first that actors should be able to order their (individual) preferences, and secondly that they should be able to behave in such a way that their actions lead to the best possible outcome according to their (individual) preferences. In order to comply with the first element - that of individual rationality - the preference ordering of a player should be complete and transitive. Complete means that all relevant alternatives should be ordered, and transitive means that if a player prefers alternative A to B, and B to C, he or she must also prefer A to C. The second element is also referred to as utility maximising: an actor should, according to his or her own preferences, choose the option that is most likely to produce the best possible outcome, i.e. highest utility. This pattern of purposeful behaviour, i.e. rationality, is dealt with extensively in the second chapter of *An Introduction to Positive Political Theory* (Riker & Ordeshook, 1973). Finally, note that rationality is not the same as egoistic behaviour. A player can act perfectly rational while intentionally following altruistic motives, since an altruistic goal can also maximise a player's utility.

Game theoretical modelling starts with a description of the game wherein players' preferences for the outcomes and possible actions are determined. The second part is the predictive part of the game. Here, the maximising utility assumption is applied and the actual solution of the game can be found. As we will see in the next chapter, maximising utility can be interpreted in different manners and therefore a game can be solved with several solution concepts.

An important distinction in game theory is that between decision making in which players can or cannot make binding agreements. In the latter case we speak about non-cooperative game theory. The examples of buying a car and the well-known Prisoner's Dilemma¹ are non-cooperative games. Coalition formation and the games on which they are based lie within the field of cooperative game theory. Players in a coalition make binding agreements about governing together. Since the object of research in this work is coalition formation, cooperative game theory and more in particular the coalitional games will be modelled in the remainder of this section.

Coalitional Games

In game theory, cooperative games - the games that allow binding agreements - deal with payoff structures. This means that these theories study what individual players gain when joining a coalition. Coalitional games study coalition formation within the context of cooperative game theory, but add assumptions about the prediction of coalitions. These coalitional games are central in our study. A coalitional game consists of two stages. In the first, descriptive stage, there is a profile of a player's preferences over the set of all possible outcomes. The second predictive stage leads to the outcome of a coalitional game, which is a specification of the coalition that will be formed and its possible actions (Osborne & Rubenstein, 1994).

Formally, a coalitional game is an ordered pair (N, v) , where N is a non-empty set of players and where v is a mapping that assigns a real number to each subset, i.e. a coalition, of N . This function v is called a characteristic function. The real number assigned to a coalition S is called the value of S , $v(S)$ (Aumann, 1989). The theory on simple games is defined by Von Neumann and Morgenstern within the framework of n -person game theory. A game is called a simple game if the worth of a coalition is restricted to $\{0,1\}$. Formally: $v(N) \rightarrow \{0,1\}$. Note that a list of symbols and abbreviations can be found in appendix K.

¹ The famous prisoner's dilemma is an example of a two-person non-cooperative game and is treated in almost any game theory book. It can also be found in *Games and Decisions* (Luce and Raiffa, 1957, p 95).

A *characteristic function*, v , satisfies the following two axioms:

- 1) $v(\emptyset) = 0$; the value of an empty coalition - a coalition without members - is zero.
- 2) $v(S \cup T) \geq v(S) + v(T)$ if $S \cap T = \emptyset$; the coalition of any two disjoint coalitions has at least the same value as the value of the two separate coalitions together.

For an *essential* game it must be true that at least for one combination of S and T , the value of the join must be larger than the separate values.

A *simple game* can be represented by the ordered pair $G = (N, \mathcal{W})$ where \mathcal{W} is the set of winning coalitions; $\mathcal{W} = \{S \mid v(S) = 1\}$. Any subset S of N is called a coalition. The subset of players from N that are not in S , is called the complement of coalition S . Coalitional solution concepts are used in order to predict a set of coalitions from the set of winning coalitions². This prediction set is the solution of the game. For each simple game $G = (N, \mathcal{W})$ it is supposed that \mathcal{W} satisfies the following assumptions:

1. Monotonicity: if $S \subset T$ and $S \in \mathcal{W}$, then $T \in \mathcal{W}$, that is, any coalition that includes a winning coalition is itself winning. This proceeds from the criterion of super-additivity: a winning coalition cannot become losing by adding new members to that coalition (Rapoport, 1970).
2. Non-triviality: $\mathcal{W} \neq \emptyset$ and $\emptyset \notin \mathcal{W}$, this condition excludes trivial games. It states that there are winning coalitions and that an empty coalition cannot be winning (Rapoport, 1970).

Simple games can be further characterised by the following properties. Consider a game with N players and coalition S : we refer to the group of players that are not included in S but are in N , as the *complement* of coalition S (denoted as S^c). Games in which the complement of every winning coalition is losing are *proper* games. In a proper game, every pair of winning coalitions has at least one player in common. A game is called *strong* if the complement of every losing coalition is winning. If this is not the case, it is a weak game, which means that the complement of a losing coalition can be losing. Such a coalition is called blocking and can obstruct the formation of a winning coalition. A game is called *decisive* if it is both proper and strong (Van Deemen, 1991). These characterisations will be used for the existence theorems in the actor-oriented coalition formation theories: the dominant- and centre player in Section 3.4.

² Note that these coalitional solution concepts predict coalitions and not, like many other game theoretical solution concepts, pay-off vectors.

A special kind of simple game with many applications to politics, for instance cabinet formation, is *the weighted majority game*. A weighted majority game is a simple game in which a weight is assigned to each player and in which a quota determines when a coalition becomes winning. A weighted majority game can be represented by the $N+1$ tuple $[q; w_1, w_2, \dots, w_N]$, where w_i for $N = \{1, 2, \dots, n\}$ represents the weight of player i , and q denotes the quota. The number of players is finite and runs from 1 to n . A coalition S in a weighted majority game is winning if and only if $\sum_{i \in S} w_i \geq q$ (Shapley, 1962). If every player holds the same weight, this is called a symmetric (weighted majority) game.

Since the aim of this research is to compare spatial and non-spatial coalition formation theories, we should also define spatial simple games. A simple game is well equipped to model an office-driven coalition formation theory since in this kind of theory only information about the weight of the players is needed. However, in spatial theories of coalition formation, preferences of players are based on the distances between the players and the possible coalitions; we therefore need to extend the simple game into a spatial game.

A *spatial voting game* is a simple game together with a set of points, x_i in an m -dimensional Euclidean space. This space is the set of policy positions that might be taken by a player. Spatial voting games are denoted by (N, W, R^M) , whereby m is the number of dimensions of the policy space. In this research we study coalition formation in spatial games with $m \geq 2$, for which reason these spatial games should be modelled.

A distinction can be made between ideology and policy. I refer to a space as ideological if the dimensions consist of coherent groups of issues that together form an idea about how society should be constructed and evaluated (Hinich & Munger, 1994). Otherwise, if the issues are not so linked, the space is a policy space. The definition and interpretation of ideology and policy spaces - introduced in the previous chapter - is further elucidated in Chapter 5.

Furthermore, in a spatial game a point $x \in R^M$ is interpreted as a policy bundle in an m -dimensional space. It is assumed that each player has an ideal point, x_i in R^M , also known as his or her bliss point, which represents that player's most preferred position in the policy (or ideology) space. Utility is defined in terms of distance, d , from the ideal point. Let $\| (x_S - x_T) \|$ denote the Euclidean distance between the coalitional ideal points x_S and x_T . Note that we use a capital letter if we refer to the positions of multi-party coalitions. The Euclidean distance between the coalitional policy positions $x_S = (x_{S1}, x_{S2}, \dots, x_{Sm})$ and $x_T = (x_{T1}, x_{T2}, \dots, x_{Tm})$ is defined as follows:

$$\| (x_S - x_T) \| = \sqrt{ (x_{S1} - x_{T1})^2 + (x_{S2} - x_{T2})^2 + \dots + (x_{Sm} - x_{Tm})^2 }.$$

In the descriptive part of spatial coalitional games, where the players' preferences are determined, we take the distances between the players' preferred position and the coalition positions into account. A player i prefers a coalition with the expected policy position x_S to a coalition with the expected policy position x_T if and only if the distance between the player's preferred policy position, x_i , and x_S is smaller than the distance between x_i and x_T . This is called a Euclidean preference and can also be written as follows: a player i prefers x_S to x_T if and only if $\|x_S - x_i\| \leq \|x_T - x_i\|$. The greater the Euclidean distance between a policy position and a player's bliss point, the less he or she prefers that point.

We will see that most spatial theories of coalition formation are fairly similar in the descriptive part of the theory. However, similar preference profiles will lead to different coalition predictions because of significant differences between the predictive parts of the theories.

In summary, coalition formation can be modelled as a simple game or as a spatial simple game. In the spatial voting game, preferences of the players are based on distances. The preferences of players for coalitions are determined in the descriptive part of a coalition formation theory. In the predictive part of the theory, solution concepts are applied that predict a coalition or a set of coalitions as the outcome of a game (De Vries, 1998).

2.3 Spatial Modelling

Party competition models have inspired theories of coalition formation. I shall illustrate in this section that spatial theories on coalition formation are all based on the classical model of party competition. In order to present the relation between spatial party competition models and spatial theories on coalition formation, the classical spatial party competition model and two alternatives will be introduced in this section.

The most influential model starts from the smallest distance hypothesis. We again assume the actors to behave rationally. Furthermore, we assume that political parties are driven by a desire to win as many votes as possible, and that voters are driven by a wish to select the party that is as close to them as possible on an ideological scale. In a two-party system, this leads to convergence of the parties towards the middle of the distribution of the voters. In a multi-party system, the behaviour of the parties can be both converging and diverging but the goal is still to gain as many votes as possible (Downs, 1957). After discussing the classical smallest distance model, alternatives to this model will be studied. The first and most famous alternative to the classical model is the 'directional model' (Rabinowitz & Macdonald, 1989). In

this type of model the voters are not searching for the closest possible party, but are motivated by both the direction of their preferences - am I in favour of or against this particular issue - and the intensity of their preference. The next alternative that I shall present is the linkage model, which emphasises the relation between ideology and policy positions and then applies the 'smallest distance hypothesis' (Enelow & Hinich, 1984).

2.3.1 Classical Spatial Model

Hotelling (1929) was the first academic - as far as I know - to discover the beneficial position of the middle in spatial analysis. He did so when he studied the location of firms from an economic point of view. In an imaginary world with potential customers distributed along the "*Main Street in a town or a transcontinental railroad*", a firm is likely to have most possible customers if it were positioned right in the middle of its customers (Hotelling, 1929, p 45). Even though Hotelling was an economist writing in an economic journal, he refers to applications of this spatial model to politics: "*each party strives to make its platform as much like the other's as possible. Any radical departure would lose many votes, even though it might lead to stronger commendation of the party by some who would vote for it anyhow*" (Hotelling, 1929, p 54). If we would position all voters on one line this platform is located in the middle of all voters.

Both Downs (1957) and Black (1958) have explained voting and party competition from this perspective. The starting point in their models is that the political system can be represented by one left-right ideological dimension. This dimension is used by voters as well as candidates to determine their choices. Black (1958) explains that the best place for a party to be located on the ideological dimension is at the median position. He proves that the median position cannot lose in a majority contest and provides us with a formal definition of the median voter result in which the members' optima are denoted by O_1, O_2, \dots, O_n and n denotes the number of members in the committee.

"When there are n members in a committee, all of whose [preference] curves are single peaked, and n is odd, the value $O^{1/2(n+1)}$ can get at least a simple majority against any other, and it is the only value that can do so" (Black, 1958, p 16).

In order for the median voter result to hold, some properties must be met (Hinich & Munger, 1994). The first is that the underlying dimension must be uni-dimensional. Furthermore, it is assumed that the voters or members in a committee reveal their sincere preferences and vote accordingly. Also important are the properties of single-peakedness and symmetry. These determine the link between preferences, utility

and closeness. A single-peaked preference implies that each member likes new proposals more, the closer they are to her ideal point. Symmetry implies that deviations from the ideal point in opposite directions are evaluated equally (ibid.).

Downs's model of party competition translates Black's median voter result into an economic model of party competition. The preferences of the voters should still be single-peaked and symmetrical. He also assumes an uni-dimensional continuum, in this case a left-right dimension representing the extent of state interference in the economy. The parties strive to maximise their utility by means of getting as many votes as possible. The voters choose the closest party on the dimension, provided that the party is reliable.

Briefly, the most important behavioural assumptions applied in the classical spatial model³ are:

- in order to maximise utility, the voter will choose from all possible alternatives that candidate or party whose expected policy is closest to the voter's own desires. Voting behaviour is thus based on ideology or policy, which leads to choosing the closest party. Note that the voting behaviour is to a lesser extent also based on past record of the parties, which means that the party should also be reliable. The voter reaches maximal utility if a responsible candidate has policy views that are identical to the voter's.
- parties are unitary actors; literally Downs declares that "*every member of the team [party] has exactly the same goals as every other*" (Downs, 1957, p 25).
- parties are vote-maximisers, i.e. parties are office seeking actors: "*every government's goal is to be re-elected*" (Downs, 1957, p 13).
- parties, if necessary, modify their ideological position in order to gain as many votes as possible.

In a two-party system these assumptions lead to parties converging on the one dimension. The parties both want to hold the median voter position and therefore converge to the median, but still do not become completely identical out of fear of losing the more extremist voters. This leads to the same equilibrium Black described in his *Theory of Committees and Elections*.

³ The classical spatial model is also referred to as - the smallest distance model, - the proximity model, or - the Downsian model.

In a multi-party system the parties and the voters have identical motives as in the two-party model, but they can lead to different patterns of behaviour. In this kind of system it is more difficult to choose an effective strategy. Usually ideologies are more sharply defined in a multi-party system, which leads to diverging positions of the parties, but converging movements towards the median voter can also be observed. The explanation for this is that parties want to be dissimilar in order to receive as many votes as possible, and at the same time want to be attractive coalition partners, for which reason they cannot take too extreme positions. Moreover, Downs states that during elections in a multi-party system all parties try to be as ambiguous as possible about their willingness to compromise as they enter various coalitions. A multi-party system is also more complicated for voters; if their favourite party has a reasonable chance of winning they will vote for it, if this is not the case, the voter should act strategically and either vote for another party or abstain.

The role of uncertainty and information costs is often neglected when Downs's theory is studied. Parties are often unsure about where the voters are positioned on the ideological dimension, as are voters about parties'. More knowledge would make decision-making more rational, but whether or not politicians or voters attempt to reduce this uncertainty depends on the information costs. It might for instance be rational for voters to abstain if the uncertainty is high and if reducing uncertainty is costly. The role of ideology in this model can be portrayed as a mechanism to reduce information costs. For the voter, ideology makes selecting the 'best' party easier, which means that less information is needed to determine which party is closest to one's own position. Communicating through ideology is also cheaper for parties. Parties will rather use ideology as a shortcut than verbalise and present all their policy preferences to the voters. The other side of the same coin is that in a multi-party system, parties want to become coalition members. Due to their only using ideology, and thus not stating their precise preferences on all issues, they can disguise possible differences and thereby enhance their chances of getting into government.

Although the median voter result and thus the smallest distance hypothesis are important contributions to the theory on party competition, I have some doubts about their applicability. My main concern is that in the *Economic Theory of Democracy* Downs assumes that parties can move freely in the uni-dimensional space. In my opinion, if a party would change its position in the ideological space in order to increase its share of the vote, this would in reality be likely to cause a party credibility problems. My second consideration concerns an underlying assumption of the equilibrium concept. The median voter result is not an accurate

tool to analyse politics once the number of ideological dimensions exceeds one. The median voter in a more than one-dimensional space exists only under harsh symmetry conditions (Plott, 1973).

The median voter result is, then, not applicable to more than one dimension. This does not imply that the behavioural assumptions of the Downsian model are incorrect or irrelevant. Similar assumptions, like preferences of parties for the closest possible coalition, are translated into spatial coalition formation theories, but in the predictive parts of the theories different equilibrium notions are introduced. In terms of the measurement of distance between voters and parties or parties and coalitions, models based on the classical model usually apply squared Euclidean distance. This can be either based on one ideological dimension as in Downs' research, but it can also be based on multiple policy issues. For the definition of Euclidean distance, I refer to the previous section.

Robertson (1976) has studied Downs's model extensively and discusses the following three 'missing elements':

- I. Actors: the assumption that parties are unified teams with no commitment to ideology but to getting elected is unrealistic. A party needs resources and therefore credibility. A sponsoring organisation or person may want a direct reward (jobs, a government contract) or a promise on the adoption of some specific policy. In short, the party's strategy is constrained by the need to optimise both "membership (sponsorship)" and voters. This dependency constrains the party and thus inhibits the so-called free movement on the ideological dimension by the party.
- II. Constitutional constraints: in a country with multiple constituencies, one party can hold different opinions on policy proposals in order to win in different constituencies. Therefore, the party cannot be regarded as a unitary actor.
- III. Voter: the choice of a voter does not only depend on the ideological position of a party, but also on the responsibility and reliability of the party, which can be evaluated by past behaviour. This makes determining the voting strategy complicated, since a voter might prefer one party's policy position but another party's credibility.

As I stated earlier, I agree with the first point, namely that the mobility of the parties to move along the dimension is constrained. This could, among other things, - as Robertson noted - very well be caused by a trade-off between getting as many members and as many votes as possible.

Budge and Farlie (1977) - in their review of the Downsian model - also discuss the assumption of the party as a unitary actor. I agree with their empirical evidence, which shows that parties are not unitary actors, as well as with Robertson (1976)

who analysed different levels of elections - national and constituency - and argued that parties can not be regarded as unitary actors. Yet, the multiple constituency argument is not relevant for our research, since it studies coalition formation in the Netherlands, which is a one-constituency party system. Even though the other arguments about factions within political parties may hold for the Netherlands, I will for sake of clarity (which was also Downs' motivation) view a political party as a unitary actor in the remainder of this research.

Robertson's last point about the past behaviour of politicians is in my opinion not a missing element in the *Economic Theory of Democracy*. Downs argued that voters select their party based on the ideology as well as the responsibility and reliability of the party (Downs, 1957, p 105). Parties are therefore relative immobile and conflicts of interest can arise between maintaining ideological purity and winning the elections.

What is most interesting in Robertson's review is not the list of 'missing elements' in Downs' model, but his description of different mechanisms for 'safe seats' and 'marginal' seats. Some voters are in a position where a party can be sure of their vote, and others are in a position where they need to be persuaded. In order to 'win' marginal seats the parties might slightly change their policy positions towards these voters. Finally, Robertson (1976) compares the party-identifier voter model with the rational economic voter model. Even though he states that '*strong party identifiers are seldom attached to the 'wrong' party in terms of social class*' [read in terms of their ideological preferences], he does not believe that these two models can be combined (Robertson, 1976, p 181). In the Downsian spatial model, the rational voter should be able to adjust his voting behaviour to moving party positions, which can lead to a 'new' party identification. One cannot simultaneously rely on competition for the vote maximising point on the ideological dimension and thus allow voters to move from party to party, and believe that a voter's preference depends on his party identification. So, a synergy of these models seems problematic.

In *Information Participation and Choice*, edited by Grofman in 1995, Downs reminisces on the origin of his *Economic Theory of Democracy*. The roots of the idea for the 'Economic Theory' lie in Schumpeter's *Capitalism, Socialism and Democracy* (Schumpeter, 1976; first edition 1942). The economic motivation of politicians is formulated by Schumpeter as follows: even in a socialist organisation of democracy a politician can say that "*What businessman do not understand is that exactly as they are dealing in oil so am I dealing in votes*" (Schumpeter, 1976, p 285). Downs follows Schumpeter and argues that the main personal motivation for a politician is to "*get elected and remain in power so as to enjoy the perquisites and privileges of office as long as possible*" (Downs, 1995, p 197). Downs thus believes that politicians have

predominantly personal and not policy motives when getting elected, and also that the voters are often not well informed about policy after the elections. Downs refers to this as “*voters who are rationally ignorant of government affairs*” (Downs, 1995, p 199). The reason for this is that it is costly - and probably not worthwhile - to keep oneself informed about government policy. Most exciting in Downs’s retrospect is that he declares that he finds the way information costs and thus uncertainty are treated in his book are the most important contribution to the economic literature and not the spatial analysis of parties, even though the latter became more famous.

In conclusion, the classical spatial or Downsian model is one of the models of party competition that can influence and has influenced or inspired theories of cabinet formation. In this model, the voters are utility maximising actors who choose a party based on the ‘smallest distance hypothesis’. In the spatial coalition formation theories investigated here, the ‘smallest distance hypothesis’ is translated to parties and coalitions. A party will prefer the coalition with the closest ideological or policy position. In the remainder of this chapter, alternative models will be studied.

2.3.2 Alternative Models

As described in the previous section, voters in Downs’s model choose the candidate closest to them in terms of distance in an m -dimensional issue space. In this section two important alternatives will be studied: the directional theory and the linkage theory.

Directional Model

The intuition at the basis of the directional theory is that voters do not have clear preferences on policies but rather have a general idea about the direction they prefer a policy issue to develop into. This direction is defined relative to some neutral point on the policy dimension. People can, for instance be in favour of or against a state-subsidised health care programme.

An important paper dealing with the directional theory is ‘A Directional Theory of Issue Voting’ by Rabinowitz and Macdonald (1989). The main difference between the classical proximity model and the direction model is in the information that the theories suggest the voters are able to ingest. In the Downsian proximity model a voter should judge whether a candidate’s policy position on an issue lies close to her own preferred position - and how close compared to other positions -, whereas in the directional model a voter should decide the following:

- * Are you - i.e. the candidate or party - on my side?
- * How strong do I feel about this issue?

three fictitious candidates, A, B, and C, with positions on the scale above, and suppose that we know voter i 's position, denoted as X_i . Let us consider the voter who must decide which candidate to support. First, she judges which candidate(s) are on the same side and then she studies the intensity of the candidate's positions. Candidates A and C are on the same side as the voter, to the left of the neutral point, and candidate B is on the opposite side.

According to the directional model, the evaluation of the candidates by the voter is done by the following formula: $(X_p - SQ) \times (X_i - SQ)$. The position of the candidate is denoted by X_p . If the status quo is the neutral point 0, it can be removed from the formula, if not, we should subtract the SQ.

If the voter and the candidate are on the same side of the SQ the evaluation will be positive. The sign of the evaluation determines the direction, and the magnitude of the product determines the intensity. So in our example the candidates are evaluated as follows:

$$\text{Candidate A: } (-4) \times (-1) = 4$$

$$\text{Candidate B: } (1) \times (-1) = -1$$

$$\text{Candidate C: } (-5) \times (-1) = 5$$

According to the directional model, the higher the score the better. In our example the voter, i would like C most, and A more than B. The Downsian proximity model would predict that voter i prefers candidate B since this candidate is closest to i . Candidate A would then be secondly in i 's preference order and C last. Note that in Figure 2.1 a line, representing the 'region of acceptability', is introduced. (Rabinowitz & Macdonald, 1989). Even though a voter prefers the candidate who takes a strong stand on the side of the issues that she favours, the provision is made that the position of the candidate should be realistic. In other words, the voter should perceive the position of the candidate as responsible. This provision is introduced to 'save' the model from the absurdities to which the notion the more extreme the better might lead. So according to Figure 2.1 the position of candidate C lies outside the region of acceptability. The penalty for this candidate is that she is no longer a possible winner. In this version of the directional theory, where candidates who are too radical are penalised, the following preference order can be found: voter i prefers A to B.

The different models have different implications. In the proximity theory - see previous section - there is a pressure in the model favouring convergence of competing alternatives towards the centre of the voter distribution, i.e. the median voter result. Even if we assume that convergence to the median also holds in the directional theory, this leads to a candidate who takes a strong stand on the side that the median voter prefers, provided that this candidate is considered a responsible candidate.

Hence, since in the directional model candidates must take relatively strong stands on issues to generate support, it can lead to relative extreme positions.

Complete piles of articles have been published evaluating the classical Downsian and the Directional models. It is striking to learn that most discussions focus on empirical results and not on theoretical arguments.

A theoretical argument in favour of the directional model, voiced among others by Rabinowitz and Macdonald (1989) is that the directional model is less demanding for the voter. Determining whether a candidate is on the same side and whether this candidate is responsible is said to be less cognitively demanding than determining the 'precise' distance between voter and candidate. Westholm (1997, p 879) contradicts this since in his opinion voters do not perceive issues as 'black and white', but can at least distinguish some shades of grey. The idea of the centre being some kind of neutral point is moreover, at least problematic. What if, on a seven-point scale, 1 would denote 'keep income differences as they are', and 7 'lower the income differences'. Where would the neutral point be? This may sound annoying, but quite a lot of scales in surveys are similar to this one. Moreover, Westholm continues, the directional model is hard to falsify since the region of acceptability is determined empirically, and will therefore never contradict the results. A candidate with a lot of support will not be found - or in his point of view will not be given a position - outside the 'region of acceptability'.

In 1997, the *Journal of Theoretical Politics* devoted an entire issue on these models. Advocates of the proximity theory and of new mixed models went into discussion with the most important defenders of the directional model (Macdonald, Rabinowitz and Listhaug). I shall briefly sum up the main arguments, insofar they differ from the argumentation above. An interested reader is referred to the journal for the complete debate. An important and often recurring issue is that of 'rationalisation', which means that voters are inclined to wishful thinking and hence believe positions of the parties they like to lie closer to their own position than they do in reality. It is common to determine the distance between voters and parties on the basis of the mean placement of the party positions by all respondents. Gilljam (1997) proposes that distance should instead be measured on the basis of the position of the party as perceived by the individual voter under consideration. Macdonald et al. dispute this idea and state that the proximity and directional models can only be analysed appropriately using an objective measure of party position, not a measure that is idiosyncratic to each voter (Macdonald et al, 1997, p 19). Gilljam also provided some empirical evidence to demonstrate that with an idiosyncratic measurement of party positions, the proximity model 'beats' the directional model, contrary to what Macdonald et al. argued.

Merrill and Grofman (1997, p 44) continue with a proposal for a mixed model and further suggest that the support for the incumbent party is probably well explained by the classical model, whereas for a mixed model could have higher explanatory value for the challenger's support. Literally: "*The modelling of voter choice as reflecting some combination of proximity, directionality and perhaps also intensity effects, as well as the incorporation of Grofman's (1985) idea of discounting into a unified spatial framework, offers, we believe, an important theoretical extension of the existing literature on formal models of voter choice. ... On the empirical side, ..., it appears quite clear that voter's utilities have both directional and proximity components and that intensity plays a role for challengers but probably not for incumbents*" (Merrill & Grofman 1997, p 44).

The discussion on projection of the voters, i.e. voters' belief that the parties they like are close to them, is eloquently summarised by Pierce (Pierce, 1997, p 65). He argues that the advocates of the use of mean locations in estimating candidates or parties positions "*do not so much justify that practice as criticise the alternative use of idiosyncratic perceptions*". More interesting is that he also wonders which of these methods best represents competition. He compares both the mean candidate positions and idiosyncratic perceptions in each model, and thus ends up comparing four distributions of voters over candidates. The main theoretical problem he notices is that the directional model misinterprets voters who may feel intensely about the status quo, as indifferent. Pierce's conclusion, based on empirical studies on French and US voters' preferences on candidates, is that the directional model is almost always a better predictor than the proximity model provided that the models are based on mean perceptions of candidate issue positions. But note that the differences in the explained variance of the two models are small. A corresponding conclusion, also based on mean party placements, derived by a comparison of the two models for the Netherlands, can be found in an article by Aarts, Macdonald and Rabinowitz (1999).

The reverse is true - the proximity model beats the directional model - only if the models are based on idiosyncratic voter perception. Pierce suggests that "*This means that the interaction between model and measurement techniques is central to the continuing debate over which model is a better representation of what goes on in voters' minds when they evaluate candidates*" (Pierce, 1997, p 73). Further, note that the difference between the models is quite small in two-party systems since in these countries "*there are no centrist candidates to be crushed between the two [candidates] that amass the lion's share of the public preferences*" (Pierce, 1997, p 72).

Shaffer (1996) shows that the empirical differences between the distances constructed by the two models are in fact rather small. Only in a few cases, is a party on the ‘wrong’ side of an issue closer according to the Euclidean model, than a party on the ‘right’ side. Shaffer argues:

“...owing to the fact that when employing conventional 7-point scales, there are only two instances in which a party on the opposite side of an issue could actually be closer to the voter than a party on the same side of the issue. That condition occurs when the voter is at “3” and the party is at “5”, or the voter is at “5” and the party is at “3”. Given that less than 4 percent of the Dutch and American samples fit this condition, it is not at all surprising that Euclidean distance and side of the issue are so highly correlated.”

Before drawing conclusions or positioning myself in this debate, I shall present the last contribution, namely the linkage model of party competition.

Linkage Model

Spatial analysis of political ideological competition is not limited to one dimension. Unlike in Downs’ original model, the number of ideological dimensions can be higher than one. It is subject to statistical measurement to empirically determine the number of dimensions. Since the key of the linkage model is to determine the relation between issues and ideological dimensions, in this section ideology and issues will be defined. Downs uses ideology because he believes it is an important concept for cutting down uncertainty, and thus the information costs, of voters and candidates. Voters would find ideology useful because it removes the need to check every issue with their own view. In this sense, ideology would frame the dimensions of the political debate. Since voters are organised around ideology it would be natural for the parties to follow. It is important that voters and candidates agree on their interpretation of ideology, and it is because of this that ideology is a meaningful concept.

In their *Ideology and the Theory of Political Choice* Hinich and Munger (1994) give a definition of ideology. They state that an ideology has to tell us what is ethically good, how society’s resources should be distributed, and where power appropriately resides. In our study, ideology will be used mostly as a practical device. In this model, voters as well as parties are required to have a similar understanding of what ideology means and, moreover the voters and parties should use this predictive dimension(s) for making choices. However, one must bear in mind that this dimension is not necessarily the classical left-right dimension but that it can be any (latent) group of issues that divide groups. The linkage model relates ideological positions to things people care about, i.e. issues. Hinich and Munger define issues in the policy space as follows:

“Issues. Social problems large numbers of citizens care about that (1) politicians talk

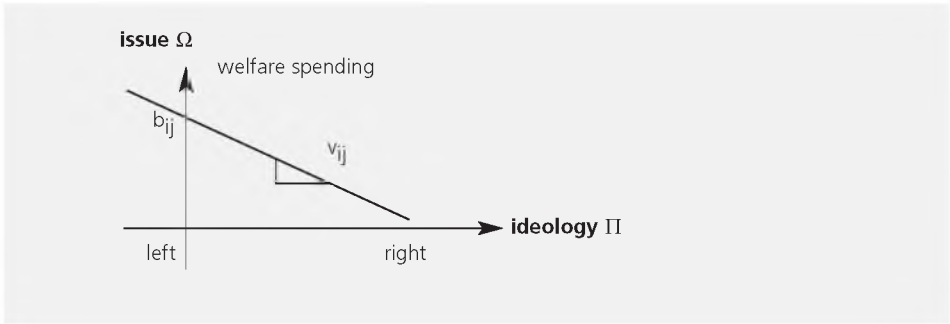
about, (a) in public, (b) to contributors, or (c) among themselves, OR (2) the press talks about, either because some interest wants it discussed or because citizens care about it” (Hinich & Munger, 1994, p 111).

A central idea in the linkage-, or also referred to as ideology-, model is that voters make choices based on their preferences and these preferences tend to group together, so that the choices can be described by an (ideological) space of much lower dimensionality than the policy space of issues. This mapping from ideology to policy space can be represented as a linear function of the ideological dimensions. The basic function consists of an electorate whose parties and voters can be represented along one ideological dimension, denoted by Π . The policy space is denoted by Ω , which can have m dimensions. Points in the ideological space are denoted by the lower case π s and in the policy space by the lower case ω s. We will use subscript p to index all of the L candidates or parties, such that $p = 1, 2, \dots, L$. The status quo is denoted by π_0 . If we have a voter i , on a policy dimension j , we denote voter i 's perception of candidate p 's position on issue j as ω_{ijp} . Hinich and Pollard first introduced the following equation in 1981:

$$\omega_{ijp} = b_{ij} + v_{ij} \pi_p \quad (\text{Hinich \& Pollard, 1981; Enelow \& Hinich, 1984})$$

The intercept parameter b_{ij} represents voter i 's perception of the status quo on issue j . The slope parameter v_{ij} is voter i 's perception of the way in which ideological distances translate into policy changes. This linkage parameter represents a linear transformation from ideological dimensions to issue dimensions. Suppose that we are dealing with one ideological dimension that represents economic liberalism, the far left representing state ownership and the extreme right representing laissez-faire capitalism, and that we are dealing with the issue of social welfare spending. In this case, we would expect the right to represent a lower level of spending as compared to the left. This leads to the assumption that in this imaginary world - with only one ideological dimension and one issue - the linkage parameter v will be negative. The mapping from ideology to the issue of social welfare spending is illustrated in the Figure 2.2.

Figure 2.2
Linkage model



The ideology or linkage model thus requires a basic understanding of the relation between ideology and issues. It is necessary to statistically estimate the relationship between ideological dimensions Π and issues in Ω that voters actually care about.

In a multi-dimensional extension of a Downsian model, we should either believe that one ideological dimension is sufficient to explain all variance between the various policy positions of parties, or we should believe that taking the weighted average of policy positions of candidates and voters on the various dimensions is adequate. In the latter case, there is no coherence between the issues and thus no ideological message (Hinich & Munger, 1997).

In the ideology model, we start with a couple of latent ideological dimensions that are determined by the way that issues tend to cluster in the voters' and parties' minds. This can result in a uni-dimensional ideological solution which is predictive for issues, or in a few latent ideological dimensions. The number of dimensions and the content of the dimensions can for instance be determined by factor analysis. The authors involved with the linkage model, i.e. Enelow, Hinich and Munger, further suggest that these ideological dimensions frame the political debate and can as such predict the position of the parties or candidates on the political issues. Constructing these ideological dimensions of issues that tend to cluster and then suggesting that the ideological dimension is predictive for the policy positions seems circular reasoning. However, if we would, as Enelow and Hinich suggest in *The Spatial Theory of Voting* apply thermometer scores in order to measure voters' feelings towards politicians and then assign positions on the 'ideological' dimension, this flaw disappears. Based on this dimension, positions on issues can be predicted. In this case the ideological dimension is not constructed with data on issues and therefore the reasoning is not circular.

Moreover, if we extend the classical proximity model into a multi-dimensional model and do this empirically, that is by using statistical estimates to determine the number and content of the latent ideological dimensions, we follow the ideas of the linkage model within the framework of the proximity model. The advantage of data reduction in order to find the latent ideological dimensions holds in both models. If we apply and empirically test coalition formation theories that take policy preferences into account, it is easier to work with a small number of latent dimensions, than to work with the whole lot of issue preferences. Party positions on a couple of latent dimensions are easier to represent in a figure, and calculating preferences of parties for coalitions on a few dimensions is obviously less laborious than on many. Note that this is, under certain conditions, what the linkage model aims to do.

2.4 Concluding Remarks

It should be emphasised that although the origins of the models in this chapter lie in theories on party or electoral competition, the purpose of this chapter was to present the relation between these models and coalition formation theories. For this matter, the distances and preferences between voters and candidates in party competition have to be translated to distances and preferences between parties and coalitions in coalition formation.

First, we return to the sections on game theory and modelling coalition formation. In order to study coalition formation theories we can apply simple games. If coalition formation theories also include policy positions of parties, and as such start from preferences that are based on distances, we need spatial voting games. These spatial games or spatial coalitional games apply assumptions that are inspired by the classical Downsian model of party competition. This leads to a first conclusion.

- Spatial voting games are necessary to study spatial coalition formation theories, and moreover these games are founded upon the classical model of party competition.

In the second part of this chapter the classical spatial model and two alternatives to the classical spatial model, the directional theory and the linkage theory, were studied and evaluated.

First, we compared the classical model with the directional model. In my opinion, and based on theoretical and empirical evidence, it is not possible to be conclusive about which theory - the classical Downsian or directional theory - refutes the other.

Empirical evidence shows a slight advantage for the directional theory in explaining electoral results, but theoretical evidence points in both directions. The directional theory is said to utilise arbitrary assumptions in for instance ‘the measurement of the region of acceptability’. I agree with this complaint. The region of acceptability is not an assumption that is applied prior to testing the directional theory, but is mostly an empirical construction that is applied when testing the theory. The neutral point in the directional theory is also disputable. On the other hand ‘raising to the power of two’ in the formula for Euclidean distance in the Downsian theory, and the assumption of uni-dimensionality in the classical Downsian version are also problematic. The first issue - the formula used to measure distances - will be elaborated on in Chapter 5, and the latter concern - uni-dimensionality - can be solved easily, as we will see in the following discussion.

The last theory that was discussed and compared with the classical model was the linkage model. In our spatial theories on coalition formation as well as in theories on electoral competition, we assume that more than one policy issue, or even more than one ideological dimension, influences politics. If, in the classical proximity model, multi-dimensionality is allowed and data reduction is applied in order to reduce the number of relevant dimensions, and if the remaining dimensions are ideological dimensions, these dimensions are naturally predictive for the issues that together form the dimension(s) under consideration. Therefore, using a model that explicitly mentions the fact that the constructed ideological dimensions are predictive for policy issues, like the linkage model, may in practice not really contribute much to our understanding of party competition or coalition formation. The assumptions of the linkage theory are more or less similar to the assumptions of the classical model. If applied correctly, these theories lead to the same results.

Comparing the classical theory with its alternatives leads to the following conclusion:

- The party competition models do not refute one-another. The evaluation of the classical spatial model and the directional model ends in a draw. Moreover, since I view the ideology model as an extension of the classical spatial model, neither one is preferable.

Finally, since none of these theories on party competition has proven to be the best theory, I shall continue with spatial theories on coalition formation and apply the model suggested by these theories. It appears that coalition formation theories are quite silent on this issue, but are for the greater part inspired by and apply the classical spatial or extended (that is multi-dimensional) spatial model. In these spa-

tial coalition formation theories, parties want to maximise their utility by choosing the closest possible winning coalition in a Euclidean space, and not according to the directional assumption. Party and coalitional positions are usually derived with data reduction methods based on positions on issues, and thus preserve the notion of underlying latent ideological dimensions. For these spatial theories, a combination of the classical spatial model and the linkage model will thus be applied.

3. Coalition Formation Theories

3.1 Introduction

Since Von Neumann and Morgenstern (1990) developed the concept of minimal winning coalitions in 1944, a large number of scholars from different disciplines have studied coalition formation theories. The main goal of these theories is to predict which coalition will be formed. As discussed in the previous chapter, in game theory, a coalition can be any group of actors - people or organisations - working together in order to achieve some goal. In this study, coalition formation theories are applied to cabinet formation in the Netherlands.

In this chapter an overview of non-spatial coalition formation theories will be given. First, classical coalition formation theories will be classified and introduced. The main assumptions and the hypotheses that are derived from them will be presented. Then one of the latest developments in coalition formation theory - the institutional theories - will be studied.

These non-spatial theories will, like spatial theories in the next chapter, then be evaluated. In the concluding section of this chapter, theories that do not comply with the requirements for a formal theory will be reviewed. Spatial theories of coalition formation, which will be reviewed in the next chapter, will be compared with non-spatial theories. The comparison in this research is aimed at their empirical performance.

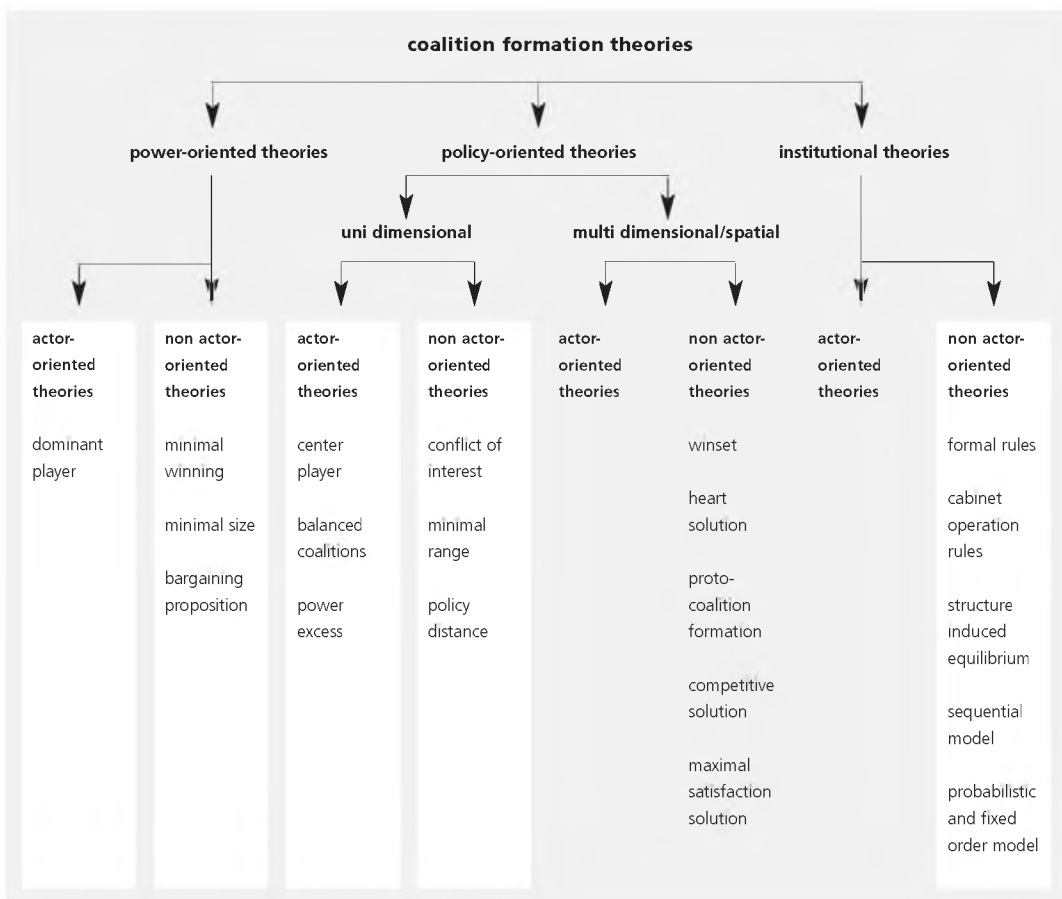
Non-spatial theories consist of the traditional power-oriented or as they are also called office-seeking theories, the uni-dimensional policy-oriented theories, the actor-oriented theories, and the other new development in coalition formation theory, namely the institutionalist approaches to coalition formation. A summary of the classification of the theories can be found in Figure 3.1.

The most common important line of division among coalition formation theories is that between power-oriented - or as they are also called policy-blind theories - and policy-driven theories. In the first group, the sole motivation for political parties to join a coalition is their personal gain, i.e. a place in office. This means that members of a coalition prefer to join a coalition with as little weight as possible, since in that case the benefits of the coalition will be larger for the individual members. Theories based on this assumption are the earliest coalition formation theories and will be discussed in Section 2. In that section the theory of minimal winning coalitions (Von Neumann & Morgenstern, 1990), the minimum size theory (Riker, 1962), and the bargaining proposition (Leiserson, 1968) will also be presented.

The second group contains policy-oriented theories. In these theories both power and policy motivations determine the process of coalition formation. Axelrod's (1970) notion of a connected coalition was the first policy-driven coalition formation theory. Axelrod's theory, Leiserson's (1966) minimal range theory and De Swaan's (1973) policy distance theory will be presented in Section 3.3.

Another differentiation is that between the two classes above and actor-oriented theories. In the latter approach, an actor is selected that has more power in the formation process than any other player. The powerful position of this particular player can be caused by her larger weight as compared to the other players in the game, or by her strategic ideological position (Peleg, 1980; Van Deemen, 1991). The coalition formation theories in which the characteristics of specific players are explanatory variables will be discussed in Section 4.

Figure 3.1
Classification of coalition formation theories



One of the latest developments - the introduction of institutional factors that influence coalition formation - will be discussed in Section 3.5. Green and Shapiro (1994) indirectly contributed to the growth of institutionalism when they criticised the formal deductive approach used by the rational choice theorists. They argued: *“Formalization, (...) cannot be an end in itself; however analytically tight and parsimonious a theory might be, its scientific value depends on how well it explains the relevant data”* (Green & Shapiro, 1994, p 10). Institutional constraints can help explain the relevant data, i.e. the cabinet formation. Green and Shapiro further argue that hardly any formal rational choice theories have ever been tested, and in the cases that they were tested, the results were usually disappointing.

Institutional approaches to coalition formation are said to solve the problem of instability occurring in many spatial representations of coalition formation. In multi-dimensional spatial games there is often instability: in some cases there is no equilibrium at all, whereas in others there are multiple equilibria. Tullock (1981), among others, observes that stability can result from institutional constraints.

Institutional arrangements can induce stability in two ways:

- First, an institutional rule can induce stability directly; for instance if, in a decision-making situation, a party gets jurisdiction, meaning that it becomes a dictator in this area and that an outcome can come about.
- Secondly, the institutional rules can reduce the number of possible alternatives, which enhances the chances of finding a stable outcome.

In 1996, Rothstein argued that in rational choice and game theory institutions are ‘rediscovered’. Institutionalists, for instance Scharpf (1990), discovered that cooperation could be the result of specific historical circumstances. In short, institutionalised systems sometimes determine choices and sometimes constrain the range of strategies and thus the outcomes. Institutionalism is not only important in solving the flaws of rational choice theories; it is a growing sub-discipline in political science in general. A demonstration of the growing importance of the role of political institutions is that institutionalism is included - as one of the eight sub-disciplines - in the ‘new handbook of political science’ (Goodin & Klingemann, 1996).

Another development in modelling coalition formation is the growing number of spatial theories on coalition formation. These theories will be presented in the next chapter. As said above, a problem with these theories is that they do not always generate equilibria, or not always predict coalitions. Another drawback is that they have not been tested yet. Both problems will be tackled in this research. The focus is on spatial theories that do predict coalitions, i.e. generate equilibria. Hypotheses will be defined for five spatial theories, enabling us to test them empirically.

Note that the theories that will be discussed in this and the next chapter are merely a selection from the whole body of coalition formation theories. Naturally, not every coalition formation theory or solution concept can be discussed in this chapter. I will, without assuming to be complete, briefly present a number of theories or solution concepts that are not included in the (empirical) research, yet also contribute to research on cabinet formation.

One group of theories that will not be studied here is that of the so-called theories on power indices. In these theories, the 'actual' power of parties is considered rather than the number of seats. The two best known power indices are the Shapley-Shubik index (1954) and the Banzhaf (1965) index. The value of a player in the Shapley-Shubik index indicates the chance that a player will be the last member of a coalition that turns a losing coalition into a winning coalition. This player is then said to be pivotal for the coalition under consideration. All possible permutations are considered, and the number of coalitions for which a player is pivotal divided by the total number of orderings is that player's Shapley-Shubik index. Note that the order of the players in the permutations determine the index (Shapley & Shubik, 1954). The Banzhaf index depends on the number of times that a player is the swing player in a coalition. A player that can turn a winning coalition into a losing coalition is said to be a swing player. Hence, in minimal winning coalitions all players are swing players. All winning coalitions - and thus not all possible permutations - are considered and the number of times that a player can change a coalition from winning to losing, divided by the total number of swing players in the winning coalitions, is that player's Banzhaf Index (Banzhaf, 1965). In these theories, the number of seats of a party are considered to be a rough measure of its voting power, and therefore the authors propose to apply indices to more precisely determine the power of the parties. For researchers of coalition formation it is an interesting task to develop coalition formation theories that include the voting indices instead of the party weights, and combine this with for instance the assumptions on policy distance used in our policy-seeking or spatial theories. Van Deemen (1997, Ch 6.) already combined power indices with an actor-oriented theory when he introduced power indices in the power-excess theory. The power-excess theory will be introduced in Section 4.2.

In summary, being complete is not my intention. In this research only the best known power-oriented and uni-dimensional policy-oriented theories will be included. The same holds for actor-oriented theories. Furthermore, only a small selection from the growing literature on institutional constraints can be included.

3.2 Power-Oriented Coalition Formation Theories

3.2.1 Minimal Winning Coalitions

Von Neumann and Morgenstern designed simple game theory in 1944. In these n -person cooperative games the value of a winning coalition is 1 and that of a losing coalition is 0. Hence, the value of a winning coalition does not increase when members are added to a winning coalition. As a result, the players in a simple game will try to form a winning coalition that does not contain more members than absolutely necessary. These coalitions are called minimal winning coalitions. Actors maximise their utility in a minimal winning coalition. Every subset of a minimal winning coalition is a losing coalition. This means that in a minimal winning coalition the withdrawal of one player turns the coalition into a losing one.

Definition 3.1

Let $G = (N, W)$ be a simple game and let S be a coalition.

S is a *minimal winning coalition* if $S \in W$ and $\forall T: (T \subset S \Rightarrow T \in L)$.

The set of minimal winning coalitions is denoted by W^{MIN} . In the theory of minimal winning coalitions, preferences of the actors are based on the expected payoff in a coalition. In the predictive part of the theory, the solution of the game consists of the set of minimal winning coalitions.

Hypothesis 3.1

Let $G = (N, W)$ be a simple game.

Then only coalitions from W^{MIN} will be formed.

3.2.2 Minimum Size Coalitions

In 1962, both Riker and Gamson developed a theory that restricted the prediction set of the theory of minimal winning coalitions. Not only should a coalition be minimal winning, but it should also be minimum size. In non-symmetric weighted majority games, minimal winning is not equivalent to minimum size. From the set of winning coalitions, Riker and Gamson selected the set of coalitions with the smallest weight. Riker defined the size principle as follows: *“In social situations similar to n -person, zero sum games, participants create coalitions just as large as they believe will ensure winning and no larger”* (Riker, 1962, p 47).

Definition 3.2

Let $[q, w_1, w_2, \dots, w_n]$ be a weighted majority game.

A coalition S is of *minimum size* if

- i) $S \in \mathcal{W}$
- ii) $w(S) \leq w(T) \forall T \in \mathcal{W}$

The set of minimum size coalitions is denoted by $\mathcal{W}^{\text{SIZE}}$. A minimum size coalition is always minimal winning but this does not necessarily hold the other way around. In other words: $\mathcal{W}^{\text{SIZE}} \subseteq \mathcal{W}^{\text{MIN}}$.

An interesting difference between both contributions is the assumption Gamson made about the proportional distribution of the payoffs of the parties; Riker made no such assumption. Gamson writes the following: “*any participant will expect others to demand from a coalition a share of the payoff proportional to the amount of resources which they contribute to a coalition*” (Gamson, 1962, p 158). Apart from this difference, Riker (1962) and Gamson (1962) use similar behavioural assumptions and in both cases the prediction-set is the set of minimum size coalitions.

Hypothesis 3.2

Let $[q, w_1, w_2, \dots, w_n]$ be a weighted majority game.

Then only coalitions from $\mathcal{W}^{\text{SIZE}}$ will be formed.

3.2.3 Bargaining Proposition

In the Bargaining Proposition theory, the goal of the actors is the same as in other power-oriented theories. Parties want to be members of a winning coalition for personal gain, that is the desire to hold cabinet posts and in particular the position of Prime Minister. Von Neumann and Morgenstern’s notion of a minimal winning coalition is crucial in Leiserson’s theory. Leiserson (1968) predicts minimal winning coalitions with as few members as possible. The argument is that with fewer members it is easier to negotiate and bargain, and it is also easier for a cabinet to stay together.

The central idea of Leiserson’s theory is the following: “*The proposition regarding bargaining is that as the number of actors increases there is a tendency for each actor to prefer to form a W^{min} with as few members as possible*” (Leiserson, 1968, p 775).

Definition 3.3

Let $[q, w_1, w_2, \dots, w_n]$ be a weighted majority game.

A coalition S is in the bargaining set, denoted \mathbb{W}^{BAR} if

i) $S \in \mathbb{W}^{\text{MIN}}$,

ii) $\forall T \in \mathbb{W}^{\text{MIN}}, T \neq S \mid \# S \leq \# T$

where $\# S$ denotes the cardinality of S , that is the number of elements in S .

The set of bargaining coalitions is denoted by \mathbb{W}^{BAR} .

Hypothesis 3.3

Let $[q, w_1, w_2, \dots, w_n]$ be a weighted majority game.

Then only coalitions from \mathbb{W}^{BAR} will be formed.

Leiserson follows Gamson and argues that in a simple coalitional game, the outcome will be a coalition in which the payoffs are divided in proportion to the weight of the parties. In a 1962 article on coalition formation in Japan, Leiserson also ranks cabinet posts. According to Leiserson, the best thing to gain in Japan is the Prime Minister portfolio; second best is finance minister; third best is foreign minister and so on. This is interesting because little attention has been given to this division of cabinet posts in coalition formation theories until much later. However, every researcher will intuitively accept that not all portfolios are of the same importance. Browne and Feste in 1975, and Budge and Keman in 1990 (1990a; 1990b) developed this idea further. It is also of great importance in one of the multi-dimensional policy-oriented theories that will be discussed in the last section of this chapter (Laver & Shepsle, 1996).

3.3 Policy-Oriented Coalition Formation Theories

3.3.1 Conflict of Interest Theory

Axelrod (1970) and Leiserson (1966) were among the first to acknowledge the influence of the policy positions of players on the formation process. In this class of policy-driven theories, the behavioural assumption is that a player strives to be member of a coalition in order to see her preferred policy implemented. The basic idea in Axelrod's theory is that if the policy preferences of some parties are not too diverse, it is likely that these parties will form a stable coalition. The smaller the conflict of interests between players, the larger the chance that they will cooperate. Axelrod translates this idea into the following assumptions.

- “The less conflict of interest there is in a coalition, the more likely the coalition will form.
- The less conflict of interest there is in a coalition, the more likely the coalition will have long duration if formed ” (Axelrod, 1970, p 167).

Axelrod assigns to all players a position on a uni-dimensional ordinal policy scale, and predicts that only connected coalitions will emerge. By connected coalitions, also denoted as closed coalitions, Axelrod refers to coalitions composed of players that are adjacent on a scale of policies. As said before, Axelrod uses an ordinal scale. This means that if we consider a game with five parties A, B, C, D, E - ordered from left to right -, it is feasible that the diversity between A and C is larger than between A and B, but the magnitude of the difference remains unknown. It is also impossible to compare the dispersion between coalitions ABC and BCD, but we can conclude that a coalition of players ABC is less diverse, and thus more likely to be formed than a coalition with players ABD. We can also conclude that coalition ABC is less diverse than coalition ABCD, even though both are connected.

For the formal formulation of the conflict of interest theory, I use of Van Deemen’s (1997) description in *Coalition Formation and Social Choice*. In order to give a formal presentation, some additional concepts should be introduced. First, the policy position of player, i is denoted by x_i . If a player is to the left of another player on the policy dimension, we assume that this player’s policy position precedes the policy position of the other player.

Definition 3.4

If x_i is to the left of x_j and x_j is to the left of x_k , then $x_i \theta x_j \theta x_k$

The symbol θ represents the policy order for G_θ , and is a binary relation satisfying reflexivity, anti-symmetry, completeness and transitivity. A preference order is reflexive, if any alternative is at least as good as itself. Anti-symmetry states that for all alternatives it must be true that if x_j is at least as good as x_i then it is not true that x_i is at least as good as x_j . A preference order is complete if every alternative is compared to every other alternative. The policy position of player i is either to the left or to the right of player j , or they prefer exactly the same position. A relationship is transitive, if it holds that if a player prefers A to B and B to C, he will also prefer A to C, and if he is indifferent between A and B and between B and C, he should also be indifferent between A and C. A set of preferences that satisfies these four properties is called a linear order. Now, we can define a policy game. A *policy game* is a simple game with a linear policy order.

Consider the policy game G_θ :

- i) A player k is between players i and j if $(x_i \theta x_k \wedge x_k \theta x_j) \vee (x_j \theta x_k \wedge x_k \theta x_i)$.
- ii) Two players i and j are neighbours (connected) if there is no other player k between i and j .
- iii) A coalition $S \subseteq N$ is closed if for all $i \in S$, there is a $j \in S$ such that i and j are neighbours.
- iiii) A coalition which is not closed is said to be open (Van Deemen, 1997).

Axelrod predicts a winning coalition, which is connected, and minimal in the sense that it can lose no member party without ceasing to be connected or winning.

Definition 3.5

Let G_θ be a policy game.

A coalition $S \in \mathcal{W}$ is minimal connected if for each $i \in S$, $S - \{i\}$ is either losing or open. The set of minimal connected winning coalitions is denoted by \mathcal{W}^{MC} (Van Deemen, 1997).

Hypothesis 3.4

Let G_θ be a policy game. Then only coalitions from \mathcal{W}^{MC} will be formed (ibid.).

3.3.2 Minimal Range Theory

In his thesis *Coalitions in Politics: A Theoretical and Empirical Study*, Leiserson (1966) developed the minimal range theory. In Chapter 6, he defines ideological diversity as follows: “By ideological diversity, we mean the maximum ‘distance’ between players in the proposed coalition in the space defined by the ... major issues” (Leiserson, 1966, p 314). Note that these major issues are time and place dependent. In the Netherlands the diversity is usually measured on a socio-economic left-right dimension. Furthermore, Leiserson argues that players want to be members of coalitions with some positive payoff – read: winning coalitions - and then will ‘find’ that coalition which has a minimum of ideological diversity. He suggests the use of Gamson’s fairness-rule according to which a player is entitled to a share of coalition’s winnings proportional to her share of the coalition’s resources.

For the formal representation of Leiserson’s theory, I follow De Swaan’s elaboration since he uses a notation similar to the one used elsewhere in this chapter. The central concept of Leiserson’s theory is a coalition’s range, which is defined as the distance between the two members of the coalition that are on the extreme of, or furthest apart on, a policy scale.

Definition 3.6

An extreme actor in a coalition S is an actor l_S who has a policy position x_L that is more to the left than the policy position of any other actor in S . An actor r_S is an actor whose policy position is rightmost among the policy positions of the members of S (De Swaan, 1973). The position of the most extreme actor on the left is denoted as x_L^S , and the policy position of the most extreme actor in S on the right side as x_R^S . Distance is denoted as d

Definition 3.7

For extreme actors l_S and r_S in coalition S , it is true that:
 $x_L^S \leq x_i$ for all $i \in S$, and $x_R^S \geq x_i$ for all $i \in S$ (De Swaan, 1973).

The range of a coalition S , notation D_S is defined as follows:

$$D_S = d(x_L^S, x_R^S)$$

According to this theory, an actor prefers a winning coalition in which she is a member, and she selects from this set of coalitions the one with the smallest range. A coalition will be formed, if all members agree that the range of this coalition is not larger than the range of any other winning coalition.

Hypothesis 3.5

Let G_θ be a policy game and let $S, T \in \mathbb{W}$ and $\exists S \mid D_S < D_T \quad \forall T \in \mathbb{W}$, then only coalitions from S will be formed.

3.3.3 Policy Distance Theory

De Swaan's policy distance theory (1973) is another example of a policy-oriented theory. In this theory actors, i.e. political parties, compare their policy positions to the expected policy positions of coalitions. De Swaan describes the central behavioural assumption of the policy distance theory as follows: *"An actor strives to bring about a winning coalition in which he is included and which he expects to adopt a policy that is as close as possible, on a scale of policies, to his own most preferred policy"* (De Swaan, 1973, p 88).

In this section, I shall first discuss the descriptive part of the policy distance theory. In this part, actors define preference profiles for possible winning coalitions. These preference profiles are based on the comparison between the actor's own policy positions and the expected policy positions of the coalitions. The 'scale of policies' in De

Swaan's research is a coherent scale of policy issues that together form an ideological socio-economic left-right dimension. After defining the preference ordering, I shall discuss the predictive part of the theory. At this point a game theoretical solution concept is used to single out a set of coalitions that might occur. De Swaan applies the core solution, which selects undominated coalitions.

The assumptions of the descriptive part of the policy distance theory will be given in formal notation. The assumptions 3.2, 3.3, and 3.4 define the rank order of expected policies of coalitions and of the actors' policy positions. The other assumptions define the preferences of the actors for the coalitions.

The weights and policy positions of its members determine the expected policy position of a coalition. The distance between the expected policy position of coalition S , and the most preferred policy position of an actor, i , is denoted as $d(x_i, x_S)$ (De Swaan, 1973).

The first assumption that De Swaan formulates is, that if an actor i is a member of two winning coalitions, the actor prefers the coalition with the expected policy closest to his own most preferred policy. The coalitions are ordered on an ordinal policy scale corresponding with the social-economic left-right dimension.

Assumption 3.1

For all i , such that $i \in S$ and $i \in T$; $S, T \in W$: $SP_i T$ if $d(x_i, x_S) < d(x_i, x_T)$ (De Swaan, 1973).

The order of the policy positions will again be denoted by θ . The preference order of the policy positions of the players is complete and transitive. Formally:

Assumption 3.2

For all $i, j \in N$; either $x_i \theta x_j$ or $x_j \theta x_i$; and for all $i, j, k \in N$; if $x_i \theta x_j$ and $x_j \theta x_k$, then $x_i \theta x_k$ (De Swaan, 1973).

The concept of a pivotal player is of major importance in this theory. An actor k is pivotal in S , if the difference between the combined weights w of the members to the left of this actor and the weights of the members to her right is less than the weight of this pivotal actor. "Within each coalition S , an actor k can be singled out as pivotal because it is plausible that the coalition's expected policy will be especially close to k 's position" (De Swaan, 1973, p 94).

Definition 3.8

k is a pivotal actor for S , if, for all i and j , such that $i, j, k \in S$, and $x_i \theta x_k \theta x_j$:
 $|\sum w_i - \sum w_j| \leq w_k$ (De Swaan, 1973).

An actor's most preferred policy is closer to the expected policy of a coalition in which she is a pivotal player than to the expected policy of any coalition in which she is not. Formally:

Assumption 3.3

For every pivotal actor k , $k \in N$, and for $S, T \subseteq N$; if $k \in S$ and $k \notin T$,
 then $d(x_k, x_S) < d(x_k, x_T)$ (De Swaan, 1973).

The next axiom defines an order among coalitions with the same pivotal actor. De Swaan defines the excess e_S of coalition S , as follows: ' $\sum w_i - \sum w_j$ ' (De Swaan, 1973). If two coalitions have the same pivotal player, the coalition with the higher excess is positioned further to the left on the policy order than the other coalition. This makes sense, since higher excess means that the combined weights of the actors to the left of the pivotal actor are higher than the combined weights of the actors to her right. This concept is important for the next two assumptions.

Assumption 3.4

For every actor k , k is pivotal in S and T , and $S, T \subseteq N$, $x_S < x_T$ if $e_S > e_T$
 (De Swaan, 1973).

Coalitions with the same pivotal player can be given a position on a policy ordering. In the following axiom, De Swaan describes how to compare the policy distance between a pivotal actor and the coalitions for which she is pivotal. If it is the case that for the pivotal player k the absolute value of the excess of coalition S is smaller than the absolute value of the excess of coalition T , then the distance between x_k and x_S is smaller than the distance between x_k and x_T . Small excess means that the policy position of the pivotal player and the expected policy position of the coalition are close to each other. Hence:

Assumption 3.5

For an actor k , k is pivotal in S and T , $d(x_k, x_S) < d(x_k, x_T)$ if, $|e_S| < |e_T|$
 (De Swaan, 1973).

The next assumption in De Swaan's theory guarantees individual rationality of winning coalitions. It consists of two parts. The first part states that an actor prefers

being a member of any winning coalition to being a member of a losing coalition. The second part formulates that an actor prefers being a member of a winning coalition to not being a member of a winning coalition.

Assumption 3.6

For all i , such that $i \in S, i \in T, S \in \mathcal{W}, T \notin \mathcal{W}, SP_i T$ (De Swaan, 1973).

Assumption 3.6'

For all i , such that $i \in S, i \notin T, S \in \mathcal{W}, T \in \mathcal{W}, SP_i T$ (De Swaan, 1973).

The assumptions formulated so far lead to a preference on coalitions for each player. A configuration of coalition preferences is called a preference profile. These preference profiles are essential for the predictive part of the theory. In the predictive part of a coalition formation theory, a set of coalitions is predicted. We therefore need a solution concept assigning a set of outcomes, i.e. payoffs, to each game. Under the assumptions of the policy distance theory, solution concepts from n-person game theory are applicable. The solution concept that De Swaan uses is the core concept. To define the core, we first define domination among coalitions. A coalition dominates another coalition if every player in the former coalition thinks this coalition is at least as good as the other and if it is true that for at least one player the former coalition is strictly preferred to the latter. The core solution selects a set of undominated preference vectors. A coalition S is undominated if there is no coalition T in which all members are better off, and if there is at least one member i of S such that i prefers S to T . Formally:

For all $S, T \in \mathcal{W}$, S dominates T , notation $S \Delta T$, if:

- i. for all $i \in S$: $SR_i T$
- ii. for at least one $i \in S$: $SP_i T$ (De Swaan, 1973).

Coalition S is a core solution if there is no coalition T that dominates S :

$S \in \text{Core}$ if $\neg \exists T \in \mathcal{W}: T \Delta S$.

To illustrate the core concept, consider a game with three players A, B, and C and four possible winning coalitions AB, AC, BC, and ABC. Player A's policy position is closer to AB than to AC. Player A therefore prefers coalition AB to AC. Player B also prefers coalition AB to coalition AC. Player C prefers coalition AC to coalition AB. In short, all members of coalition AB prefer AB to AC. Therefore coalition AB is not dominated by coalition AC. The preferences of the parties for the coalitions can be found in Table 3.1. The higher the numbers, the higher the preference. According to the core solution concept, the coalition AB is undominated and will therefore be predicted.

Table 3.1
Preference profiles

	A	B	C
AB	3	3	0
AC	2	0	3
BC	0	2	2
ABC	1	1	1

Hypothesis 3.6

Let G_0 be a policy game. Then only coalitions from the core will be formed (De Swaan, 1973)

Unfortunately, De Swaan's model is inconsistent. The coalitions in the policy distance theory are located on a policy dimension. Boute discovered in 1981 that this part of De Swaan's theory is not without problems (Boute, 1981). For the second axiom, a complete ordering of the actors' policy positions on the policy scale is required. The problem lies in the fact that a coalition can be placed more than once on the policy ordering of coalitions. This is caused by the fact that some coalitions may contain more than one pivotal player. Van Deemen (1997) gives the following example, which displays the inconsistency. Consider the following decisive weighted majority game with three players with equal weight and a quota of 2: $[2; 1, 1, 1]$ with players A, B, C respectively. The following coalitions with their pivotal actors can be formed: player A = {AB, AC}
player B = {BC, AB, ABC}
player C = {AC, BC}

In this example, both players A and C are pivotal actors for coalition AC. Since player A is pivotal for coalition AC and not for coalition ABC, AC lies closer to player A than coalition ABC. Player C is also pivotal for coalition AC, but also not for ABC, so that coalition AC is closer to player C than coalition ABC. This leads to an ordering in which coalition AC is placed twice, once to the left of coalition ABC and once to the right of that coalition. The excess of the pivotal players in each coalition is calculated. It appears that coalition AC is preferred to coalition ABC and vice versa. The policy distance theory thus rejects the first of the requirements for a good formal theory, namely that the axioms should be internally consistent.

A remedy, discussed by both Boute and Van Deemen, is to a priori exclude the possibility of more than one pivotal player for a coalition. For this reason, the 'less

than or equal to' relation in the definition of the pivotal player should be replaced with the strict inequality 'less than' relation. However, this does not lead to very promising results. Coalitions that can be ordered in the original situation - like the two-person coalitions in the above example - can not be ordered when using the adjustment proposed by Boute and Van Deemen. There are other inconsistencies in De Swaan's model, but for these I refer to Van Deemen (1997).

In a multi-dimensional version of De Swaan's theory, as in the descriptive part of most spatial theories in this research, each player is assumed to hold a policy position not on an ordinal scale, but in an m -dimensional Euclidean space. Distances between policy positions will be measured metrically by means of Euclidean distance. This formulation will avoid the inconsistency of De Swaan's theory, as we will shall in, for instance the Maximal Satisfaction Solution which applies the same behavioural assumptions.

3.4 Actor-Oriented Coalition Formation Theories

In actor-oriented coalition formation models, coalition formation is explained by certain properties of political parties. These properties can be either the size or a specific ideological position of a player. Powerful actors are assumed to influence the formation process.

3.4.1 The Dominant Player

Peleg (1980/1981) developed a policy-blind player concept in which the size of a specific actor determines the course of the game. This actor is called dominant if she holds the power to act decisively in the formation process. A simple game with a dominant player is called a dominated simple game. In these dominated games, a single player has decision-making power within the coalition formation process. Note that the concepts dominant and dominated in this theory differ from that of domination among payoff, as used in De Swaan's theory.

The dominant player approach is derived from a binary dominance relation between coalitions, called 'desirability relation'. A coalition S is at least as desirable as coalition T if it is the case that if coalition T can win with player B , then coalition S can also win with B .

Definition 3.9

Let $G = (N, \mathcal{W})$ be a simple game and let S and T be coalitions:

- i) S is at least as desirable as T , denoted as $S \succeq_D T$, if for every nonempty coalition $B \subset N$, such that $B \cap (S \cup T) = \emptyset$: $B \cup T \in \mathcal{W} \Rightarrow B \cup S \in \mathcal{W}$
 - ii) S is more desirable than T , denoted as $S >_D T$, if $S \succeq_D T$ but not $T \succeq_D S$
 - iii) S is equally desirable as T , notation $S \approx_D T$, if $S \succeq_D T$ and $T \succeq_D S$
- (Peleg, 1981).

The relation $>_D$ is the asymmetric part of the desirability relation. In the definition above, this implies that if $S >_D T$ coalition S can win with B , while T cannot. In the symmetric part, $S \approx_D T$, if S can win with B , T can also win with B . Peleg continues with defining dominance and weak dominance.

Definition 3.10

Let $G = (N, \mathcal{W})$ be a simple game and let S be a coalition:

1. $i \in N$ weakly dominates S , if
 - i) $i \in S$,
 - ii) $\{i\} \succeq_D S - \{i\}$.
2. $i \in N$ dominates S , if
 - i) $i \in S$,
 - ii) $\{i\} >_D S - \{i\}$.

Van Deemen (1997) derived the following theorem on domination:

Theorem 3.1

Let $G = (N, \mathcal{W})$ be a simple game. A player $i \in S$ dominates a coalition S if:

- i) for every non-empty coalition $B \subseteq S^c$: if $B \cup (S - \{i\}) \in \mathcal{W}$, then $B \cup \{i\} \in \mathcal{W}$
- ii) there is a non-empty coalition $B \subseteq S^c$ such that $B \cup \{i\} \in \mathcal{W}$, and $B \cup (S - \{i\}) \in L$.

In a simple game, player i is called dominant if there is a coalition $S \in \mathcal{W}$ such that i dominates S . A simple game with a dominant player is called a dominated simple game. The set of dominant players in G will be denoted with $d(G)$. A dominant player can only exist in non-symmetric games.

Theorem 3.2

Let $G = (N, \mathcal{W})$ be a proper simple game and let $i \in N$

If there are $j \in N, j \neq i$, such that $\{j\} \succeq_D \{i\}$, then $i \notin d(G)$ (Peleg, 1981).

In order to describe the size of the set of dominant players, Peleg introduces the following consequences of the above definitions:

Corollary 3.1

Let $G = [q; w_1, \dots, w_n]$ be a proper weighted majority game.

Then there is at most one dominant player, $|d(G)| \leq 1$

Corollary 3.2

Let $G = (N, \mathcal{W})$ be a weak game.

Then there is at most one dominant player, $|d(G)| \leq 1$

Corollary 3.3

Let $G = (N, \mathcal{W})$ be a weak game and let veto players be denoted by V .

If $|V| \geq 2$, then $d(G) = \emptyset$ (Peleg, 1981).

If there is a dominant player in a weighted majority game, this must be the player with the highest weight. If there is a dominant player in a weak game, then this player has to be a veto player. The opposite is not necessarily true; not every vetoer in a weak game is a dominant player. In a weak game with exactly one veto player, there may exist a dominant player.

In order to describe the power of the dominant player in a coalition that she dominates, we introduce the concept of a subgame. With the concept subgame, the internal opposition in a dominated coalition can be studied.

Definition 3.11

Let $G = (N, \mathcal{W})$ be a simple game and let $S \subset N$. A subgame $G \upharpoonright S$ associated with S is a simple game (S, \mathcal{W}_S) , where S is the player set and \mathcal{W}_S is the set of winning coalitions.

A subgame is thus the game played within the coalition. Van Deemen revealed the powerful position of the dominant player in the subgame associated with the coalition in the following theorem:

Theorem 3.3

Let $G = (N, \mathcal{W})$ be a dominated and proper simple game and let i be the dominant player. Suppose i dominates S . Then $G \upharpoonright S = (S, \mathcal{W}_S)$ is dictatorial with i as the dictator (Van Deemen, 1989).

For the proof of this theorem I refer to Van Deemen (1989, p 330).

So far, we can conclude that the dominant player is really powerful. Within a dominated coalition the dominant player holds a strict majority and as such no decisive opposition can be formed against the dominant player. Since the dominant player is a dictator in the subgame, the other players in the subgame are dummies. The question rises why any player would like to form a coalition with a dictator. Peleg does not go into this, but it seems relevant since games with a dictator are inessential games. This phenomenon can only be explained by introducing new assumptions. One possible assumption is that parties value being a member of a coalition, even though they have to govern with the dominant player. Another is that if it is necessary to vote on legislation, a majority is needed, and although the dominant player is dominant within the coalition, a parliamentary majority is needed in order to get a proposal to win. The dominant player is also externally more powerful.

Outside the subgame, the dominant player has more opportunities to form a winning coalition than any other player does.

Definition 3.12

Let $G = (N, \mathcal{W})$ be a simple game with one dominant player.

Let i be the dominant player:

- 1) $D_{\mathcal{W}}(G) = \{S \in \mathcal{W} \mid i \text{ weakly dominates } S\}$,
- 2) $D(G) = \{S \in \mathcal{W} \mid i \text{ dominates } S\}$

Peleg developed the first set: $D_{\mathcal{W}}(G)$, whereas the second $D(G)$ was introduced by Van Deemen. Based on the definitions above, the following hypotheses can be formulated:

Hypothesis 3.7

Let $G = (N, \mathcal{W})$ be a simple game with one dominant player.

Then only coalitions from $D_{\mathcal{W}}(G)$ will be formed (Peleg, 1981).

Hypothesis 3.8

Let $G = (N, \mathcal{W})$ be a simple game with one dominant player.

Then only coalitions from $D(G)$ will be formed (Van Deemen, 1989).

Van Deemen (1989) has refined the dominant player approach by introducing the size principle. Combining the minimum size and dominant player theory led to the idea that a dominant player wants to form a coalition of minimum size that she dominates. In such a coalition, this player would not only control the internal opposition but would do so with the greatest predominance possible.

Hypothesis 3.9

Peleg-Riker Principle Let $G = [q, w_1, w_2, \dots, w_n]$ be a dominated and proper weighted majority game. Then only coalitions from $D(g) \cap W^{ize}$ will be formed (Van Deemen, 1989).

3.4.2 The Centre Player

The second actor-oriented coalition formation theory that will be discussed here is a policy-driven theory. In this case, the powerful player is called the centre player. In this section, some of the concepts that are introduced in section three will be applied again. We start with a policy game - see the definition in Section 3.3.2 - in which the preferences are linear. Once more, a player $i \in N$ is said to be *to the left* of player j if $x_i \theta x_j$. If this is the other way around, $x_j \theta x_i$, player i is said to be *to the right* of player j . Formally:

Let G_θ be a policy game and let S be a coalition, then:

$$Le(i, S) = \{j \in S \mid x_j \theta x_i\}$$

$$Ri(i, S) = \{j \in S \mid x_i \theta x_j\}$$

Because we demand a linear order, a player's position in our policy game can never simultaneously be $i \in Le(i, S)$ and $i \in Ri(i, S)$.

Definition 3.13

A player $i \in N$ is called a centre player in G_θ if:

- i) $Le(i, N) \in L$ and $Le(i, N) \cup \{i\} \in W$ and
- ii) $Ri(i, N) \in L$ and $Ri(i, N) \cup \{i\} \in W$ (Van Deemen, 1991).

Thus, a player i is a centre player, if the coalition of all players who are to the left of i are losing without i , but winning with i , and if all the players to the right of i are losing without her but winning with her.

A *centralised policy game* is a policy game G_θ with a centre player. The next theorem characterises a centre player in a weighted centralised policy game.

Theorem 3.4

Let $G = [q, w_1, w_2, \dots, w_n]$ be a centralised weighted majority game with relevant policy order θ . Let $c \in N$ be the centre player.

Then: $|w(Le(c, N)) - w(Ri(c, N))| < w_c$ (Van Deemen, 1997).

In words, the weight of the centre player is strictly more than the absolute value of the difference between the weights on the left of the centre player, and the weights to the right of the centre player. Therefore, the centre player has a powerful position: she holds the game balanced. The centre player can form coalitions with the players to her right or with players to her left or even with both sides.

Van Deemen (1991) developed the following two theorems about the existence of the centre player.

Theorem 3.5

Let G_θ be a policy game. There exists at most one centre player.

Theorem 3.6

Let G_θ be a policy game. Then G_θ has a centre player if G_θ is decisive.

The powerful position of the centre player leads to the following prediction.

Hypothesis 3.10

In centralised policy games only coalitions with the centre player (C) will be formed.

Since the set of C - winning coalitions with the centre player - is usually large, Van Deemen developed a refinement of the theory. In the theory of Balanced Coalitions (Van Deemen, 1990) the idea is that a rational player will strive to form maximally balanced coalitions because in these coalitions she can best control the policy formation process. A coalition with the centre player is maximally balanced if,

- i) this coalition includes the centre player c and,
- ii) the difference of the weights to the left of the player and the weights to the right of c are as small as possible.

The hypothesis is that in a centralised policy game, only maximally balanced coalitions will be formed. This prediction set denoted B is a subset of C.

Hypothesis 3.11

In centralised policy games only maximally balanced coalitions (B) will be formed (Van Deemen, 1997).

Another refinement - which is a combination of the centre player and a power-oriented theory - is the theory of power excess coalitions (Van Deemen, 1991). The

power excess of the centre player in a coalition is the weight of the centre player minus the size of the internal opposition to the centre player in that coalition. If the centre player has positive power excess, she can control the internal opposition in that coalition. The hypothesis is that in centralised policy games only coalitions with maximal power excess for the centre player will be formed. The power excess theory differs from the maximal balanced coalition theory in that the latter is policy-driven - the position of the centre player determines if the coalition is balanced - while in the former the extension is power-oriented: the centre player wants maximal power excess.

Hypothesis 3.12

In centralised policy games only coalitions with maximal power excess will be formed (Van Deemen, 1997).

Both theories also have a further refinement, namely a closed version. As we saw in the former section, a coalition is closed if it consists only of neighbours. In the first case, closed (maximally) balanced coalitions are predicted, and in the second case closed coalitions with maximal power excess will be formed.

Einy (1985) investigated the theoretical compatibility of Axelrod's connectedness hypothesis and Peleg's dominated simple games. In this research, Einy also introduces the centre player and studies the case where the dominant player occupies a central position with respect to the policy order. Van Roozendaal (1992) has continued the study of the two main player-oriented approaches: the dominant and central player. He tested the two theories empirically and studied the combination of the two approaches.

3.5 Institutional Theories of Coalition Formation

3.5.1 Introduction: Constraints on Cabinet Formation

In this section we shall study institutions that influence coalition formation. In the first part institutional constraints will be studied. Both formal and informal rules that restrict coalition formation will be discussed. After that, institutions and behaviour and their interaction will be studied. In that part, coalition formation theories that include institutional factors are discussed.

At their core, political institutions are ‘the rules of the game’ (Rothstein, 1996). These rules can be both formal and informal. Institutions enter coalition formation theories as constraints. Ström, Budge and Laver (1994) argue that institutions in coalition formation are both exogenous and endogenous constraints on the process of bargaining. Constraints on coalition bargaining can be defined as: *any restriction on the set of feasible cabinet coalitions that is beyond the short term control of the players* (Ström et al., 1994).

In rational choice approaches to coalition formation, political parties are engaged in interaction and stabilise in equilibrium, i.e. a coalition. However, if we consider the search for equilibria, there are two related problems. In the first case, a dominant coalition in multi-dimensional policy space is often non-existent - that is, there is no core solution -, which means that we cannot predict a coalition. In the second case, if the core is non-empty, it is not necessarily unique. This can lead to multiple equilibria in which almost any outcome - coalition - can be predicted.

Existing institutions set constraints on parties’ choices, and therefore bring back the number of possible equilibria. In *Constraints on Cabinet Formation in Parliamentary Democracies* by Ström et al. (1984) and in Laver and Schofield’s (1990) *Multiparty Government*, several rules that influence cabinet formation are introduced. The main point of Ström et al. is that implementation of institutional rules or constraints leads to better predictions than most common coalition formation theories allow. Unlike other theories I discuss in this chapter, Ström et al. implement these institutional constraints without applying behavioural assumptions, then evaluate the strength of this institutional approach. In order to present an extensive overview of institutional constraints on coalition formation, I shall follow the elaboration of Ström et al.. Note however that since no behavioural assumptions are included, it can not be seen as a real coalition formation theory.

1. Formal Rules

The formal rules that influence cabinet formation are:

- *size and composition requirements*; examples are electoral thresholds, only parties with more than 5% of the vote share can participate in government in Germany and a composition requirement would be the provision that in Belgian cabinets the number of Dutch and French speaking ministers should be equal.
- *investiture rules*; this concerns the formal rules of installation of a cabinet. In many countries a new government requires an investiture vote which can privilege certain parties or majority coalitions.
- *recognition rules*; these rules can give special bargaining power to either the *head of state* or to the *status quo government*. The recognition rule specifies which parties

will be asked to form a government and in which order. An example of this rule is the appointment of a *formateur* - who initiates coalition formation - by the queen in the Netherlands.

2. Cabinet Operation Rules

A second class of rules that affect cabinet formation are *cabinet operation rules*. These rules relate to the doctrine of 'collective cabinet responsibility'; if this is very strong, ideologically diverse parties can hardly join a coalition because they would have to defend policies that contradict their commitments to the electorate. If the collective responsibility is weaker, parties that lose out in cabinet are more able to distance themselves from cabinet policy. In these cabinet operation rules, specific rules of cabinet termination, which can influence the formation process and for instance lower the chances of minority cabinets, are also included.

3. Legislative Rules

Another kind of rules that influence formation are *legislative rules*. This can lead to oversized cabinets if a qualified majority is necessary for constitutional reform. In this framework, we also consider electoral rules. In some electoral systems, pre-electoral alliances are useful, which influences the formation process.

4. Party Rules

Rules imposed by parties themselves can influence coalition bargaining. A party can announce to refuse to join a cabinet with another party, or it can be an anti-system party and therefore unwilling to enter into a coalition, or parties can form pre-electoral coalitions.

5. External Veto Players

Another possibility is that *pressure from outside the parties* influences the formation. An example is the American influence in Europe after World War II. No sane European country would allow communist parties in its cabinet because of the anticipated resistance of the United States (Ström et al., 1994).

These constraints are tested by Ström et al. for an unstable period (1977-1980) in Belgium, for five cabinet formations. The number of feasible coalitions - after taking the institutional constraints into account - turns out to be a fairly good prediction for cabinet formation. For the few cases under consideration both the success rate and the prediction efficiency is higher than the results for the minimal winning and minimal connected winning theory. The success rate is simply the number of correctly predicted coalitions divided by all cases. The efficiency rate also takes into account the number of coalitions that are predicted by the theory. In other words, a theory that selects one coalition at a time can have a small success rate, but when it predicts the correct coalition, it is the only coalition that has been predicted. If another theory predicts a larger set of coalitions, the chance of predicting the right coalition is large,

but in the latter case the prediction efficiency is smaller than the prediction efficiency on the former theory when predicting correctly.

None of the five coalitions that were formed in this period (1977-1980) were minimal and connected, so the success rate of the conflict of interest theory is zero. One coalition was minimal winning so the success rate of the minimal winning theory is .20. The success rate of the 'feasible coalitions under constraints' is .60; three out of five cases were predicted by this criterion. For both theories the prediction efficiency is small, 0.034 for the coalitions under constraints and 0.026 for the minimal winning theory. However, even though the institutional constraints eliminated the vast majority of all possible coalitions, and the actual coalition fell - in three out of five cases - within the constraint set, it is a difficult task to implement these constraints in a behavioural theory of coalition formation.

As I said, Laver and Schofield (1990) also discuss institutional rules in their study on multiparty governments. They order the rules differently, but basically discuss the same rules as Ström et al.. Laver and Schofield stress the distinction between more or less formal rules and 'ad hoc' rules. The latter consist of very special local circumstances that are interesting, but very hard to build into a general model. These 'rules' can be a personality clash between party leaders, and a situation in which a party is considered by other parties as 'non-coalitionable'. These rules are also found in Ström et al. (1994) under the headings *party rules* and *external veto players*.

The institutional constraints bring down the number of possible coalitions, but neither Ström nor Laver and Schofield present a comprehensive coalition formation theory that includes behavioural assumptions as well as institutional limitations. Ström et al. (1994) do acknowledge that a successful model of coalition formation should depend on both institutional and preference based factors. One way of accomplishing this is to model coalition formation on a country-by-country base. Another option is to explore the effects of constraints under different behavioural assumptions. The latter option seems to offer the best of both worlds, but so far no author has been able to come up with a general behavioural coalition theory that includes institutional constraints without leading to either horrendously complex mathematical models or to inaccurate simplifications of reality. Examples of these models will be discussed in the next section. For instance Romer and Rosenthal (1978) present a theory based on agenda setting which, in my opinion, is a too simple representation of coalition formation in multi-party systems. Baron and Austen-Smith (1988) present models that do not provide sufficient information on how to find equilibria, whenever more than three parties and more than two policy dimensions enter the model. These models will be discussed in the next section.

3.5.2 Institutional Government Formation

The research that will be discussed in the final part of this section relates to models that include both common behavioural assumptions and institutional constraints. These comprehensive theories, for instance Baron's and Austen-Smith's studies, are usually able to predict what coalition will occur in a two-dimensional policy space with three parties, but these models become complex if more parties or more dimensions enter the game. Still, since these theories are important contributions to the institutional approach to coalition formation, and since they might be starting points for theories that include both behavioural assumptions and institutional factors, they will be discussed in this section.

Shepsle was among the first formal theorists to acknowledge the important role of institutions. He is also one of the most progressive theorists in combining formal theory and institutional constraints. The main goal of Shepsle's research is to solve social choice problems. Pure majority rule decision-making in situations with multiple dimensions and multiple actors often leads to cycling. For any alternative in the cycle, there is another alternative inside this set that can beat the former alternative in pure majority rule. Therefore Shepsle developed the so-called 'structure-induced equilibrium'. The idea is that in bargaining situations with multiple possible outcomes, the structure - for instance always having the status quo voted on last - will induce an equilibrium. The main point in Shepsle's 1979 study is that: *"institutional structure - in the form of rules of jurisdiction and amendment control - has an important independent impact on the existence of equilibrium and, together with the distribution of preferences, co-determines the characteristics of the equilibrium state(s) of collective choice processes"* (Shepsle, 1979).

Structure and procedure together with preferences produce equilibria. Shepsle discusses various kinds of structures and procedures that induce stability, for instance, the division of labour, in which every committee is allowed to decide only on one policy dimension (1979). This idea cannot be applied to the process of coalition formation, since coalition formation includes decision-making on multiple dimensions that should be combined in one coalition. In the final instance, this theory could offer one party complete power over the cabinet formation. Theoretically, this is possible, but naturally this does not comply with the practice of coalition formation. Another kind of structure described by Shepsle, is the sequence of the game. In coalition formation, the sequence in which parties are allowed to suggest a coalition determines the course of the game (Shepsle, 1989). Yet another example is a model in which the number of possible alternatives is reduced. This domain restriction is

a procedural matter which leads to a lesser number of possible equilibria (Shepsle, 1979). Sometimes parties themselves reduce the number of possible coalition alternatives, by announcing that they will not join a coalition with some other party. Other institutional features are an agenda setter model, or a sequence model in which amendments are always compared with the status quo position. In the first case, the agenda setter has more than average power and influences the outcome of the game, and in the second case the status quo position can be very powerful. In coalition formation, the ‘formateur’ can be seen as the agenda setter who leads the formation, and the incumbent government can be seen as the status quo position. The latter institutional feature can lead to problems when ‘translated’ into coalition formation, since it can be the case that the status quo cabinet does not represent the majority in parliament after the elections.

Romer and Rosenthal (1978) also developed an institutional model based on the agenda setter idea. Their main argument is that the agenda setter is an institution that reduces the number of possible equilibria. Stated more eloquently: “*controlled agendas appear to minimize decision costs*” (Romer & Rosenthal, 1978). But Romer and Rosenthal did not develop their model in order to solve the problem of coalition formation. Their model was applied to decision-making on the issue of tax expenditure and can be applied to other cases of collective decision-making.

Like most work on the institutional approach, research on the issue of coalition formation is also mainly examined in a non-cooperative setting, which leads to major changes in the behavioural assumptions of the parties. Most important is that we should abandon simple game theory since this is developed for cooperative games. In a cooperative setting, preplay communication is allowed and players can increase their payoffs when cooperating. It is quite uncommon in institution-oriented coalition formation theories that the ideas are translated into a model. The research of Ström et al. and Laver and Schofield, discussed in the previous sections, are examples of research on institutional coalition formation without constructing formal models.

Shepsle (1979) has developed the following model. A position x - whether it be a policy position, a social choice or a coalition - is invulnerable whenever there is no alternative that can beat it. If there is an alternative *within the rules* that can beat x , position x is vulnerable. The rules can demand splitting up the committee or the policy space (for instance: distributing the jurisdiction among committee members). The position x is a *structure induced equilibrium* if and only if it is invulnerable.

For the formal definition of a structure-induced equilibrium, we need to define the following:

For a policy x , the set of policies preferred to it by a majority is known as the *policy winset* of x , denoted by $W^*(x)$. Let $F(y)$ be the set of *feasible points* open to coalition S , to be proposed at the given point. If we define the preference set for x for coalition S (that is points that are preferred to x by a coalition S) by $P_S(x) = \{y \mid y R_S x\}$; we can examine whether the members of S prefer any proposals from the feasible set to x (Shepsle & Weingast, 1981).

Definition 3.14

x is vulnerable if $\exists y$ such that:

$y \in P_S(x)$ for some coalition S

$y \in W(x)$ (Shepsle & Weingast, 1981).

Definition 3.15

x is invulnerable if x is not vulnerable (Shepsle & Weingast, 1981).

It is now possible to define Shepsle's notion of an equilibrium:

Definition 3.16

A point x^* is a *structure-induced equilibrium* (SIE) if it is invulnerable (Shepsle, 1979; Shepsle & Weingast, 1981).

Thus, x^ is a SIE iff $W(x) \cap P_S(x) = \emptyset \forall S$. This says that a point x is a SIE if and only if those points which defeat x^* either can be proposed only by those who do not prefer to do so, or cannot be proposed at all* (Shepsle and Weingast, 1981, p 512).

In order to defeat an alternative, it is necessary that there are other alternatives within the feasible set - $F_S(x)$ - i.e. there should exist other alternatives that *can* be proposed. Furthermore, the latter alternative(s) should also be preferred to the former. In this design, notions of agenda setting and the status quo position are incorporated in the equilibrium concept, because they determine the feasible set. If an amendment can only be put to a vote against the status quo, this means that the set of feasible alternatives is small. Likewise, if members of a coalition S only have jurisdiction in one policy area, the number of possible feasible alternatives is small, and thereby enhances the chance of a structure-induced equilibrium (SIE).

Shepsle considers domination of alternatives in his SIE approach, and therefore needs an assumption on preferences. It is worthwhile to design a spatial coalition

formation theory - in which preferences are based on distances from ideal points - which also includes institutional factors. If we consider the incumbent government as the status quo position, and compare this coalition with others, the winset of the status quo can be determined. Laver and Shepsle do exactly this, in their theory on credible proposals in 1996, which will be discussed in Chapter 4. In this theory, the feasible set is determined with Shepsle's institutional approach, i.e. every possible coalition is compared with the status quo coalition, and then the winset of the status quo is determined. In this theory, called the winset theory, the notion of jurisdiction is also central. The state-secretaries are considered sole masters of their departments.

In 1988, Austen-Smith and Banks developed a sequential model to analyse electoral and legislative decision-making in a three-party proportional representation system. Since, the core position on the policy space is in general non-existent, an exogenous institutional structure is imposed. The institutional feature they applied is the convention of first asking the party with the largest share of the vote to attempt to form a government. The Austen-Smith and Banks model is a non-cooperative and multi-stage model. It differs from for instance the SIE approach in that it does not predict coalition formation as such. Rather, it is a model that describes which coalition would occur if this rule would be applied. Moreover, the model seems quite clear in a simple situation, but it does not include information about how to extend it to a situation with multiple issues and multiple actors.

Baron applied a similar idea in 1993. Baron proposed two coalition formation models with institutional features. For the sake of illustration, Baron's models will be discussed at some length but without presenting all the formal definitions. In contrast to work as discussed in the previous section on constraints, Baron (1991/1993) does try to present a comprehensive coalition formation theory that takes institutional matters into account. We shall however see that these models do not provide equilibria when multiple actors and multiple policy dimensions are included.

Baron (1993) distinguishes three main stages in (multi-party) political systems:

- the electoral system, which usually is a proportional representation system,
- the legislative system that is said to be parliamentary, and
- the government formation process.

He further distinguishes two main actors: parties and voters. The party's choice of a policy position depends on the distribution of the voters. This position can be viewed as an electoral platform, and as the bargaining position during the formation. The set of supporters, i.e. voters is endogenous to the choice of a party's platform as induced by the government formation process.

Baron states that the government formation process should lead to equilibrium governments. The objectives of Baron's analysis are to establish and characterise equilibrium party configurations and party positions. Baron argues that a political equilibrium is expected to reflect the characteristics of the government formation process which occurs after an election has determined the number of seats for each party. A political equilibrium consists of "*(1) sets of voters each of whom supports the party with a policy position closest to his or her ideal point, (2) a vector of party policy positions each of which maximizes the average expected utility of the party's supporters and from which the parties bargain in the context of a government formation process, and (3) a government formation equilibrium in which the government and its policies are determined*" (Baron, 1993, p 38).

As said above, Baron considers two kinds of government formation processes. The first is probabilistic; the probability that a party will be given authority to try to form a government, is equal to the proportion of seats it holds in government. In the second model, a fixed order or in other words a recognition rule - see Section 5.1, a rule that gives special bargaining power to some actor - is involved. A fixed order, e.g. by representation of parties, can be used to select a party that first attempts to form a government.

Baron's research is similar to Austen-Smith's work, in which a rule is first applied and coalition formation is examined next. Testing these theories is not very useful since they refer to rules that are not applied in reality.

First, in the probabilistic model, Baron predicts that an equilibrium can be established at the centre of the policy space. He describes this in the following proposition, in which he explores a situation with three parties:

"For a government formation process in which the probability of selection equals the proportion of seats held, all three parties choosing policy positions at the center and one third of the voters voting for each candidate form a political equilibrium. The center is the only policy position that is an equilibrium with all parties choosing the same policy" (Baron, 1993).

This position at the centre seems plausible since if one of the parties moves away from the centre it will lose a share of the votes. If one of the other two parties is then selected to form a government it will invite the other party located at the centre. The parties thus remain 'trapped' at the centre by majority rule. This model leads to the next result: *"For a government formation process with proportional selection, there is an equilibrium in which all three parties choose policy positions that are equidistant from the*

centre and at a distance $D = .485$ from each other. The parties receive one-third of the vote” (Baron, 1993). Note that this idea is an extension of Downs’ idea, which is presented in Chapter 2, that in a multi-party system with one dimension, parties converge to the median position in order to receive as many votes as possible (Downs, 1957).

Secondly, government formation with ‘a fixed order’ is a different story. Based on institutional traditions in countries, a fixed order is used to determine which party may start trying to form a government. An example of a fixed order is giving the largest party the first opportunity. If we have two large parties and one small party, one of the large parties will start by negotiating a government with the small party. This small party will never be in the selection process, but is a good coalition partner. Its goal is therefore to find the optimal location as compared to the other parties. Equilibria are possible if the small party is equidistant from the policy positions of the two other parties. This leads to the following result: *“In a government formation process with (1) selection in the order of representation, (2) fixed and symmetric positions of two parties, and (3) a party that will never be in the selection process, that party has an optimal location and will be in the government with whichever of the large party is selected”* (Baron, 1993). For some fixed positions of the two parties, the third party may have an optimal position. If the third party reaches its optimum, i.e. maximises its share of the vote, the political equilibrium has the property that each party maximises its vote share.

In the fixed order model, an equilibrium can be found at another point than in the probabilistic model: *“If all three parties are in the selection process and a fixed order of selection is chosen randomly when all three parties have the same vote shares, there is a political equilibrium in which all three parties choose policy positions equally distant from the centre and at a distance $D = 1.375$ from each other”* (Baron, 1993). The positions are further away from the centre than in the proportional selection model. In the latter, the parties are not vote maximising. When selection is based on size, the parties choose positions more distant from the centre than the centroids of their voters’ ideal points. They do so because another position would allow another party to gain a larger vote share and thus the opportunity to form a government.

Based on these two models, Baron concludes that electoral incentives in proportional representation parliamentary systems do not necessarily lead to political convergence. The proportional selection model reduces dispersion of policy positions, but in the fixed model a party may have an incentive to choose a policy position that gives it the smallest vote share in order to become an attractive coalition partner for one of the larger parties. In this model with equally large parties, the parties are positioned symmetrically around the centre and dispersed.

To summarise, Baron presented a model based on the distribution of votes. The distribution of these votes and the institutional system are the main ingredients of his model. Baron provides examples that include three parties and two policy dimensions. Theoretically, some pointers are given about how to generalise and extend this theory. Yet, if we add more parties and more policy dimensions, the analysis gets extremely complex, making it hard to tell which equilibria will come about. Furthermore, Baron's goal seems to be to predict policy positions of parties and not coalitions as such. Unfortunately, this has not led to a comprehensive behavioural coalition formation theory that includes institutional features.

In conclusion, Ström et al. (1994) and Laver and Schofield (1990) presented impressive lists of institutional variables that can influence social choice processes in general and coalition formation in particular, but they did not develop a formal coalition formation theory. Furthermore, some of the institutional features are already integrated in the behavioural theories, which are discussed in this and the next chapter. The formal rules - such as the electoral thresholds and the majority requirement if investiture vote is needed - precede in formal coalition formation theories, since we start with simple games. In most theories, the distribution of seats is the point of departure and only majority governments are predicted. The cabinet operation rules and the legislative rules are interesting and could be included in formal coalition formation theories. I agree with Laver and Schofield (1990) that party rules and the influence of external veto players are ad hoc considerations, which are difficult to insert in a formal coalition formation theory. Recognition rules, that give special bargaining power to for instance the head of state or the status quo government, are included in institutional theories on coalition formation.

Shepsle (1979) and Romer & Rosenthal (1978) developed coalition formation theories but their theories require more information on preference-formation of the players. The sequence model, in which the status quo and amendments are voted upon, might not be relevant in coalition formation since it is feasible that in weighted majority games the incumbent government could receive less than the quota. In that case, it cannot be considered as a possible winning coalition and could consequently not function as a feasible status quo. However, a formal theory - the Winset theory - that includes institutional factors and behavioural assumptions, will be described in the next chapter. In this Section, 4.2.3, Shepsle's notion of feasible coalitions and winsets is further developed in Laver and Shepsle's theory on credible proposals (Laver & Shepsle, 1996).

Baron (1993) and Austen-Smith & Banks (1988) developed models that describe which coalition could come about if a specific rule is applied. The main problem

with these models is that they do not provide sufficient information about how to apply them in situations with multiple issues and multiple actors. Moreover, Baron (1991, 1993) seems more concerned about predicting policy positions of parties than about predicting coalitions.

In conclusion, institutional theories have provided hints on how to reduce the number of feasible coalitions but have not led to a comprehensive theory of coalition formation. Most theories discuss constraints that are already incorporated in other coalition formation theories, sometimes even because they simply follow from the definitions of a simple game, and therefore their added value is not large. Also, in the case of the division of labour, like in the Structure Induced Equilibria (SIE) approach, and in the sequential model of Baron (1993), the theories do not represent the reality of cabinet formation. It is for these reasons that these theories will not be empirically tested in this research. However, note that institutional constraints are not disregarded completely, since in some cases the constraints are already included. Moreover, the winset theory, which will be tested, includes an idea that is similar to the notion of jurisdiction of the SIE approach.

3.6 Summary

The theories and hypotheses presented here are derived for the best known ‘traditional’ coalition formation theories. We started with the ‘oldest’ coalition formation theories, namely office-seeking theories. Next, policy-oriented theories that apply ordinal uni-dimensional policy scales were presented, followed by actor-oriented approaches. For all formal theories in these sections, hypotheses were derived that will be confronted with data in Chapter 6.

As I said in Chapter 1, most institutional theories are not formal theories and are therefore difficult to compare with the other theories modelled in this study. This seems especially true for the informal theories in Section 3.5.1, which are not derived by deduction, and consist of constraints rather than assumptions. Ruling out all coalitions not obeying the constraints is not at all the same as an axiomatic theory predicting which coalition should be formed.

In case of the more comprehensive and predictive theories in this class, the following was concluded. Romer and Rosenthal (1978) designed an agenda-setter theory that cannot easily be applied to coalition formation. Baron (1993) and Austen-Smith & Banks (1988) presented theories, which apply rules that do not necessarily hold for coalition formation in the Netherlands. More importantly, they have not given

insight on how to extend their models to more than three party-systems. Further, note that the structure-induced equilibrium does seem to fit the requirements of a formal theory, and can be included in the empirical research. Yet, since this theory is very similar to the winset theory that will be studied in the next chapter, I have decided not to consider it. Consequently, all institutional theories are left outside of the empirical analysis.

All other theories in this chapter, office-seeking, policy-seeking as well as actor-oriented, are simple axiomatic models that do comply with the requirements for formal models and can be tested easily. From the class of policy-seeking theories, only De Swaan's policy distance theory is problematic because it is internally inconsistent.

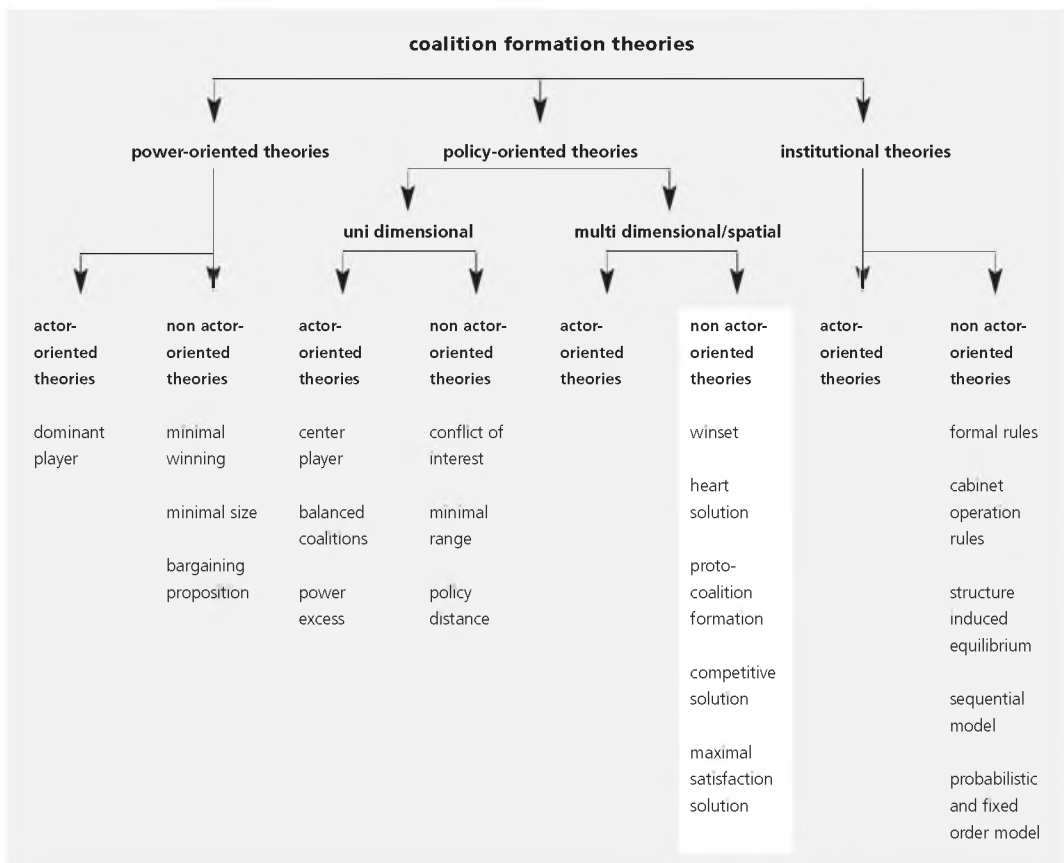
Finally, the hypotheses that were derived in this chapter will be tested in Chapter 6. The evaluation will be done using the same format as used for the classification of the theories. We shall test the theories for every class, which will lead to a conclusion about what that class of theories is that performs best. The hypotheses derived in this chapter and the hypotheses that will be derived in the next can be found in Appendix A3.

4. Spatial Coalition Formation Theories

4.1 Introduction

Spatial coalition formation theories are multi-dimensional policy-driven theories. These multi-dimensional theories share with the uni-dimensional policy driven theories the assumption that policy positions of parties are important ingredients in the formation process. However, instead of having a position on an uni-dimensional policy scale, players hold a position in the multi-dimensional policy or ideology space. Moreover, and more important, they use a metric for measuring distances. This is a distinctive feature with respect to the uni-dimensional theories treated in the previous chapter. Furthermore, multi-dimensional theories are attractive because the placement of parties in a multi-dimensional space is more detailed than the placement on one dimension. The spatial theories in this section are modelled as spatial simple games: $G = (N, W, R^M)$.

Figure 4.1
Classification
of coalition
formation
theories



The spatial coalitional theories examined here are the latest development in this type of research, and since the goal of this research is to compare spatial theories with the 'traditional' coalition formation theories, a thorough overview of these theories will be presented in this chapter. Also, in order to gain more insight in these theories, a computation example will be provided for every theory. In addition, we also refer to the requirements for formal theories – namely that the assumptions are internally consistent, independent, sufficient, and necessary - in the discussion of the spatial theories. In the last section of this chapter, spatial theories will be compared - theoretically - with the other classes of coalition formation theories. For a summary of the classification of the theories I refer to the Figure 4.1

The following theories - highlighted in Figure 4.1 - will be discussed:

- Political Heart Solution (Schofield, 1993a; 1993b; 1995)
- Protocoalition Formation (Grofman, 1982)
- Winset Theory (Laver & Shepsle, 1990; 1996)
- Competitive Solution (McKelvey, Ordeshook & Winer, 1978)
- Maximal Satisfaction Solution (De Vries, 1997).

These spatial theories have in common that they have a descriptive part in which the preferences of the players are determined and a predictive part that applies solution concepts and thus selects coalitions.

A problem with spatial theories is that they often lack a core solution. Owen (1995) states this eloquently in the following theorem:

"A necessary and sufficient condition for a spatial game to have a non-empty core is that all median hyperplanes pass through the same point. That point (the intersection of all median hyperplanes) is necessarily the ideal point of at least one voter. Moreover, this point is not only undominated, it actually dominates all other points" (Owen, 1995, p 411).

Owen further states that the absence of a core solution deprives us of one of the most appealing solution concepts. The response to this problem is introducing points which come as close as possible to being in the core. Examples of these solution concepts are the Copeland winner and the Yolk (Owen, 1995).

Another theoretical problem is that most spatial theories are not designed to predict coalitions, but to search for an undominated policy point in the space. This policy point does not directly refer to a particular coalition.

The last theoretical drawback is that some of the spatial theories that are concerned with coalition formation predict key players and not the whole coalition.

In this research, the focus is on spatial theories that do generate equilibria, and these equilibria are coalitions or at least key players in these coalitions.

Of the five theories, the Heart Solution and the Winset Theory are not designed to predict coalitions, but to predict key players. They have nevertheless been included in this research, because they introduce interesting behavioural assumptions. The Heart Solution is innovative, because it searches for undominated policy points based on studying median lines. These policy points can be associated with coalitions. The Winset Theory is fascinating, because it starts from the assumption that the distribution of ministerial portfolios is central to coalition bargaining.

These theories, in their pure form, are not qualified to predict coalitions. In other words, not all axioms necessary for predicting coalitions are present. In the first theory, a party or a group of parties form the heart are predicted, whereas in the second, the portfolio allocation on the (two) main dimensions is predicted. These theories provide solutions, which often do not refer to majority or winning coalitions, but to the 'guts' of a coalition¹. Since the behavioural assumptions of these theories are interesting, I have decided to add assumptions, so that winning coalitions can be predicted. These adjusted 'solution concepts' enable us to compare the prediction efficiency of these coalition formation theories with other coalition formation theories examined in this research.

The Protocoalition Formation (Grofman, 1982), the Competitive Solution (McKelvey et al., 1978) and the Maximal Satisfaction Solution take as point of their departure a distance matrix, in which distances between positions of parties and expected positions of coalitions are computed. Preferences are based on these distances and different solution concepts are applied. Protocoalition Formation uses a clustering strategy, the Competitive Solution selects viable coalition proposals, and the Maximal Satisfaction Solution predicts the coalition with the highest average aggregated satisfaction of the players. The Maximal Satisfaction Solution is a promising concept, since it introduces the idea of collective satisfaction. This is favourable, since if we search for individual maximal satisfaction this often leads to cycles of preferences on the collective level. This new solution concept is the only theory that, strictly speaking, abandons the assumption of individual rationality. It predicts the coalition with the highest average utility of the players, but the choice of a party for the coalition with the highest aggregate satisfaction, can be based on an individual rationality.

¹ Since most words referring to the centre of a coalition (core, yolk, centre, heart) have already been used, to refer to specific theories or solution concepts, I shall refer to the centre or essence of a coalition as the 'guts' of a coalition.

The five theories that will be discussed in this chapter, are merely a selection from the whole body of spatial coalition formation theories. I shall, without assuming to be complete, briefly present a number of theories or solution concepts that are not included in this research, but did contribute to developments in the field of spatial theory.

First of all, not included in this chapter on spatial coalition formation theories are a number of core-related solution concepts. The core in a spatial configuration, i.e. the point where all median lines or median hyperplanes intersect, is the set of undominated policies. Two extensions of the core concept are the Copeland Winner and the Yolk (Owen, 1995). The Copeland Winner selects, in absence of a core point, a policy point that is dominated by as few points as possible. The Yolk is also applied when no core point exists, and is the point(s) closest to all median hyperplanes. These solution concepts give an indication for the ‘best’ policy point of the coalition, but they do not predict which coalition should be formed. Therefore, they concepts are not included in this research. Other solution concepts, closely related to the core, the Nucleolus and the Kernel (Shubik, 1995; Owen, 1995), are , for the same reason, not included here.

Secondly, not discussed in this chapter is the Bargaining Set, which considers the payoff structures of the players in an n -person game. In the Bargaining Set, threats and counter-threats are considered, and stable payoff structures are predicted as the outcome of the game. To put it simply, without the formal definitions, a point is a bargaining point if any threat or objection can be met by a counter-threat or counter-objection (Shubik, 1995).

Another solution concept not included is the theory of ‘Uncovered Sets’ (Shepsle & Weingast, 1984; Cox, 1987). In uncovered sets, undominated policy points with respect to a cover relation are predicted; x is uncovered if there is no y that covers x . Policy point x covers y , if x is majority-preferred to y , and if everything that is majority-preferred to x is also majority-preferred to y .

In summary, providing a complete overview of spatial theories has not been my intention. In the case of spatial theories, the choice for theories in this research has been quite selective. Spatial coalitional theories, which I believe are promising, have been included: they should combine a clear assumption on party behaviour, with a non-empty coalitional prediction set. In the next section, the spatial theories included in this research will be extensively discussed one by one. For these, computation examples will be given. They are complex theories, and an illustration improves the understanding of the intuition of these theories. The Dutch party system and the positioning of the political parties in space will be considered in Chapter 5. A brief clarification, of the parties and coalitions, which might be helpful for reading the

computation examples, is given in Appendix A. In the final section of this chapter, I shall briefly evaluate spatial and non-spatial theories. The hypotheses that are derived in this chapter, and that will be used for the test of spatial theories, are also summarised in Appendix A.

4.2 Multi-dimensional Coalition Formation Theories

4.2.1 The Heart Solution

Schofield developed the political heart as a solution concept for spatial coalitional games (Schofield, 1993a; 1993b; 1995). The descriptive part of the Heart Solution is similar to other theories that will be discussed in this section. A party holds a position in a policy space, and preferences for coalitions are based on Euclidean distances. Schofield (1993a) refers to the convex hull of the preferred positions of the parties as the *compromise set* for a coalition. In two dimensions, we can present this as the area bounded by straight lines joining the bliss points (which is an ideal policy position of a party) of the parties and including all possible coalition members.

The main difference between this solution concept and the Competitive (Section 4.2.4) or the Maximal Satisfaction Solution (Section 4.2.5) is that in the Heart Solution, we search for undominated policy points. The intersection of the compromise sets for all winning coalitions is non-empty if there is a core solution². If there is a core, no other coalition can propose an alternative policy point that is preferred by all members of a winning coalition. Thus, a policy point is a core point if it lies in the compromise set of every winning coalition (Schofield, 1993a; 1993b). Next, a core party is a party whose ideal point is a core point. In two dimensions the core party must be the largest party (Schofield, 1993a). As we saw in the previous section, the core in multi-dimensional space is often empty. It exists only under severe symmetry conditions. Hence, another solution concept must be applied. The solution theory designed by Schofield to solve this problem is known as the Heart Solution (Schofield, 1993a; 1993b; 1995).

The first step in order to determine the Heart Solution is to examine whether a core position exists. Checking whether the median lines intersect does this. In two

² Note that in this theory the core refers to the core point or core position in space, and not to the core as in section 3.6.4 where it refers to the set of undominated coalitions that are based on the preference profiles of the players.

dimensions, a *median line* is a line through two party positions, for which it is true that either on or to one side of the line, these parties comprise a majority. This must be true for both sides of the line. If more than two dimensions are included, the median lines are median hyperplanes.

If not all median lines intersect, the core is empty, and the area bounded by the median lines is called the *cycle set* (Schofield, 1993a). For a point x in the cycle set there always exists another point in this set that dominates x . Cycles of preferences thus exist. For a point outside the cycle set z , there is always a point inside the cycle set that dominates z . So, if the core is empty, there will be voting cycles, but usually these will not involve coalition possibilities that range all over the policy space (Schofield, 1995). Schofield describes the relation between the Pareto set, the cycle set and the core as follows:

"The Pareto set is just the compromise set of all parties, and with our assumption of Euclidean preference, this set is simply the convex set bounded by the outer party positions. Clearly, the Cycle set is a subset of the Pareto set. Given the party strengths and the party positions, the heart is the union of the core and the cycle set" (Schofield, 1993a).

Schofield defines the political heart as the union of the core and the cycle set. We first define the following: the core is denoted as CH (choice) and CY is the cycle set of D . D is defined as the family of winning (or decisive) coalitions defined by the manifesto profile z . This D corresponds to our W , namely the set of winning coalitions, but is a problematic concept since the Heart also predicts minority coalitions. These minority coalitions are not winning according to the rules for weighted majority games. Note that Schofield refers to the Heart as either Heart or political Heart and that these concepts are identical. For reasons of clarity, I shall, in the remainder of this study, only use the term Heart. The relation between the core and the cycle set can now be defined:

$$H(D(z)) = CH(D(z)) \cup CY(D(z)) \quad (\text{Schofield, 1993b, p 145}).$$

The Heart is never empty since if the cycle set is empty the core is non-empty and vice versa. Therefore the following hypothesis, based on Schofield (1993a, 1993b, 1995) can be defined:

Hypothesis 4.1 Heart

In a spatial coalitional game only coalitions in the Heart will be formed.

The prediction set of the Heart is thus a set of coalitions from either the cycle set or the core. If a core policy point exists, and if a party represents that point, it is still not decided which coalition to predict. In his 1993(a) research, Schofield suggests that: *"when the party positions are such that the core does indeed exist, then it is not ratio-*

nal for any winning coalition to exclude the core party” (p 8). Moreover, the ability of a core party to control policy implies a tendency for core parties to form minority governments. Coalitions consisting of the core party and one or two other parties will be predicted.

In the absence of a core party, a wide variety of coalitions can be predicted. An example, from the same study as referred to above (i.e. Schofield, 1993a), will be presented in order to demonstrate the - lack of - discriminatory power of the Heart Solution. The example consists of the coalition formation process in 1952 in the Netherlands. The party configuration that will be used, is taken from this article (Schofield, 1993a) and the party positions are derived from a different data set, than the data set that I shall use in the next Chapter. Therefore Schofield’s configuration of 1952 is not identical to the configuration that will be used in the remainder of this research.

PARTY NAME	SYMBOL	SEATS
LABOUR PARTY	PvdA	30
ANTI-REVOLUTIONARY PARTY	ARP	12
CATHOLICS PEOPLES PARTY	KVP	30
CHRISTIAN HISTORICAL UNION	CHU	9
LIBERALS	VVD	9
TOTAL		100

Table 4.1
The election of June 1952 in the Netherlands (Schofield, 1993a.)

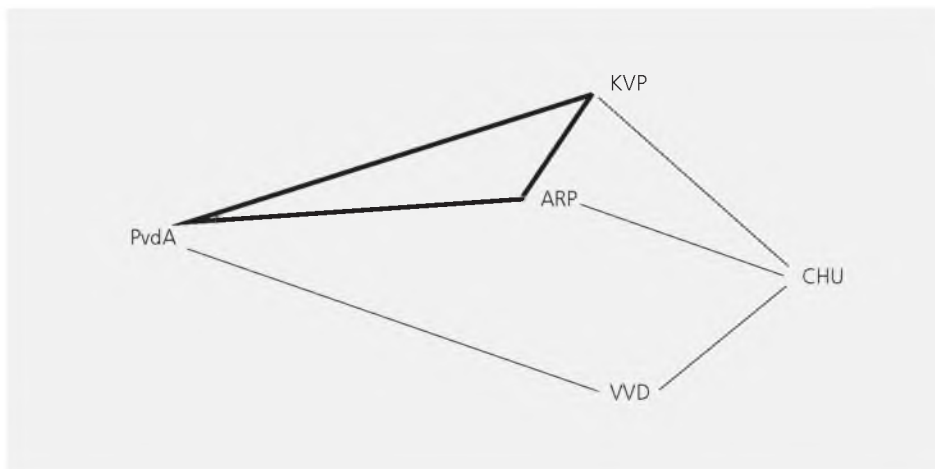


Figure 4.2
An empty core and a non-empty cycle set (bounded set) for a hypothetical configuration of party positions in two dimensional policy space in the Netherlands (Schofield, 1993a.)

Since the median lines (bold lines) do not intersect, we can conclude that there is no core party. So there must be a cycle set. In order to present Schofield's approach accurately, we cite from his research: "To define this set (i.e. the Heart) for the configuration [of Figure 4.2], consider a line through {KVP, ARP} positions. On this line and to the right lies a majority coalition {KVP, ARP, CHU}, while on the line and to the left lies another majority {KVP, ARP, PvdA}. Such a line is called a median line. ... A quick inspection shows that {PvdA, ARP} and {PvdA, KVP} are also both medians (in the second case because the coalition of the PvdA and the KVP is itself a majority coalition" (Schofield, 1993 a. p 10)

Schofield further suggests that: "*one interference from the model is that parties whose positions are in the Heart will be more powerful than those whose positions are outside it. The model therefore gives a quite restrictive coalition prediction:*

- (a) *either the Heart surplus coalition {PvdA, KVP, ARP}; or*
- (b) *a minimal winning coalition {PvdA, KVP}; or*
- (c) *one of the two minority coalitions {PvdA, ARP} or {KVP, ARP};*
- (d) *or one of these minority coalitions supported (informally) by one of the weak players, VVD or CHU* (Schofield, 1993a, p 11).

Schofield presents the Heart as a restrictive solution for coalition formation. The Heart is said to reduce the number of possibilities substantially. Schofield states that in the above example there are 16 winning coalitions, "*but with party positions as in [Figure 4.2] there are effectively only three coalitions associated with the Heart*"³ (Schofield, 1993a, p 11).

In my opinion, this statement and the prediction set obtained by 'steps' (a), (b), (c) and (d) are contradictory. If we reconstruct the above prediction set, we start with selecting the Heart surplus coalition. The Heart surplus coalition is: {PvdA, KVP, ARP}. The next step is to select minimal winning coalitions from inside the Heart; only the coalition {KVP, PvdA} meets this requirement. The next step (c) selects minority cabinets from the Heart. These are {PvdA, ARP} and {KVP, ARP}. In the last step, these minority governments receive support. This leads to {PvdA, ARP, VVD}, {PvdA, ARP, CHU} and {KVP, ARP, VVD}, {KVP, ARP, CHU}. The four steps result in the following prediction set: {KVP, ARP, PvdA}, {PvdA, KVP}, {PvdA, ARP}, {KVP, ARP},

³ Actually, this is not correct since there are only 14 winning combinations of parties. Recode: [51; 30, 12, 30, 9, 9] as respectively [a,b,c,d,e]. There is 1 winning two-player combination: {AC}. From the 10 possible three-party combinations, 7 are winning: {ABC}, {ABD}, {ABE}, {ACD}, {ACE}, {BCE}, {CDE}. Further, all 5 four-party combinations and the grand coalition are winning. This leads to 1+7+5+1=14 possible winning combinations.

{PvdA, ARP, CHU}, {PvdA, ARP, VVD}, {KVP, ARP, CHU}, {KVP, ARP, VVD}. There are indeed effectively three median lines connecting two parties, but this does not, as Schofield states, bring down the prediction set to three coalitions, but to eight possible coalitions.

Refinement of the Heart Solution

The large prediction sets necessitated a refinement of the theory, which was proposed by Schofield in *Party competition in a spatial model of coalition formation* (1993b) and in *Multiparty electoral politics* (1997). The refinement starts with assigning probabilities to the various coalitions inside the Heart. The coalition outcomes in the Heart occur with a probability α . This probability becomes smaller when the distance between the parties in the coalition increases. Schofield states that “*parties assume that the probabilities associated with different coalitions are inversely proportional to the [squared] distance between their declarations*” (Schofield, 1997).

Schofield (1997)⁴ has defined the probability α as follows: $\alpha = \frac{1}{(\text{distance})^2}$

In this refined version the hypothesis is that the coalition with the highest probability will be formed.

Additional Assumptions

Hence, the main idea of Schofield’s Heart is the following: “*the proposed coalition theory associated with the Heart is that the governments that form will incorporate the parties on the boundary of the Heart*” (Schofield, 1997, p 288). Unfortunately testing the Heart Solution based on the information provided by Schofield is difficult. Schofield suggests the following four steps (a) *either the Heart surplus coalition; or (b) a minimal winning coalition [from one of the median lines]; or (c) one of the two minority coalitions [which are median lines]; or (d) one of these minority coalitions supported (informally) by one of the weak players*” (Schofield, 1993a, p 11). Although these steps seem clear enough, there is still a lot of uncertainty if one tries to obtain a prediction set.

In order to resolve the ambiguities, I propose a set of additional assumptions. Most assumptions are implicit in Schofield’s work, but for reasons of clarity we need to make them more explicit. These assumptions are necessary if we want to compute the Heart Solution. The assumptions are used for the standard version of the Heart

⁴ This probability definition was designed by Schofield and Parks in an unpublished paper (1993) and was also suggested by Schofield in correspondence with the author (July 1997).

- see Hypothesis 4.1 - since the extra assumptions define more accurately the steps that we need to take to determine the coalitions inside the Heart. These assumptions are also required for the new versions of the Heart, the Heart Majority and the Heart Distance, that shall be introduced in the remainder of this section.

The first set of assumptions refers to the support of minority cabinets. These minority cabinets are located on the median lines. They are said - in step d - to be supported (in two dimensions) by a ‘third’ party, but it is not decided which parties will support the minority coalitions. I therefore propose the following assumptions:

- If there is a median line which itself represents a majority, the parties on this median line will not support a minority cabinet.
- From the remaining parties - i.e. the parties that do not form a winning median line cabinet themselves - the party closest to the minority cabinet will join the coalition. Parties join this coalition until the coalition becomes winning.

This latter assumption, although not proposed by Schofield, is added not only to distinguish between all possible coalitions that can be formed from minority cabinets, but it will also be used in the “majority version of the Heart”, which will be discussed later in this section. In the case of minority cabinets, it is reasonable to assume in a policy-driven theory that parties in the policy space that are as close as possible to the minority coalition will join the ‘guts-coalition’.

The idea behind the first assumption is that parties which themselves form a winning coalition, will prefer their ‘own’ coalition and will thus not want to support another. Compare, for instance, the 1952 example described above. The KVP will not support minority {PvdA, ARP}, since it prefers the minimal winning coalition {PvdA, KVP}.

In discussing the 1952 example we also said that based on step d, the minority cabinet {KVP, ARP} could be supported by the CHU, but also by the VVD. Even though Schofield is not definite about this situation, we shall interpret the refined versions of the Heart, based on the above assumptions, to allow support from the party that is closest to the minority median line under consideration. In our example, this would lead to removing the minority cabinets supported by the VVD from the prediction set. The VVD is further away from the minority cabinets than the CHU.

The following additional assumptions concern the ‘boundedness’ of the cycle set. In quite a few empirical examples, the median lines do not form a bounded set or area. In these cases there is no closed cycle set, but it is yet possible to determine median lines. For these configurations, I have decided to proceed with the median lines, and predict all coalitions that can occur from the median lines.

- If the median lines do not form a closed cycle set, we shall proceed with the median lines and follow steps a, b, c, and d.
- If we find more median lines in the party configuration than the lines that together form a bounded cycle set (see in the next example), we continue predicting with the median lines that together form the cycle set and shall exclude the ‘unnecessary’ median line.

The next assumption deals with the presence of a core-party.

- If a core party exists, only coalitions from the median lines that naturally include the core party will be predicted. Again, next to the ‘heart surplus coalition’, no coalitions larger than minimal winning will be predicted.

Note that a ‘supported’ minority cabinet is not necessarily a minimal winning coalition. It is nonetheless minimal in the ‘closeness’ sense. Consider a four-party cabinet, where the first two parties form the minority cabinet, the third is the closest party and the fourth is the next close party that turns the coalition into a winning coalition. In this case, it is possible that a combination of the minority cabinet and the ‘fourth’ party is winning. This cabinet would not include the party closest to the minority cabinet and would thus not be winning in the ‘closeness’ sense. This is similar to the Axelrod’s notion of minimal connected winning coalitions (see Chapter 3).

As stated in the introduction to this chapter, I wish to predict majority coalitions. The reason is mainly practical. There are neither constitutional constraints that prohibit the occurrence of minority coalitions, nor theoretical constraints that prohibit minority cabinets, but the political culture in the Netherlands is such that as a rule only majority, i.e. winning, coalitions are formed. Since most other theories in this chapter start from this winning assumption, I shall now introduce a majority version of the Heart. This improves our ability to compare spatial theories with one another. Naturally, the prediction efficiency of a theory that predicts minority cabinets in a country in which only winning coalitions are formed is smaller than the prediction efficiency of theories that do not predict minority or losing coalitions.

I shall now present the hypothesis based on the first refined version of the Heart. In this version, which will be denoted as Heart Majority, the additional assumptions together with the demand for majority coalitions lead to the following hypothesis:

Hypothesis 4.2 Heart Majority

In spatial coalitional games only winning coalitions from the Heart will be formed.

The last assumption that will be introduced is needed for a second refined version of the Heart. Schofield proposes this restriction in order to reduce the number of coalition possibilities. For a discussion about this revision of the Heart, I refer to Schofield (1993b; 1997). The revision starts by assigning probabilities to the various coalitions inside the Heart. The coalition outcomes in the Heart occur with probability α . This probability becomes smaller if the distance between the parties in the coalition increases. Schofield states that “*parties assume that the probabilities associated with different coalitions are inversely proportional to the distance between their declarations*” (Schofield, 1997). The formula Schofield uses, states that the utility of a coalition is inversely proportional to the squared distances within a coalition, namely inversely proportional to $\|z_i - z_j\|^2$. This is a common assumption in game theory; e.g. Enelow and Hinich (1984) and Riker and Ordeshook (1973) also assume that utility of a player is inversely proportional to the squared distance between that player’s policy position and the expected position of the coalition.

Schofield does not give much insight into how the distance within a coalition is computed. In the above formula, z_i is the policy position of party i , and the distance between the two parties, i and j , depends on their policy positions. A coalition of two parties is said to *split the difference between its declarations in formulating policy* (Schofield, 1997, p 281). Since Schofield splits the difference of the policy declarations when two parties are considered, I expect that he would do the same with a coalition consisting of more parties. The expected policy position of a coalition would then simply be the weighted average policy positions of the parties inside the coalition. I assume that the distance within a coalition is computed by adding the distances of the parties to the expected policy point of that coalition. Even though Schofield (1993a, 1993b, 1997) does not actually state that the expected policy point of the coalition should be the *weighted* average policy point of the parties, I assume this is the case since it is common to determine the policy position of a coalition this way.

- The distance of a coalition is computed by adding the individual distances of the parties to the expected ideal point of the coalition. The expected policy position of a coalition is the ‘weighted’ ideal point of the parties included in that coalition. Furthermore, Euclidean distance is used.

Schofield (1997) has defined the probability α as follows: $\alpha = \frac{1}{(\text{distance})^2}$

With this definition, the probability of the various coalitions occurring can be computed. Unfortunately, we run into problems when we try to calculate these probabilities. First, if some of the distances are below and others above one, squaring the distances leads to smaller distances if they ranged from 0 and 1, whereas greater

distances become even larger when squared. Moreover whenever the distance of a coalition is smaller than 1, in the above formula we end up with probabilities greater than one, which is an impossibility. In short, taking the inverse of the squared distances can lead to problems.

These problems can be seen as simply a ‘unit of analysis’ problem, and can therefore be solved easily. First, we set the smallest distance at 1, and then re-scale the other distances. Subsequently the squared distances for each coalition can be calculated. This leads to numbers (distances) that are inversely related to the probability of forming a coalition. If we re-scale these numbers so that they add up to 1, the probability can be found by subtracting each number from one. We have done this in the following example of coalition formation in the Netherlands in 1946:

Table 4.2
Probabilities of the
heart coalitions

DISTANCE	VVD	PVDA	ARP	CHU	KVP	TOTAL	RESCALE DISTANCE	SQUARED	RESCALE	PROBABILITY
SURPLUS	1.08	0.68	0.80	1.01	0.07	3.64	4.98	24.83	0.62	0.383
PvdA/KVP		0.39			0.36	0.75	1.02	1.05	0.03	0.974
KVP/ARP			0.52		0.21	0.73	1.00	1.00	0.02	0.975
KVP/CHU				0.79	0.20	0.99	1.35	1.82	0.05	0.955
KVP/VVD	0.88				0.16	1.04	1.43	2.04	0.05	0.949
KVP/ARP/VVD	0.86		0.51		0.26	1.63	2.24	5.00	0.12	0.876
KVP/ARP/CHU			0.50	0.77	0.28	1.55	2.12	4.48	0.11	0.889
SUM								40.22	1.00	

It is now possible to calculate the probability of a coalition from the heart with the above formula. However, since we are only interested in the coalition with the highest probability - and this coalition is always the coalition with the smallest total distance - the above steps seem unnecessary. The outcome - that is predicting the coalition with the highest probability - is invariant with respect to distance. Hence, the coalition with the highest probability will always be the coalition with the smallest aggregated distance. Based on Ockham’s razor principle, i.e. the famous principle that states that entities or essences must not be multiplied beyond necessity (Popper, 1974, p 350), I therefore suggest that we simply predict the coalition from the heart with the lowest aggregated distance.

The third hypothesis - called Heart Distance - will therefore be:

Hypothesis 4.3 Heart Distance

In spatial coalitional games the heart coalition with the lowest aggregated distance will be formed.

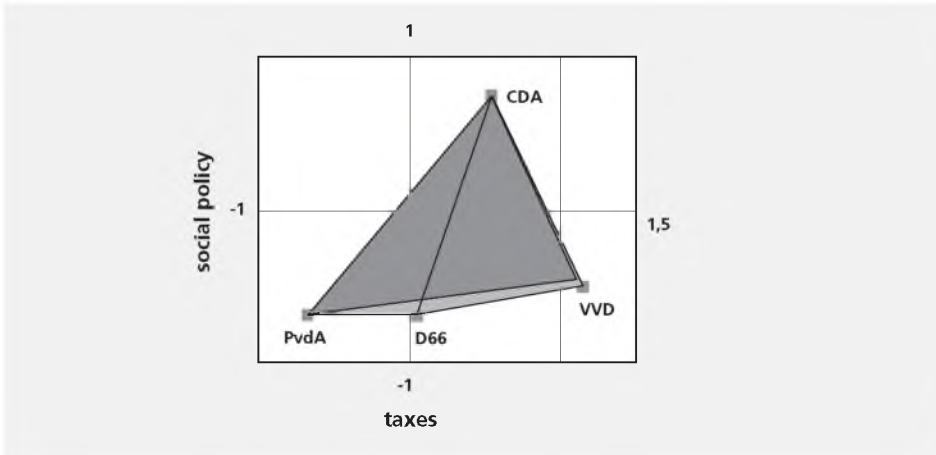
The Heart Solution, together with the additional assumptions, can be illustrated with a spatial representation of the parties and the Heart Solution of 1989 in the Netherlands (see Figure 4.3). The weights of the four largest parties and their positions on the two main policy dimensions (an economic dimension based on the scores on the tax issue and a social dimension based on the scores on social policy) are used for the computation example. The total number of seats in parliament is 150; therefore 76 seats are necessary to create a majority. The following parties are included in the example: PvdA, D66, CDA, and VVD. The party strengths lead to the following weighted majority game: [76; 49, 12, 54, 22]. Parties are portrayed in the following order: PvdA, D66, CDA, and VVD.

The lines PvdA-CDA, PvdA-VVD, and CDA-VVD are median lines. Each has the property that either on or to one side of the line, parties can be found that between them comprise legislative majorities. For instance, the line PvdA-CDA is a median line with 103 seats, and on the line and below we have PvdA-CDA-D66 representing 115 seats. The Cycle set (defined with the additional assumptions) is the area bounded by {PvdA, VVD, CDA}. D66-CDA also meets the requirements for being a median line, with on the line and to the left 115 seats, and on the line and to the right 88. However, this median line will not be considered, since it is not included in the cycle set. There is no core solution since not all median lines intersect.

The heart, which is the area bounded by median lines, is PvdA-CDA-VVD. Hence, PvdA-CDA-VVD is the cycle set, and coalitions from this set will be formed. The coalitions that can be formed according to this theory are:

- (a) the heart surplus coalition {PvdA, CDA, VVD};
- (b) the minimal winning coalitions {PvdA, CDA} or {CDA, VVD};
- (c) one minority coalition {PvdA, VVD};
- (d) this minority coalition supported by another party {PvdA, VVD, D66}.

Figure 4.3
Heart Solution for
the Netherlands
in 1989



The second hypothesis predicts only winning coalitions from the heart. The prediction set of the Heart Majority is {PvdA, CDA, VVD}, {PvdA, CDA}, {CDA, VVD}, {PvdA, D66, VVD}.

Again we predicted a large set of coalitions. Since a theory that predicts exactly one coalition is preferable, we will now proceed with the refinement and thus apply the third hypothesis⁵. The coalition inside the heart with the lowest aggregated distance will then be predicted. We can conclude from Table 4.2, that coalition {CDA, VVD} is the Heart Distance solution.

Table 4.3
Distances and
Squared Distances
of Heart Coalitions

DISTANCE	D66	VVD	CDA	PvdA	AGGREGATED DISTANCE
PvdA/CDA/VVD		0.957	0.823	1.000	2.779
PvdA/CDA			0.846	0.932	1.778
CDA/VVD		0.901	0.367		1.268
PvdA/VVD		1.138		0.511	1.649
PvdA/VVD/D66	0.729	1.746		0.110	2.585

⁵ Note that it is possible for more than one coalition to have the smallest aggregated distance, in which case the refined Heart Solution can and will predict more than one coalition.

Another proposition to refine the solution set of the heart is to regard the possible coalitions in the prediction set as protocoalitions. Schofield (1995) suggested this, but has not provided information on what would then be the procedure. I suggest linking the Heart Solution with Grofman's Protocoalition Formation Theory in such a way that only Protocoalition Formation from parties inside the heart will be considered. This will be discussed at more length in section 4.2.2.

Remarks

The idea of searching for undominated policy points, in order to find the core party or the cycle set is interesting. However, a lot of additional assumptions were necessary to turn the Heart Solution into a theory that predicts coalitions. The model - as designed by Schofield - does not really restrict the number of possible coalitions. The winning coalitional version with the 'probability' refinement seems promising in this respect.

4.2.2 Protocoalition Formation

The model of Protocoalition Formation developed by Grofman (1982) is a generalisation of Axelrod's (remind section 3.3.1) connectedness to M -dimensional space. The model is based on ideological closeness of parties. The behavioural assumption is that a party prefers a coalition which is close to its ideal point, to a coalition that is more distance from its ideal point. The utility function of a party is the inverse of the square of the Euclidean distance. In other words, the larger the Euclidean distance the lower the utility.

The predictive part of the protocoalition model is dynamic. In the first stage a party seeks the party that is its closest 'neighbour' in multi-dimensional space. Preferences are determined by ideological closeness. This closeness relation must be reciprocal in order for two parties to form a protocoalition. Grofman describes this stage as follows:

"If and only if actor i is the actor closest to actor j and actor j is also the actor closest to actor i , where closeness is defined in terms of weighted (subjective) distance, do the two join together in a protocoalition" (Grofman, 1982).

Grofman assumes that in a coalition between a party with large weight and a party with small weight, the position of the protocoalition in M -space will reflect the relative weights of the players (ibid.). Consequently, the protocoalition will be closer to the

ideal point of the stronger party, i.e. the party with larger weight than to that of the weaker party. This is an important assumption, because we usually assume distance to be symmetrical. In Grofman's definition, party A can be more distant from party B than vice versa, because they have different weights. This seems to be plausible because if one party is far stronger than the other it seems likely that the former will have a higher impact on the policy position of a coalition between these two parties. This type of distance will be referred to as subjective distance. Note that in other spatial theories, distance between two parties is not subjective, even though the weights of the parties influence the policy positions of the coalitions.

If a protocoalition represents more than half of the seats, and thus is winning, this coalition will be predicted. If not, the second stage starts. The protocoalition is assumed to act as a single player and the same process starts again. The Protocoalition Formation ends when a winning coalition is generated. This formation process, which is divided in different phases, is referred to as a dynamic coalition formation process.

The following standard definition is used to determine the Euclidean distance denoted d , $d(x_a, x_b)$ between two points:

$$\| (x_a - x_b) \| = \sqrt{((x_{a1} - x_{b1})^2 + (x_{a2} - x_{b2})^2)} .$$

The Subjective Euclidean Distance from party A to party B is denoted by

$$SED(A, B) = d(A, B) \times \frac{W_b}{W_a + W_b} \quad (\text{Straffin \& Grofman, 1984}).$$

We illustrate the Protocoalition Formation model for the Netherlands in 1994. The weights of the four largest parties and their positions on the two main ideological dimensions are used for the computation example. In this section, we shall also use two ideological dimensions to determine the party positions. The first dimension is based on economic government activity, and the second is an immaterial dimension or also referred to a social values dimension in which issues such as freedom play an important role. The first letter of their Dutch name will denote the parties. The four parties are thus denoted as follows: the Social Democrats as P the left-wing liberals as D the Christian Democrats as C and the Liberal Party as V. In our illustration, we will denote coalitions as the set of players that are members of that coalition, i.e. a coalition of players P and D is represented as {PD}. In the first column of Table 4.4, the weights of the parties are given; in the second column the position of the parties on the first dimension, and in the last column the position of the parties on the immaterial dimension.

Table 4.4
Party weights and policy positions of the four main parties in the Netherlands in 1994

	WEIGHTS	ECONOMIC	SOCIAL
pvda (P)	37	1.02	0.53
d66 (D)	24	0.31	0.52
cda(C)	34	0.05	-1.50
vvd(V)	31	-1.37	0.46

Table 4.5
Subjective Euclidean distances in the first stage

	pvda	d66	cda	vvd
pvda (P)	0.00	0.28	1.08	1.09
d66 (D)	0.43	0.00	1.19	0.94
cda(C)	1.17	0.84	0.00	1.15
vvd(V)	1.30	0.73	1.26	0.00

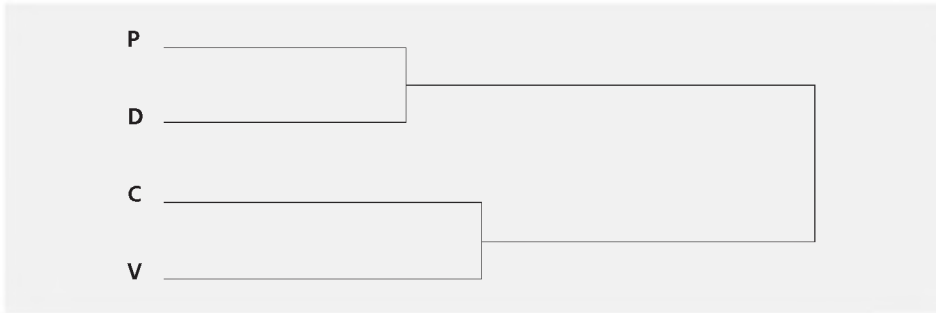
In the first stage in 1994, parties P and D were closest to each other, and would form a protocoalition. Since they do not form a majority, we must continue with the second stage.

Table 4.6
Subjective Euclidean distances in the second stage

	PD	C	V
PD	0.00	0.76	0.71
C	1.37	0.00	1.15
V	1.40	1.26	0.00

In the second stage, parties C and V are closer to each other than either one is to the protocoalition. Since no two-party coalition had a majority between them in 1994, Grofman would have predicted the grand coalition, {PDCV}. This protocoalition process of 1994 is represented in the following figure. The actual coalition that was formed after the 1994 elections, is a coalition of parties P, D, and V. In a dynamic spatial coalition process, parties form protocoalitions if their offers for partnership are reciprocal. The hypothesis can therefore be defined as follows:

Figure 4.4
 Protocoalition
 formation in
 the Netherlands
 in 1994



Hypothesis 4.4

The first protocoalition that represents a legislative majority of votes will be formed.

In 1996, Grofman suggested the following refinements of his Protocoalition Formation theory. He redefined connectedness at different dimensions. In the original theory, parties are connected and form protocoalitions if they are each other's closest 'neighbour'. In the 1996 extension, a distinction is made between being closest on both dimensions at once, and lying next to each other on each separate dimension. In a multi-dimensional model it is possible that players are connected in the m -space, (remind that the dimensionality of the space in spatial voting games is referred to with an m see R^M) but are at the same time not connected on every single dimension. Formally, the model could be extended as follows:

Definition

A (proto)coalition shall be said to be fully connected in m -space when it is j -connected for all integers $0 < j < m$ (Grofman, 1996).

The idea is that, if actors are not fully connected, there exists a dimension that can potentially split the coalition. Note that the additional requirement of full connectedness is similar to the notion of a dimension by dimension median, as applied by Laver and Shepsle (see Section 4.2.3). With this new definition, it is possible to extend the theory and predict only fully connected coalitions. However, we shall not test this hypothesis. Grofman's empirical results showed that most post-war coalitions in Norway, Denmark and Germany, were connected in m -space, where m was set at 2 most of the times. However, these coalitions were often not connected on each separate dimension, so predicting coalitions based on the notion of connectedness on separate dimensions would not improve our results.

In Grofman et al. (1996) institutional facts are added to the Protocoalition Formation Model. Grofman et al. stress that the “*diversity of actual coalition formation processes in different countries*” should be recognised (Grofman et al., 1996). In this sequential model, other facts than ‘connectedness’ are included. Now, the party with the greatest electoral strength can for instance start the formation process, or a particular party can be excluded from the formation. In practice, the largest party offers a protocoalition to the party that is closest to it. This party joins if the centre of gravity of the new protocoalition is closer to it than the centre of the complementary protocoalition. This is an interesting extension, but it will not be included and tested here, because it does not comply with the rules of Dutch coalition formation practice (for these rules I refer to the next chapter).

In both articles, Grofman (1996) and Grofman et al. (1996), state that different models of coalition formation work best in different situations. In some countries, like Italy or Israel, cabinet formation often occurs without new elections, whereas in other countries elections always precede coalition formation. Naturally, in the first case, a model that predicts a unique coalition cannot account for the shifts in coalitions without changes in legislative representation.

As suggested in Section 4.2.1, the combination of the Heart Solution and the Protocoalition Formation theory might be a useful coalition formation theory. We shall illustrate this theory with the example used in the previous section. The heart, which is the bounded set of median lines, consists of parties P, C and V. The subjective Euclidean distances between the parties inside the heart will be computed, and the process of Protocoalition Formation will then take its course.

Table 4.7
Party weights and policy positions of the parties inside the heart in the Netherlands in 1989 and their Subjective Euclidean Distances (SED).

1989	WEIGHT	TAXES	SOCIAL POLICY
PvdA (P)	49	-0.68	-0.68
CDA (C)	54	0.56	0.74
VVD (V)	22	1.17	-0.4
SED	PvdA	CDA	VVD
PvdA	0	0.99	0.58
CDA	0.90	0	0.37
VVD	1.29	0.92	0

The parties C, the Christian Democrats and V, the Liberal party are closest to each other and therefore join together in a proto-coalition. Since this proto-coalition is winning, the process ends and the coalition {CV} is predicted according to the combination of the Heart and the Proto-coalition Theory. The Heart Solution with the highest probability is the coalition {PC}, which was the coalition that actually formed in 1989. Note that there is another theoretical difference between the 'highest probability Heart Solution' and the combination of the Heart and Proto-coalition Formation. In the latter, weighted distances, i.e. subjective Euclidean distances, are used to compute the distances between these parties, instead of plain Euclidean distances.

In a spatial coalition formation process, parties form proto-coalitions from parties inside the heart if their offers for partnership are reciprocal. This continues until a winning coalition is formed. The combination of the heart and Proto-coalition Formation leads to the following hypothesis.

Hypothesis 4.5

The first proto-coalition from parties inside the heart that represents a legislative majority of votes will be formed.

Remarks

Grofman (1982) discusses some interesting features of his dynamic proto-coalition model. The model provides unique predictions and incorporates information about both weights and policy positions of parties. In general, the model has a comprehensible behavioural assumption, clear stages in order to predict a coalition, and is relatively easy to test empirically (Grofman, 1982). Special about this theory is that it is dynamic, which seems to follow our intuition: coalition formation in general takes time and viewing this process as dynamic makes sense. Grofman also takes account of the need for reciprocity and because of that the need for asymmetry.

4.2.3 Winset Theory

The Winset spatial coalition formation theory distinguishes itself from the other theories in this chapter by focusing on bargaining on ministerial portfolios and not on coalition membership in general. The role of the status quo government is also important in the Winset theory. In this respect it resembles the structure induced-equilibrium notion as discussed in Section 3.5.

Laver and Shepsle's main hypothesis is *"that the credibility of proposals for alternatives for the incumbent government is central to coalition bargaining ... the notion of credibility depends crucially on the proposed allocation of cabinet portfolios in the new government"* (1990). Their theory was first published in 1990, and was further developed in *Making and Breaking Governments* (1996). Here, the main focus will be on this later work, in which the theory has improved as compared to the earlier version.

In the descriptive part, the main behavioural assumption for determining preferences for coalitions is that actors try to move government policy outputs as close as possible to their own most preferred policies. This otherwise common assumption is translated into the issue of division of labour within a cabinet. Laver and Shepsle assume that a party controls a policy area if it holds the ministerial portfolio (1996). In the predictive part of the theory, Laver and Shepsle (1996) examine proposals for coalitions in terms of particular allocations of cabinet portfolios between parties, and predict an equilibrium cabinet. *"An equilibrium cabinet, once it is formed, stays formed because no political actor with the ability to act in such a way as to bring down the cabinet and replace it with some alternative has the incentive to do so"* (Laver & Shepsle, 1996, p 61). The prediction set in this theory, given two policy dimensions, consists of one or two parties that hold the portfolios under consideration, and are therefore likely to become member(s) of the new government.

The central ideas of the Winset Theory will now be introduced. The political arena involves political parties, which are characterised by their weights and policy positions. In this theory, a policy position is the policy intention of a party on a key dimension. Furthermore, each salient policy dimension falls under the jurisdiction of a department, for which a cabinet minister is responsible. Finally, in the formation process, proposals for government consist of proposals for cabinet portfolios with jurisdiction over key policy dimensions.

A portfolio proposal is denoted as θ . In a two-dimensional 'portfolio' space, which represents two salient policy dimensions, a player A's ideal point is the point where she controls both portfolios, θ_{AA} . A proposal θ_{BA} stands for a two-dimensional portfolio space, in which player B controls the first portfolio and player A the second. A proposal for government consists of a proposed allocation of parties having jurisdiction over the salient policy dimensions. Preferences are based on distances from the ideal point of a party in the policy area considered. The points that player A prefers to portfolio θ_{BA} are the points within its indifference curve; these are the points inside the circle centered at player A's ideal position, θ_{AA} and passing through θ_{BA} (Laver & Shepsle, 1996).

The set of proposals that can beat this proposal - θ_{BA} - is the winset of this point. Note that a portfolio proposal is not exactly the same as a proposal for a coalition since a portfolio allocation, for instance θ_{AA} can be reached with a coalition containing parties A and B.

For a policy x , the set of policies preferred to x by a majority is known as the policy winset of x , denoted $W^*(x)$. For a coalition S , the set of portfolios preferred by a majority to x is the portfolio winset of S , $W(S)$. If we denote the set of possible portfolio allocations by θ_L , the set of majority coalitions by W , and the points y that are preferred to x by party i : $\{y \mid y R_i x\}$, then the portfolio winset of x is defined as:

$$W(x) = \cup_{S \in W} [\cap_{i \in S} y R_i x] \text{ for all } x \in \theta_L$$

Consider a situation - see Figure 4.5 - with three parties {A, B, C}, two key policy dimensions, and therefore nine possible portfolio proposals, $\{\theta_{AA}, \theta_{AB}, \theta_{BB}, \theta_{BA}, \theta_{AC}, \theta_{CA}, \theta_{CB}, \theta_{BC}, \theta_{CC}\}$. The proposal θ_{BA} is the status quo.

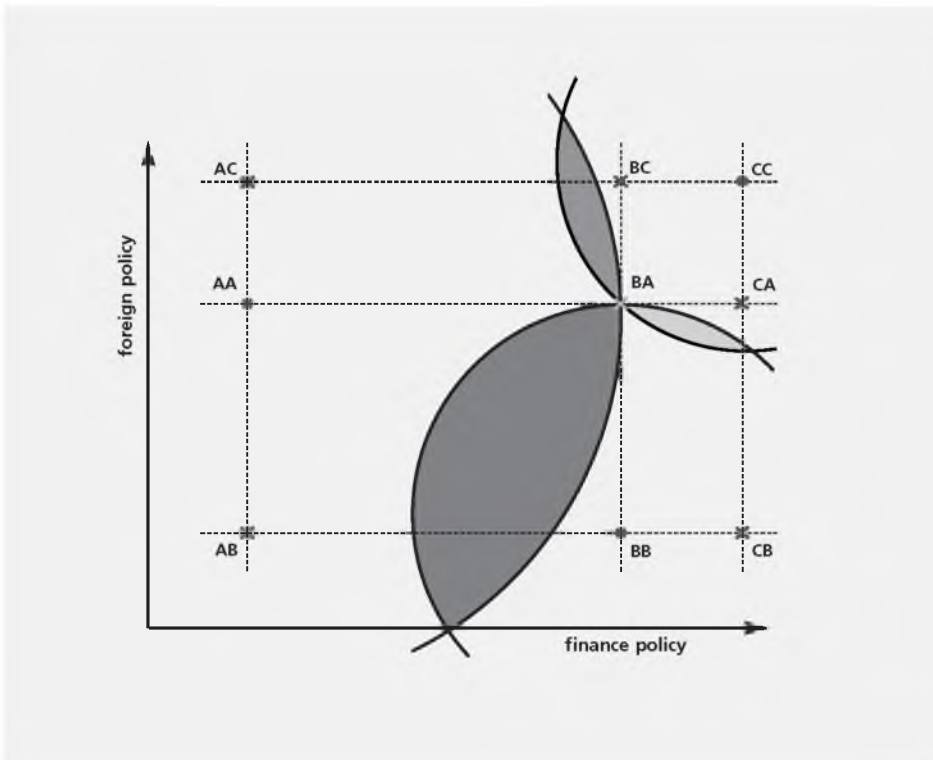


Figure 4.5
Winset of the
Status Quo θ_{BA}
from: Laver &
Shepsle, (1996)

It is now possible to determine the policy winset of portfolio θ_{BA} ; $W^*(\theta_{BA})$. The policy winset of the status quo θ_{BA} is the intersection of the indifference curves from the three ideal points, $\{\theta_{AA}, \theta_{BB}, \theta_{CC}\}$ through θ_{BA} . Every policy position inside these intersections is preferred by a legislative majority to the policy of θ_{BA} . As we can see in Figure 4.5, not every policy proposal is a portfolio proposal. A policy proposal can be an area that does cover any of the combinations of the ideal points of the parties, like the nine portfolio proposals above. In this respect, the theory differs from other spatial theories. In the Heart Solution, for instance, all policy positions are possible, whereas in the Winset Theory only policy proposals that are lattice points - that is portfolio proposals - are considered.

Therefore, we have to examine the portfolio winset and not just the policy winset, to predict a portfolio allocation and the accompanying coalition. If there are no portfolios inside the intersection, the portfolio proposal θ_{BA} is an equilibrium coalition. This means that, if θ_{BA} reflects the status quo,

“this coalition is in equilibrium if, when it has been formed it stays together because there is no player with the ability to bring down the coalition and replace it with an alternative which has the incentive to do so” (Laver & Shepsle, 1996, p 61).

According to Laver and Shepsle (1996), a coalition formation process in a parliamentary democracy requires that a new government can replace the status quo. The status quo can be replaced if the new government holding the portfolios receives the support of each of its participants, plus the support of a legislative majority if necessary. Since the point of departure is always a status quo, every formation process starts by examining the portfolio winset of the status quo. Note that if the incumbent government is brought down by the legislature or of it resigns, there may be a caretaker government until new elections take place. The outgoing government will however still be reckoned as the status quo, because we expect a caretaker government to continue the policy of the outgoing cabinet. In other words *“if the incumbent has been defeated and a caretaker has taken over, government policy remains by default at the position of the defeated incumbent”* (Laver & Shepsle, 1996, p 48).

In order to describe Laver and Shepsle’s theory more exactly, I shall now present the main assumptions Laver and Shepsle developed in order to characterise equilibrium cabinets. I have translated these assumptions into propositions that are hierarchically structured. This allows us to test the Winset Theory empirically. Based on these propositions, two hypotheses will be derived. The first is based on the theory as described by Laver and Shepsle and refers the prediction of an equilibrium portfolio allocation. The second hypothesis has been formulated for practical reasons and translates the portfolio prediction into a coalition prediction, which enables us to

compare this Winset Theory with other spatial theories that predict coalitions (rather than portfolios).

The first proposition refers to status quo equilibria. We have already said that, if the portfolio winset of the status quo is empty, there is no alternative that can beat the incumbent coalition. In this case, the status quo can be the dimension-by-dimension median. This means that the portfolio proposal of the coalition is the median on every dimension; $x = (x_{1 \text{ med}}, x_{2 \text{ med}}, \dots, x_{m \text{ med}})$. This leads to the first assumption:

*“The Dimension-by-Dimension Median (DDM) cabinet is an equilibrium if there is no alternative government in its winset”*⁶ (Laver & Shepsle, 1996).

Proposition 1 If the status quo portfolio allocation is in equilibrium - in other words, if it has an empty winset - this allocation will come about.

For the next proposition we should define a strong party. A player j is called strong if she participates in every coalition preferred by a majority to the cabinet in which party j takes all portfolios (Laver & Shepsle, 1996). If the status quo allocation is not in equilibrium - that is if proposition 1 does not hold - we continue by examining whether strong parties exist. Strong parties with a non-empty coalition winset may occur. Two types of strong parties can be distinguished. If the ideal point of a party has an empty winset and the party is a generalised median, DDM, this party is considered to be very strong, denoted as VSP (Laver & Shepsle, 1996). In this case the strong party holds the median position on all portfolio dimensions. In the other case, the party has a non-empty winset but is nevertheless strong because it participates in every cabinet in the winset. This is called a merely strong party and is denoted as MSP. If there are two dimensions, i.e. two portfolios, the ideal point of the strong party is θ_{jj} . We define the strong party in a situation with two dimensions as follows⁷: j is strong if and only if:

$$\{(W(\theta_{jj}) = \emptyset) \vee (j \in S, T \mid S, T \in W \wedge S, T R_j \theta_{jj})\} \forall i.$$

⁶ As I said, a portfolio allocation is not equivalent to a coalition. In this proposition and in the following propositions Laver and Shepsle define equilibrium cabinets, which in fact are equilibrium portfolio allocations. I prefer the first assumption to be read as follows: the DDM portfolio proposal is in equilibrium if there is no alternative portfolio proposal in its portfolio winset.

⁷ Note that although the strong party is usually unique, it is technically possible that two parties are strong parties at the same time. Imagine a two-dimensional space and two parties with exactly the same number of seats. In this case both parties are strong parties and hold the DDM position.

We shall now define equilibria that deal with the strong party:

“When a strong party exists, it is a member of every equilibrium cabinet”

(Laver & Shepsle, 1996). The portfolio proposal is either the ideal point of the very strong party or another cabinet in which the merely strong party participates. The strength of this player lies in the fact that it can veto every proposal (Laver & Shepsle, 1996).

The DDM portfolio proposal has an empty winset if the following assumption is met: *“When there is an empty winset DDM, no coalition in the winset of the strong party ideal is in equilibrium if it is less-preferred by the strong party to the DDM”* (Laver & Shepsle, 1996).

The above leads to the following proposition:

Proposition 2 If the status quo is not in equilibrium but there exists a very strong party, the ideal portfolio distribution of the very strong party will come about.

The merely strong party can prevent coalitions that it prefers less than the dimension by dimension median from forming. Since the strong player is a participant in every equilibrium cabinet, it has the power to veto these cabinets.

However, it is possible that a merely strong party cannot veto because of strategic behaviour by other parties. If the other parties in the winset prefer another coalition to the ideal point of the merely strong party, they can reach that point by making credible threats about vetoing the strong party’s ideal proposal. They can for instance threaten to support a coalition without the strong party. In this case, a stand-off can be reached (Laver & Shepsle, 1996). Unfortunately, in these cases, it is hard to predict what will happen. Laver and Shepsle predict that the strong party will participate in a coalition, but they cannot tell in which cabinet. In order to solve this ambiguity, in case of a so-called standoff, I suggest that we predict the allocation from the winset, together with the largest party.

Proposition 3 If proposition 1 and 2 are not true, the ideal point of the merely strong party (MSP) or one of the points in its winset will be formed. If at the same time we find a MSP and an empty winset DDM, we predict an allocation from the winset of the MSP or the empty winset DDM. The empty winset DDM necessarily - by definition - includes the MSP on one of the portfolios. In case of a standoff, we decide as follows: from the prediction set we choose the allocation of the MSP, together with the largest party. If the MSP is itself the largest party (measured in party weight), we predict the ideal point of the MSP

If there is neither equilibrium status quo nor a strong party, but there is an empty winset DDM, this DDM will be predicted:

Proposition 4 If there is no equilibrium status quo, or any kind of strong party, but there exists an empty winset DDM, then this allocation will be predicted.

Strong parties and DDM's create a structure for the coalition formation process. Unfortunately, Laver and Shepsle do not provide us with a solution if the situation is less stable. In situations without a strong or holdout party (i.e. a powerful but not strong party) and a non-empty winset of the DDM, no coalition can be predicted. In these cases, cycles of cabinets can occur and bargaining remains. However, even though Laver and Shepsle do not define this, I propose that if there is no other allocation that beats the SQ, the status quo allocation remains.

Proposition 5 If there is no equilibrium whatsoever, i.e. if propositions 1 to 4 do not provide equilibria, the status quo allocation will be maintained.

Based on these five propositions, the following hypothesis can be derived:

Hypothesis 4.6 Winset

In the Winset Theory, the equilibrium portfolio allocation that satisfies propositions 1 to 5 will come about.

Even though the division of portfolios is the main goal and contribution of the Winset Theory, a 'coalitional version' of the Winset Theory will be designed in order to compare the Winset Theory with other coalition formation theories. Naturally, the party or parties from the portfolio allocation are expected to govern. If this party or these parties do not represent a legislative majority - which is unfortunately true in most cases - I expect that other parties will join, until we find a winning coalition. The party that is as close as possible in the portfolio space to the party or parties that hold the portfolios will join the coalition. Now the hypothesis for the coalitional version of the Winset Theory can be defined.

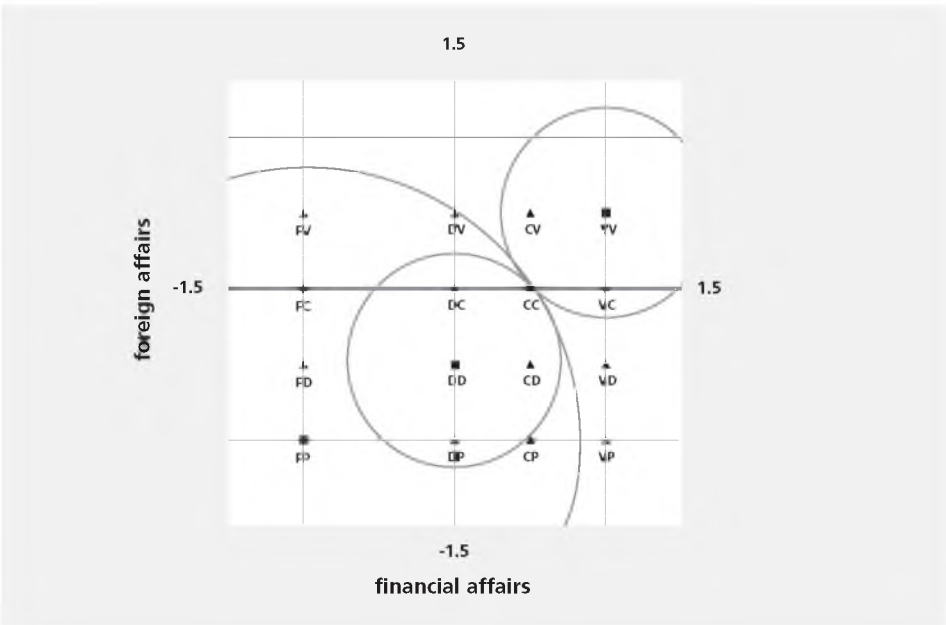
Hypothesis 4.7 Winset Majority

According to the Winset Theory, the parties or party that holds the main portfolios will govern. If this party or these parties do not represent a legislative majority, the closest parties in the portfolio space will join one by one, until this coalition becomes winning.

The Winset Theory will be illustrated with the coalition formation process after the Dutch elections of 1989. The two key policy dimensions in 1989 were an economic

dimension and a dimension on foreign affairs. For this example, we use the Laver and Hunt data set. In their survey on policy and party competition, Laver and Hunt rankorder the most important policy dimensions as well as the most important portfolios. For the Netherlands, as well as for many other countries, the two most important portfolios are Finance and Foreign Affairs. The party positions are derived from the same data set by using the scores of the parties on the following two policy dimensions: - increase services vs. cut taxes, and - pro friendly relation to the USSR vs. anti friendly relations towards the USSR. Laver and Hunt notice that in the portfolio game, the foreign affairs domain is much more important than it is in party competition in general (Laver & Hunt, 1992). In the period 1986-1989, the two portfolios were held by the Christian Democratic Party (CDA) - θ_{CC} - and in 1989 the portfolio Financial Affairs was held by the Social Democratic Party (PvdA), and the Foreign Affairs minister came from the CDA - θ_{PC} - . The parties that I include in this survey are the Social Democratic Party P with weight: $w_p = 49$; the left-wing liberals D $w_D = 12$; the Christian Democrats C $w_C = 54$; and the Liberal Party V $w_V = 22$. The total number of seats in parliament is 150, which means that a coalition is winning if it represents at least 76 seats. In the period 1986-1989 the Christian Democrats governed together with the Liberal Party (denoted as coalition {CV}). After the 1989 elections a government of Christian Democrats and Social Democrats - coalition {PC} - was formed. In our model, the incumbent government is represented by the portfolio θ_{CC} . The possible winning coalitions are {PC}, {CV}, {PDC}, {PDV}, {PCV}, {DCV} and {PDCV}.

Figure 4.6
Ideal Points and
Policy proposals in
the Netherlands
Indifference curves
through the
status quo, θ_{CC}



In Figure 4.6 we see the representation of the ideal points of the parties, and the possible portfolio allocations. The square points are the ideal policy points of the four parties. Indifference curves are drawn centered around the parties ideal points and running through the status quo θ_{CC} . The intersection of the circles is the winset of coalition θ_{CC} , i.e. the status quo. As one can see, the intersection of the indifference curves contains no portfolio proposal. This means that the portfolio winset of θ_{CC} is empty. The Christian Democratic party is a very strong party and is the DDM. Based on the theory, we may conclude that the allocation θ_{CC} is in equilibrium and that this portfolio distribution will remain the same after these elections.

However, in 1989 the portfolio allocation was no longer θ_{CC} as predicted, but θ_{PC} . Hence, the portfolio prediction was not correct. As can be seen in Figure 4.6, the coalitional prediction will also be wrong. The cabinet that was formed after the 1989 elections was a cabinet of the Christian Democrats and Social Democrats. If we predict that the strong party - CDA - will be supported by the closest party until it reaches a majority, CDA will not be supported by the Social Democrats (P) without first receiving support from the closest party, namely the liberal democrats (D).

Remarks

The Winset Theory has its merits but also its shortcomings. Laver and Shepsle themselves admit that the assumptions necessary to keep the number of credible proposals small, are hard to meet. These assumptions require:

- the number of salient policy jurisdictions to be low,
- the number of parties to be small, and
- the internal party discipline to be high (Laver & Shepsle, 1996).

The theory is likely to predict better and could actually predict coalitions - instead of the party distribution on the two main portfolios - if we could model all dimensions, i.e. all portfolios. In most multi-party systems this would lead to at least 10 dimensions. It seems that Laver and Shepsle do not give sufficient arguments for assuming that two or three dimensions would be enough to represent all portfolios. The theoretical argument could be that there are less than 10 'main dimensions'.

However, we must acknowledge that with ten or more dimensions, the number of credible proposals will be very high, which makes the prediction of a portfolio allocation complicated. Even with the computer programme⁸ that was developed for this theory, it is impossible to investigate the lattice points (portfolio positions)

⁸ Computer programme WINSET 5.1; winset calculator. Developed by Paul Doyle. Copyright: Laver and Shepsle, 1997.

if many dimensions are included. “*The number of comparisons increases dramatically with both the number of dimensions of the lattice and the number of parties*” (Laver & Shepsle, Winset Manual). For instance, five parties and two portfolio-dimensions leads to 600 comparisons, whereas the same number of parties and one dimension extra leads to 15500 comparisons. Naturally, with a more sophisticated computer programme than the one at hand, these numbers would not cause that much trouble.

Another difficulty, partly caused by the low dimensionality, is the distinction between a portfolio proposal and a coalition. Since a portfolio proposal can consist of only one party or two parties that represent less than the majority of the votes, we cannot be not sure which coalition will be formed if the portfolio allocation is introduced. If all portfolios would be modelled, this discrepancy would disappear and we could predict coalitions. Note that the extra assumption about joining the parties from the winset solved this problem. This discrepancy between portfolios and coalitions is acknowledged in Laver and Hunt (1992). The authors admit that it is possible to predict only one party, if one party holds the two key portfolios, but that does not imply that only that party will form the government. Laver and Hunt argue that this theory sets out to identify key players and not the whole coalition. This means that a prediction of two parties does not imply that the government will comprise at most two parties, but rather that this approach is silent on aspects other than the two key portfolios. This assumption is similar to the idea in the Heart Solution, which sometimes also predicts one or two key players and remains silent on the coalition as such, or implies that parties that are not a member of the coalition will support a minority cabinet. This issue is dealt with in hypothesis two, but remember that this is my personal interpretation of the Winset Theory, and not Laver and Shepsle’s view, nor their goal.

Next to uncertainties caused by the low dimensionality of the portfolio space, it is also regrettable that the Winset Theory does not predict a coalition if there is no equilibrium. If there is no strong or holdout player and the winset of the dimension-by-dimension median is non-empty, no coalition can be predicted. This is not an uncommon problem in multi-dimensional coalition formation theories. For practical reasons this problem has been solved by including Proposition 5.

The distinction between a proposal θ_{AB} - where party A has jurisdiction over the first and B over the second portfolio - and proposal θ_{BA} seems intuitively right. However, even though I find the picture of ministers as ‘sole-masters’ over their jurisdiction to be far reaching, the distinction between proposals with identical parties but different distributions is, in my opinion, the main contribution of Laver and

Shepsle's theory. We should bear in mind that this leads to more complicated predictions. Laver and Shepsle do only predict which parties will hold the cabinet portfolios, but also who will hold which portfolio. The truth about the influence of the jurisdiction on portfolios probably lies somewhere in the middle. In the Netherlands, for example, parties and thus ministers who want to govern together develop a declaration of policy for the forthcoming years. Ministers work together in a coalition and share collective cabinet responsibility, so that they are not sole masters over their policy area. This can also be demonstrated by the fact that it is common in the Netherlands for an under-secretary of state - the highest political official after the minister in a department - to come from another governing party than the minister. We therefore suggest that the assumption that ministers are in control over a department must be weakened. Laver and Shepsle acknowledge the dilemma of ministers as sole masters versus ministers working together in a coalition. They consider collective decision-making in cabinet, but also state that this happens within "*the context of the departmental structuring of the agenda of choices*" (Laver & Shepsle, 1996).

4.2.4 Competitive Solution

The Competitive Solution was, like other spatial theories, developed for spatial voting games. As we know, in these games the winning coalition receives a value of 1 while the losing coalition gets nothing. The ideal points of parties are represented by points in a multi-dimensional ideological space. Again, the utility of a coalition for a player is inversely proportional to the distance of the player to that coalition. McKelvey et al. (1978) define the main assumption as follows: "*potential coalitions must bid for their members in a competitive environment via the proposals they offer*". If we compare two coalitional proposals the parties that are members of both coalitions are the critical players. The preference relations of these parties determine the formation game. The fact that we compare the coalitional preferences of the *critical players* rather than all players is the main distinction of this theory.

The set $S_1 \cap S_2$ is referred to as the set of critical - also denoted as pivotal - players between coalitions S_1 and S_2 . A proposal is an ordered pair (u, S) , where u denotes the utilities of the coalition for the players $u = (u_1, \dots, u_n)$ and S is a coalition, with $1, \dots, n \in S$. Let L be any set of distinct proposals such that no coalition is associated with more than one proposal. A proposal $(u_1; S_1)$ is viable against proposal $(u_2; S_2)$ if $(u_2; S_2)$ is not strictly preferred to $(u_1; S_1)$ by all the pivotal players. At least one pivotal player must be indifferent or must prefer $(u_1; S_1)$ to $(u_2; S_2)$.

Definition

Viable: For any two proposals $(u_1; S_1)$ and $(u_2; S_2)$, $(u_1; S_1)$ is viable against $(u_2; S_2)$ if it is not the case that, $u_{1i} < u_{2i}$ for all $i \in S_1 \cap S_2$ (McKelvey et al., 1978).

Viability can also be defined in terms of preference relations between coalitions: a proposal for coalition S_1 is viable against S_2 if $S_1 R_i S_2$ for some $i \in S_1 \cap S_2$.

The theory allows us to predict coalitions which coincide with a proposal from L , that are viable. Since there may be distinct sets of viable proposals, the authors introduced the concept *upset* to reduce the prediction set. Closely related to the concept *upset* is the notion of *strict viability*. I shall here define strict viability. Selecting strictly viable proposals leads to the same prediction set as selecting based on the concept *upset*. Since the notion strict viability more logically follows viability, I shall use strict viability.

A proposal (u, S) is strictly viable against (u', S') if:

- i) (u, S) is viable in $L \wedge (u', S')$ is viable in L ,
- $\forall i \in S \cap S': u_i > u'_i$

Strict viability can also be defined in terms of preference relations between coalitions: A proposal for coalition S_1 is strictly viable against S_2 if $S_1 P_i S_2$ for all $i \in S_1 \cap S_2$.

A set of proposals K is a Competitive Solution if

- i) For any pair of distinct proposals (u, S) and $(u', S') \in L$ and $S \neq S'$,
- ii) Every $(u, S) \in L$ is viable in L and
- iii) For no $(u', S') \in L, \forall i \in S \cap S': u_i > u'_i$ (McKelvey et al., 1978).

The prediction is that proposals from K , the Competitive Solution, will be formed (McKelvey et al., 1978). All coalitions in the Competitive Solution are viable against each other. Therefore we can formulate the following hypothesis:

Hypothesis 4.8

Let $G = (N, W, R^M)$. Then a coalition from K will be formed.

For any coalition in the Competitive Solution set, it is true that all pivotal players simultaneously prefer a coalition to at least one proposal from L . A more restrictive set is the Strong Competitive Solution. K^S is a Strong Competitive Solution if

- i) For any pair of distinct proposals (u, S) and $(u', S') \in L$ and $S \neq S'$,
- ii) Every $(u, S) \in K$ is viable in K and
- iii) For $\underline{u_0} (u_1; S_1), (u_2; S_2) \in K$, it is the case that
 - for all $i \in S_1 \cap S_2: u_{1i} \geq u_{2i}$,
 - with $>$ holding for at least one $i \in S_1 \cap S_2$ (McKelvey, et al., 1978).

In the Strong Competitive Solution, denoted as K^S , strict viability is demanded for every proposal in the set K . The coalition or coalitions in the Strong Competitive Solution will be formed (McKelvey, et al., 1978).

Hypothesis 4.9

Let $G = (N, W, R^M)$. Then a coalition from K^S will be formed.

To illustrate the Competitive Solution, the 1994 cabinet formation in the Netherlands will be studied. A procedure similar to the procedure for the Maximal Satisfaction Solution is followed. First, the Euclidean distances between the players and the possible winning coalitions are determined, which can be found in Table 4.8

DISTANCES	PDC	PDV	PCV	DCV	PDCV
PvdA (p)	0.90	0.99	1.26	1.61	1.14
D66 (d)	0.74	0.28	0.60	1.04	0.62
CDA(c)	1.37	2.00	1.33	1.30	1.46
VVD(v)	1.97	1.40	1.48	1.23	1.49

Table 4.8
Weighted
Euclidean distances
between parties
and coalitions
in the Netherlands
in 1994

The next step is to compare the coalitions and select the viable ones. In Table 4.8, the most preferred coalition of every player is highlighted. Note that a small number means a small distance: the smaller the better. If it would be true for one coalition that all players prefer this coalition most, this would be a Strong Competitive Solution and we could stop the procedure. This coalition would simultaneously be a dominant coalition. Since this is not the case we have to start comparing coalitions:

{PDC} vs. {PDV}:	both viable,
{PDC} vs. {PCV}:	both viable,
{PDC} vs. {DCV}:	both viable,
{PDC} vs. {PDCV}:	both viable,
{PDV} vs. {PCV}: {PCV}	is not viable,
{PDV} vs. {DCV}:	both viable,
{PDV} vs. {PDCV}: {PDCV}	is not viable.

The set of viable proposals in this example is {PDC}, {PDV}, and {DCV}. A proposal is strictly viable if it is viable and if it is true that the proposal is strictly preferred to every other proposal by all pivotal players. In this example, none of the proposals is strictly viable. For example, player P prefers {PDC} to {PDV} and player D prefers {PDV} most. In 1994, the coalition PDV was formed. This coalition is included in the Competitive Solution.

Consider the adjusted distance matrix after the elections in 1994, in Table 4.9. Some distances have been changed in order to illustrate the case of a strictly viable proposal. The fictitious data are highlighted. Coalition {PDC} is now a strictly viable proposal. Since {PDC} is strictly viable, the coalition {PDC} is also a Strong Competitive Solution.

Table 4.9
Adjusted Weighted
Euclidean distances
between parties and
coalitions in the
Netherlands in 1994

DISTANCES	PDC	PDV	PCV	DCV	PDCV
pvdA (A)	0.90	0.99	1.26	1.61	1.14
d66 (B)	0.28	0.74	0.60	1.04	0.62
cDA(c)	1.25	2.00	1.33	1.30	1.46
vvd(D)	1.97	1.40	1.48	1.23	1.49

Remarks

The descriptive part of the Competitive Solution is similar to other spatial theories, and the theory does predict coalitions. The solution concept is interesting because the authors relate their solution to other well-known concepts such as the core solution in policy space. We know, for instance, that if the core position is non-empty, the core and the Strong Competitive Solution will predict the same coalition. The core solution is the only coalition that is strictly viable. In this definition of the core, the

core is - like the core in the Heart Solution - the dominant point, and not, as in the coalitional core (see Chapter 3, the policy distance theory), the set of undominated coalitions. Any other proposal is not strictly viable as compared to the core solution. It is easier to determine strict viability than dominance -, as one would do to find the core solution - because for the (Strong) Competitive Solution, only the payoffs of the pivotal players need to be compared. Another interesting fact is that in most spatial examples in McKelvey's article - including the example in this section - the Competitive Solution, unlike the Maximal Satisfaction Solution, corresponds to minimal winning and connected coalitions.

4.2.5 Maximal Satisfaction Solution

In this section, I shall present a new theory of coalition formation. It is a multi-dimensional extension of De Swaan's policy distance theory (1973). In contrast to De Swaan, this theory uses a metric distance measure. Furthermore, the theory uses a new solution concept called the Maximal Satisfaction Solution.

In De Swaan's theory - see Section 3.3 - actors, i.e. political parties, compare their policy positions with the expected policy positions of coalitions. De Swaan describes the central behavioural assumption of the policy distance theory as follows:

"An actor strives to bring about a winning coalition in which he is included and which he expects to adopt a policy that is as close as possible, on a scale of policies, to his own most preferred policy" (De Swaan, 1973, p 88).

One important argument for transforming De Swaan's policy distance theory into a multi-dimensional theory is that simultaneously positioning a party or a coalition on two or more policy or ideological dimensions is more accurate than placing it on a one-dimensional scale since it contains more information. As defined in Chapter 2, a policy dimension can represent any policy issue, and an ideological dimension represents a group of coherent policy issues. Ideally, a couple of important ideological dimensions are used to represent what a party desires. For instance, the position of the Christian Democratic party in the Netherlands on an economic left-right dimension can be moderately right-wing, whereas its position on 'religious issues' is more to the extreme on a liberal-authoritarian, or also denoted as social values, dimension. Since party representation is more accurate on multiple dimensions than on one, we assume that the same is true for coalition formation. This is the main reason for extending the De Swaan's policy distance theory.

Obviously, the objective of the extended theory is the same as in De Swaan's uni-dimensional model. The premise is the minimisation of the distance between the policy position of a player and the expected policy position of a coalition. However, there is an important difference: in the extended theory distance is measured metrically instead of ordinally. In the multi-dimensional theory, Euclidean distances are used. Both the distances between the policy positions of the parties and the expected coalitions, and the preferences for coalitions that follow from this, are defined within the model.

A new assumption is also introduced. Since in the predictive part of the theory the coalitional core - the set of undominated coalitions- is in many cases large, I shall introduce a new solution concept called the Maximal Satisfaction Solution. I assume that instead of striving for their highest individual gain, parties strive for maximal collective satisfaction. Aiming for the best individual output often leads to cycling, for which reason I introduce the Maximal Satisfaction Concept which predicts the coalition with the highest average utility.

Descriptive part of the theory

De Swaan (1973) defined the expected policy position of a coalition as a function of the weights and policy positions of the members of a coalition.

Formally: $x_S = f(x_i, w_i), i \in S$. In order to compute the expected policy position of a coalition, the connection between weights and position is maintained in the extended policy distance theory.

The weights are normalised as follows: $\lambda_i = \frac{w_i}{\sum_{i \in S} w_i}$

where w_i are the weights of the players in a coalition S . The expected policy position of a coalition S , in the extended model, is defined as $x_S = \sum_{i \in S} \lambda_i x_i$. Again, x_i is the ideal point of player i in an m -dimensional Euclidean space.

De Swaan introduced a pivotal player in order to detect preferences of actors for coalitions. It is often impossible to identify the pivotal player in the multi-dimensional model. The pivotal player would be the median in all directions (Enelow & Hinich, 1984). Plott (1967) proved that the median in all directions only exists under severe conditions which are seldom met. Yet, in the multi-dimensional model players can easily define their preference profiles because they use real Euclidean distances between the policy positions of the players and the expected positions of the coalition. The greater the distance between a player and the expected position of a coalition, the less preferred this coalition will be. Hence, the axioms considering the pivotal player in De Swaan's original theory are no longer needed.

No more than two assumptions are necessary to define the descriptive part of the extended policy distance theory. The first is the central assumption. A player prefers a winning coalition, which is closer to her own preferred policy position to a coalition that is less close. The second assumption - the office seeking axiom - is the same as the last assumption in De Swaan's model. It states that a player prefers a winning coalition to a losing coalition, and a player prefers a winning coalition of which she is a member to a winning coalition in which she is not.

Assumption 4.1

$\forall i$, such that $i \in S$ and $i \in T$; $S, T \in \mathcal{W}$
 $SP_i T$ if and only if $\| (x_i - x_S) \| < \| (x_i - x_T) \|$,
 $SI_i T$ if and only if $\| (x_i - x_S) \| = \| (x_i - x_T) \|$.

Assumption 4.2

$\forall i$, such that $i \in S, i \in T, S \in \mathcal{W}, T \notin \mathcal{W}; SR_i T$,
 $\forall i$, such that $i \in S, i \notin T, S \in \mathcal{W}, T \in \mathcal{W}; SR_i T$.

Here, P_i denotes strict preference, R_i preference, and I_i indifference for player i .

Predictive part of the theory

In this part of the theory, solution concepts from n-person game theory will be used. The solution concept that will be applied, is the Maximal Satisfaction Solution. Empirical research has shown that for many coalitional games, the prediction set of the coalitional core is often a large set of coalitions. The new solution concept should not predict large sets of coalitions like the core, but preferably predict only one or a few coalitions. This new concept should also preferably be non-empty in all cases.

Maximal Satisfaction Solution

I propose a concept, called the Maximal Satisfaction Solution, which predicts coalitions in which players, instead of striving for ones own maximal utility, agree on the coalition with the highest average satisfaction. It is rational for the players to choose the maximal satisfaction coalition even if this coalition may not attribute them their highest individual utility. In social choice terms, aiming for the highest individual payoffs can lead to cycling preferences and thus to an intransitive social choice. It is therefore rational to settle for the coalition with the highest aggregate utility. This does not infer that I abandon the individual rationality assumption, which is one of the main assumptions of rational choice or game theory. It are individually rational players who will - according to the Maximal Satisfaction Solution - aim for the coalition with the highest average utility.

For this solution concept, the utility of the players for the coalition is first aggregated and then divided by the number of players in the coalition. Dividing by the number of players leads to coalitions in which the amount of players is not very large which contributes to the stability of the coalition. Furthermore, the Maximal Satisfaction Solution often predicts oversized coalitions in terms of weight. This seems to fit the empirical reality since for example in the Netherlands coalitions on average represent 65% of the seats in parliament.

To sum up, in the Maximal Satisfaction Solution concept the following behavioural assumption is introduced: players strive for maximal collective utility. As I said, if only individual rationality is followed, preference cycles can occur. Since none of the players can enforce any coalition, it seems reasonable that the players settle for the coalition with the highest ‘average’ aggregated utility and thus choose for collective rationality - i.e. the Maximal Satisfaction Solution - which is the dominant strategy.

In order to compute the total satisfaction of a coalition, the first step is to ascribe utility to preferences. The preferences of the players are based on the distances between the player’s preferred policy position and the expected policy position of a coalition. The utility u_i of a player i , for a coalition is assumed to be inversely proportional to the distance between that player and a coalition. Distances will be normalised and inverted in order to ascribe utility to the coalitions. Next, it is possible to find the coalition with the highest aggregated utility.

The smallest distance between any player’s ideal point and a winning coalition in a game can be seen as a reference number, and the difference between the smallest and the largest distance can be seen as the range of the distances within the game. The reference distance and largest distance are used to normalise the utilities.

Definition 4.1

The reference distance - the smallest distance d between any party position x_i and any expected coalition position x_S in the game - is defined as follows:

$$\text{Min } \{d(x_i, x_S) \mid \forall i \in S, \forall S \in \mathcal{W}\}.$$

Definition 4.2

The largest distance, d , between any party position x_i and any expected coalition position x_S in the game - is defined as follows:

$$\text{Max } \{d(x_i, x_S) \mid \forall i \in S, \forall S \in \mathcal{W}\}.$$

Definition 4.3

i) If $j \in T$: the utility, u of player j for coalition T is:

$$u_j(T) = 1 - \frac{d(x_j, x_T) - \min d(x_i, x_S)}{(\max d(x_i, x_S) - \min d(x_i, x_S))}$$

where $\max d(x_i, x_S) \neq \min d(x_i, x_S)$

ii) The utility of a player who is not a member of a coalition, in accordance with the office seeking argument, is zero: If $j \notin T$: the utility, u of player j for coalition T is: $u_j(T) = 0$.

It follows from this definition that the utility of a player for a coalition is: $0 \leq u_j(T) \leq 1$. So, the utility is 0 if a player is not a member of the winning coalition under consideration, and if it is the player that is farthest away from any of the winning coalitions, i.e. when $d(x_j, x_T) = \max d(x_i, x_S)$. On the other hand, the utility of a player for a coalition is 1, if this player and this coalition are the closest combination in the game, in which case $d(x_j, x_T) = \min d(x_i, x_S)$.

The coalition with the highest aggregated utility divided by the number of players in a coalition is predicted. The total utility or satisfaction of a coalition is the sum of the individual utilities of the players that are member of that coalition, divided by the number of players in that coalition. Dividing by the number of players does not conflict with the notion of highest collective utility. This concept often leads to coalitions that do not ascribe the highest possible individual utilities to all players, but predict coalitions where the average satisfaction is as high as possible. Solely summing up the utilities without dividing by the numbers of players would lead to very large coalitions. Even though the policy distances and the weights are incorporated in the computation of utility, if enough players are added to a coalition, the satisfaction will increase.

We can now define the satisfaction score of a coalition.

Definition 4.4

$$i. \text{ Sat}(S) = \frac{\sum_{i \in S} u_i(S)}{\#S}$$

where $\#S$ denotes the number of players in S .

The set of maximal satisfying coalitions is defined as:

$$ii. W^{\text{SAT}} = \{S \in W: \neg \exists T \in W: \text{such that } \text{Sat}(T) > \text{Sat}(S)\}$$

The next theorem shows that the Maximal Satisfaction Solution is never empty in spatial voting games.

Theorem 4.1

Let $G = (N, W, R^M)$ and $S, T \in W$, then $W^{SAT} \neq \emptyset$

Proof: If $W^{SAT} = \emptyset$, we have to assume an infinite ordering of the satisfaction of winning coalitions; $Sat(S) \geq Sat(T) \geq \dots \geq Sat(S-1)$. Since in a voting game the number of players $\{1, 2, \dots, N\}$ is assumed to be finite, the number of possible winning coalitions is finite and thus $W^{SAT} \neq \emptyset$.

Moreover, the Maximal Satisfaction Solution can predict a different solution than the Coalitional Core. In other words, the Maximal Satisfaction Solution is not a core-inclusive concept.

The descriptive part of the extended policy distance theory indicates how the preferences of players for coalitions can be obtained. In the predictive part, the Maximal Satisfaction Solution provides us with a concept that solves the coalition game. The following hypothesis states that in coalitional games a coalition from the set of Maximal Satisfaction Solution(s) will be formed.

Hypothesis 4.10

Let $G = (N, W, R^M)$. Then a coalition from W^{SAT} will be formed.

Consider the following simplified coalitional game, based on the coalition formation after the 1998 Dutch elections: [76; 11, 45, 14, 29, 38]. The parties in this weighted majority game are respectively Green Left (GL), the Social Democrats (PvdA), the left wing liberals (D66), the Christian Democrats (CDA), and the liberals (VVD). Data were obtained on three ideological dimensions by means of computer based content analysis of the 1998 party manifestos (see Chapter 5). The three dimensions are 'economic left-right', 'social values', and 'environmental protection'. The positions of the parties on the three equally weighed ideological dimensions are presented in Table 4.10.

Only the five largest parties are included in the analysis of this simplified game, and only eight possible winning coalitions are considered. Naturally, there are - also with these five parties - more winning coalitions possible, but since this is an illustration and not an empirical test, only cabinets that are likely to form, based on substantive knowledge of the Dutch party system, are included.

The expected policy positions of the coalitions are computed with the definition presented before:

$$x_S = \sum_{i \in S} \lambda_i x_i . \text{ For instance } x_{PV} = ((45/83 (0.179) + 38/83 (1)), (45/83 (0.419) + 38/83 (0)), (45/83 (1) + 38/83 (0.806))) = (0.555, 0.227, 0.911).$$

The expected policy positions of the coalitions can be found in the following table. Note that the first letters of all parties included in a coalition denotes the coalition. In the example above: x_{PV} is the expected policy position of the coalition containing PvdA and VVD.

PARTY	SEATS	LEFT-RIGHT	ENVIRNMENT	VALUES
GRLINKS	11	0	1	0.851
PVDA	45	0.179	0.419	1
D66	14	0.446	0.474	0.926
CDA	9	0.221	0.098	0
VVD	38	1	0	0.806
COALITIONS	Σ SEATS			
PV	83	0.555	0.227	0.911
GPC	85	0.170	0.385	0.641
GPV	94	0.490	0.318	0.905
GCV	78	0.570	0.177	0.514
PDC	88	0.235	0.322	0.659
PDV	97	0.539	0.263	0.914
PCV	112	0.469	0.194	0.675
DCV	81	0.626	0.117	0.538

Table 4.10
Expected position of the coalitions on three ideological dimensions in 1998.

The next step is to compute the distances between the parties and the expected policy positions of the coalitions. The formula for Euclidean Distance is used to compute these distances. The results can be found in the following Table 4.11.

table 4.11
Distances between parties and expected positions of coalitions in 1998.

DISTANCES	PV	GPC	GPV	GCV	PDC	PDV	PCV	DCV
GRLINKS	0.953	0.675	0.841	1.058	0.745	0.915	0.950	1.129
PVDA	0.431	0.361	0.341	0.669	0.359	0.402	0.490	0.710
D66	0.270	0.407	0.163	0.523	0.373	0.231	0.377	0.557
CDA	0.979	0.704	0.969	0.626	0.696	0.981	0.726	0.673
VVD	0.511	0.929	0.609	0.550	0.843	0.541	0.581	0.475

The distance between party CDA and coalition PDC is calculated as follows:

$$\| (x_{CDA} - x_{PDC}) \| = \text{sqrt} ((0.221 - 0.235)^2 + (0.098 - 0.322)^2 + (0 - 0.659)^2) = 0.696$$

Based on the distances above, it is possible to create a utility matrix. The distances will be used to calculate the utilities of the parties for the coalitions. These utilities are necessary to determine the Maximal Satisfaction Solution, i.e. the coalition with the largest average aggregated utility. The new concept selects the maximal satisfying coalition. The definitions in the previous section are used to compute the utilities of the parties. The parties' coalitional utilities are given in the Table 4.12.

Table 4.12
Utility, aggregated utility, and the average aggregated utility of the parties for coalitions in 1998 in the Netherlands

UTILITY	PV	GPC	GPV	GCV	PDC	PDV	PCV	DCV
GRLINKS	0	0.470	0.298	0.073	0	0	0	0
PvDA	0.723	0.795	0.817	0	0.797	0.753	0.662	0
D66	0	0	0	0	0.783	0.930	0	0.592
CDA	0	0.440	0	0.521	0.448	0	0.418	0.472
VVD	0.640	0	0.538	0.600	0	0.609	0.568	0.677
$\sum_{I \in S} U_I$	1.363	1.706	1.653	1.194	2.029	2.292	1.647	1.741
$\sum_{I \in S} U_I / \#S$	0.682	0.569	0.551	0.398	0.676	0.764	0.549	0.580

The utility of coalition PDC for party CDA is measured by, taking 1 minus - the subtraction of the smallest distance of any party to any coalition in the game from the distance that party CDA has to PDC, divided by the difference between the largest and the smallest distance of a party to a coalition, i.e. the range of the distances. In other words: $u_{CDA}(PDC) = 1 - ((0.696 - 0.163) / (1.129 - 0.163)) = 0.448$.

The total satisfaction of the coalition PDC is simply the summation of the utilities of the parties in that coalition: $\Sigma u(x_{PDC}) = 0.797 + 0.783 + 0.448 = 2.029$. The average aggregate satisfaction, i.e. the satisfaction score, is $2.029 / 3 = 0.676$.

The hypothesis is that the coalition with the highest average aggregate utility will be formed. In the game above, coalition {PDV} will therefore be predicted. This is in fact the coalition that did come about. So, in this case the Maximal Satisfaction Solution has predicted the correct coalition.

Remarks

The descriptive part of the extended policy distance theory is roughly the same as that of most of the theories discussed in this section. The preferences are based on distances. These distances are translated into utilities, in order to apply the predictive part of the theory. Since the coalitional core often predicts a large set of coalitions, the Maximal Satisfaction Solution is applied. This concept maximises the average aggregate utility of the parties for the coalitions. The idea of maximising the aggregate satisfaction distinguishes the theory from other theories in this research, since emphasis is placed on a collective notion of utility. A major advantage of this concept as compared to other solution concepts is that the solution always exists, and that it usually predicts exactly one coalition.

4.3 Summary

A presentation was given and hypotheses derived for most well known 'traditional' coalition formation theories in Chapter 3. The same was done in this chapter for five spatial coalition formation theories. The main question in this research is whether spatial theories are preferable to the other classes of theories.

On theoretical grounds, spatial theories seem promising. Especially the Proto-coalition Formation and the Maximal Satisfaction Solution have good prospects, since both usually predict one only coalition. The Proto-coalition Formation theory is a straightforward theory that does not have too many assumptions, and is not difficult to test. Most striking about this theory is its focus on subjective - rather than symmetric - distances. The Maximal Satisfaction Solution is innovative, since it introduces a collective notion of utility. The Competitive Solution also starts from preferences that are based on distances, but it often predicts more than one coalition. Interesting about this theory is its focus on critical players.

The Heart Solution is a spatial solution that seems less promising, because it often predicts a series of coalitions or more specifically a series of key parties and not a coalition as such. Quite a number of additional assumptions were needed, to make the concept fit for testing. We concluded that the set of axioms was insufficient, for which reason the Heart Solution does not meet the requirements for a formal theory. However, note that predicting coalitions instead of party configurations may not have been the author's goal.

The Winset Theory is quite dissimilar to the others, since it assumes that coalition formation is based on the distribution of ministerial portfolios. It is at the same time the most 'institutional' oriented spatial coalition formation theory in our selection, since it emphasises the powerful position of the status quo. Like the Heart Solution, the Winset Theory determines key players and not coalitions, and also here, I introduced new assumptions to enable empirical testing.

The reason for developing new coalition formation theories has not been that these theories are bad on theoretical grounds, but that they are not as good as we would like them to be empirically. Ideally, a coalition formation theory predicts every coalition formation correctly. This leads us back to our research question: "Do spatial coalition formation theories perform better empirically than the non-spatial theories". This question will be addressed in Chapter 6. The empirical evaluation will be done in the same format as the classification of the theories. For every class, the theories will be tested, which will lead to a conclusion about the class of theories that performs best. The list of all hypotheses can be found in appendix A3.

5. Dutch Politics, Parties and Their Positions

5.1 Introduction

The spatial and non-spatial theories of coalition formation that will be tested were presented in the previous chapters. Before we can test them, we need to obtain data on party positions. In this chapter the Dutch party system will therefore be presented. The main goal is to provide positions of political parties on a number of ideological dimensions. In this context an ideological dimension is ideally a coherent group of issues that form an idea about how society should be organised. These ideas need only hold for one country at one time, but the ideology should be the same for both political leaders and citizens. For instance, on the traditional left-right dimension, parties on the left side claim that more state interference in the economy for social equality is better than less state interference, whereas the parties on the right side of the spectrum claim the opposite. This dimension gives us information about how parties and the citizens that support these parties feel about tax policy, welfare state expansion, public vs. private ownership etc. Another dimension is often an immaterial or social values dimension that reflects liberal vs. authoritarian views on issues such as abortion, euthanasia, freedom and religion.

More important than the content of these dimensions is, however, that these so-called 'ideological' dimensions reduce the high dimensional policy space into a low dimensional space. Even if it is inductively obtained by using methodological techniques to reduce dimensionality, this low dimensional space is preferable because it makes testing our spatial theories easier. It can however be that these dimensions are methodological artefacts instead of real ideological dimensions. Nevertheless, it is clear that the obtained dimensions do incorporate more information on what the parties stand for than the most commonly used ordinal uni-dimensional left-right scales that are applied to the one-dimensional policy oriented coalition formation theories.

Before the party positions are derived and coalition formation in the Netherlands can be tested empirically, a brief description of the organisation of the Dutch political system in general seems indispensable. Hence, the next section will contain a description of the Dutch parliamentary democracy. The third section provides an overview of the various data sets that can be used for deriving party positions. In the Section 4, the Manifesto data set that is used for positioning the parties in the Netherlands from 1946 until 1994 is described at length. Apart from the description, these data are analysed and party positions are derived. For the 1998 elections, I have gathered data myself by computer-coded content analysis of the party mani-

festos. The results of this procedure are presented in Section 5. In Section 6, party positions based on another data set - the Laver and Hunt expert data - are presented. This data set contains data on policy positions for 1989 and 1994, and will be added as a data set to check the results of the Manifesto data. The data from the expert analysis should lead to the same coalitions as the Manifesto data for the years under consideration.

5.2 The Political System

The political system in the Netherlands can be characterised by two concepts: it is a constitutional monarchy, as well as a parliamentary democracy. These two features will be discussed in this section, and after that a description of the stages of the coalition formation process will be presented.

Parliamentary democracy

A central feature of the Dutch political system is that it is a so-called representative democracy. In a parliamentary democracy the will of the people is represented by a parliament that, among other things, supervises the executive power, i.e. the government. This division of power is a main organisational characteristic of the Dutch political system. The judiciary power lies in hands of the judiciary, and the executive power is in hands of the government. Parliament and government together hold legislative power. Both government and parliament have the right to propose and initiate legislation. In most cases, however, the government enforces legislation and parliament supervises this.

The Dutch parliament is divided into two chambers: the First (upper) Chamber has 75 members, who are elected by members of the Provincial States, whereas the Second (lower) Chamber has 150 members, who are chosen directly by the electorate. We can therefore say that the Second Chamber is the most 'democratic' institution of the Dutch political system. This Chamber is also the most powerful of both Chambers of parliament.

The First Chamber is only allowed to accept or veto (and is thus not allowed to amend) legislative proposals that have already been accepted by the Second Chamber. The main task of the First Chamber, also referred to as the Senate, is to check if the legislative process proceeds accurately, and to check if the proposals are in line with international treaties and the constitution. The Second Chamber, on the other hand, is also allowed to initiate legislation, and to amend proposals from government. The broader mandate and the direct election of the Second Chamber cause the more powerful position of this Chamber.

The Dutch electoral system is a list system of proportional representation in

which seats are allocated to parties. There is in practice only one constituency. Compared to many other democracies, the election of the Second (lower) chamber is very close to a pure proportional division. All 150 members of the Second Chamber are elected on the basis of the national distribution of party votes. A party needs 0.67%, i.e. 1/150th, of the national vote for a seat in the Second Chamber. The seat allocation is computed with the d'Hondt formula (Farell, 1997).

The relation between government and parliament becomes most clear if we consider responsibility and votes of confidence. In a parliamentary system, the government is obliged to justify its actions to parliament. Furthermore, it is said that parliament has confidence in the government as long as the opposite is not expressed by a majority of the parliament. The ministers can also be confronted by a vote of no confidence at the individual level. In these cases, either a single minister or the cabinet in its entirety can be dissolved. If the government has a conflict with parliament, another possibility is that the government dissolves parliament and announces new elections. In this case, the aim of the government is to gain confidence in the new parliament (Van Deth & Vis, 1995). In conclusion, the relation between government and parliament is tight and both institutions cannot function without approval of the other.

Constitutional monarchy

The Dutch system is also a constitutional monarchy. In this system the King, or in the present Dutch case a Queen, is formally the highest authority, but she is not an absolute ruler since the Queen is bounded by the constitution. The succession of the Queen is hereditary. The government consists of the Queen together with the ministers.

Formally, the Queen is the head of the government, but in contrast to the ministers she is not responsible for government actions. One formal instrument of power of the Queen is that she has to countersign legislation. This means that she can veto legislation if she for instance has moral objections. Another formal obligation is her role in the cabinet formation process. The Queen starts by consulting important politicians, after which that she appoints an *informateur*¹ whose task it is to investigate cabinet possibilities. If the *informateur* has finished his job and can inform the

¹ The concepts 'informateur' and 'formateur' will be referred to as such. The *informateur* is a (some) senior politician(s) assigned by the Queen who examines which cabinets are feasible. The *formateur* enters later in the formation process and his task is to form a new cabinet. Since the *informateur* and the *formateur* are typical for the Dutch formation process and they do not exist in other countries, there is no correct Anglo-Saxon word for them and therefore we will refer to them in Dutch.

Queen that the formation of a particular cabinet is feasible, the Queen appoints a *formateur* who to actually form a new government. The *formateur* guides negotiations on future government policy and negotiations on the distribution of the offices between the different parties in the future cabinet. The *formateur* is often the party leader of the largest party of the prospective government, which means that he is likely to become the Prime Minister of the future cabinet. The political power of the Queen lies in the choice of the (in)*formateur(s)*, which actually exerts a major influence on the formation process.

It is difficult to ascertain where the power of the Queen actually lies. Being head of state without being responsible for the government actions would seem to make one powerful, for example. Yet, this privileged (immune) position of the Queen is in practice seriously constrained. Since the ministers are responsible, they always check the actions of the Queen. When she visits other countries, for instance, the ministers always receive a copy of her speeches in advance, which they can try to change. On the one hand then, the Queen's power is limited by the constitution, and on the other she is restrained by the fact that the ministers are accountable for her actions. This means that the Queen's freedom of autonomous action is in practice relatively small. The tasks of the monarch are therefore often said to be mainly ceremonial and symbolic (Van Deth & Schuszler, 1990).

We also stated that the Queen has to countersign all legislation. Again, this seems to make her more 'powerful' than she is in reality. I do not know of any case where the Queen decided against legislation that was approved by government and parliament. However, this is not the same as knowing for a fact that she has always approved. It can very well be the case that in earlier stages the Queen indicated or implied that she would not approve, and that as a result the proposal in question was revised or not pursued further.

In the case of cabinet formation, the 'informal' or 'real' power of the Queen is probably larger than her formal power seems to be. The choice for an *informateur* is a political decision. It is in this case, as in others, difficult to find hard evidence for the influence of the Queen. It is easy to imagine that if the Queen receives contradictory advice about whom to appoint, she will take a decision based on her own knowledge and preferences. Either she simply cannot comply with all opinions at the same time, or she can but will not do so. During the formation of the Den Uyl cabinet in 1972, the Queen has been said to have been biased (Van Wijnen, 1975; Houwaart, 1998). The Queen is said to have steered the formation process in the direction of a cabinet with the Social Democratic party. The unexpected appointment

of informateur Burger, in times of deadlock, and the later statement of Den Uyl that “everything was going in accordance with the script” (Van Wijnen, 1975, p 57) can be interpreted as evidence of an active and biased Queen.

Note that since conversations of the Queen with political leaders take place behind closed doors, there is no way to check whether and how the Queen deals with advice, nor to find out to what extent she follows her own preferences.

On the positive side, the Queen is - and the former Queens have been - very interested and knowledgeable about politics. Moreover, the Queen is usually by far the most experienced person in the cabinet formation process, for starters because she has usually reigned longer than politicians have been in office, which automatically gives the Queen expert status.

In summary, the role of the Queen is definitely more than marginal, or in other words her task is more than being a stamping machine. The precise power of the Queen depends on the interest she takes in politics and the political situation at any given moment in time.

Coalition formation

Typical for coalition formation in the Netherlands is that there are hardly any formally established rules. The choice for appointing either an informateur or a formateur, for instance, depends on an estimation of how difficult it will be to form a cabinet. The formal appointment of the ministers by the Queen at the end of the formation process is the only stage that is laid down in law. Maas (1992) however noticed the following trends:

- it is usually the largest party that initiates the negotiation,
- if parties are trying to form a particular cabinet, they tend to keep trying to form this cabinet even if negotiations become problematic, and
- if the previous cabinet has fallen, the ‘trouble maker’ in that cabinet, usually gets the initiative to try and patch the cabinet.

In my opinion, this last trend only holds if the same parties are willing to continue governing together, which is naturally not always the case. In the 1989 formation, for instance, after the coalition of Christian Democrats and Liberals has fallen, the Christian Democrats immediately started negotiating with the Social Democratic party.

Even though the rules are not formalised, it is fair to say that the Dutch coalition formation process proceeds in the following stages:

- 1) The Queen consults politicians about which cabinet(s) is (are) feasible, and what procedure should be followed. It is convention that at least the chairs of the Chambers in Parliament, the vice-president of the State Council, and the leaders of all parliamentary parties are consulted.
- 2) In the second stage, an informateur is, or a couple of informateurs are appointed. Only in case of a clear-cut formation, in which it is already evident which parties will join a cabinet, and provided only limited controversy, will a formateur be appointed directly. In other cases, we start with an informateur, whose task it is to examine feasible coalition possibilities that will be supported by a majority in parliament. During this orientation period, the goal is to find out what problems could arise and at which points parties agree and disagree about future policy.
- 3) In the third stage, a first decision is made about the composition of the coalition, that is which parties are likely to join the new cabinet. If at this point parties agree on future policy in a broad sense, and if they agree on the composition of the new government, the informateur has fulfilled his job and the next stage starts with the appointment of the formateur whose task it is to actually form a new government.
- 4) In stage four, the formateur together with representatives of the future cabinet parties formulate a draft of the government's Declaration of Policy.
- 5) In the fifth stage, the distribution of portfolios in general, that is, which and how many departments each of the parties will get, are discussed.
- 6) In the sixth stage, the political parties in the new government decide which party members will take which offices.
- 7) In the final stage, the government is presented in a public conference, and the Queen officially installs the new ministers.

As said earlier, the formateur is often the leader of the largest party in the new government and often becomes prime minister. Since the position of the prime minister is an important office, it can be smart to give the informateur more leeway and have him take care of the process of selecting ministers, that is formally the job of the formateur. In that case, if problems arise during negotiations it is not the would-be prime minister who is politically damaged. Note that the prime minister in the Netherlands does not have the same position as for instance the president in France. The prime minister is the leader of the government but is not allowed to take decisions on behalf of the government. The same confidence relation between government and parliament holds for the prime minister.

Another observation that should be made in this context is that in practice the coalition formation process often does not go as smooth as suggested in the 'seven

stages' model. Problems can lead to moves backwards and forwards through the stages described above. It is not uncommon to start with an informateur, followed by a formateur, followed by - in case of no success - a new informateur, followed by a new formateur etc. The average duration of cabinet formation since 1946 is 71 days.

The fact that a new cabinet should be supported by parliament, i.e. a government can only govern if it can rely on the confidence of parliament, often leads to what are called winning coalitions. In that case the parties in government represent a majority of the seats in the Second Chamber. In general the parties in government represent a relatively large majority of the parties in parliament: on average 65%.

5.3 Data selection

The main goal of this chapter is to determine positions of political parties on a number of ideological dimensions. The first step then is to decide which kind of data to use. In the next chapter, coalition formation theories will be confronted with empirical research on coalition formation in the Netherlands. Therefore a database with a relatively large number of cases and enough information to place the parties on two or three dimensions is needed. The following types of data sets are available:

- Election surveys
- Voting on legislation
- Data on expenditure
- Expert data on positions of parties on issues
- Content analysis (manifesto data)

The first database, the Dutch Election Studies (NKO) is based on surveys held around every general election since 1967. Since 1977, questions on perceived policy positions of parties on some issues are included. The respondents are asked to place parties on seven or ten point scales.

An example is: "Euthanasia: Where would you place the PvdA (i.e. the social democratic party) on this line?" Options are then offered from 1. Forbid euthanasia to 7. Allow euthanasia. Another example is: "Income Differences: Where would you place the VVD (right wing liberals) on this line?" Options are then offered from 1. Larger differences to 7. Smaller differences. The information gathered by these questions is the kind of material necessary for testing our multi-dimensional theories. A drawback, however, is that these questions were not included until 1977 which means that there are only seven cases, i.e. the coalition formations in 1977, 1981, 1982, 1986, 1989, 1994 and 1998. Another disadvantage of these election

studies is that they only contain information on positions of parties on a small number of policy issues. On average, five or six questions about party positions on issues are asked. This is not enough if one wants to examine the dimensionality of the party-space and then make a configuration of the political parties. In order to obtain ideological dimensions that are predictive for policy positions of parties, more policy issues are needed. Technically, methods like Factor Analysis or Multi-Dimensional Scaling that can be applied to reduce the issue space, also require more variables in relation to the number of parties. Another problem with these mass-survey data is that they represent what the voters think the parties *should* do, and not what the parties actually do.

Data on voting on proposals for legislation and expenditure seem suitable because these data are 'hard evidence', but they have a disadvantage too. It is often hard to distinguish between coalition partners in these databases. During a governmental period, parties that govern together tend to spend money together and to vote together. Moreover, package deals are often made, which makes it even more difficult to determine policy positions of individual parties. Even though expenditure data actually show what parties *do* when they are elected, instead of reflecting promises, the fact that parties do not govern alone make these data unfit for our task. As Kraan (1990) moreover demonstrated in his PhD-thesis, different governments show hardly any differences in expenditure patterns. The expenditure and voting data are, in my opinion, useful if the goal is to study cabinet-parties versus opposition-parties, but they are less valid for the purpose of this research.

Several expert-survey databases are not very useful for our goal, since they only contain information on positions of political parties on one 'left-right' dimension (Castles & Mair, 1984; Hubert & Inglehart, 1995). Since I want to confront spatial coalition formation theories with empirical data, positions of parties on more than one dimension are necessary. For an overview of expert judgements on one left-right dimension, I refer to the appendix in Laver and Schofield (1990).

An important expert survey on party positions is the Laver and Hunt (1992) database. In this survey, country experts are asked to assign policy positions to political parties on several issues. This database is very broad and deals with interesting questions. For one, the questions as such are interesting because they were designed for the '89 formation and adjusted for 1994. Hence, issues that were particularly important in these years are included, whereas in other data sets important issues are missing and issues that are no longer political issues - i.e. issues that divide parties - are still included. In the Laver and Hunt survey, country experts positioned parties

on eight policy issues on a scale from 1 to 20. What is also interesting is that, in contrast to other data sets, information is included about the weights of policy issues for the parties and data on policy versus power orientation of parties. Despite the fact that the small number of cases makes this otherwise attractive data-set unfit for the task ahead - there are merely two cases available - these data will be used as control data to study the cabinet formation of 1989 and 1994 more thoroughly, and to examine whether the prediction efficiency of the theories is different, if different data sets are used.

In my opinion, the best qualification of the final database in this overview - the Manifesto data - is that *'in the land of the blind, the one-eyed is king'*. Much has already been written about these data, though not often in a very positive tone (Laver & Hunt, 1992; Laver & Garry, 1998). The methodological status of these data has been questioned. Quantitative content analysis is said to be a bad method to gather information about party positions since the procedure only counts the number of sentences that are concerned with each issue, while it does not inform us about the positions of parties on these issues. Most issues in the database are valence issues, which means that all parties agree on the goal - like environmental protection - but differ on how to reach this goal or on to which issue within the general set of issues priority should be given. In less than half of the cases, positive and negative attitudes on issues are distinguished. Moreover, the coding scheme provides 'only' 56 issues. This seems a large set of issues, but questions have been raised about the relative importance of the issues that are present and those absent in the coding scheme. I acknowledge these drawbacks, and yet it is this data set that will be used mostly in this research. The main reason is that the set includes more issues than other data sets and also runs over a longer period of time. Even though I shall only test coalition formation empirically in the Netherlands, it is interesting that this data set is the largest and most comprehensible set available. It contains data for 20 countries from 1945 to 1988². Using the Manifesto data set makes future empirical research, i.e. extending the empirical tests of these theories to other countries, relatively easy.

The following data sets and data reduction methods will be used in this study to obtain the data needed for empirical testing:

² The author is grateful to Volkens et.al, and Keman, H., and P. Pennings for providing the manifesto data. Volkens, A. et al. Manifestos Research project [computer file] Colchester: ESRC Data Archive, 1995.

- 1946-1994: In order to test four out of five spatial theories - Heart Solution, Proto-coalition Formation, Competitive Solution, and Maximal Satisfaction Solution - policy positions will be derived from the Manifesto data set by means of multi-dimensional scaling.
- 1946-1994: In order to test the Winset Theory, data on specific portfolio dimensions are necessary. The same data set is used, the Manifesto data, but another data reduction method, namely reliability analysis, will be applied.
- For 1998, data were not yet available when the empirical research for this study was performed, so I performed a computer-coded content analysis of the party manifestos.
- 1989-1994: the expert data set of Laver and Hunt (1992) and Laver (1995) will be used to check if the predictions based on multi-dimensional scaling of the Manifesto data in 1989 and 1994 and the predictions based on expert data comply.

As said above, we need multi-dimensional data on party policy positions for policy-based government formation theories. In this chapter we shall now discuss the various possibilities of determining policy positions and in addition provide policy positions of parties on a number of dimensions. However, we must bear in mind that the Manifesto data set is by no means a perfect database. The lack of systematic data on more than a single dimension of ideology makes obtaining policy positions and testing theories a tricky enterprise. The ultimate consequence of a shortage of good multi-dimensional data is that developing multi-dimensional coalition formation theories is useless, since they cannot be tested anyway. The least we can say in this respect is that in this research an attempt is made to test spatial theories.

5.4 Deriving Policy Positions of Political Parties with the Manifesto Data Set

In this section we shall study and describe content analysis in general and the Manifesto data set in particular. The next step is to perform data analysis in order to obtain party positions. The first part of this analysis will aim at deriving positions of parties on a number of dimensions that best represent their positions. For four out of the five spatial theories that will be tested, data on a number of dimensions are necessary in order to measure distances between parties and perceived positions of coalitions. For the fifth spatial coalition formation theory, which is based on dividing the cabinet portfolios, specific positions on a number of ministerial dimensions are needed. Analyses to obtain these data are performed at the end of this section.

5.4.1 Description of the Manifesto Data Set

The Manifesto Research Group is a special research group within the European Consortium of Political Research that has conducted content analysis of election programmes in 20 countries. The official title of the project is *Comparative Manifesto Project: Programmatic Profiles of Political Parties in Twenty Countries, 1945-1988*.

The Manifesto data are obtained by content analysis. Weber (1990) defined content analysis as “*a research method that uses a set of procedures to make valid inferences from text*”. Content analysis is basically a method for data reduction. Holsti (1969) defined three requirements for content analysis:

- 1) Objectivity: each step in the research process must be carried out on the basis of explicitly formulated rules and procedures.
- 2) Systematic: the choice of categories for coding should be done systematically, i.e. consistent with rules that are defined to answer the research question.
- 3) Generality: the finding(s) should have theoretical relevance (Holsti, 1969).

Weber (1990) suggests that content analysis should meet reliability and validity requirements. Nowadays, these two requirements are most referred to in texts on content analysis. The first demand - reliability - is very much like objectivity in Holsti's work. This means that the results of content classification should be invariant over time and over different coders. The last requirement - validity - refers to the content of the research and more or less combines the 'systematic' and 'generality' requirements. The method used by the Manifesto Research Group is referred to as quantitative content analysis, carried out by expert coders. Quantitative simply refers to the fact that the frequency of the issues occurring in the text is coded, whereas qualitative textual analysis is non-numerical and focuses on interpreting text. In the Manifesto content analysis, documents are selected, a coding scheme is constructed, and a counting unit is selected with which the programmes can be analysed.

The original goal of the research group was to operationalise a specific model of party competition, which held that parties compete with each other in terms of salience of particular issues. The Manifesto data therefore measure the relative emphasis placed on an issue and not the parties' positions on the issues. Unfortunately, the scarcity of policy data has led to using the manifesto data as policy positions.

The research group analysed original documents supplied by political parties, in most cases election programmes. Twenty countries are included in the project and the general time span is from World War II until the late 1980's. For the Netherlands, data for the formation of 1989 and 1994 are also included³. Political parties that participated in at least one cabinet since 1945 were included in the analysis. In Table 5.1, I present the cases for the Netherlands, i.e. the election years and the parties that are included in the data set:

PARTIES	PPR	PvdA	D66	VVD	CDA	KVP	ARP	DS70	CHU	PROGRESSIVE	CHRISTIAN
1946		*		*		*	*		*		
1948		*		*		*	*		*		
1952		*		*		*	*				
1956		*		*		*	*		*		
1959		*		*		*	*		*		
1963		*		*		*	*		*		
1967		*	*	*		*	*		*		
1971	(*)	(*)	(*)	*		(*)	(*)	*	(*)	*	*
1972				*				*		*	*
1977	*	*	*	*	*			*			
1981		*	*	*	*						
1982	*	*	*	*	*						
1986	*	*	*	*	*						
1989	*GRLINKS	*	*	*	*						
1994	*GRLINKS	*	*	*	*						

• (*): these parties are included in the platforms of combined programmes (Progressive and Christian).

Table 5.1
Dutch
documents
covered

³ These data (1989, 1994) were made available by Hans Keman and Paul Pennings who co-ordinated the content analysis for these elections.

- The first party on the list, the PPR was a radical left-wing party. In 1989 the PPR together with two other small left-wing parties, the pacifist socialist party (PSP) and the communist party (CPN), merged into Green Left. The party Green Left (GrLinks) is a left-wing alternative for voters who find the social democrats (PvdA) too moderate. The average support for these parties (the PPR and GrLinks) is about 3% to 4% of the electorate.

- The second party on the list, the PvdA has its roots in the labour movement and is the largest left-wing party in the Netherlands. This social democratic party usually gains almost one third of the votes and has been a partner in 8 out of 16 cabinets since 1946.

- The next party in the table is D66, Democrats66, named after the year in which it was founded. It is a moderate left-wing liberal party that originated as a party proposing constitutional reform. Its support ranges from 4% to 16% of the votes.

- The VVD is a right-wing secular liberal party and is the main opponent of the PvdA on social economic issues. In general, PvdA and VVD were alternating coalition parties for the main Christian Democratic Party. The average turnout of the VVD is 15%.

- The Christian Democratic Party, CDA, was officially founded in 1980 but already entered the elections of 1972 with a list. Three smaller religious parties merged into the CDA. These parties were the KVP (catholic party, the largest of the three), the ARP (protestant party) and the CHU (also a protestant party). CDA is, and before its founding the KVP was a centre party and a member in every cabinet until 1994. Its support ranges from approximately 20% to 35% of the vote.

- The DS'70 party was originally founded by discontented members of the PvdA, but became a right- rather than left-wing party. Its electoral support has always been small.

The last two programmes in Table 5.1 are joined lists. In 1971 and 1972, the three progressive parties - PvdA, PPR and D66 - joined a combined 'progressive' platform, whereas in the same years the religious parties did the same and formed a united Christian list. The parties that were member of these joined lists are put between brackets in 1971, since they are not included seperately in the 1971 analysis. Counting them twice would cause two problems. The first problem is of course that they would be analysed twice, the second that the number of parties (programmes) in 1971 would be much larger than in other years, which leads to a disproportional weight of this year when scaling methods are applied.

We continue with a brief overview of the coding procedures. These procedures are described extensively in the Userguide (ECPR, 1996). The content analysis is performed with election programmes, because these programmes cover a wide range of issues and represent the whole party. Moreover, the programmes are published before every election. The research group aimed at including all significant parties. In this respect a party is called a significant party if it has blackmail potential for being a coalition member (ECPR, 1996). Moreover, parties that are or have been members of a coalition are called significant parties and are thus included in the analysis, as are parties that are likely to become government members. Content analysis is a technique that provides a quantitative description of the documents. In this research, 56 issues divided in seven policy domains are distinguished. The coding unit in the party programme is a statement or argument. Usually this coincides with a sentence, but it can be that a sentence contains two arguments that are easy to identify and distinguish. In that case the concept 'quasi-sentence' will be introduced. This is a set of words containing one political idea. The total number of units of analysis equals the total number of quasi-sentences in a party programme.

If the (quasi-) sentences are identified, the next step is to decide in which of the 56 categories of the Standard Coding Frame these (quasi-) sentences fit. For dealing with difficult situations, like 'no or more than one category seem(s) to apply', specific rules are given. Finally, every coder in each country has to code the same exercise party platform in order to reach the highest possible degree of precision and standardisation. Only if the coder is able to 'code' this document well, she is allowed to code. The final score for an issue is the number of hits divided by the total amount of coded (quasi-) sentences.

The 56 issues are presented in appendix B. The seven policy domains over which the issues are distributed are:

- 1) External Relations
- 2) Freedom and Democracy
- 3) Political System
- 4) Economy
- 5) Welfare and Quality of Life
- 6) Fabric of Society
- 7) Social Groups

Most issues - 30 out of 56 - are uni-polar salience issues. This means that they can only be used to measure the emphasis given to these issues. For 13 issues, both a positive and a negative variant is included, for example 'internationalism positive'

and 'internationalism negative'. We can assume that if a programme makes more references to the positive than the negative variant of this issue, this party wants to increase internationalism. But even with these bipolar issues - that are more similar to position issues - it is difficult to interpret the results. A position on a seven- or 10-point scale ranging from more to less internationalism would provide more information.

For 30 issues, there are no positive and negative stands possible. The idea is - and actually this concept holds for content analysis in general - that if a party really favours something, it will mention this issue often and therefore have a high score on this issue. Klingemann, et al. (1994) describe this as follows: "*By stressing certain items and excluding others - without overtly denouncing the latter - parties are, to be sure, implicitly taking pro and anti positions*". This is a harsh statement since the absence of opposing sides on many issues can create ambiguity. For instance, we probably get into trouble if we assume that a party with a moderate position on an important issue like welfare will get a high score because this issue is mentioned a lot, whereas a party that has a more extreme 'pro-'position but does not say so much about it, will have a lower score.

Laver and Garry (1998) describe this problem very eloquently: "*Position and emphasis are utterly distinct parameters of party policy. One party may regard its centrist position on some issues as an electoral asset and devote a large section of its manifesto to emphasising this. A rival party may well, and equally justifiably given the policy positions of its closest rivals, regard its relative extreme position on precisely the same issue as an electoral asset. It may therefore devote a large section of its manifesto to emphasising this issue. The two parties thus have quite different substantive positions on the same issue, but emphasise this issue to precisely the same extent in their respective manifestos*". To summarise, the differences in scores on issues do not always reflect what we would like them to do. This is - of course - a problem of quantitative content analysis in general and not of the manifesto data set in particular. Since the original goal of the Manifesto Research Group (MRG) was to investigate whether the saliency model of party competition was correct, and not to provide policy positions of parties, all we can do is keep this in mind. What pleads for the salience theory of party competition - which is the basis for this content analysis (Robertson, 1976 and Klingemann et al., 1994) - is that in the Manifesto data set, many anti or negative issues also have empty or almost empty cells. This complies with the intention of salience theory, namely that if parties oppose certain policies, they simply do not mention them.

One of the strong points of the data set is that so many countries can be compared since the same coding scheme is used all over the world throughout the whole

post war period. This, I believe, is also the downfall of the Manifesto data set. It has led to the inclusion of issues that do not seem to fit to the Dutch political situation. Issues like ‘political corruption’, ‘foreign special relationships - negative’, ‘economic planning’, ‘controlled economy’ and ‘nationalisation’, are not political issues in the Netherlands, but are included in the coding scheme. This is a small problem since these issues simply get extremely low or zero scores, and low or zero variance. However, significant issues that should be included in the analysis but are not, i.e. issues on unemployment, inflation, and gender politics and equality policies constitute a more serious problem. Many immaterial issues like abortion, religion, homosexuality and euthanasia are, as a group, incorporated in other issues in the data set, for instance in issues about ‘traditional morality’ and ‘special social groups’. I believe that these immaterial issues deserve their own place in the coding scheme, and should have been coded separately.

In order to examine the coherence between issues in the different domains, I have performed reliability analysis and factor analysis of the issues within each domain. These data reduction methods will be presented shortly. The results of these analyses are bad, that is to say, there is not much connection between the issues within each domain.

The first method that I used in order to check the coherence between issues within a domain, and later on in order to find underlying dimensions in the policy space in general, is factor analysis. Harman (1976) gives a profound overview of factor analysis. In this work both the foundation and mathematical background, as well as different models of factor analysis are presented (Harman, 1976). Factor analysis refers to a set of techniques, the goal of which is to represent a large set of variables into a smaller set of hypothetical variables. Starting point for any kind of factor analysis is the correlation matrix of the variables. If any set of variables is highly correlated, this set can be treated as an imperfect measure of the same phenomena. If at the same time several sets of variables are mutually independent, this can mean that the data set consists of a series of uncorrelated ‘latent’ variables (Kim & Mueller, 1978). In two different kinds of situations, factor analysis can be performed. At one extreme, the researcher has absolutely no idea about which and how many underlying dimensions there are. In that case, exploratory factor analysis is used as a way of finding the minimum number of latent factors that can account for the observed covariation. In this type of analysis, the data are explored with an eye to possible data reduction. On the other extreme, the researcher anticipates for instance two factors and uses the analysis as a method for testing this hypothesis. This is referred to as confirmatory factor analysis (Scott Long, 1983).

The last type of analysis is performed to check whether the issues within the seven domains are highly correlated, and are thus different issues measuring the same phenomena. The expectation is that issues within one domain are highly correlated and can be represented with one latent dimension. For instance, the first ten issues (per 101 - per 110) measure the extent to which parties approve or object to a further growth of the external relations of a state. Factor analysis of these ten issues leads to four factors - underlying dimensions - all with an eigenvalue greater than one. The eigenvalue is the most common criterion by which the number of common factors (latent dimensions) can be determined. The average number of underlying dimensions that were detected when performing factor analysis is three per domain. This does not comply with our expectations. We expected one underlying dimension for every domain. Even two dimensions could have been satisfactory as long as the explained variance of the first factor would be high. For all policy domains, the explained variance for the first factor is low. The highest explained variance for the first factor is in domain 2 'Freedom and Democracy' which consists of only four issues, and amounts up to 40 %. In summary, the confirmatory factor analysis did not confirm the expectation that within each domain one latent phenomenon is examined.

The second method to examine coherence between issues within a specific domain is reliability analysis. By this method, scales are constructed for a variety of related - correlated - items. On a scale, responses to each of the items can be summed, resulting in a score for each case, in our case a score on for example external relations for every party. Reliability analysis starts with constructing a scale consisting of items that the researcher believes 'belong together'. If the correlation between the items on a scale and the scale itself are high, the scale is said to be reliable. If, for a particular item, the correlation between this variable and the scale is low, this item can be deleted so that the reliability of the scale improves. The reliability analysis uses a coefficient to test the internal consistency of a scale. The most common coefficient is Cronbach's alpha, which is based on the average correlation of items within a test. Since the alpha is an average correlation it ranges between zero and one; the closer the coefficient is to one, the better the scale. Reliability analysis is performed for the items within a domain, not to construct scales, but again to examine the coherence of the domains. Again, the results were not promising, the best scales those with the highest Cronbach alpha are for domain 2 'Freedom and Democracy' and for 6 'Fabric of Society'. The scales have alpha's .39 and .36 respectively. These alphas can improve if items are deleted, but this is not done since the scaling procedure was merely performed to get an impression of the coherence of the issues within a domain, and not to construct scales.

In this section, an assessment of content analysis and the Manifesto data was presented. In summary, we studied how the data are obtained, what the data look like, and how the data are divided in seven policy domains. The absence of some important issues and the presence of unimportant issues, as well as the lack of coherence between the various issues within the domains, were discussed.

5.4.2 Multi-Dimensional Scaling and Property Fitting

Obtaining policy positions for political parties from 1946 until 1994

Factor analysis and reliability analysis both use correlation matrices as input for the scaling procedure. As concluded in the previous section, these methods do not fit the manifesto data well. The lack of coherence between the issues within each policy domain also indicate that we cannot simply use the seven domains as seven latent dimensions and start testing our theories. For four of the spatial theories that will be tested in this research, party positions on two (or more) dimensions are nevertheless required. In view of all this, multi-dimensional scaling (MDS) will be applied. This method allows an analysis of the Manifesto data and gains party positions on a number of dimensions. The MDS uses proximity as input and then searches for a low-dimensional representation of the data, that is, a good estimate of the proximity between the parties. The results of MDS are inductively obtained positions in - for instance - two dimensions. The derived configuration will be interpreted by property fitting.

The procedures that are used to analyse the data in order to derive policy positions, and naturally the derived positions, will be introduced in this section.

Data Theory

Starting point for any sort of scaling is data theory. Any type of empirical observation can generate different kinds of data, and it is these data that we need for testing theories. In *Data Theory and Dimensional Analysis* Jacoby defines data theory as a theory that examines how real world observations are transformed into something to be analysed - that is data (Jacoby, 1991). In order to obtain these data measurement is necessary. Measurement refers to the process of applying numbers to objects in a meaningful way. Data theory, then, uses models that translate observations into data. One way to model observations is to take a geometric approach. Coombs developed several theories on the geometrical interpretation of data and argues the following:

“Many measurement models in the behavioral sciences are based on geometric representations of the observed behavior. Frequently this geometric representation is a one-dimensional scale but it need not be, and multi-dimensional representations are becoming more common. The points on these scales or in these spaces may represent individuals or stimuli or both, and the relations among the points reflect the observations according to some rule” (Coombs, Dawes & Tversky, 1970, p 32).

Data can be viewed as relations between points in a space. In this context Coombs et al. distinguish between two types of relations between the objects. The first class deals with comparisons between objects based on a dominance or order relation, whereas in the second class the proximity (or consonance) relations are considered (Coombs et al., 1970). In general, a dominance relation exists when one object possesses more of some characteristic than another object does. This is the case when for instance children's reading abilities at a certain age are compared. A proximity relation exists, when two objects coincide with each other to a greater extent. In the geometrical representation, entities are modelled as points within a space. If the objects are connected by a dominance relation, this is reflected by the ordering of the points along the dimension(s). If one object dominates another, its point is placed at a more extreme position on the dimension. Proximity is modelled as interpoint distance. If two objects become more alike - proximal -, the distance between their two points becomes smaller, and vice versa (Jacoby, 1991).

As said in the previous section, the most popular method for data reduction is factor analysis. This technique is often used to analyse the manifesto data (Budge, Robertson, Hearl, 1987, Klingemann et al., 1994). However, the data gathered in the Manifesto set - content analysis data - are more similar to proximity data than to dominance data, and are therefore not really suitable for factor analysis. This is also argued by Jacoby (1991) and by Van der Burg (1997). The fundamental difference lies in the entries of their respective data matrices. For factor analysis, correlations are represented as scalar products and the angles between vectors. Factor analysis would monotonically transform the correlations. The MDS models (dis) similarities as distances. It seems then that MDS is better equipped to model the Manifesto data as distances than to model them as correlations. My conclusion is that MDS is a more appropriate scaling technique for obtaining party positions from these data.

Multi-dimensional scaling refers to a family of techniques that use proximity among any kind of objects as input (Kruskal & Wish, 1978; Young, 1987). The MDS algorithms determine positions of objects in a space, based on the distances between these stimuli (objects). Different MDS techniques use different methods of translating

proximities into distances. All MDS methods have in common that they provide spatial representations of data. The main goal of MDS is to represent a more or less incomprehensible data-matrix in a spatial fashion that is easier to interpret (Kruskal & Wish, 1978).

The Manifesto data consist of percentages of the total amount of sentences in the manifesto for each of the 56 issues. The proximity between parties on all these issues is calculated and then the scaling can start. If the multi-dimensional scaling is successful it will provide the best possible low-dimensional representation of this proximity matrix. The scaling procedure that is used to gain this configuration and thus the party positions will now be presented.

The MDS Model

In our data set, party positions are determined by the differences in emphasis that parties place on the issues. In the MDS model, this means that the more different issues are emphasised, the more distant the parties will be. In order to perform an MDS analysis, a proximity matrix should be created.

In studies on multi-dimensional scaling next to nothing has been written on the creation of the proximity matrix. All that is said in for instance Roskam's manual on MINISSA about the input is: "*The data matrix must be a symmetric matrix of (dis) similarity indices ... The entries in the matrix are considered as ordinal measures of similarity or dissimilarity between the objects indicated by the row and column indices*" (Roskam, 1975). The same holds for many articles that contain otherwise detailed descriptions of the procedures (Coxon, 1982; Davison, 1983; Ahrens, 1974; and Shephard, 1974). The inference from this is that creating proximity matrices can be done in many different ways from very different kinds of data, and no strict requirements are in force.

In accordance with Van der Brug (1996)⁴, I find the city block metric most suitable for transforming the raw manifesto data into a proximity matrix. City block is not the most common metric, but it has the following two advantages as compared to the more common Euclidean metric:

⁴ Note that the method which I apply is used in the same manner as Van der Brug did, but the conclusions based on the analysis differ. Van der Brug (1996) concluded that positioning parties on one dimension is preferable to positioning the parties on two dimensions.

- simply taking the sum of the absolute differences between the scores on all issues to obtain proximity between parties is a very straightforward and easy method.
- the city block metric is less sensitive to ‘rightly skewed’ data, like the manifesto data, than the Euclidean metric.

Since I am not interested in how parties score on different groups of issues, nor in the relations between the issues, and since I only need a total proximity score for any pair of parties, the city block measurement seems a very straightforward method. The second argument, namely that the city block metric is considered more appropriate in case of ‘rightly skewed’-data, the exponential term in Euclidean distance would ‘over’-emphasise the issues in which large differences in emphasis are found, is also important. Euclidean distance would overestimate the difference in scores on these issues and thus ‘over-estimate’ the influence of ‘popular’ issues (i.e. issues with high scores and high variance) in the proximity matrix.

The formula for city block distances is the following:

$$d(x,y) = \sum_{i=1}^{56} |x_i - y_i| / 2$$

Where:

$d(x,y)$ is the distance between manifesto x and manifesto y

i is the index of the issues (56 in total)

x_i the proportion of coded sentences in manifesto x assigned to issue i

y_i is the proportion of coded sentences in manifesto y assigned to issue i .

The distances range from zero to one. If the distance between two party programmes is 0 this means that the same proportion of sentences is assigned to each issue in both documents; the distance is 1 if all issues present in one manifesto are not emphasised by the other, and vice versa.

After determining the proximity matrix, the next step is to perform the MDS. The scaling procedure produces a configuration of points from the proximity matrix. This configuration consists of party positions that present a good fit between the proximity matrix and representation in a low dimensionality. The MDS programme that was used is called MINISSA, and it applies the Minkowski EQ2 metric (which is an Euclidean metric) with a possibility to untie. The scaling itself is performed ordinal (i. e. non-metric).

In contrast to the lack of attention for the question which metric to choose in designing a proximity matrix, a lot of energy has gone into explaining the different MDS methods and metrics. The central idea for this step is to start with an

Euclidean metric and diverge from this only if:

- there are strong theoretical reasons to do so, or
- the results of the analysis are disappointing, i.e. high stress and/or non-comprehensible configurations. (Davison, 1983; Ahrens, 1974)

Coxon (1982, p 146) explains this as follows:” ... *the Euclidean metric appears to be robust against even extreme departures from its assumptions. ... Even if users wish to scale in a ‘simpler’ metric they are advised to begin with a Euclidean solution and work down (or up) to the preferred metric*”.

Another important justification for using Euclidean Distance, next to the ones mentioned above, is that the goal of this analysis is to find party configurations in an Euclidean space. Euclidean distance is the metric that meets our intuition since we always calculate in Euclidean space and the coalition formation theories that will be tested in this research are based on Euclidean distances between parties and coalitions.

I acknowledge that creating the proximity matrix with the city block metric, and then performing the scaling in an Euclidean space sounds counter-intuitive. Yet as I said earlier, compelling reasons have led to applying the city block metric for creating the proximity matrix. I have also mentioned that basically no requirements can be found in the literature for using a proximity matrix, and thus only the ‘uneasy’ feeling about using both city block and Euclidean distances is an argument against these steps. For either step however, the argumentation for the choice of the metric is clear⁵.

In summary, the scaling method that will be used in this analysis is non-metric - ordinal - scaling in a Euclidean space. The MDS programme that is used is MINISSA and the specific Euclidean metric is Minkowski EQ2, which includes a possibility to Untie (Roskam, 1975; Coxon, 1982).

The number of cases - manifestos - in the analysis is 73. I have decided not to perform one single MDS over the full data set. This would assume that the underlying dimensions would be the same during the whole post-war period, which I do not believe to be the case. The opposite alternative is to perform a separate analysis for every election year. This is not a good idea either. In separate analyses, the number

⁵ Moreover, the fear of violating the monotonicity demand in the scaling procedure is not realistic, since the monotonicity relation should hold for the transformation from the proximity matrix to the party configuration, and naturally this holds.

of observations - i.e. cases - would be too small for meaningful MDS. Therefore I have chosen, in accordance with Van der Brug (1996) to divide the complete data matrix in overlapping sub-matrices and then perform MDS. In these sub-matrices of approximately ten years, the underlying dimensions in the party system have not changed significantly. Dividing the data in sub-matrices of roughly ten years has led to the following ten periods:

Table 5.2
MDS-periods

PERIOD 1	1946	1948	1952	1956
PERIOD 2	1952	1956	1959	
PERIOD 3	1956	1959	1963	
PERIOD 4	1959	1963	1967	
PERIOD 5	1963	1967	1971	1972
PERIOD 6	1967	1971	1972	1977
PERIOD 7	1971	1972	1977	1981
PERIOD 8	1977	1981	1982	1986
PERIOD 9	1981	1982	1986	1989
PERIOD 10	1986	1989	1994	

In the analysis, we thus start with a sub-matrix and search for the configuration that best fits the data matrix. The motivation is that the distances between the points should correspond to the proximities.

Three measures of fit determine which configuration and thus which corresponding dimensionality is suitable to represent the party positions:

- The Shephard Diagram: a scatter diagram which plots the distances versus the proximities,
- The stress scores: a ‘badness of fit measure’, and
- Face validity: the question whether the configuration of party positions makes sense according to prior knowledge of party positions.

The first test of the correspondence is by a scatter diagram (or called Shephard diagram) which displays proximities on the horizontal axes and distances at the vertical axes. The best configuration of the data is the configuration with the highest ‘goodness of fit’. Next to the geographical representation of the fit - the Shephard diagram - the statistical equivalent, the stress factor, also informs us about the quality of the dimensionality of the space. The stress factor that actually is a ‘badness of fit measure’, measures the discrepancy between the dissimilarity and the distance

among all points. We denote the distance between programmes x and y as d_{xy} and their proximity as δ_{xy} . We can now define the following stress formula:

$$S \text{ (stress d-hat)} = \sqrt{\frac{\sum_{xy} \{d_{xy} - f(\delta_{xy})\}^2}{\sum_{xy} d_{xy}^2}}$$

where $f(\delta_{xy})$ is a real number assigned to the proximity obtained by monotone regression.

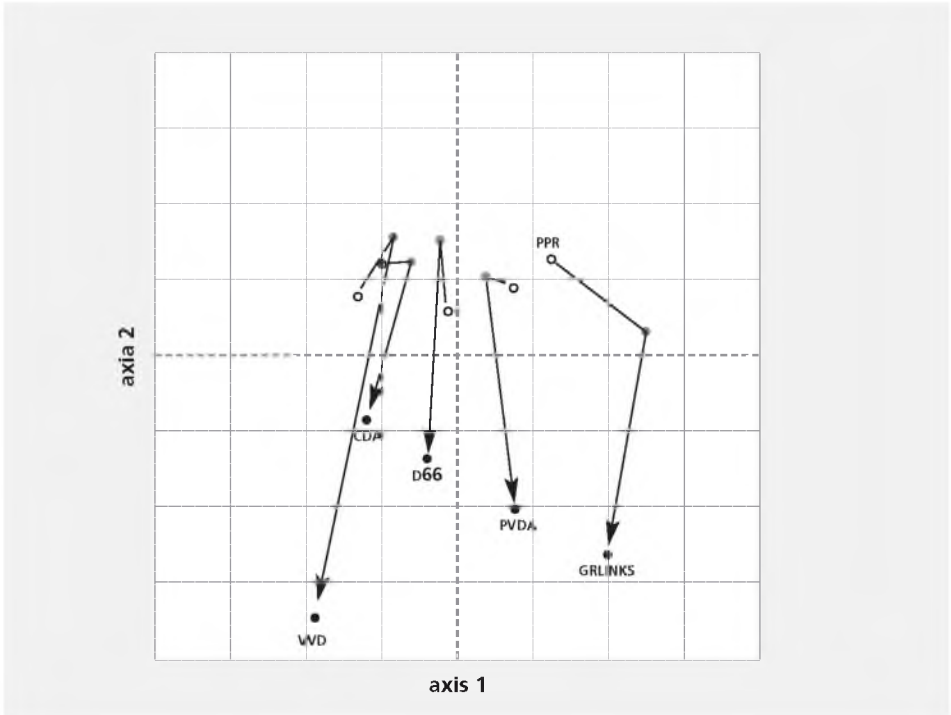
Note that the smaller the stress is, the better the representation will be. Remind that the stress decreases as the number of dimensions increases. In order to determine the dimensionality of the space we use the statistical technique and examine the 'stress', but one should keep the interpretability of the space and ease of use of the configuration in mind (Kruskal & Wish, 1978). As a rule of thumb, the following can be said about the stress or 'coefficient of alienation':

- Stress < .01 : excellent
- .01 < S < .05 : good
- .05 < S < .10 : fair
- .10 < S < .15 : moderate
- .15 < S : poor (Roskam, 1975).

As I said, not only the stress but also other considerations matter when the dimensionality of the space is determined. A third factor is interpretability. This is very important because all that has been proposed so far in this model is, roughly speaking, an inductive reduction of the multi-dimensional proximity space into a lower dimensional distance space. If MDS is performed, a two-dimensional representation of the distances between the manifestos can be derived. For illustrative purposes we shall now consider the MDS results for the manifestos in the 1986-1994 period.

In Figure 5.1, the parties are placed on two coordinate axes, which as such have no substantive meaning. The figure presents a plot of party positions based on the parties' 1986, 1989 and 1994 election programmes. The black dots are the positions of the parties. The lines connect party positions over time. An arrow denotes the direction. The first dot on a line is the party's position in 1986, the second in 1989 and the last - to which the arrowhead points - is its position in 1994.

Figure 5.1
Plot of the
two-dimensional
MDS solution
of the manifestos
in 1986, 1989
and 1994



The stress of this two-dimensional solution is .09, which means that the two-dimensional representation of these manifestos is, according to our rule of thumb, a fairly good representation of the data. Intuitively, the parties more to the right in this figure seem to be parties that we denote as left-wing, so we can suggest that there is a 'left-right' dimension crosscutting the figure. I would however like to be more systematic in the interpretation of the MDS space. It is important to realise that all directions can be used to interpret this Euclidean space. The directions of the coordinate axes do not necessarily have any substantive meaning. A more reliable alternative to simply examining the configuration and recalling what is already known about the political parties - like checking for the 'left-right' dimension - is a method based on linear regression. The computer algorithm, developed by Chang and Carroll (1972), for fitting outside property vectors into stimulus spaces, is called PROFIT. If a variable is expected to relate to the configuration, it is possible to perform a linear multiple regression, using this variable as the dependent variable and the coordinates of the configuration as the independent variables. In this way, all 56 variables can be regressed in the space. I have chosen to present only those variables in the plots that have a high explained variance and are at the same time vectors in different directions. Issues with more or less the same meaning and thus the same directions on the other hand do not lead to a significant increase of our understanding of the

party system. For the ten MDS configurations of the party manifestos, the most important regression vectors based on the 56 possible variables are included. Next, I have also made two scales that are useful for understanding the configuration of the manifestos.

These scales - a 'left-right' and a 'social values' scale - are included in the plots, if their explained variance for the configuration considered is high. The two scales are based on a number of issues from the original data set. The scales were constructed with reliability analysis. The left-right scale consists of the following issues:

- peace
- democracy
- nationalisation
- social justice
- labour groups: positive
- military: positive
- governmental and administrative efficiency
- free enterprise
- incentives
- economic orthodoxy
- welfare state limitation
- education limitation
- law and order

On the left-right scale, an emphasis on the first five issues is considered to refer to left-wing party manifestos, whereas the others issues are considered right-wing statements. The manner in which the scales are constructed will be discussed in the next section. Here we confine ourselves to presenting the scales. The first seven issues on the following 'social-values' scale determine the extent of libertarianism, whereas the last issue on the scale determines the extent of authoritarianism. The social values scale consist of the following issues:

- peace
- democracy
- anti-growth economy
- environmental protection
- national way of life: negative
- traditional morality: negative
- minority groups
- traditional morality: positive⁶

⁶The Cronbach Alpha scores for the left-right and social values scales are .68 and .78 respectively.

The results of the property fitting of the issues and scales in the 10 MDS configurations are presented in Table 5.3. Only the vectors with a high explained variance and substantive meaning have been included.

Table 5.3
Results of the linear regression procedure, including the positions of the property vectors on the MDS axes and their explained variance R².

PERIOD (MDS)	PROPERTY VECTOR	ISSUE OR SCALE	1ST DIM	2ND DIM	R ²
1946-1956	free enterprise	401	.78	.62	.92
	traditional morality positive	603	-.74	.66	.91
	left-right	scale	.22	-.97	.59
1952-1959	free enterprise	401	.14	-.99	.92
	traditional morality positive	603	.73	.68	.92
	left-right	scale	-.90	.43	.83
1956-1963	free enterprise	401	-.11	-.99	.88
	traditional morality positive	603	.95	.30	.86
	left-right	scale	-.48	.88	.89
1959-1967	freedom and human rights	201	-.99	-.04	.87
	democracy	202	-.95	-.31	.90
	social values	scale	-.95	-.31	.92
	left-right	scale	-.87	.49	.85
1963-1972	incentives	402	.20	-.98	.83
	social justice	503	-.99	-.07	.83
	left-right	scale	-.99	-.15	.94
	social values	scale	-.73	.68	.90
1967-1977	peace	106	.59	-.81	.88
	social justice	503	.99	-.05	.85
	left-right	scale	.97	-.26	.95
1971-1981	free enterprise	401	-.95	.32	.86
	social justice	503	.69	.72	.85
	left-right	scale	.90	.43	.94
1977-1986	social justice	503	.99	.11	.85
	welfare state expansion	504	-.19	.98	.92
	left-right	scale	.72	.70	.94
1981-1989	peace	106	.91	.42	.93
	economic goals	408	.99	-.10	.84
	left-right	scale	.66	.75	.93
1986-1994	freedom and human rights	201	.96	.29	.78
	welfare state limitation	505	-.69	-.73	.88
	left-right	scale	.21	.98	.97

The ease of use should also be considered in the choice for dimensionality. If, based on the statistical results (the stress), the researcher is not sure about how many dimensions to include, lower dimensionality beats higher dimensionality. It is much easier to examine and interpret a two-dimensional space than a three- or higher-dimensional space. Higher dimensional configurations have to be presented as a number of lower dimensional configurations that are related, simply because we cannot grasp more than three dimensions at once.

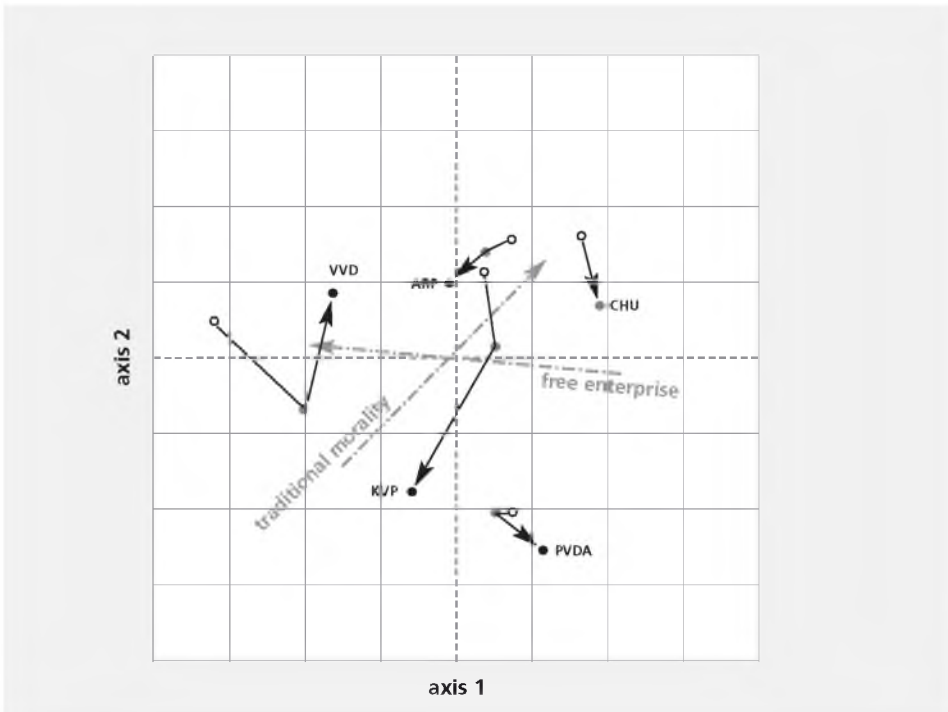
The ideal scaling result is a low-dimensional representation of the party system in which the dimensions are ideological dimensions. As said in the introduction to this chapter, in that case each dimension consists of a coherent group of issues that form an idea about how society should be organised. I follow the definition of ideology given by Hinich and Munger (1994):

“Ideology. An internally consistent set of propositions that make both proscriptive and prescriptive demands on human behavior. All ideologies have implications for (a) what is ethically good; (b) how society’s resources should be distributed; and (c) where power appropriately resides”.

If we obtain party positions on ideological dimensions, the ideology provides a set of linkages with the numerous policy issues in the m-dimensional policy space. In this case, the ‘latent’ ideological dimension predicts what parties will do on a number of policy issues. Remember our left right scale: if we know the position of a party on this scale, we can infer its attitude towards tax-policy or welfare issues. In *Analytical Politics*, Hinich and Munger (1997), further argue that ideology is a means of communication, commitment and budgeting. Ideology simplifies the message that is to be sent to the voter. If parties follow an ideology, they do not have to inform the voter about their position on every issue, since these positions can be inferred from the ideology. Moreover, ideology makes voters believe that the parties are committed to what they promise. The ideology can be seen as the reason why parties take certain stands on particular issues. Thirdly, the ideology provides information on how the state budgets will be distributed once a party is elected. Most interesting for our purposes is the fact that once we have party positions on ideological dimensions, we can expect these positions to represent a large number of issues, and can therefore rely on a low number of dimensions. Party positions on two or three ideological dimensions are the ideal input for testing our coalition formation theories. Unfortunately, this is not the output of our MDS. The important role of ideology is the reason why the left-right and social values (libertarian versus authoritarian attitudes) scales were designed. Hence, even though the party positions on the coordinate axes do not represent party positions on ideological dimensions, we prefer the property vectors across the space to consist of our ideological scales.

The MDS analyses yield ten two-dimensional plots. The policy positions of the parties in each sub-matrix can quite well be represented in a two-dimensional space. In this section, three MDS plots in which the interpretation of the configuration by means of property fitting is included, will be presented. The first is a plot of the manifesto positions in the 1952-1959 period, the second is a configuration for the 1970's, and the last is the same configuration of parties as in Figure 5.1 above, for 1986-1994, but differs in the sense that the results of property fitting are included. These configurations display different periods in Dutch politics.

Figure 5.2
Plot of
the two-
dimensional
MDS solution
of party
manifesto
in 1952, 1956
and 1959



Ever since the introduction of universal suffrage in 1917, the Dutch political system was characterised by 'verzuiling' or pillarization. This segmentation in subcultures is described in detail by Lijphart (1990). The country was divided in five minority groups that organised not just politics but almost every aspect of social life. The five minority groups were: the liberals politically represented in 1952 by the VVD, the working class (PvdA), the Catholics (KVP), and two protestant groups (ARP and CHU). The division is based on two main dimensions of conflict, the first being religion and the second social class. The same division in two dimensions can be found in

the interpretation of the MDS-configuration of the party system in 1952-1959. The first social class dimension is represented by the vectors left-right and free enterprise, whereas in the second dimension, traditional morality, divides the space into religious parties on one, and secular parties on another side. For this configuration the stress value is .11, which is characterised by Roskam (1975) as a 'moderate' result.

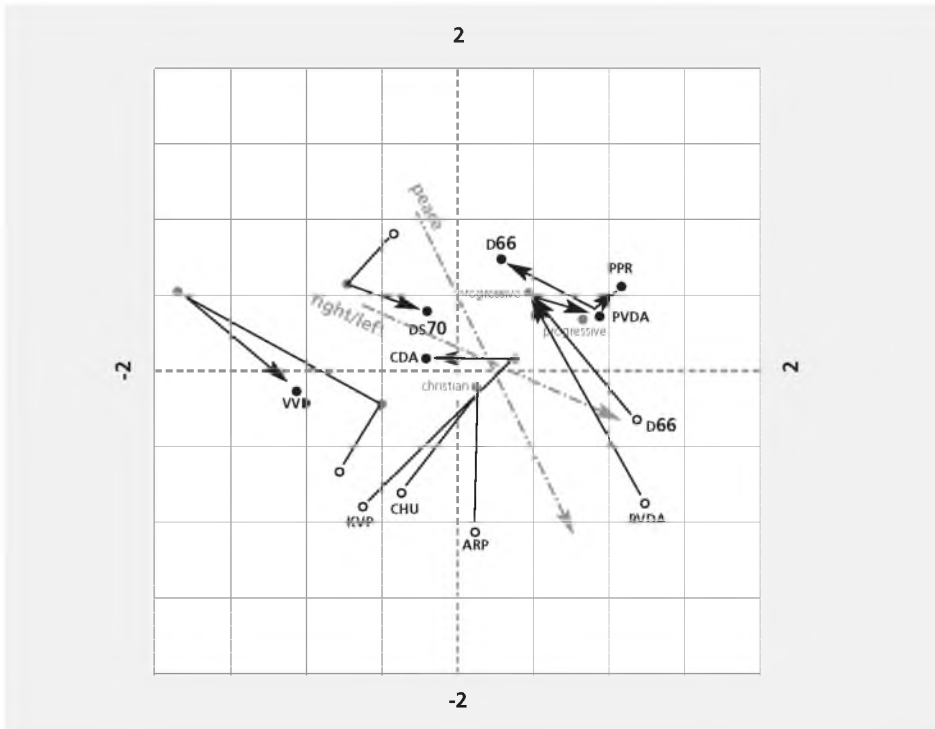
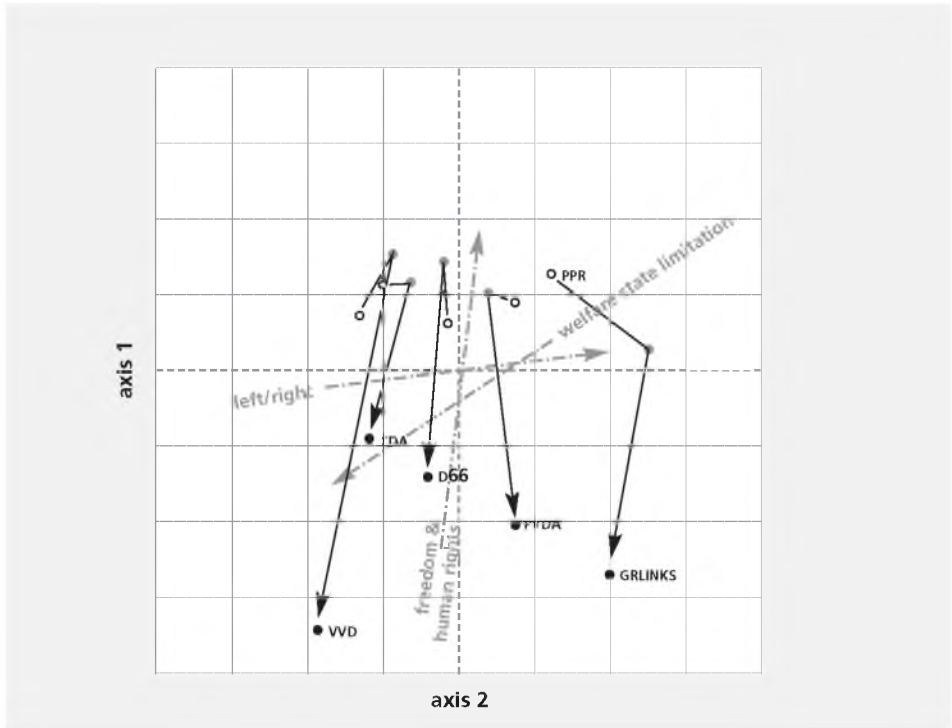


Figure 5.3
Plot of the
two-dimensional
MDS solution
of the manifestos
in 1967, 1971,
1972, 1977

In the late 1960's the political system started to change. Most important indicator of political change was the election result of 1967, when 10 % of the seats unexpectedly changed 'political hands'. This was a big event, since the period of pillarization was - among other things - characterised by a large degree of electoral stability. New political parties also appeared and the old conflict dimensions seemed to loose weight. In particular the role of religion in subcultures declined. These developments can be found reflected in Figure 5.3. Traditional morality - the issue representing religious denomination - is no longer an important vector giving meaning to the configuration. It seems that more weight is attached to social class, or to put it differently the left-right dimension, than before. Although an increasing number of parties can be found in this configuration, the stress value of the representation for the 1970's is .12, again a moderate result.

Figure 5.4
Plot of the
two-dimensional
MDS solution
of the manifestos
in 1986, 1989
and 1994



One of the results of the dwindling influence of religion on politics, and thus the decline of electoral support for the religious parties, was the amalgamation of three religious parties into one Christian Democratic Party (CDA) in 1980. Naturally this changed the balance of parties and seats. The central position of the CDA in the political space made it a pivotal player. All cabinets until 1994 included the Christian Democrats, and they used to govern together with one or two of the other main parties, the Social Democrats (PvdA), the left-wing Liberals (D66) and the right-wing Liberals (VVD). In our configuration, positions on the left-right axis - denoted by left-right and welfare state negative - are fairly stable. The relative positions of the parties compared to one another keep pace on this axis. The party positions do change in another direction in this period, but they simultaneously move in the same direction. The vector that most coincides with changes in this direction is 'freedom and human rights', which includes attitudes towards personal freedom, freedom from bureaucratic control, and individualism. The stress value of this configuration is .09, characterised by Roskam (1975) as a fair result.

These plots are interesting because they are graphical representations of the party space. Since a number of election programmes of each party are included in these plots, changes over time in party positions can also be detected easily. This is interesting,

but in order to test coalition formation theories, the only essential information are the coordinates for every party in every election year. Apart from avoiding dreariness, this is the reason why not all configurations are presented and no attempts to elucidate movements in party positions are made.

The coordinates and stress-scores for every configuration can be found in Appendix C. Since most party manifestos are included in a number of MDS analyses - because we used overlapping sub-matrices - we have distinct coordinates for identical manifestos. The following step is then to decide which configuration will be used for which election year. This could be a difficult choice if the MDS results were to be used in order to study party change over time. But since this is not our goal, and since the relative positions of the parties remain the same within the different configurations, this is not a problem. I have therefore chosen - whenever possible - to select the coordinates for a specific election from the configuration where this election lies most in the middle of the ten years included. In that case the substantive meaning of the space is 'most correct'. For the choices of configurations and the results of the scaling procedure in general, we refer to the tables in Appendix C. In these tables, the stress value is and the coordinates on two dimensions are given. The data that will be used for testing the coalition formation theories have been highlighted.

In this section, party positions based on a content analysis of the party manifestos were presented. The raw data contained information on the salience of issues. From these data, distances between parties were derived and multi-dimensional scaling was performed. This resulted in party positions on two dimensions for all election years included in the data set. These party positions will be used, in the next chapter to test spatial coalition formation theories.

5.4.3 Reliability Analysis. Obtaining portfolio positions for political parties from 1946 until 1994

The above data - derived by multi-dimensional scaling - are useful to test spatial theories that rely on the policy positions of parties in a multi-dimensional space. With MDS, we applied an inductive method and had the 'data speak for themselves'. This resulted in a configuration of the parties in a two-dimensional space that we could interpret by means of property fitting. However, in order to test the theory on credible proposals (Laver & Shepsle, 1996) a different kind of party positions are needed: policy positions on specific ministerial portfolios. A ministerial portfolio is a minister's portfolio, and a party is said to govern a policy dimension if it 'holds' the accompanying portfolio. Therefore a different scaling method will be applied.

With regard to the portfolio distribution theory, the following questions need to be answered:

- Which portfolios are considered key-departments in the Netherlands?
- Which policy-dimension best describes the jurisdiction of each key portfolio?
- Where does each party stand on each of these policy dimensions?

(Laver & Shepsle, 1996).

The first question was already answered by Laver and Shepsle (1996). They claim that for the Netherlands, as well as for many other countries they studied, the Finance and Foreign Affairs portfolios are most significant. Financial Affairs is an important portfolio because it symbolises the 'left-right' position of the parties. Other portfolios that are also important in this respect, are Employment and Social Security, and Economic Affairs. Parties are expected to have more or less the same positions on these portfolio dimensions as compared to their positions on Finance. Since the political experts in the Laver and Hunt survey (1992) also claim that Finance is the most important portfolio, this is the first portfolio that will be used in our analyses.

Attitudes of political parties on Foreign Affairs are in general less outspoken. In everyday discussions about politics, these attitudes are not on the top of the agenda. Yet, parties do hold different views on the extent to which countries should participate in international cooperative ventures such as UN forces. Even though the foreign issues policy dimension is usually not seen as one of the most important policy dimensions, the Foreign Affairs portfolio is an important ministerial portfolio in cabinet formation, and is therefore included in this analysis.

If we choose to add a third portfolio in the analyses, for instance in case the same party holds the portfolios above, the best option is probably to add Internal Affairs¹. It is an important policy dimension since it is concerned with the fabric of society. The dimension is based on attitudes of parties on bureaucracy, efficiency and law and order.

Even though Dutch political scientists would choose the so-called Triangle Finance, Economic Affairs and Social Affairs as the main portfolios, for this research, the two main portfolios will be Finance and Foreign Affairs. The classical Dutch threesome all belong to the same policy jurisdiction and therefore only one of them will be chosen. Moreover, in the Laver and Hunt (1992) and Laver and Shepsle (1996) studies, the portfolios Finance and Foreign were said to be the most important portfolios. The answer to the first question “Which portfolios are considered key-departments in the Netherlands?” is therefore Finance and Foreign. If a third portfolio is required by the coalition formation theory, Internal Affairs will be added to this list.

The answer to the second question “Which policy-dimension best describes the jurisdiction of each key portfolio” has already been given in the previous section. The left-right dimension best describes the portfolio Finance, whereas the Foreign Affairs portfolio is symbol for the foreign policy or internationalisation dimension. The third portfolio, Internal Affairs, belongs to the policy domain ‘fabric of society’, which describes the organisation of public rule.

Based on the Manifesto data set, party positions on these portfolio dimensions will be derived by simple reliability analysis. This will provide the answer to our third question: “Where does each party stand on each of these policy dimensions?” Using reliability analysis is a pragmatic choice, since the scales that we need cannot be obtained by MDS. Therefore, we shall use reliability analysis even though this technique is based on correlations between issues and not on similarities. We shall start with all issues and the same manifestos as described in Table 5.1. Measurement is necessary in order to obtain positions of the parties on the policy-dimensions represented by the main portfolios. The aim is to create scales that measure the positions on the portfolios as well as possible. A scale is said to be a good scale if the inter-item correlation is high. This means that there should be a clear connection between the

¹ This is based on a theoretical argument that is put forward in Chapter 4. The empirical consequences for predicting coalitions if one party holds both portfolios - whether in the former cabinet or in the new cabinet - will be studied in the next chapter. In short, it is possible in this case to predict a one-party coalition even if this party does not represent the majority in parliament.

items that together constitute the scale. In that case, the scale is a reliable measurement of the phenomena to be studied. Naturally the scale should be valid too. Otherwise any group of issues that happen to be highly correlated can form a scale. The procedure to carry out reliability analysis is the following:

- First the researcher selects a list of items that (s)he believes are good indicators for the scale.
- In the next step the analysis is performed. This is done with a computer program (SPSS PC version) that computes the correlations, constructs the scale and provides a scalability coefficient.
- This reliability coefficient, Cronbach's alpha, is based on the internal consistency of a test. Cronbach's alpha is always between zero and one, since it is based on the average correlation of the items within a scale. If the coefficient is high - let us say above .8 - the procedure ends because the items are good indicators for the scale. If the alpha is low, the item with the lowest correlation should be deleted, and the analysis should be repeated until a scale is found in which the items are highly correlated.

This procedure is followed for our three policy dimensions. I first transformed the raw data in order to weaken the influence of issues with extremely high scores. The raw data were first rounded down and then ordered from large to small. The rounding off downwards is done in order to avoid small differences in the raw data to cause large differences in the correlations. The ordering from large to small is done to avoid that issues with large values predominate issues with smaller values.

With this transformed data set, I performed the procedure presented above. The Finance portfolio is represented by the same left-right dimension as discussed in the former section. Again, the left-right scale consists of the following issues:

- peace (per 106)
- democracy (per 202)
- nationalisation (per 413)
- social justice (per 503)
- labour groups: positive (per 701)
- military: positive (per 104)
- governmental and administrative efficiency (per 303)
- free enterprise (per 401)
- incentives (per 402)
- economic orthodoxy (per 414)
- welfare state limitation (per 505)
- education limitation (per 507)
- law and order (per 605)

On the left-right scale, emphasis on the first five issues is considered to refer to left-wing party manifestos, whereas the other issues are considered right-wing statements. Again, for the content of these issues I refer to Appendix B. In order to construct a scale based on these issues, the scores on the first five issues are inverted. Since a high score on the first five issues would make a party more left-wing, and scores on the last eight issues would make a party more right-wing, it would be thoughtless to add them all. The left-wing scores are inverted and the right-wing scores not, so that a lower score puts a party more to the left, which meets our intuition. Exactly the same issues as in our scale are used by Van Kersbergen (1997) where these issues are referred to as 'typically left issues' and 'typically right issues'. The Cronbach alpha of this scale is .68. This is not by far an ideal scale coefficient. For a scale to be really good, the coefficient should be larger, but this is the best combination of validity and reliability that could be found. Naturally, in a data set constructed for obtaining policy positions, and not as in our case a data set created to study saliency, the likelihood of generating a better scale is higher.

The next scale that was constructed concerns the portfolio Foreign Affairs. In general, the foreign affairs issues in the Manifesto data set have low values, and for some of the issues within the External Relations Domain the parties hardly distinguish themselves. This has forced me to create a scale consisting of only two issues. These issues are internationalism 'positive' (per 107) and peace (per 106). The reliability coefficient for this scale is .67. A higher score on this scale means more internationalisation and promoting peace, whereas a lower score means less emphasis on these issues.

The scale for the portfolio Internal Affairs consists of four items. The Cronbach alpha coefficient is .64, which again is not high. The issues that are part of this scale are centralisation (per 302), governmental and administrative efficiency (per 303), political authority (per 305), and law and order (per 605). Bluntly, a higher score on this scale represents a positive attitude toward a stronger government.

These three scales, constructed with the manifesto data, are frankly the best I could do with the data. We must keep in mind that they consist of very few items each, and that they are not highly correlated - see the relatively low alpha scores - and are therefore not very reliable. Yet since there are no better data available, these scales still have to be used to assign positions to the portfolio dimensions of the political parties.

The last question in the introduction to this section was: “where does each party stand on each of these policy dimensions?” The position of a party on a scale is based on the average position this party has, on the items that together form the scale. Since the scales are formed with the transformed, as opposed to raw, data, the positions of the parties on the scales are also derived from the transformed data. The standardised scores of the parties on these three policy dimensions can be found in Appendix D. These policy positions stand for the positions of the parties on the portfolios, and can thus be used as input for our test of the theory of credible proposals in the next chapter.

5.5 Positions of Parties on the Main Ideological Dimensions in 1998: Computer-Coded Content Analysis

5.5.1 Computer-Coded Content Analysis of the Party Manifestos: Theory

Obtaining policy positions of parties in the present can be done with methods like expert surveys, elite surveys, mass surveys, or content analysis. In order to test theories on party competition or coalition formation in retrospect, the data on party positions should be improved. Since for past policy positions the formal texts, i.e. the party programmes, are the best possible information sources, Laver and Garry (1998) propose two important improvements for the Manifesto data. They suggest the following two methods to refine the content analysis:

- To redo the content analysis with a fine-grained coding scheme. This new coding scheme contains at least bipolar and most of the time three-polar issues (i.e. pro, con and neutral). The issues are also hierarchically structured, starting with defining to which domain an issue belongs and then refining more and more until they fit in a specific category. This method is similar to the original manifesto coding since expert coders perform the coding. The improvement lies in the more refined coding scheme, which allows us to obtain policy positions instead of measuring emphasis and it is at the same time expected to have higher coder reliability.
- The second, more revolutionary alternative to the qualitative expert coding is quantitative computer coding, which distinguishes itself from the former method by perfect ‘coder’ reliability and ease of use, especially when large documents are concerned (Laver & Garry, 1998).

I have decided to use the latter method for content analysis of the 1998 Dutch manifestos, for the following reasons. First, the reliability is better than in expert

coding. This goes without saying since there is no room for interpretation - a word is either in the text or is not - or mistakes in computing a word's frequency. Secondly, although computer coding is said to be less valid because it mechanically codes without being able to 'understand' the context, the other side of the coin is that expert coders are almost inevitably biased. The coder - being an expert - is familiar with the basic ideas of the parties, and can thus be inclined to interpret similar statements differently if they stem from different parties. Hence, Computer coding has validity advantages too. Thirdly, the fact that the first results of computer coding of the manifestos by Laver and Garry are promising, has also contributed to the decision. Laver and Garry have performed computer coding as well as the revised - fine grained - expert coding for Britain in 1989 and 1997 and Ireland in 1992 and 1997. They compared the results of these methods with the original MRG results and the Laver and Hunt expert surveys. They consider their results encouraging because the cross validation of the different methods is good, i.e. high Pearson correlations exist between the party positions derived by different methods. The estimates of economic left-right positions showed correlations above .84 (Laver & Garry, 1998). In conclusion, Laver and Garry suggest that "*computer coding of huge volumes of virgin text may be a viable undertaking*" (Laver & Garry, 1998).

In the next section, the computer-coded content analysis of the 1998 Dutch manifestos will be performed. For the most part, I shall follow the procedure described in Laver and Garry (1998). The following steps, which are the basic steps for any kind of content analysis, will be taken:

- Selection of the documents to be coded
- Defining the coding units (sentence, quasi-sentence or word)
- Defining the coding categories (dictionaries)
- Performing the analysis.

5.5.2 Computer-Coded Content Analysis of the Party Manifestos: Practice

High reliability of computer coding and promising empirical results of Laver and Garry's content analysis are part of the reason to perform the same type of analysis for the Netherlands in 1998. What is also important is the urge to explore possible methods that might solve the lack of reliable and valid estimates of party positions in retrospect. Better methods will in future years probably result in better estimates of policy positions, and improved empirical studies on party competition in general and coalition formation in particular. This section should therefore not only be seen

as a means to collect data for 1998, but most of all as a first effort towards improving the data on policy positions in general. However, this is a tryout and many improvements, especially by refining the dictionaries, should be made before applying the method in retrospect.

Computer coded content analysis is performed to obtain policy positions of the main political parties in 1998. The first step was to choose the documents to be analysed. The five largest parties - CDA, D66, GrLinks, PvdA, and VVD - are included in the analysis and the documents are the party manifestos. In this method, the next step is to design dictionaries of words that are relevant for a particular policy domain. These dictionaries are the coding schemes. In this procedure, the coding unit is a word. If these steps are accomplished, the computer analyses the texts word by word, and counts the number of words associated with each coding category.

After choosing the coding unit and the documents, the dictionaries have to be developed. Designing the dictionaries is a vital part of content analysis. Since there were no good dictionaries at hand, I designed my own. I did not have to start from scratch, because I decided to use the policy domains distinguished by Laver and Garry (1998). They applied the following categories for both refined expert coding and computer coding:

- Economic policy
- Social values
- Political reform
- Law and order
- Environmental policy

The next step is to allocate words to these coding categories. The dictionaries made by Laver and Garry were used as reference dictionaries. These reference dictionaries, the manifestos and common sense were used to design the dictionaries. Ideally, other important documents of political parties in the same period, instead of the manifestos themselves should be used, to develop the dictionaries. Using other documents to create the dictionaries is suggested by Laver and Garry (1998). In this way, we would avoid using the same texts for designing the wordlists and performing the analysis. Unfortunately, the same texts are used for both in this analysis. This is of course not very elegant, but being limited by time and lack of available reference documents has led to this procedure.

The main requirements for a word to be added to a wordlist are:

- it should have substantive meaning for a category, i.e. a validity requirement,
- it should be interpreted the same in all texts, i.e. there should be little room for ambiguity about the meaning of the word, and
- it should be discriminating between the parties, i.e. the frequency of a word turning up in a document should be significantly different for different parties (Laver & Garry, 1998).

For the categories distinguished above, I designed bipolar wordlists. For economic policy and social values bipolar dictionaries were created and content analysis performed. The same procedure was followed for the categories 'law and order' and 'political reform'. Dictionaries for these two domains were constructed, but they were later removed from the analysis, because the parties did not distinguish themselves on these domains.

Only for environmental policy is the wordlist uni-polar, since references to environment are made in the protection sense only. No sane party would actually state that it wants to destroy the environment. Even if a party is not willing to spend a lot of money on environmental protection, it will only make positive references. The difference in the extent to which parties choose for environmental protection is measured by comparing the percentage of words of the whole document dedicated to environmental protection.

The wordlist for left-wing words for the economic left-right dimension consists of typical left-wing words like 'care', 'state', 'insurance', 'health' and 'social security'. Words on the others side of the left-right dimension are 'growth', 'budget deficit', 'individual', and 'stimulate'. These words have substantive left- or right-wing meaning, and the frequency of these words in the different documents differs. The social value wordlist provides a list of liberal words on the one and conservative words on the other hand. Parties distinguish themselves on this scale and the words are relevant for each category. Liberal words are 'emancipation', 'equality', 'self-determination', 'freedom' and 'ethnicity', whereas conservative words are 'value', 'traditional', 'religion', and 'family'. The dictionary for ecological commitment is a very large dictionary, since environmental words are usually not ambiguous. The words with 'energy', 'soil' or 'resources' or even the term 'environment' itself, usually refer to environmental protection and are thus used in a pro-ecological sense. The wordlists for the domains *left-right*, *social values* and *environmental protection* can be found in appendix E. These dictionaries will be set down in Dutch. Anglo-Saxon readers will understand the meaning of the scales from the short overview above. Keeping the dictionaries in Dutch gives the opportunity to verify the results and to extend the same analysis with new documents.

The frequencies of words from the wordlists - obtained with the computer program KWALITAN (1998) - occurring in the documents, are portrayed in the following table.

Table 5.4
Counts of
coded words
in the party
manifestos
of 1998

PARTY	LEFT RIGHT		SOCIAL VALUES		ENVIRONMENT	TOTAL # WORDS
	LEFT	RIGHT	LIBERAL	CONSERV.	ENVIRONMENT	
GRLINKS	590	93	109	114	319	23025
PVDA	738	186	110	106	325	34275
D66	656	279	176	177	502	50744
CDA	636	176	153	267	239	33832
VVD	212	212	64	69	101	15959

The next step is to calculate the party positions on the policy scales. The position of a manifesto on the left-right scale depends on the proportion of left-wing statements as compared to the right-wing hits. For example, the position of Green Left on the left-right policy scale is the number of words coded right, minus the number of words coded left, divided by the total number of hits on left and right;

$93-590 / 683 = -.73$. The score for the D66 is $279-656 / 935 = -.40$. The same formula works for the value scale. The position on the ecological scale is computed differently. On this salience issue, parties always score positive. The position is therefore the proportion of words dedicated to environmental protection from the total amount of words in a document.

The ranges of these positions differ considerably, since the number of words in the dictionaries for social values and left-right, also vary considerably. For instance, the list and hits for left-wing words is larger than for right-wing words which means that all scores are below zero. The raw scores for environment are also very small since they are related to the total number of words in the document. To make comparing positions on different scales easier and to create better data for testing the theories, I have decided to transform the scores. On each scale, the largest score receives the value 1 and the lowest score receives 0. The other scores on the scale receive their normalised score, which is the raw score divided by the range of the scores on the scale. If differences in the size of the dictionaries induce a smaller range of scores on a particular scale than on another, and if at the same time these scales are perceived as equally important, this would (mis)lead to the conclusion

that on one scale parties are more alike than on another. This would influence the perceived party policy positions and would thus cause problems when testing the coalitions formation theories for 1998. The normalised scores of the Dutch manifestos in 1998 for left-right, social values and environmental protection can be found in Appendix E. For illustrative purposes, we present a graphical representation of party positions on the scales in the Figures 5.5 and 5.6.

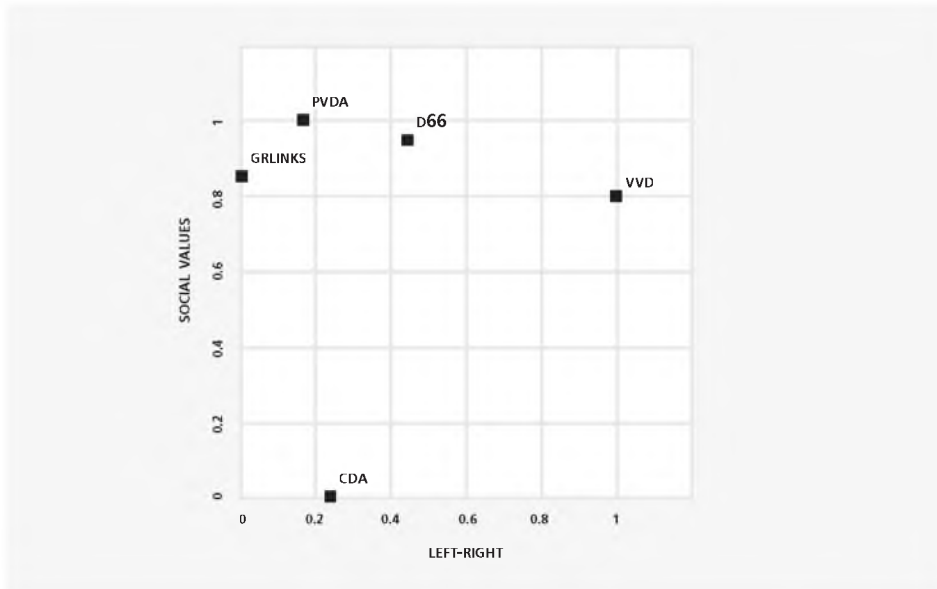


Figure 5.5
Left-right vs.
liberal-conservative
values in 1998

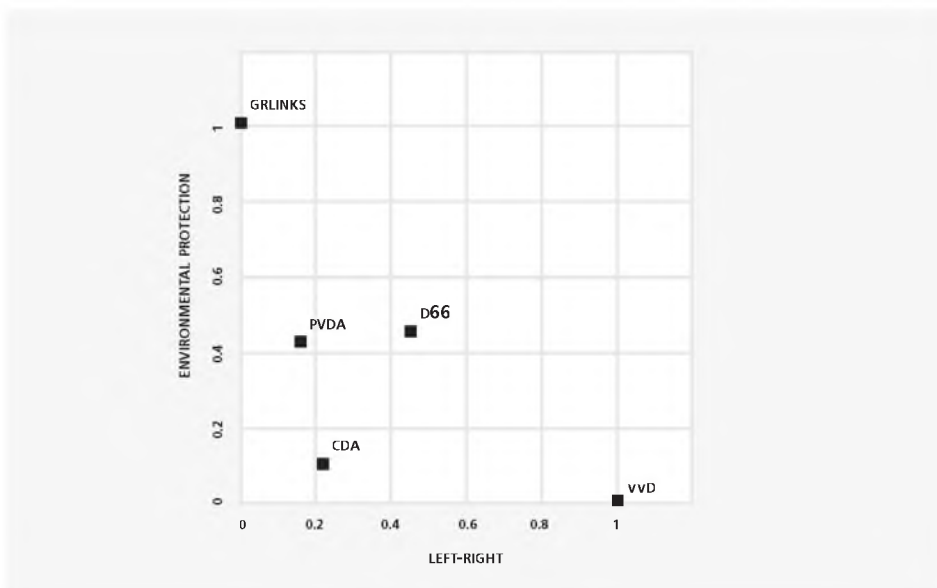


Figure 5.6
Left-right vs.
environmental
protection in 1998

Researchers from the Free University of Amsterdam have also been working on the 1998 party positions. Kleinnijenhuis and De Ridder performed expert content analysis in media, newspapers and television programmes in the months before the elections until Election Day in 1994 (Kleinnijenhuis & De Ridder, 1998) and in 1998 (Kleinnijenhuis et al. 1998). The emphasis of these studies is on issue ownership of parties, and less on issue positions like in our analysis. Still, it is interesting to compare these results and see whether or not they comply with our results. The issues in their 1998 research closely related to our scales are: environment, Christian ethics and left-right. The placement of the parties in relation to each other on the first two issues - in our research denoted as environmental protection and social values - are fairly similar but not identical to our results. On the social values dimension positions of parties have even changed place. In both studies the Christian Democratic Party is positioned far away from the other parties on the value scale, and the remaining parties lie closer together. However, on Kleinnijenhuis' scale, the most liberal party is the PvdA, whereas on our scale it is D66. Of course, these analyses were done with different wordlists, different documents and for different purposes, but since the same parties were analysed, one would expect the same positions to be found. It is, however, encouraging that on the economic policy domain we find the position of the Christian Democratic Party in both analyses further to the left on the left-right scale - even at the left-hand side of D66 - than its traditional position. In most studies, the CDA is positioned to the right of D66, and the fact that both studies show the same deviance from the CDA's traditional position increases confidence in the scaling method. Based on merely face value, the CDA manifesto of 1998 also seems to be more 'social', i.e. left-wing, than the D66 programme. Finding this unanticipated shift of the CDA in both analyses complies with the idea of high reliability of computer coded content analysis.

A criterion to validate the results used by Laver and Garry is to study correlation between scales constructed by different methods. Fortunately, Laver and Mair (1999) were so kind to provide the - not yet published - results of their 1998 expert survey. The results of the cross validation seem very promising. The lowest correlation coefficient can be found for left-right - based on computer coding - and general left-right in the expert survey: it is .865. If we apply and average this general left-right issue with the other left-right issue in the expert data set - taxes vs. public spending - the average correlation between these methods increases to .93. The correlation between the Laver and Mair environmental party positions, and the computer-coded environmental party positions is .97. The last dimension social values also provides promising results. The correlation between computer-coded social value positions and social values in Laver and Mair is .937; whereas computer-coded

social values and the Laver and Mair clerical issue scores .956. A summary of these results can be found in Table 5.5.

correlation coefficient	TAXES VS. SERVICES expert data	LEFT-WING VS. RIGHT-WING expert data	AVERAGE POSITION ON LEFT-RIGHT expert data
LEFT-RIGHT computer-coding	.973	.865	.93
correlation coefficient	PERMISSIVE POLICIES ON ABORTION/HOMOSEXUALITY expert data	CLERICAL expert data	AVERAGE POSITION ON SOCIAL VALUES expert data
SOCIAL VALUES computer-coding	.937	.956	.949
correlation coefficient	ENVIRONMENTAL PROTECTION expert data		
ENVIRONM. PROTECTION computer-coding	.97		

In order to construct decent scales, more research on content analysis and especially on designing wordlists is necessary. Also, the validation method should be applied and extended, so that a good criterion can be found to evaluate the computer-coding method in general. If this method for obtaining party positions on important ideological dimensions proves to be as promising as it seems, the next task is to perform computer-coded content analysis in retrospect.

Table 5.5. Cross-validating party positions: correlating computer-coding with expert data

5.6 Expert Data as Control Variables

In the Laver and Hunt data set, country experts of 24 democracies positioned parties on a range of policy dimensions. It is exceptional that in this survey also information on salience of the policy dimensions and the salience of the ministerial portfolios is gathered. Even though policy positions of the political parties in the Netherlands for 1989 and 1994 have already been constructed by means of MDS of the Manifesto data, this survey will be used too. Advantages of the expert survey are that the 'right' questions are asked, that the policy issues included seem important issues in society, and that information on the salience of issues and portfolios is included. Therefore, the party positions obtained by this data set will be used as control variables. If the policy positions in this expert survey are correct and if the

policy positions derived by the MDS are valid, the same policy positions should emerge from both data sets, so that the same coalitions will be predicted.

In this survey for the Netherlands in 1989, parties are positioned on eight policy issues on a scale from 1 to 20. The issues included are:

- taxes vs. public services
- foreign policy
- public ownership
- social policy (policy on abortion and homosexuality)
- religious dimension
- urban vs. rural interests
- centralisation of decision-making
- environmental policy

For the elections of 1994, Laver repeated the expert analysis but used “*a shorter survey form more closely tailored to the Dutch case*” (Laver, 1995). The scales with the lowest salience scores in 1989, which were centralisation of decision-making and urban vs. rural interests, were removed from the analysis. In 1994, the foreign affairs issue changed from ‘pro friendly relations towards the USSR vs. anti friendly relations toward the USSR’ into ‘pro or anti friendly relations towards the USA’. Four new issues were introduced to meet the changing political reality. These issues deal with policy on the European Union, immigration, institutional change and the welfare state.

Note that Laver and Hunt (1992) and Laver (1995) denote policy issues as policy dimensions. Since I want to reduce this issue space into a smaller dimensional space, I refer to these policy dimensions as policy issues and to the newly obtained dimensions as dimensions. For 1989, I shall reduce the dimensionality even though for some of our theories it might be just as well to use the eight issues as eight dimensions. However, for the graphical representations of the data and for comparability of the different data sets, it is preferable to reduce dimensionality and focus on the main dimensions. Moreover, I want to obtain party positions on more or less the same dimensions as found earlier. In that case the data can truly be used as a ‘control’ data set. Hence, I would like to find a left-right- and a libertarian-authoritarian (or social values) dimension in 1989 and 1994.

Reducing dimensionality was done in many different ways in this chapter. The techniques that I shall apply here are a combination of face validity and information on the salience of policy issues and correlations between the policy issues. More

inductive methodological techniques like factor analysis or MDS will not be used in this survey because the aim is to gather data on the dimensions that we have already detected in the previous sections.

First the results from the 1989 survey will be presented. The policy issues with the highest mean saliency scores are taxes vs. public services and social policy. These issues are very similar to the dimensions that I would like to find, namely left-right and social values. Since 'public ownership of business and industry' is also included in the survey, and since this seems to be a 'left-right' issue, this policy issue was also considered. The correlation between the scores on 'taxes vs. public services', which represents the attitudes of the parties toward raising or cutting down taxes for public spending, and 'public ownership' is very high, namely .98. A left-right scale was constructed of these two issues. Since the direction of these issues is the same, a score on this dimension can simply be obtained by taking the average score of a party on the two issues. Note that, a low score on the dimension again means a position more to the left than a high score.

The second dimension in the multi-dimensional scaling of 1986-1994, represented by the property vector 'freedom and human rights', and in the 1998 content analysis represented by social values, should be the score on the policy issue 'social policy'. Social policy consists of attitudes of a party that promote or oppose permissive policies on matters such as abortion and homosexual law. A high score on the social dimension means a more conservative attitude, whereas a lower position represents a more progressive attitude. The scores on the left-right dimension and the social policy dimension for 1989 were added as control data and can be found in Appendix G in table G1.

Like in the sections above, different data are needed for the theory on ministerial portfolios. Questions on the salience of portfolios are asked in these expert surveys. As we observed earlier, finance and foreign affairs seem the most important portfolios. The score of a party on left-right - representing the finance portfolio - is the same as above. For the score on foreign affairs, the foreign policy issue is used. A low score on the left-right dimension is again more left- than right-wing, and a low score on the foreign affairs dimension is a positive attitude towards friendly relations with the USSR, whereas a higher score is a more anti USSR attitude. The data can be found in table G2 in appendix G.

For 1994, the same pattern is followed. A difference is that the left-right dimension includes a new issue, namely 'welfare state'. This issue concerns promoting versus cutting back on existing welfare benefits. The left-right dimension is thus composed of

three policy issues: taxation, public ownership and welfare state. The second dimension is again social policy, which measures policy on homosexuality and abortion. Another new issue, namely immigration policy, i.e. accepting immigration and promoting policies helping immigrants versus opposing immigration and opposing any policies helping immigrants, also has high salience. This new issue in the survey can be added as a separate dimension. I will however not include it, since I prefer to apply dimensions that are as similar as possible to the dimensions constructed with the other data sets. The data for 1994 on the two dimensions can be found in table G3 of appendix G. The direction of the scales is the same as in 1989. For the theory on the distribution of portfolios, we look once more at Finance and Foreign Affairs. The finance portfolio is policed by the left-right dimension. The Foreign Affairs portfolio is the average score on two foreign issues, namely ‘foreign policy’ and ‘European policy’: opposing versus promoting a close relationship with the United States, respectively opposing versus promoting a close relationship with the European Union. Note that for this dimension the direction has changed as compared to 1989. A low score means opposing a close relation with the USA and the EU, whereas a high score means promoting these relations. The data on the positions of the portfolios for the parties in 1994 can be found in table G4 in appendix G.

Applying statistical tests to evaluate the party positions of the different data sets is not advisable, because we do not have many cases, and the dimensions - except for left-right - obtained by the different data sets are not similar enough. To test the

Figure 5.7
Party positions
in 1989, based
on expert data.

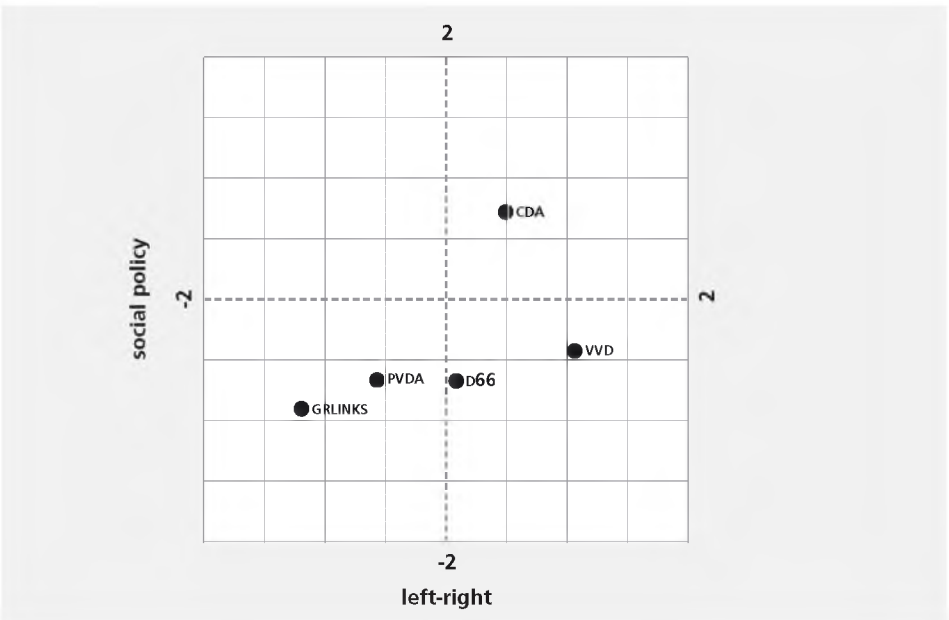
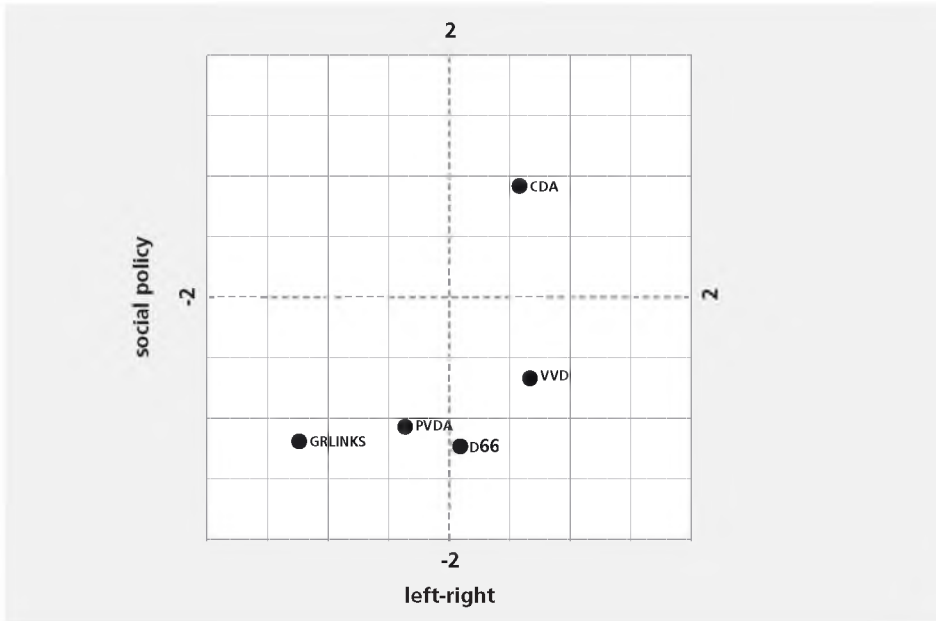


Figure 5.8
Party positions
in 1994, based
on expert data.



main spatial theories, we use the two dimensions, namely left-right and social values. The latter dimension consist of a quite different issue in the Laver and Hunt survey - policy on abortion and homosexuality - as compared to the most suitable property vector from the manifesto data, i.e. freedom and human rights. Comparing the party positions of the Laver and Hunt survey for 1989 and 1994 with the MDS results of the manifesto data for the same period is thus difficult. The party positions on these dimensions are presented in Figure 5.7 and Figure 5.8.

It is hard to compare the MDS results with the expert survey results, since the policy positions derived by Laver and Hunt (see above) are on the main axes, whereas the positions of the parties on the dimensions in MDS (see Figure 5.4) can be found with the property vectors. It seems that the left-right positions of the parties are more or less similar in both data sets, or at least the order of the parties on this dimension is the same. However, the positions of the parties on Laver and Hunt's social policy dimension and on the 'Freedom and Human Rights' vector of the manifesto data are very different. Especially the traditional 'conservative' position of the Christian Democratic Party (CDA) is not found in the MDS solution. This is probably caused by the fact that the issue 'freedom and human rights' does not relate to issues that are traditionally opposed by the churches, whereas abortion and homosexuality are issues that religious parties in general do not support.

We can also compare positions on the portfolio dimensions of the Laver and Hunt data set with the positions gathered by reliability analysis of the manifesto data. For both data sets, Finance and Foreign Affairs are examined. Again, the positions of both databases on the finance portfolio - policed by left-right - are very similar. The Foreign Affairs dimensions consist of different issues and unfortunately the two data sets produce very different policy positions. In the 1989 Laver and Hunt data set, the foreign portfolio is represented by opposing vs. promoting a close relation with the USSR. Green Left (GrLinks) promotes this relation whereas the Liberals (VVD) oppose a close relationship. In 1994 however, the survey concerns opposing vs. promoting a close relation with the USA, and opposing vs. promoting a close relation with the EU, and the scores are reversed. For instance, the Liberals opposed a close relation with the USSR in the 1989 survey, but promote a closer relation to the USA and the EU. There seems to be hardly any connection between these party positions, and the positions obtained by reliability analysis of the manifesto data that concerned attitudes towards internationalisation and peace. Not only did we find large differences in the positions of parties between the two data sets, we also found an extremely large discrepancy in the party positions of 1989 and 1994 within the manifesto data. Even though the same issues were used, most parties changed place on this dimension. If we suppose that the Laver and Hunt survey is valid, and thus believe that the positions of the parties on their foreign policy issues make sense, this leads to the conclusion that the Foreign Affairs scale derived from the manifesto data-set is problematic. Omitting these data, however, would mean that the portfolio theory could not be tested for cabinet formations before 1989. Hence, we continue with these data, and again keep in mind that the manifesto data are not as valid nor reliable as we would like them to be.

5.7 Concluding Remarks

In this chapter, we first described the Dutch political system. It appears that the Queen has a peculiar position in the cabinet formation process. Exactly indicating the Queen's influence turned out to be impossible, but the overall conclusion is that her political role and influence definitely exceeds the connotation 'symbolic'.

Secondly, the Manifesto data set was used to obtain party positions for 1946 until 1994 on the main dimensions. The greatest part of the data was analysed with multi-dimensional scaling, and the outcomes seem to make sense. The stress scores (remember that the lower the score, the better the result) are fairly high - between .09 and .18 - but still not too bad, and the interpretability analysis with Profit provided

good results. However, we must not forget that the Manifesto data were collected for another purpose than obtaining party positions, and therefore the quality of the raw data is not very high. The results from our analyses are the best we can get. The resulting party positions will be used for testing spatial coalition formation theories.

Thirdly, reliability analysis was performed with the Manifesto data in order to collect data on portfolio dimensions for 1946 to 1994. The results are not promising. The scalability scores are not good - .68, .65 and .67 - but at least the dimensions - left-right and foreign affairs - consist of issues that are expected to represent the main portfolios well. However, as we have seen in the previous section, especially the foreign affairs dimension causes problems.

A computer-coded content analysis – based on the approach developed by Laver and Garry (1998) - was performed for the 1998 coalition formation. The party manifestos of 1998 were analysed, and scales were made. Party positions on an environmental scale, on left-right, and on social values were gathered. For this election year, no data were collected for the specific portfolio dimensions. This analysis is an important first step towards developing a reliable and valid method for obtaining policy positions, both in the future and for retrospective research.

The last step was to study the Laver and Hunt data set. These data were not fit for our task, since the survey was at the time of testing only held twice; namely in 1989 and 1994. Positions of parties on a large number of important issues are examined. Information on the position and importance of portfolios is also included. This makes the data set valuable, but more cases are needed to test the theories. This data set was however used as a control variable. The resulting party positions of the MDS with the manifesto data and the resulting positions of the expert data were compared for 1989 and 1994. The positions of the parties on the left-right dimension are quite similar, but the positions on the values dimension in the Laver and Hunt data set and the positions on the vector 'freedom and human rights' in the MDS display great differences. The same problem was found with the party positions of these data sets on the portfolio dimensions. Again, left-right seemed reliable, but Foreign Affairs caused problems.

Even for an optimist, the conclusion must be that the party positions gained by our data sets are not very reliable. The lack of reliable multi-dimensional data is a large handicap. If, in the next chapter, the hypotheses of the coalition formation theories are falsified, we cannot be sure if this is caused by the data-problem or by a theoretical deficiency. The differences between the data sets can simply be caused

by the fact that different issues produce scales that I would like to be the same but are probably not. It might also be the case that the MDS solutions are reliable, but the interpretation of the property vectors causes the deviance from the other data sets. I suggest that the best thing to do is continue with testing the theories, and at the same time be critical about the results.

6. Empirical Confrontation of the Coalition Formation Theories

6.1 Introduction

The most common office- and policy-seeking coalition formation theories were presented in Chapter 3. Hypotheses that were derived there will now be confronted with data. The cases that we shall study are cabinet formations in the Netherlands, since World War II. Only coalition formation that follows elections is taken into account in the analysis. This leaves 16 cases of coalition formation in the Netherlands after the Second World War: 1946, 1948, 1952, 1956, 1959, 1963, 1967, 1971, 1972, 1977, 1981, 1982, 1986, 1989, 1994 and 1998.

In order to test power-oriented, policy-oriented and actor-oriented theories, data on the number of seats of parties and the position of parties on a uni-dimensional scale are necessary. The legislative power of the parties and the coalitions that have been formed can be found in the 'Compendium voor politiek en samenleving in Nederland', which is a compendium of Dutch Politics (Daalder & Schuyt, 1986). Party positions on a uni-dimensional ordinal scale are also available (Van Roozendaal, 1992).

For testing spatial theories, presented in Chapter 4, metric data on party positions on more than one policy or ideological dimension are needed. These data were gathered, and the results of the analyses presented, in the previous chapter. These spatial theories will also be tested in this chapter.

Not every political party has been selected for the analysis. This is partly my choice but mostly motivated by the Manifesto Research Group's selection of parties. Since it is my general aim is to compare the theories as well as possible, only parties that were included in the Manifesto data set are included in the analysis. If, we would for instance use all possible parties when testing office-seeking theories, and only the 'significant' parties for testing spatial theories, the comparison would not be fair. Not much is said in the Userguide of the Manifesto Project about the criteria for selecting parties. Parties with blackmail potential are said to be included. This excludes very small parties, but it also excludes the communist party after WW II, even though it had ten percent of the seats in 1946. Coalition potential is defined as 'the actual or former membership in a government' or 'the possibility of becoming a government party' (Manifesto Userguide, 1995)¹.

¹ In one case, I have removed a party even though it was in the data set. The Democratic Socialist party, 'DS'70', was no longer a significant party in 1977: it only had one seat.

The first step is to examine whether or not the theories predict the coalitions that came about - i.e. whether or not the theories would have predicted the so-called historical coalitions². This is simply done by confronting the theories with the election results, and if necessary the policy positions of the parties. For each theory the results of the testing and an example of the procedure to derive a prediction set will be presented in the Section 2.

In Section 3, the success rate and prediction efficiency of the theories will be determined and evaluated. For a sound description of the concepts success rate and prediction efficiency, I refer to Steunenberg (1992). The first is the ratio of correct predictions by the theory. The correct coalition is of course the historical coalition. The latter compares the success rate with the total number of predictions by each theory. This enables us to compare naïve theories - with broad prediction sets - with more thrifty theories. Both measurement tools are descriptive and are used to gain more insight in the predictive power of the theories.

Since information about the statistical strength of the theories is also needed, the following step in this chapter is to perform a statistical test. In the past, several statistical tests have been suggested to determine the predictive power of coalition formation theories. The tests start from the notion that the number of correct predictions by a theory should be higher than the number of correct predictions based on a random selection of coalitions (Taylor & Laver, 1973; De Swaan, 1973; De Swaan & Mokken, 1980; Boute, 1988; Steunenberg, 1992). Various kinds of tests based on this idea have been performed. De Swaan (1973) applies the 'Fisher exact probability test'. The null hypothesis is that the random selection of coalitions selects the same number of historical coalitions as the theory, whereas the alternative hypothesis states that the selection of historical coalitions by the theory is more accurate than the number of correct predictions selecting random. The question is: does the theory predict better than a random selection? To answer this, a one-tailed hypergeometrical test is performed, since the variables are discrete. Every period leads to one unique prediction set, even though during inter-electoral periods more than one cabinet formation can take place. In the statistical test, De Swaan and Mokken (1973,1980) consider one period as sampling without replacement.

Taylor and Laver (1973) however, examine all cabinets within a period. They apply sampling with replacement and use a binomial distribution. They further

² In accordance with - among others - De Swaan and Mokken (1980), I refer to the coalition that actually came about as the 'historical coalition'. This is to distinguish between the coalition(s) predicted by the theory and the actual coalition.

apply a correction for discontinuity. The largest difference between the two test statistics is that De Swaan and Mokken use a different admissible set than Taylor and Laver. De Swaan and Mokken only allow winning coalitions in the admissible set, whereas the latter allow all possible combination of parties. Note that the admissible set is the set of feasible coalitions. De Swaan and Mokken's admissible set seems reasonable since most theories assume the majority principle anyway. Moreover, if we enlarge the admissible set by permitting minority coalitions, this may lead to an overestimation of the predictive power of the theories.

Boute (1988) and Steunenbergh (1992) both use a very large number of cases, since they test municipal coalition formation, view the binomial distribution as a normal distribution, and use Z-statistics.

In Section 4 of this chapter, a statistical test based on simulation will be performed. In this empirical study, the number of cases is very small, the variables are discrete - either a right (1) or wrong prediction (0) - and it is possible to exactly determine the probabilities at stake.

I agree with Mokken and De Swaan that, even though more cabinets were formed than elections held, we have a unique prediction set - that is, the set of coalitions predicted by a theory - for every period. As such, I suggest that for the purpose of testing, we only consider the first coalition that is formed after an election. Another argument for admitting only one prediction set every electoral period is that during an inter-electoral period party positions hardly change, and the weights of the political parties certainly do not change, so that the game stays exactly the same. Hence, only coalition formation that follows elections is taken into account in the analysis.

Further, I prefer only winning coalitions in the admissible (feasible) set. In the two cases that a version of a theory, i.e. the winset allocation distribution and the heart solution, allows minority coalitions, I shall adjust the admissible set and study all possible combinations of allocations or parties. Since all other theories in this study are based on the assumption that winning coalitions will be formed, and since it is not common in the Netherlands to form minority coalitions, it seems reasonable to exclude the possibility of minority cabinets and use as the standard the set of winning coalitions.

The exact probabilities for each theory, for each case of coalition formation, will be determined and then coalition formation will be simulated 50.000 times. The probability of a theory is the number of coalitions in its prediction set divided by the number of admissible coalitions for that year. The theory of minimal winning coalitions, for instance, predicts 4 coalitions out of 12 possible winning coalitions for 1946. Hence the probability of this theory predicting correctly in 1946 is $4/12$. Based on probability and the probabilities for other years, simulations will be run.

Then a one-tailed test is performed, and if the success rate of a theory lies within the region of rejection ($\alpha = .05$) of the simulated distribution, the theory performs better than random. In this case the null hypothesis, predicting that the success rate of the theory and random will be equal, should be rejected.

In Section 5, the results of the theories based on the control variables are discussed. For 1989 and 1994, I have added data on party positions based on expert surveys in order to evaluate the degree to which different data bases lead to different policy positions and, as a result of that, to different predictions.

In the final section, concluding remarks on the prediction power of the various classes of theories will be made.

6.2 Testing Coalition Formation Theories

This chapter will follow the same order as Chapters 3 and 4. We shall start with tests for office-seeking theories, continue with uni-dimensional policy-seeking theories, then deal with the actor-oriented theories and end with spatial theories of coalition formation. For the first three classes of theories, one case will be discussed and then the results of the theories for all 16 cabinet formations will be presented. Since spatial theories are often complicated to test empirically, more examples will be given there.

6.2.1 Office-Seeking Theories

Three power-oriented theories were presented in Chapter 3: the theory on minimal winning coalitions, which predicts coalitions that become losing if any party leaves it; the minimal size theory predicting combination of parties that have as few seats as possible and are still winning; and the bargaining set which selects winning coalitions with the smallest number of players.

We shall first examine the weighted majority game and compute which combinations of parties are logically possible, and then select all winning coalitions. Coalition formation in 1946 will be reviewed. In 1946, the Second Chamber counted 100 seats and the quota is thus 51. The following parties - ordered from left to right - are included in this example: the Social Democrats (PvdA), the Catholics (KVP), the Protestants (ARP), another Protestant party (CHU) and the Liberals (VVD). The corresponding weighted majority game is [51; 29, 32, 13, 8, 6]. The total amount of seats does not add up to 100, which is caused by smaller parties

that are not included in the Manifesto data set, and that will not be included in the testing. The ‘missing parties’ are the Communist party with 10 seats and a small Reformed (protestant) party with 2 seats.

There are 26 possible combinations of two or more parties: 10 two-party combinations, 10 three-party combinations, 5 four-party combinations, and the grand coalition³. The only two-party coalition that is winning is the PvdA-KVP coalition, denoted by the first letter of the party names: {pk}. Out of the 10 possible three-party coalitions only 5 are winning; all four-party coalitions as the grand coalition are also winning. For this example, I present the set of winning coalitions in Table 6.1. Note that, the coalitions are again denoted by the first letter of the included parties.

Table 6.1
Winning coalitions in 1946

COALITION	PK	PKV	KAV	PKA	PKC	KAC	PACV	PKAV	PKCV	KACV	PKAC	KACV
WEIGHT	61	67	51	74	69	53	56	80	75	59	82	88

The following office seeking hypotheses were tested for all 16 cases.

Let $G = (N, W)$ be a simple game.

Then only coalitions from W^{MIN} will be formed (Von Neumann & Morgenstern, 1990).

Let $[q; w_1, w_2, \dots, w_n]$ be a weighted majority game.

Then only coalitions from W^{SIZE} will be formed (Riker, 1962).

Let $[q; w_1, w_2, \dots, w_n]$ be a weighted majority game.

Then only coalitions from W^{BAR} will be formed (Leiserson, 1968).

For the coalition in W^{MIN} it must be true that a winning coalition turns into a losing coalition if one of the players withdraws. This is true for {pk}, {kav}, {kac}, and {pacv}. In this prediction set not all coalition are of minimal size. The opposite is never true; there cannot be a minimal size coalition that is not simultaneously minimal winning, for it would not be of minimal size then. The coalition with the smallest weight is {kav} with exactly 51 seats. Note that it is not necessary for the smallest winning coalition to hold exactly the same weight as the quota. The last

³ The number of possible combinations with 2 or more parties is computed with combinatory mathematics: a combination of k parties on n places can be computed with: $\binom{n}{k} = \frac{n!}{k!(n-k)!}$

If we consider 5 parties and we add $\binom{5}{2!} + \binom{5}{3!} + \binom{5}{4!} + \binom{5}{5!}$, we find 26 possible combinations.

office-seeking hypothesis predicts coalitions with as few members - read political parties - as possible. In 1946 this is the only two-player coalition: {pk}.

The coalition that was formed after the 1946 election, was the coalition {pk}. So, as far as 1946 is concerned, the minimal winning and the bargaining theory predict the correct - historical - coalition. Unfortunately, the coalition is not of minimal size, so that particular theory predicts wrong in 1946.

The results of the office seeking theories in general are not very promising. The results can be found in Table 6.2.

Table 6.2
Success of
office-seeking
theories

	number of possible winning coalitions	historical coalition	w_{min}	w_{size}	w_{bar}
1946	12	PvdA-KVP (pk)	pk , kav, kac, pacv	kav	pk
1948	12	PvdA-KVP-CHU-VVD (pkcv)	pk, kav, kac, pacv	kav	pk
1952 ⁴	6	PvdA-KVP-ARP-CHU (pka)	pk, pav, kav	pav, kav	pk
1956	15	PvdA-KVP-ARP-CHU (pkac)	pk, pav, pcv, kav, pac, kac	pcv, kac	pk
1959	14	KVP-ARP-CHU-VVD (kacv)	pk, pav, pcv, kav, kcv	pcv	pk
1963	13	KVP-ARP-CHU-VVD (kacv)	pk, kav, kcv, kac, pacv	kac	pk
1967	24	KVP-ARP-CHU-VVD (kacv)	pk, pacv, pdav, kacv , dkav, kdcv, kdac	dkac, pdav	pk
1971	6	Christian ⁵ -DS70-VVD (cdv)	pc, pdv, dcv	pdv	pc
1972	7	Christian-Progressive (cp)	pc , pv, dcv	dcv	pc , pv
1977	16	CDA-VVD (cv)	cv , pc, pv	cv	cv , pc, pv
1981	6	PvdA-D66-CDA (pdc)	pc, pdv, dcv	pdv	pc
1982	16	CDA-VVD (cv)	cv , pc, pv	cv	cv , pc, pv
1986	16	CDA-VVD (cv)	cv , pv, pc	pv	cv , pv, pc
1989	15	PvdA-CDA (pc)	cv, pc , gpv, pdv	cv	cv, pc
1994	11	PvdA-D66-VVD (pdv)	gpc, dcv, pcv, pdc, pdv	gpc	gpc, dcv, pcv, pdc, pdv
1998	14	PvdA-D66-VVD (pdv)	pv, gcv, gpc, dcv, pdc	gcv	pv
SUCCESS RATE			9/16	2/16	7/16

⁴ In 1952, the CHU was not included in the manifesto data set. Therefore coalition (pka) will be regarded as the correct prediction.

⁵ Christian and Progressive are joined lists (see Section 5.4.1); Christian includes KVP, ARP and CHU. Progressive includes PPR, PvdA and D66.

6.2.2 Uni-dimensional Policy-Seeking Theories

The second class of theories includes both policy and power motivations. The first theory in this class, is Axelrod's conflict of interest theory that predicts minimal connected coalitions. The connectedness refers to being 'neighbours' on the uni-dimensional policy scale, and the coalition must be winning in the sense that no player can leave the coalition without causing this coalition to be no longer winning or connected. The second theory, developed by Leiserson, only allows coalitions that include the smallest range possible - on a policy scale - without becoming losing. According to this theory a coalition will be formed if the parties agree that the range of this coalition is not larger than the range of any other winning coalition. De Swaan's policy distance theory is somewhat more complex. Players prefer to be members of a coalition for which it is true that the ideal point of this coalition is as close as possible to their own ideal point. In the descriptive part of the theory we are therefore no longer searching for the smallest range but have to determine the preferences for all winning coalitions as held by each player, based on policy distance. In the predictive part, a core concept is applied that selects undominated coalitions. The theory is naïve as compared to other uni-dimensional policy-seeking theories, since it leads to large prediction sets.

The coalition formation that will be discussed for these theories is that of 1959. We examine the following weighted majority game: [76; 48, 49, 14, 12, 19]. The parties are ordered from left to right - the Social Democrats (PvdA), the Catholics (KVP), the Protestants (ARP), another Protestant party (CHU) and the Liberals (VVD). There are 14 possible winning coalitions; 1 two-party combination {pk}, 7 three-party combinations, 5 four-party combinations and the grand coalition. For these theories a uni-dimensional policy scale is required. The scale that we use is derived from Van Roozendaal (1992). The policy scales in Van Roozendaal are based on Morgan (1976) and Castles and Mair (1984). Only the parties that are included in our data - see Chapter 4 - receive a position on our uni-dimensional left-right policy scale. The following scale is used for coalition formation until the late 1970's. From left to right: PPR-PvdA-D66-DS'70-KVP-ARP-CHU-VVD.

After the founding of the Christian Democratic Party - the CDA, which is a merger from ARP, CHU and KVP - we find the following scale: PPR-PvdA-D66-DS'70-CDA-VVD. In the late 1980's a number of small left-wing parties merged into Green Left, which turns the policy scale into: GL-PvdA-D66-CDA-VVD. These policy scales are ordinal, which means that the only information available is the order of the parties on the scale. We do not know the exact - metric - positions

of the parties on the scale. Only, for 1998, I did apply a different uni-dimensional scale. The CDA leapfrogged and ended up to the right of D66, and the last policy scale is thus: GL-PvdA-CDA-D66-VVD.

The information needed to test the uni-dimensional policy-seeking theories is complete. Since these theories will be illustrated with the data from 1959, the first policy scale is used. The parties in our 1959 data set are ordered on the ordinal policy scale as follows: PvdA, KVP, ARP, CHU, and VVD. This means that KVP and ARP are neighbours but KVP and CHU are not. The policy seeking hypotheses that were derived and tested are:

- Let G_θ be a policy game. Then only coalitions from W^{MC} will be formed (Axelrod, 1970; Van Deemen, 1997).
- Let G_θ be a policy game and let $S, T \in W$ and $\forall T \in W \mid \exists S: D_S < D_T$, then only coalitions from S will be formed (Leiserson, 1966).
- Let G_θ be a policy game. In the policy distance theory a coalition from the core, W^{core} , will be formed (De Swaan, 1973).

For Axelrod's theory, coalitions that are simultaneously minimal winning and connected are predicted. After examining all possible winning coalitions, only two turn out to be minimal connected. The coalition KVP-ARP-VVD for instance is minimal winning, but is not connected since the CHU is not included. The two-party coalition PvdA-KVP is both minimal winning and connected. The only other W^{MC} is KVP-ARP-CHU-VVD. The coalition is quite large - it represents 94 seats - but if any party departs the coalition, it either becomes losing or unconnected.

The next hypothesis predicts the winning coalitions with the smallest range. This naturally leads to predicting the only two-party winning coalition - in which the parties are adjacent on the policy scale - because on an ordinal scale any two-party coalition that is connected has a smaller range than any three-party connected coalition. The prediction set of the W^{MC} therefore consists of only coalition: PvdA - KVP

Selecting the coalitions that are predicted by De Swaan's policy distance theory is more laborious. We shall use the same ordinal policy scale, and start by assigning preferences of players to the winning coalitions. After that, in the predictive part of the theory, we shall determine dominance between coalitions and predict the set of undominated coalitions.

The main assumption is that a player prefers a coalition in which she is included and which lies as close as possible on a scale of policies to her own preferred policy

position. The first step is to find the pivotal player for every possible winning coalition and compute the excess of that coalition.

Table 6.3
Policy
Distance
Theory
in 1959

COALITIONS	WEIGHT	PIVOTAL PLAYER	EXCESS
pk	97	kvp	48
pav	81	pvda	-33
pcv	79	pvda	-31
pkv	116	kvp	29
kav	82	kvp	-33
kcv	80	kvp	-31
pka	111	kvp	34
pkc	109	kvp	36
pacv	93	pvda	-45
pkav	130	kvp	15
pkcv	128	kvp	17
kacv	94	kvp	-45
pkac	123	kvp	22
pkacv	142	kvp	3

Remember that a party is pivotal if the difference between the combined weights of the members to the left of this party and the weights of the members to the right are less than the (absolute value) weight of this actor.

Consider coalition {pav}: PvdA is pivotal because $0 - 33 = -33$ and 33 is smaller than the weight of the PvdA, which is 48 . For coalition {pka}, the pivotal player is the KVP; $48 - 14 = 34$ is smaller than the weight of the KVP. With this procedure, the pivotal player for every coalition is selected and the excess is computed. The excess is simply the difference between the combined weights of the members to the left of the pivotal player and the weights of the members to her right. Note that a pivotal player prefers coalitions for which she is pivotal above coalitions for which she is not. Moreover, the smaller the absolute excess, the closer this coalition is to the pivotal player.

It is now possible to order all coalitions on a left-right scale: (PvdA) - pcv - pav - pacv - pk - pkc - pka - pkv - pkac - pkcv - pkav - pkacv - (KVP) - kcv - kav - kacv

- (ARP) - (CHU) - (VVD). The next step is to determine the preferences of the parties for the coalitions. The most preferred coalition is the coalition for which a party is pivotal and at the same time has the smallest excess. After positioning the coalitions for which a party is pivotal, we continue by ordering the other coalitions in which this party is included. If all coalitions lie on one side of it, we simply follow the policy order in the direction away from the position of it. If remaining coalitions lie on both sides of this party, the party is indeterminate, and the coalitions on either side receive the same 'preference value'.

We start by assigning preferences for the PvdA. Note that all coalitions lie to the right of this party.

The PvdA is pivotal for coalition {pvc} and this coalition has the smallest excess. We can simply order the coalitions in the same order as above and remove the coalitions that do not include the PvdA. PvdA: {pcv - pav - pacv - pk - pkc - pka - pkv - pkac - pkcv - pkav - pkacv - (kcv, kav, kacv)} The most preferred coalition is pcv, which receives 11 points, the next receives 10 points until a number has been assigned to each coalition that could be ordered. The most preferred coalition receives 11 points, since from the 14 winning coalitions, three do not include the PvdA and thus receive the value 'zero'.

The KVP finds coalitions both on its left and on its right. The grand coalition is most preferred here; the KVP is pivotal, and the excess is as small as possible.

KVP: {pkacv - pkav - pkcv - pkac - pkv - kcv - kav - pka - pkc - kacv - kp - (pcv, pav, pacv)}. There are three coalitions in which the KVP is excluded, so that the most preferred coalition again receives 11 points, and so forth.

For the remaining parties, we simply order the coalitions in which they are members from right to left, and give the closest party the highest preference. Note that these three parties are not pivotal for any of the coalitions.

ARP: {kacv - kav - pkacv - pkav - pkac - pka - pacv - pav
(kcv, pkcv, pkv, pkc, pk, pcv)}.

CHU: {kacv - kcv - pkacv - pkcv - pkac - pkc - pacv - pcv
(kav, pkav, pkv, pka, pk, pav)}.

VVD: {kacv - kav - kcv - pkacv - pkav - pkcv - pkv - pacv - pav - pcv
(pkac, pka, pkc, pk)}.

In this example, it is quite easy to determine the preferences. Note that, in other cases, it is possible that parties lie in the middle of the policy order. If, on both sides of this party, coalitions exist, that include the party in question but for which it is not pivotal, this party is indeterminate. In that case the coalitions receive the same value in the preference order.

After the preference profiles are determined, the second part of the theory comes into effect. Domination between coalitions is measured. A coalition A dominates coalition B , if and only if all players in A prefer this coalition to the other. Only the preferences of the players that are members of both coalitions matter. Note that if we compare the first two coalitions in Table 6.4, $\{pk\}$ and $\{pav\}$, the latter dominates the first because the PvdA prefers $\{pk\}$. Even though the KVP prefers coalition $\{pk\}$, this coalition is dominated by $\{pav\}$, since the KVP has no authority in the latter coalition.

As can be seen in Table 6.4, eight coalitions are undominated and will be predicted by the policy distance theory for 1959. The prediction set is: $\{pkv, kav, kcv, pkav, pkcv, kacv, pkac, pkacv\}$.

Table 6.4
Preference profiles of parties for coalitions

PARTIES	PVDA	KVP	ARP	CHU	VVD	DOMINANCE
COALITIONS						
PK	8	1	0	0	0	DOM BY PAV
PAV	10	0	1	0	2	DOM BY KAV
PCV	11	0	0	1	1	DOM BY KCV
PKV	5	7	0	0	4	UNDOMINATED
KAV	0	5	7	0	9	UNDOMINATED
KCV	0	6	0	7	8	UNDOMINATED
PKA	6	4	3	0	0	DOM BY KAV
PKC	7	3	0	3	0	DOM BY KAV
PACV	9	0	2	2	3	DOM BY KAV
PKAV	2	10	5	0	6	UNDOMINATED
PKCV	3	9	0	5	5	UNDOMINATED
KACV	0	2	8	8	10	UNDOMINATED
PKAC	4	8	4	4	0	UNDOMINATED
PKACV	1	11	6	6	7	UNDOMINATED

The conflict of interest (W^{MC}) and the policy distance theory have predicted the historical coalition in 1959, which is $\{KVP, ARP, CHU, VVD\}$. The minimal range theory did not predict the correct coalition. I am inclined to prefer the conflict of interest theory to the policy distance theory because the size of the prediction set of the policy distance theory is fairly large; it predicted eight out of 14 possible winning coalitions in 1959. This conclusion also holds if we view the results of these three

theories for the complete set of 16 cases. The prediction set of the policy distance theory is usually very broad, and the number of correct predictions is the same as of the W^{MC} .

Table 6.5
Success of
policy-seeking
theories

NUMBER OF WINNING COALITIONS		HISTORICAL COALITION	W^{MC}	$W^{MINRANGE}$	W^{CORE}
1946	12	PVDA-KVP (PK)	PK, KAC	PK	PKA, PKCV, PKAV, PKAC, KAV, KAC, KACV, PKACV
1948	12	PVDA-KVP-CHU-VVD (PKCV)	PK, KAC	PK	PKV, PKA, PKC, PKAV, PKCV , PKAC, PKACV
1952	6	PVDA-KVP-ARP-CHU (PKA)	PK, KAV	PK	PKA , KAV, PKAV
1956	15	PVDA-KVP-ARP-CHU (PKAC)	PK, KAC	PK	KAV, KAC, PKAV, PKCV, KACV, PKAC , PKACV
1959	14	KVP-ARP-CHU-VVD (KACV)	PK, KACV	PK	PKV, KAV, KCV, PKAV, PKCV, KACV , PKAC, PKACV
1963	13	KVP-ARP-CHU-VVD (KACV)	PK, KAC	PK	KAC, KACV , PKAC, PKACV
1967	24	KVP-ARP-CHU-VVD (KACV)	PDK, KACV , DKAC	PDK	PKAV, PKCV, PDKV, PKAC, PKACV, PDKAV, PDKCV, PDKAC, PDKACV
1971	6	CHRISTIAN-DS70-VVD (CDV)	DCV , PDC	DCV , PDC	PDC, PDCV
1972	7	CHRISTIAN-PROGRESSIVE (CP)	PDC, DCV	PDC, DCV	DCV
1977	16	CDA-VVD (CV)	CV , PDC	CV	PC, RCV, DCV
1981	6	PVDA-D66-CDA (PDC)	PDC , DCV	PDC , DCV	PDC , DCV, PDCV
1982	16	CDA-VVD (CV)	CV , PDC	CV	CV , RCV, DCV, PCV, RDCV, RPCV, PDCV, RPDCV
1986	16	CDA-VVD (CV)	CV , PDC	CV	CV , RCV, DCV, PCV, RDCV
1989	15	PVDA-CDA (PC)	CV, PDC	CV	CV, DCV, GDCV
1994	11	PVDA-D66-VVD (PDV)	DCV, PDC	DCV, PDC	DCV, PDC, GDCV, GDPC, PDCV, GPDCV
1998	14	PVDA-D66-VVD (PDV)	GPC, DCV, PCD	GPC, DCV, PCD	PCV, GCDV, GPCV, PCDV, GPDCV
SUCCESS RATE			8/16	6/16	8/16

6.2.3 Actor-Oriented Theories

Two types of powerful actors can be distinguished in coalition formation. The first is powerful by virtue of its size: the dominant party. The second is powerful because of its position on the uni-dimensional policy scale, and is called the centre player.

6.2.3.1 Dominant Player

A dominant actor is not just an actor with the largest weight; she is powerful because she has as least as much power as the total weight of the other members in the coalition, dominated by this player dominates. The formal definition of a dominant player and the difference between weak domination and domination can be found in Chapter 3. Recall that there is at most one dominant player in a game and that this player is always the player with the largest weight. This information is helpful in determining whether a dominant player exist. The procedure is to select the largest party and check whether there are winning coalitions for which it is true that the largest party can form a winning coalition with parties from outside that coalition, whereas the remainder of the ‘original’ coalition cannot form a winning coalition with these parties. If this is true, this player dominates the coalition. If in another coalition this dominant player can form a winning coalition with some party or parties from outside the coalition, and the remaining parties from the first coalition can also do this, this party is said to weakly dominate that coalition. Naturally, if a party dominates a coalition it also weakly dominates that coalition, since the latter is a less severe demand.

The dominant player will be illustrated with the weighted majority game of 1963: [76; 43, 50, 13, 13, 16]. The parties are from left to right: PvdA, KVP, ARP, CHU, and VVD. The largest player - and thus candidate for dominant player - is the KVP with 50 seats. The trick is to first check whether there are two minimal winning coalitions that only have the largest party in common and examine these. In this case {pk} and {kac} are both minimal winning coalitions, sharing the KVP Party {p} with {ac} is losing whereas both party {p} with {k} and {ac} with {k} are winning (denoted as $\{p\} \cap \{k\} \in \mathbb{W}$), so the KVP is the dominant player.

The next step is to generate the prediction set by selecting the coalitions that the dominant player dominates and weakly dominates. Then we can test the following hypotheses:

- Let $G = (N, \mathbb{W})$ be a simple game with one dominant player. Then only coalitions from $D_{\mathbb{W}}(G)$ will be formed (Peleg, 1981).
- Let $G = (N, \mathbb{W})$ be a simple game with one dominant player. Then only coalitions from $D(G)$ will be formed (Van Deemen, 1989).
- *Peleg-Riker Principle* Let $G = [q; w_1, w_2, \dots, w_n]$ be a dominated and proper weighted majority game. Then only coalitions from $D \cap W^{size}$ will be formed (Van Deemen, 1989).

We shall now check all 13 winning coalitions in 1963:

- ▶ pk: $\{p\} \cap \{ac\} \in L$ and $\{k\} \cap \{ac\} \in W$: $\{pk\} \in D(G)^5$
- ▶ pkv: $\{pv\} \cap \{ac\} \in W$ and $\{k\} \cap \{ac\} \in W$: $\{pkv\} \in D_W(G)$
- ▶ kav: $\{av\} \cap \{p\} \in L$ and $\{k\} \cap \{p\} \in W$: $\{kav\} \in D(G)$
- ▶ kcv: $\{cv\} \cap \{p\} \in L$ and $\{k\} \cap \{p\} \in W$: $\{kcv\} \in D(G)$
- ▶ pka: $\{pa\} \cap \{cv\} \in W$ and $\{k\} \cap \{cv\} \in W$: $\{pka\} \in D_W(G)$
- ▶ pkc: $\{pc\} \cap \{av\} \in W$ and $\{k\} \cap \{av\} \in W$: $\{pkc\} \in D_W(G)$
- ▶ kac: $\{ac\} \cap \{p\} \in L$ and $\{k\} \cap \{p\} \in W$: $\{kac\} \in D(G)$
- ▶ pacv: does not include the dominant player.
- ▶ pkav: $\{pav\} \cap \{c\} \in W$ and $\{k\} \cap \{c\} \in L$
- ▶ pkcv: $\{pcv\} \cap \{a\} \in W$ and $\{k\} \cap \{a\} \in L$
- ▶ kacv: $\{acv\} \cap \{p\} \in W$ and $\{k\} \cap \{p\} \in W$: $\{kacv\} \in D_W(G)$
- ▶ pkac: $\{pac\} \cap \{v\} \in W$ and $\{k\} \cap \{v\} \in L$
- ▶ vpkac: $\{vpac\} \in W$ and $\{k\} \in L$

The prediction set for the first hypothesis is $D_W(G)$: $\{pk, pkv, kav, kcv, pka, pkc, kac, kacv\}$. The prediction set for the second hypothesis is: $\{pk, kav, kcv, kac\}$. The last hypothesis is a combination of the dominant player and the size principle. The dominant player is said to be most powerful in the smallest coalition possible. The hypothesis leads to predicting coalition $\{kav\}$. The historical coalition - kacv - is only predicted by the hypothesis that selects weakly dominated coalitions.

Unfortunately, the theory and its extensions on the dominant player often have empty prediction sets. In these cases none of the players is dominant. An example is the coalition formation discussed in the previous section (1959): [76; 48, 49, 14, 12, 19] The order of the parties is again pkacv.

Minimal winning coalitions are: $\{pk, pav, pcv, kav, kcv\}$. Candidate for dominant player is the KVP with 49 seats. There are no two minimal winning coalitions that have only $\{k\}$ in common for which it is true that:

$$B \cap \{S - \{k\}\} \in L \text{ and } B \cap \{k\} \in W^6$$

Consider:

$$pk: \{av\} \cap \{p\} \in W \text{ and } \{av\} \cap \{k\} \in W$$

$$kav: \{p\} \cap \{av\} \in W \text{ and } \{p\} \cap \{k\} \in W$$

$$kcv: \{p\} \cap \{cv\} \in W \text{ and } \{p\} \cap \{k\} \in W$$

There is no dominant party because all combinations of parties that can win with player $\{k\}$ can also win with player $\{p\}$.

⁶ See for explanation of these definitions Chapter 3. Note that B is a party or a coalition that has no players in common with S.

The results for the dominant player theories are presented in Table 6.6. If there is a dominant player, it is often a member of the historical coalition, but even this demand is not always met.

	number of winning coalitions	historical coalition	$D_W(G)$	$D(G)$	$D \cap W^{SIZE}$
1946	12	PvdA-KVP (pk)	PK, PKV, KAV, PKC, KAC, KACV	PK, KAV, KAC	KAV
1948	12	PvdA-KVP-CHU-VVD (pkcv)	PK, PKV, KAV, KAC, KACV	PK, KAV, KAC	KAV
1952	6	PvdA-KVP-ARP-CHU (pka)	∅	∅	∅
1956	15	PvdA-KVP-ARP-CHU (pkac)	PK, PAV, PCV, PAC, PACV	PK, PCV	PCV
1959	14	KVP-ARP-CHU-VVD (kacv)	∅	∅	∅
1963	13	KVP-ARP-CHU-VVD (kacv)	PK, PKV, KAV, KCV, PKA, PKC, KAC, KACV	PK, KAV, KCV, KAC	KAC
1967	24	KVP-ARP-CHU-VVD (KACV)	PK, KACV , DKAV, DKCV, DKAC, DKACV	PK, DKCV, DKAC	DKAC
1971	6	Christian-DS70-VVD (cdv)	∅	∅	∅
1972	7	Christian-Progressive (cp)	PC, PV, PDC, PDC	PC, PG	∅
1977	16	CDA-VVD (cv)	∅	∅	∅
1981	6	PvdA-D66-CDA (pdc)	∅	∅	∅
1982	16	CDA-VVD (cv)	∅	∅	∅
1986	16	CDA-VVD (cv)	∅	∅	∅
1989	15	PvdA-CDA (pc)	CV, PC, GCV, GPC, DCV, PDC, GDCV, GPDC	CV, PC	CV
1994	11	PvdA-D66-VVD (pdv)	∅	∅	∅
1998	14	PvdA-D66-VVD (pdv)	∅	∅	∅
SUCCESS RATE			$5/16$	$3/16^7$	0

Table 6.6
Success of the dominant player theories

⁷ If we would only observe coalitions with a dominant player, the success rate would be $D^W(G)$: $5/7$.

6.2.3.2 Centre Player

The centre player is powerful by virtue of her position on the policy scale. A party i is a centre player if the coalition of all parties to its left on the policy scale are losing without i but winning with i , and if all players to the right of i are losing without her but winning with her. This means that the weight of the centre player must be more than the absolute value of the difference between the weights to the left of the centre player and the weights to her right. The procedure demands that we order the parties on the policy scale, and determine whether the centre party exists. In the 'plain' version of the centre party theory, all coalitions that are winning and include the centre party will be predicted. The other theories based on the central actor are refinements of this assumption. The first predicts maximally balanced coalitions; these are coalitions with the centre player restricted with the demand that the difference between the weights to the left and to the right of this player, are as small as possible. In a maximally balanced coalition, the centre player can best control the coalition. The next refinement includes a more office-oriented argument. Now, the coalition with the centre player with maximal power excess will be predicted. Power excess of the centre player is maximal in the coalition where the weight of the centre player minus the internal opposition in the coalition is as large as possible.

The following three hypotheses will thus be tested:

- In centralised policy games only coalitions with the centre player (C) will be formed (Van Deemen, 1991).
- In centralised policy games only maximally balanced coalitions (B) will be formed (Van Deemen, 1997).
- In centralised policy games only coalitions with maximal power excess will be formed (Van Deemen, 1997).

Coalition formation based on these theories will be studied for 1986. The weighted majority game accompanying coalition formation in 1986 is [76; 2, 52, 9, 54, 27]. The parties are - ordered from left or right - PPR (denoted by r), PvdA, D66, CDA, and VVD. The Christian Democratic Party is the centre party since the coalition of PPR, PvdA and D66 is losing without the CDA but winning with the CDA, and the VVD is simultaneously losing without the CDA, but winning with the Christian Democrats. In Table 6.7, the winning coalitions that include the centre player and the accompanying balance weight and power excess are presented. The winning coalitions $\{pv\}$, $\{rpv\}$, $\{pdv\}$, $\{rpdv\}$ are not included in the table, since they exclude the centre party and will therefore not be predicted.

Table 6.7
Centre player
in 1986

COALITIONS	WEIGHT	CENTRAL PLAYER	BALANCE	POWER EXCESS
CV	81	CDA	27	27
PC	106	CDA	52	2
RCV	83	CDA	25	5
RPC	108	CDA	54	0
DCV	90	CDA	18	18
PCV	133	CDA	25	-25
PDC	115	CDA	61	-7
RDCV	92	CDA	16	16
RPCV	135	CDA	27	-27
RPDC	117	CDA	63	-9
PDCV	142	CDA	34	-34
RPDCV	144	CDA	36	-36

The balance excess is computed by taking the absolute value of the difference between the weights of the parties to the left of the centre player and the parties to the right. For instance {cv} is $0-27 = 27$ and {pc} is $52-0 = 52$. The power excess is the difference between the weight of the centre party and the other party or parties in the coalition. For instance {cv} is $54-27 = 27$ and {pc} is $54-52 = 2$.

Hypothesis 1 predicts the following set of coalitions: {cv, pc, rcv, rpc, dcv, pcv, pdc, rdcv, rpcv, rpdc, pdcv, rpdcv}. The second hypothesis selects the maximally balanced coalition {rdcv}, and the third predicts coalition {cv}. The coalition that was formed in 1986 is coalition {cv}, and was thus predicted by the centre player and the power excess theory.

Just like the dominant player, the centre player sometimes does not exist. Consider the weighted majority game of the coalition formation in 1981. The parties are, from left to right, PvdA, D66, CDA, and VVD; [76; 44, 17, 48, 26]. The Democrats (D66) are not the centre party because the coalition {pd} is not winning. The Christian Democratic Party is not a centre player either. The CDA can form a winning coalition with the parties to its left, but the coalition of the CDA with the party to its right - the VVD - is losing.

Note that the non-existence of centre players is in most cases a bias caused by solely including the 'significant' parties in the empirical testing. Recall that in a decisive game (for a definition see Chapter 2 Section 2.2) - a game that is proper and strong - a centre player always exists. The results of the theories based on the centre player concept are given in Table 6.8.

NUMBER OF WINNING COALITIONS		HISTORICAL COALITION	$w(c)$	$w_{\text{MAX BALANCED}}$	$w_{\text{POWER EXCESS}}$
1946	12	PVDA-KVP (PK)	PK, PKV, KAV, PKA, PKC, KAC, PKAV, PKCV, KACV, PKAC, PKACV	PKACV	KAV
1948	12	PVDA-KVP-CHU-VVD (PKCV)	PK, PKA, KAV, PKV, PKC, KAC, PKAV, PKCV , KACV, PKAC, PKACV	PKACV	KAV
1952	6	PVDA-KVP-ARP-CHU (PKA)	PK, PKA , KAV, PKV, PKAV	PKAV	KAV
1956	15	PVDA-KVP-ARP-CHU (PKAC)	PK, PKV, KAV, PKA, PKC, KAC, PKAV, PKCV, KACV, PKAC , PKACV	PKACV	KAC
1959	14	KVP-ARP-CHU-VVD (KACV)	PK, PKV, KAV, KCV, PKA, PKC, PKAV, KACV , PKAC, PKACV	PKACV	KCV
1963	13	KVP-ARP-CHU-VVD (KACV)	PK, PKV, KAV, KCV, PKA, PKC, KAC, PKAV, PKCV, KACV , PKAC, PKACV	PKACV	KAC
1967	24	KVP-ARP-CHU-VVD (KACV)	PK, PKV, PKA, PKC, PDK, PKAV, PKCV, PDKV, KACV , DKAV, DKCV, PKAC, PDKC, DKAC, PKACV, PDKAV, PDKCV, DKACV, PDKAC, PDKACV	PDKACV	DKAC
1971	6	CHRISTIAN-DS70-VVD (CDV)	∅	∅	∅
1972	7	CHRISTIAN-PROGRESSIVE (CP)	∅	∅	∅
1977	16	CDA-VVD (CV)	CV , CP, CRV, CRP, CVD, CVP, CDP, CRVD, CRVP, CRDP, CVDP, CRVDP	RDCV	CV
1981	6	PVDA-D66-CDA (PDC)	∅	∅	∅
1982	16	CDA-VVD (CV)	CV , PC, RCV, RPC, DCV, PCV, PDC, RDCV, RPCV, RPDC, PDCV, RPDCV	PCV	CV
1986	16	CDA-VVD (CV)	CV , PC, RCV, RPC, DCV, PCV, PDC, RDCV, RPCV, RPDC, PDCV, RPDCV	RDCV	CV
1989	15	PVDA-CDA (PC)	CV, PC , GCV, GPC, DCV, PCV, PDC, GDCV, GPCV, GPDC, PDCV, GPDCV	GDCV	CV
1994	11	PVDA-D66-WVD (PDV)	∅	∅	∅
1998	14	PVDA-D66-WVD (PDV)	∅	∅	∅
SUCCESS RATE			$11/16^8$	0	$3/16$

Table 6.8
Success of the
centre player
theories

⁸ If we would only observe coalitions with a centre player, the success rate would be 1.

If a centre player exists in these examples, it is a member of the historical coalition, but note that the prediction set of this theory is very broad. An important conclusion that can be drawn from Table 6.8, is that the centre position of KVP and later CDA explains their powerful positions. Note that KVP and CDA have been members of all post-World War II coalitions until 1994.

The theory of maximally balanced coalitions leads to terrible results. In none of the 16 cases the historical coalition was predicted. Finally, the power excess theory predicted the correct coalition in only three out of 16 cases.

6.2.4 Spatial Theories

The Heart solution is the first spatial theory to be tested, and for reasons of clarity the same order of theories as in Chapter 4 will be followed. After the Heart solution, Proto-coalition formation will be examined. We continue with the Winset theory, the Competitive Solution and finish with the Maximal Satisfaction Solution. As said, in the introduction to this chapter, for some theories more than one example will be given. The Heart solution can be found, for example, when a core party exists, but can also be formed by the bounded set of median lines. The Winset theory also generates different kinds of equilibria. For these theories, more examples are needed to illustrate the ‘operating procedures’.

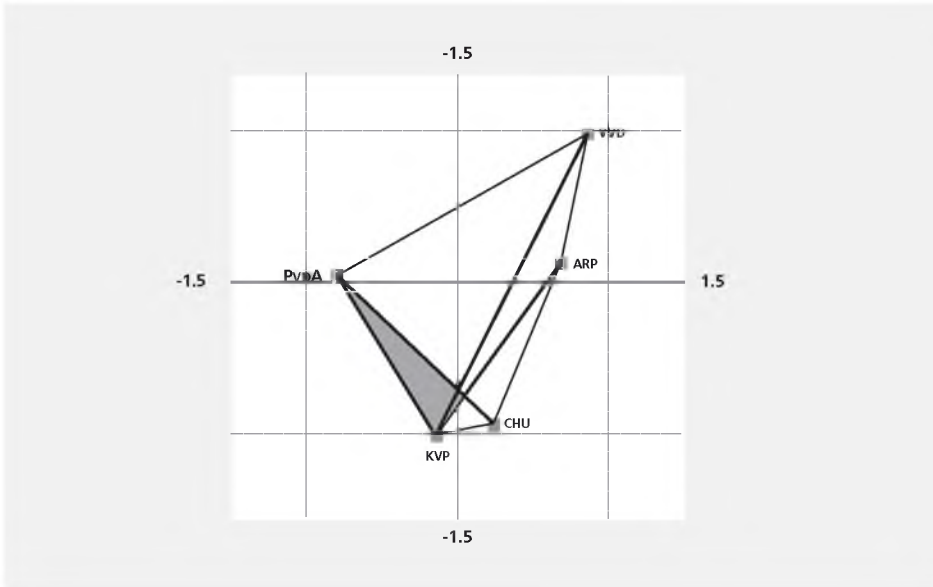
6.2.4.1 Heart Solution

Since in the heart different types of equilibria can be found, more than one example will be given. The first example includes a bounded cycle set, the second presents a core party and in the last example almost anything can be predicted. Since the heart solution, its majority extension and its distance-refinement were discussed extensively in Chapter 4, I continue straight away with the three hypotheses.

- Heart: Let $G = (N, W, R^M)$. Only coalitions from the heart will be formed.
- Heart Majority: Let $G = (N, W, R^M)$. Only winning coalitions from the heart will be formed.
- Heart Distance: Let $G = (N, W, R^M)$. The heart coalition with the lowest aggregated distance will be formed.

The 1948 election can be represented with the following weighted majority game: [51; 27, 32, 13, 9, 8]. The parties are from left to right: PvdA, KVP, ARP, CHU, and VVD. The coalitional game can be illustrated by the following party configuration⁹:

Figure 6.1
1948 Heart Solution



To find the heart, the first step is always to search for median lines. The following lines comprise a majority: {PvdA, KVP}, {KVP, VVD}, {KVP, ARP} and {PvdA, CHU}. Not all median lines run through any particular party's policy position, so there is no core party. There is however a bounded cycle set. The set is bounded by the median lines: {PvdA, KVP}, {KVP, ARP} and {PvdA, CHU}. Since the median line {KVP, VVD} is not necessary for enclosing the cycle set, this median line will not be considered in the prediction set. The VVD can however support a minority cabinet. The four steps described by Schofield will be followed to present the solution of this coalitional game.

Prediction set:

- (a) heart surplus coalition: {PvdA, KVP, ARP, CHU}
- (b) minimal winning coalition: {PvdA, KVP}
- (c) minority coalitions: {KVP, ARP}, {PvdA, CHU}
- (d) minority + support: {KVP, ARP, CHU}, {PvdA, CHU, ARP, VVD}¹⁰.

⁹ For information about the party configurations and the interpretation of the dimensions, I refer to Chapter 5.

¹⁰ As I argued in Chapter 3, I do not expect the minority coalitions {KVP, ARP} and {PvdA, CHU} to be supported by respectively PvdA and KVP, since this would lead to the minimal winning coalition {KVP, PvdA} combined with another strong party (i.e. a party on a median line), without the latter party being a necessary player.

Hypothesis 1. Heart

In a spatial coalitional game only coalitions in the heart will be formed.

Prediction set: {PvdA, KVP, ARP, CHU}, {PvdA, KVP}, {KVP, ARP}, {PvdA, CHU}, {KVP, ARP, CHU}, {PvdA, CHU, ARP, VVD}.

Hypothesis 2. Heart Majority

In a spatial coalitional game only winning coalitions from the heart will be formed.

Prediction set: {PvdA, KVP, ARP, CHU}, {PvdA, KVP}, {KVP, ARP, CHU}, {PvdA, CHU, ARP, VVD}.

For the refined version, the aggregate distances within a coalition must be computed. The results of that can be found in the Table 6.9.

Table 6.9
Aggregated distance per coalition in 1948

DISTANCE	VVD	KVP	PvdA	CHU	ARP	AGGREGATED DISTANCE
KVP/PVDA/ARP/CHU		0.525	0.823	0.693	1.070	3.154
KVP/PVDA		0.567	0.672			0.835
KVP/ARP		0.403			0.992	1.395
PVDA/CHU			0.379	1.136		1.908
KVP/ARP/CHU		0.393		0.287	1.008	1.296
PVDA/CHU/ARP/VVD	1.409		0.786	1.051	0.772	4.704

Hypothesis 3. Heart distance

In a spatial coalitional game the heart coalition with the lowest aggregated distance will be formed. In this refined version of the heart the minimal winning coalition {KVP, PvdA} is predicted. This is, however, not the coalition that came about in 1948. The actual coalition - {PvdA, KVP, CHU, VVD} is neither in the heart, nor in the heart majority, nor in the heart distance prediction set.

The election results of 1981 have led to the following weighted majority game: [76; 44, 17, 48, 26]. The parties are from the left to the right: PvdA, D66, CDA, VVD. In Figure 6.2, the party configuration that belongs to the 1981 coalition formation is presented.

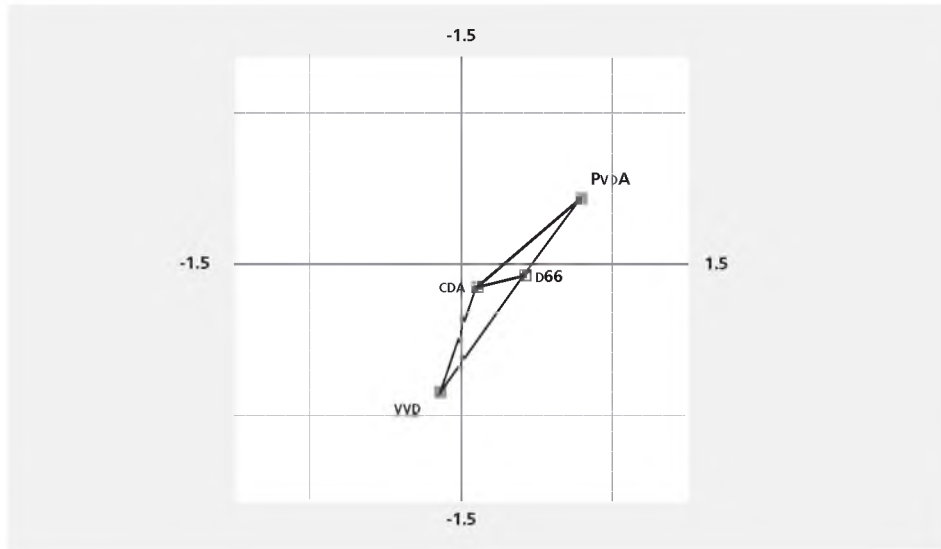


Figure 6.2
1981 Heart
Solution

In 1981, only two lines comprise a majority and are median lines: {PvdA, CDA}, {CDA, D66}

Since both median lines run through the CDA, this party is what Schofield defined as a core party.

The prediction set according to Schofield's four steps is:

- (a) heart surplus coalition: {PvdA, CDA, D66}
- (b) minimal winning heart coalition: {PvdA, CDA}
- (c) minority coalitions: {CDA, D66}
- (d) minority + support: {CDA, D66, VVD}

The first hypothesis predicts all possible coalitions in the heart, and is {PvdA, CDA, D66}, {PvdA, CDA}, {CDA, D66} and {CDA, D66, VVD}.

The second hypothesis only allows winning coalitions from the heart, and predicts {PvdA, CDA, D66}, {PvdA, CDA}, {CDA, D66, VVD}.

In order to find the prediction set of the distance version, i.e. the 'heart' coalition with the lowest aggregate distance, we have to examine Table 6.10. According to this hypothesis the minority coalition {CDA, D66} will be formed.

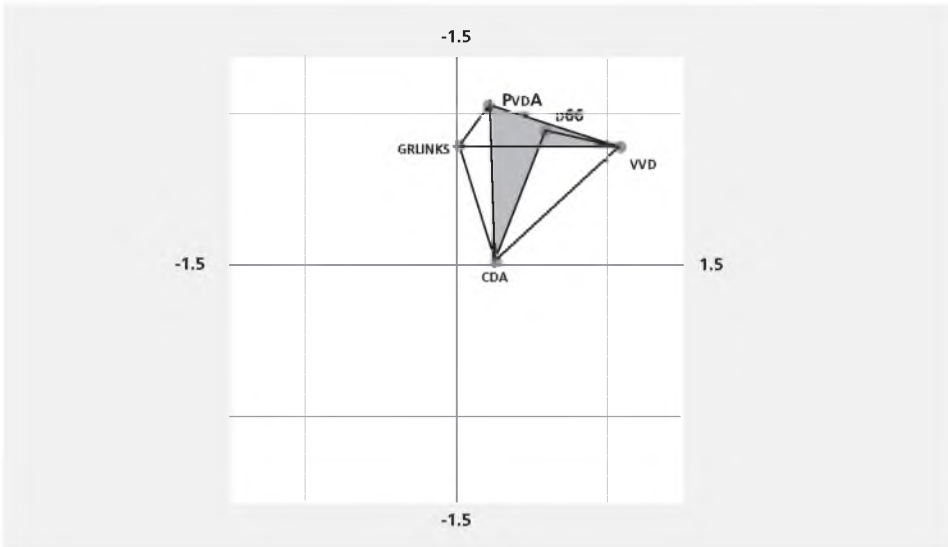
Table 6.10
Aggregated distance per coalition in 1981

DISTANCE	PVDA	D66	VVD	CDA	AGGREGATED DISTANCE
PVDA/CDA/D66	0.426	0.198		0.328	0.952
PVDA/CDA	0.393			0.360	0.753
CDA/D66		0.136		0.048	0.185
CDA/D66/VVD		0.361	0.614	0.210	1.186

Hence, the ‘heart’ and ‘heart majority’ theories did predict the historical coalition, i.e. the heart surplus coalition {PvdA, D66, CDA}, but the heart-distance version did not.

The last illustration of the heart is the 1998 coalition formation. The following weighted majority game [76; 11, 45, 14, 29, 38], with parties GL, PvdA, D66, CDA, VVD, represents the parliamentary distribution of seats.

Figure 6.3
1998 Heart Solution



In this configuration, the cycle set is a broad area connecting almost all parties. It even more or less resembles two cycle sets, i.e. the two triangles formed by median lines is {PvdA, VVD} {PvdA, CDA} {CDA, D66} {D66, VVD} {VVD, GL}. This leads to the following prediction set:

- (a) heart surplus coalition: {GL, PvdA, D66, CDA, VVD}
- (b) minimal winning heart coalition: {PvdA, VVD}
- (c) minority coalitions: {PvdA, CDA}, {CDA, D66}, {D66, VVD} {VVD, GL}
- (d) minority + support: {PvdA, CDA, D66} {D66, VVD, GL, CDA}.

The minority coalitions will not be supported by PvdA or VVD, since these parties together form a majority. According to the first hypothesis, all coalitions from the above set will be predicted: {GL, PvdA, D66, CDA, VVD}, {PvdA, VVD}, {PvdA, CDA}, {CDA, D66}, {D66, VVD}, {VVD, GL}, {PvdA, CDA, D66} and {D66, VVD, GL, CDA}.

Hypothesis 2

In a spatial coalitional game only winning coalitions from the heart will be formed. Prediction set: {GL, PvdA, D66, CDA, VVD}, {PvdA, VVD}, {PvdA, CDA, D66} {D66, VVD, GL, CDA}.

The last hypothesis predicts the coalition from the heart with the lowest aggregate distance. According to Table 6.11, we therefore predict the minority coalition {D66, VVD}.

DISTANCE	GRLINKS	PVDA	D66	CDA	VVD	AGGREGATED DISTANCE
GL/PVDA/D66/CDA/VVD	0.452	1.016	0.110	0.643	0.520	2.740
PVDA/VVD		0.386			0.457	0.843
PVDA/CDA		0.392		0.609		1.001
CDA/D66			0.643	0.310		0.953
D66/VVD			0.414		0.153	0.567
VVD/GL	0.777				0.225	1.001
PVDA/CDA/D66		0.346	0.340	0.659		1.345
D66/VVD/GL/CDA	0.619		0.365	0.664	0.505	2.153

Table 6.11
Aggregated distance per coalition in 1998

Neither the 'heart', nor the 'heart majority', nor the 'heart distance version' predicted the historical coalition of 1998, {PvdA, D66, VVD}.

The overall results of the heart solution theories are presented in the table below. The success rates are not too bad. But unfortunately the ‘heart solution’ - normal version - has broad prediction sets and still fails to predict the correct coalition in almost half the cases.

NUMBER OF WINNING COALITIONS		COALITION	HEART SOLUTION	HEART WINNING SOLUTION	HEART RIFINED VERSION
1946	12	PVDA-KVP (PK)	PKACV, PK , KA, KC, KV, KAV, KAC	PKACV, PK , KAV, KAC	KA
1948	12	PVDA-KVP-CHU-VVD (PKCV)	PKAC, PK, KA, PC, KAC, PACV	PKAC, PK, KAC, PACV	PK
1952	6	PVDA-KVP-ARP-CHU (PKA)	PKAV, PK, KA, KV, KAV	PKAV, PK, KAV	KA
1956	15	PVDA-KVP-ARP-CHU (PKAC)	PKA, PK, KA, PA, KAC, PAV	PKA, PK, KAC, PAV	KA
1959	14	KVP-ARP-CHU-VVD (KACV)	PKAC, PK, KA, KC, KACV , KCV	PKAC, PK, KACV , KCV	KA
1963	13	KVP-ARP-CHU-VVD (KACV)	PKAV, PK, KA, PV, KAV, PACV	PKAV, PK, KAV, PACV	KA
1967	24	KVP-ARP-CHU-VVD (KACV)	PK	PK	PK
1971	6	CHRIS-DS70-VVD (CDV)	PDCV, PC, PV, DC, PDV, DCV	PDCV, PC, PDV, DCV	PC
1972	7	CHRIS-PROG (CP)	PDCV, PC , PV, DC	PDCV, PC , PV,	PC
1977	16	CDA-VVD (CV)	PCV, CV , PC, PV	PCV, CV , PC, PV	CV
1981	6	PVDA-D66-CDA (PDC)	PDC , PC, DC, DCV	PDC , PC, DCV	DC
1982	16	CDA-VVD (CV)	PCV, PC, CV , PV	PCV, PC, CV , PV	PC
1986	16	CDA-VVD (CV)	PCV, PC, CV , PV	PCV, PC, CV , PV	CV
1989	15	PVDA-CDA (PC)	PCV, PC , CV, PV, PVD	PCV, PC , CV, PVD	CV
1994	11	PVDA-D66-VVD (PDV)	PDCV, PD, PC, CD, DV, PDC, CDV	PDCV, PDC, CDV	DC
1998	14	PVDA-D66-VVD (PDV)	GPDCV, PV, PC, DC, DV, GV, PDC, DVGC	GPDCV, PV, PDC, DVGC	DV
SUCCESS RATE			9/16	9/16	3/16

Table 6.12
Success of the
Heart Solution
Theories

6.2.4.2 Protocoalition Formation Theory

The dynamic Protocoalition Formation Theory also starts from ideological closeness of parties. A dynamic reciprocal closeness relation determines coalition formation. It is dynamic because the formation proceeds in stages. In the first stage, the parties that are closest to each other in a game form a protocoalition. In the second stage, this protocoalition is considered as one player, and the closest two players again form a coalition. This continues until a winning coalition is formed. A special distance measure is applied. Subjective Weighted Euclidean Distance determines the preferences and thus the formation process. For definitions on Protocoalition Formation I refer to Section 4.2.2.

For this theory, two examples of coalition formation - 1971 and 1977 - will be given, and then the results for all cases will be presented. Two hypotheses will be tested. The first relating to the Protocoalition Formation as developed by Grofman (1982). The second is a combination of the Heart Solution and Protocoalition Formation, suggested by Schofield (1995).

- Let $G = (N, W, R^M)$. The first protocoalition that represents a legislative majority of votes will be formed.
- Combination Heart Solution and Protocoalition Formation Theory. Let $G = (N, W, R^M)$. The first protocoalition from parties inside the heart that represents a legislative majority of votes will be formed.

The weighted majority game in 1971 is [76; 52, 8, 58, 16]. The parties ordered from left to right are: Prog, DS70, Chris, and VVD. Note that 'Prog' and 'Chris' are pre-coalitional alliances. Prog consists of the PvdA, D66 and the PPR and is thus a left-wing alliance and Chris is a combination of the three Christian parties - KVP, ARP, CHU - that later merged into the CDA (officially in 1980).

The weighted Euclidean distances between the remaining parties or groups of parties can be found in Table 6.13.

DISTANCE	VVD	DS70	PROGRESSIVE	CHRISTIAN
VVD	0.00	0.37	0.94	0.50
DS70	0.75	0.00	0.86	1.01
PROG	0.29	0.13	0.00	0.38
CHRIS	0.137	0.14	0.34	0.00

Table 6.13
Protocoalition
Formation
in 1971

The parties DS'70 and VVD are close to each other, and form a protocoalition. The reciprocity requirement is an important demand: even though the progressive alliance is close to DS'70, DS'70 prefers the VVD and the VVD prefers DS'70, so the latter two form a protocoalition. The protocoalition is denoted by the first two letters of the parties and can be found in Table 6.14, where again the distances are computed.

Table 6.14
Protocoalition
Formation - second
stage - in 1971

DISTANCE	VD	PROGRESSIVE	CHRISTIAN
VD	0.00	0.70	0.46
PROGRESSIVE	0.32	0.00	0.38
CHRISTIAN	0.19	0.34	0.00

In step two, the protocoalition of VVD and DS70 is closest to the Christian alliance and this relation is reciprocal. Therefore, the protocoalition {VVD, DS'70} and Chris form a new protocoalition. Since this protocoalition represents a legislative majority, it will be predicted. Hence, hypothesis 1 predicts {VVD, DS70, Chris}.

The heart surplus coalition consists of all parties. Hypothesis 2 therefore predicts the same coalition as hypothesis 1. Coalition {VVD, DS70, Chris} is the historical coalition and is thus a correct prediction.

In 1977, the weighted majority game is [76; 3, 53, 8, 49, 28] with parties PPR, PvdA, D66, CDA, and VVD. The corresponding distance table shows that the first protocoalition contains PvdA and PPR.

Table 6.15
Protocoalition
Formation
in 1977

DISTANCE	CDA	PPR	VVD	D66	PVDA
CDA	0.000	0.093	0.465	0.165	0.791
PPR(R)	1.519	0.000	2.512	0.864	0.346
VVD	0.813	0.269	0.000	0.421	1.696
D66	1.011	0.324	1.474	0.000	0.750
PVDA	0.732	0.020	0.896	0.113	0.000

We continue with the protocoalition and again compute the weighted distances.

DISTANCE	CDA	RP	VVD	D66
CDA	0.000	0.814	0.465	0.165
RP	0.712	0.000	0.867	0.110
VVD	0.813	1.734	0.000	0.421
D66	1.011	0.769	1.474	0.000

Table 6.16
 Protocoalition
 Formation
 - second stage -
 in 1977

Now the protocoalition {rp} and d66 are closest to each other, and thus form the next protocoalition. Since this is still not a majority, we continue.

DISTANCE	CDA	VVD	PVDA
CDA	0.000	0.465	0.826
VVD	0.813	0.000	1.744
RPD	0.632	0.763	0.000

Table 6.17
 Protocoalition
 Formation
 - third stage -
 in 1977

In the third stage, VVD and CDA are closer to each other than to the protocoalition. CDA and VVD form a new protocoalition. Since the combination of these two parties represents a majority, this coalition will be formed and the process ends. The prediction is therefore {CDA, VVD}.

In 1977, we found the following median lines {CDA, VVD}, {CDA, PvdA}, {CDA, D66}, {PPR, VVD}, {PvdA, VVD}. Since the cycle set consists only of {CDA, PvdA, VVD}, the median lines {VVD, PPR} and {CDA, D66} are not included in the cycle set. We continue with Protocoalition Formation from the heart surplus coalition: {PvdA, CDA, VVD}.

DISTANCE	CDA	VVD	PVDA
CDA	0.000	0.465	0.791
VVD	0.813	0.000	1.696
PVDA	0.732	0.896	0.000

Table 6.18
 Protocoalition
 Formation and
 the Heart in 1977

The same coalition is predicted by the Heart-Protocoalition Formation Theory. Now the first protocoalition that is formed is between the CDA and VVD. Since these two parties represent a majority, the second hypothesis also leads to coalition {CDA, VVD}.

Both examples of the Protocoalition Formation Theory predicted the historical coalition. As can be seen in the Table 6.19, this is not always the case. The number of correct predictions of both the Protocoalition Formation and the combination of the Heart and the Protocoalition Formation is not very high: respectively 6 out of 16 and 5 out of 16. An advantage of these theories is, however, that the prediction sets are unique.

NUMBER OF WINNING COALITIONS		HISTORICAL COALITION	PROTOCOALITION FORMATION	PROTOCOALITION AND HEART
1946	12	PVDA-KVP (PK)	KACV	KACV
1948	12	PVDA-KVP-CHU-VVD (PKCV)	PKACV	KAC
1952	6	PVDA-KVP-ARP-CHU (PKA)	KAV	KAV
1956	15	PVDA-KVP-ARP-CHU (PKAC)	KAC	PKA
1959	14	KVP-ARP-CHU-VVD (KACV)	KACV	PKAC
1963	13	KVP-ARP-CHU-VVD (KACV)	KACV	KAV
1967	24	KVP-ARP-CHU-VVD (KACV)	KACV	PK
1971	6	CHRIS-DS70-VVD (CDV)	DCV	DCV
1972	7	CHRIS-PROG (CP)	PC	PC
1977	16	CDA-VVD (CV)	CV	CV
1981	6	PVDA-D66-CDA (PDC)	DCV	PDC
1982	16	CDA-VVD (CV)	RPCD	PC
1986	16	CDA-VVD (CV)	CDV	CV
1989	15	PVDA-CDA (PC)	CDV	CV
1994	11	PVDA-D66-VVD (PDV)	DCV	PDC
1998	14	PVDA-D66-VVD (PDV)	GPDCV	GPDCV
SUCCESS RATE			6/16	5/16

Table 6.19
Success of the
Protocoalition
Formation
Theory

6.2.4.3 Winset Theory

The main distinction of the Winset Theory as compared to other spatial theories in this research is that in the Winset Theory the distribution of ministerial portfolios is central to the bargaining process. Like the Heart Solution, the Winset Theory allows minority predictions because only the distribution of the main portfolios is studied. Note that more than one coalition can go along with a ministerial distribution. The winset portfolio distribution can lead to a 'one-party' minority prediction, because the only thing that is said is that this party will hold the two main portfolios, but this is not analogous to a one-party government. Similar to the Heart Solution, is the adjusted version of the Winset Theory that I proposed in Section 4.2.3. In the original version, which will be discussed and tested first, the prediction of the portfolio distribution will be the result of the testing. In the adjusted version, a majority criterion again comes into effect. The parties closest to the proposed distribution will join the 'gut-coalition' until this coalition becomes winning.

In Section 4.2.3, I split the Winset Theory into five hierarchical propositions that will be used for testing. The following two hypotheses will be tested:

- Winset: Let $G = (N, W, R^M)$. The portfolio allocation that is in equilibrium - according to propositions 1 to 5 - will come about.
- Winset Majority Version: Let $G = (N, W, R^M)$.

According to the Winset Theory, the parties or party that holds the main portfolios will govern. If this party or these parties do not represent a legislative majority, the closest party in the portfolio space will join until the coalition becomes winning.

Since the different propositions refer to different types of equilibria, for instance a very strong or merely strong party equilibrium or an empty winset DDM (i.e. dimension by dimension median with an empty winset), four examples will be presented. In this manner, different kinds of equilibria can be illustrated. The first shows a status quo equilibrium, the second a very strong party, the third a merely strong party, and the last presents an example where no equilibrium exists. The computer programme WINSET is used in order to compute the equilibria. In order to illustrate the working of this programme, the output of the winset programme for 1948, 1956 and 1959 are presented in Appendix H.

Status Quo Equilibrium

The weighted majority game in 1989 is [76; 6, 49, 12, 54, 22] and the parties are respectively GL, PvdA, D66, CDA, and the VVD. The status quo portfolio allocation {CDA, CDA} has an empty winset. The allocation is the ideal point of the very strong party - the CDA - in equilibrium and will therefore be predicted. Hypothesis 1 thus predicts {CDA, CDA}. The portfolio allocation of the parties and the matching indifference curves are illustrated in Figure 6.4.

Since the CDA does not represent a legislative majority by itself, we continue by searching for the closest parties that will join the CDA in order to form a winning coalition. The CDA - as can be seen in the table below - will be joined by D66 and the VVD.

Figure 6.4
Legislature
1989
foreign vs.
finance

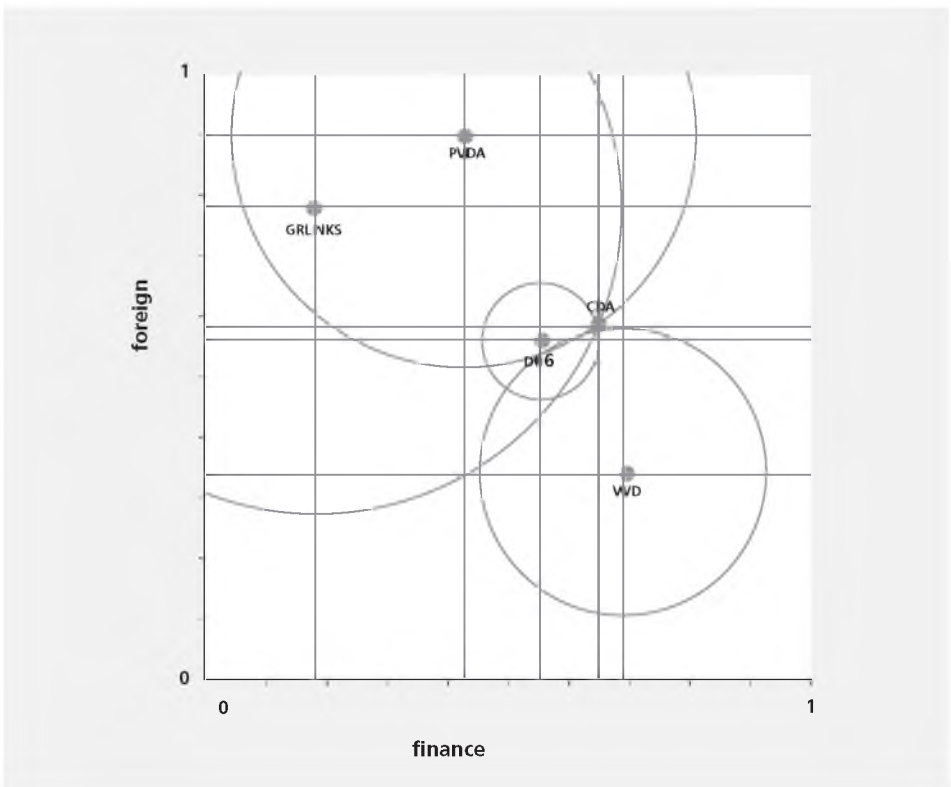


Table 6.20
Party policy
positions and
weights in 1989

PARTY	WEIGHT	FINANCE	FOREIGN
D66	12	0.557	0.564
GL	6	0.191	0.784
VVD	22	0.686	0.336
DA	54	0.648	0.576
PVDA	49	0.436	0.896
CDA/D66	66	0.631	0.574

Table 6.21
Distance table
according to the
winset majority
theory in 1989

DISTANCE	D66	GRLINKS	VVD	PVDA
CDA	0.092	0.502	0.243	0.384
CDA/D66		0.488	0.244	0.377

The correct portfolio distribution in 1989 was {PvdA, CDA}: PvdA on Finance and CDA on Foreign Affairs. This means that the portfolio predicted by hypothesis 1 {CDA, CDA} is not the correct portfolio. The historical coalition was also not predicted correct by the winset-winning version.

Very Strong Party

For 1967 we run into a problem: the winset programme indicates two DDM's. The weighted majority game in 1967 is [76; 37, 7, 42, 15, 12, 17] and the parties are PvdA, D66, KVP, ARP, CHU, and VVD. More than one dimension by dimension median can occur, if the game is symmetric, or - like in this case - if not all parties that gained seats are included in the game. Therefore, in situations like this, we solve this problem by including parties that were not in the original data set.

The winset programme led to 2 empty winset DDM's in 1967. Since this is caused by the fact that not all parties are included in our analysis, we include the Farmers Party to see which of the equilibria is strongest. This party had seven seats in 1967 and had a far 'right-wing' policy position on both dimensions. The KVP now turns out to be the very strong party, and the portfolio prediction is: {KVP, KVP}. This is, however, not the portfolio distribution that came about after the formation in 1967.

Table 6.22

Party policy positions and weights in 1967

PARTY	WEIGHT	FINANCE	FOREIGN
KVP	42	0.678	0.640
CHU	12	0.708	0.684
ARP	15	0.570	1.000
PVDA	37	0.181	0.624
D66	7	0.316	0.840
VVD	17	0.858	0.528
KVP/CHU	54	0.684	0.650
KVP/CHU/VVD	71	0.726	0.621

Table 6.23

Distance table according to the winset majority theory in 1967

DISTANCE	CHU	ARP	PVDA	D66	VVD
KVP	0.053	0.376	0.497	0.414	0.212
KVP/CHU		0.368	0.504	0.415	0.212
KVP/CHU/VVD		0.410	0.545	0.465	

Since the KVP is not winning by itself, we shall continue by adding the ‘closest’ parties until we find a winning coalition.

The predicted coalition based on the winset majority theory is {KVP, ARP, CHU, VVD}, which is the historical coalition of 1967.

Merely Strong Party

There was neither a status quo equilibrium nor a very strong party in 1956. The weighted majority game after the elections in 1956 is the following: [51; 34,33,10,8,9] and the parties are from left to right: PvdA, KVP, ARP, CHU, VVD.

The CHU is a Merely Strong Party. The winset of the ideal point of the MSP is not empty. In the winset of this allocation, we find the portfolio distribution {PvdA, CHU}. This allocation is likely to be formed, since the ideal point of the CHU is not an equilibrium and the PvdA is the largest party. If the CHU would have been both the MSP and the largest party, its ideal point would stand a chance, but now we expect that the PvdA will support the MSP

Unfortunately, the portfolio allocation {PvdA, CHU} is not the allocation that came about in ‘56. The non-empty winset of the CHU - the merely strong party - is illustrated in Figure 6.5.

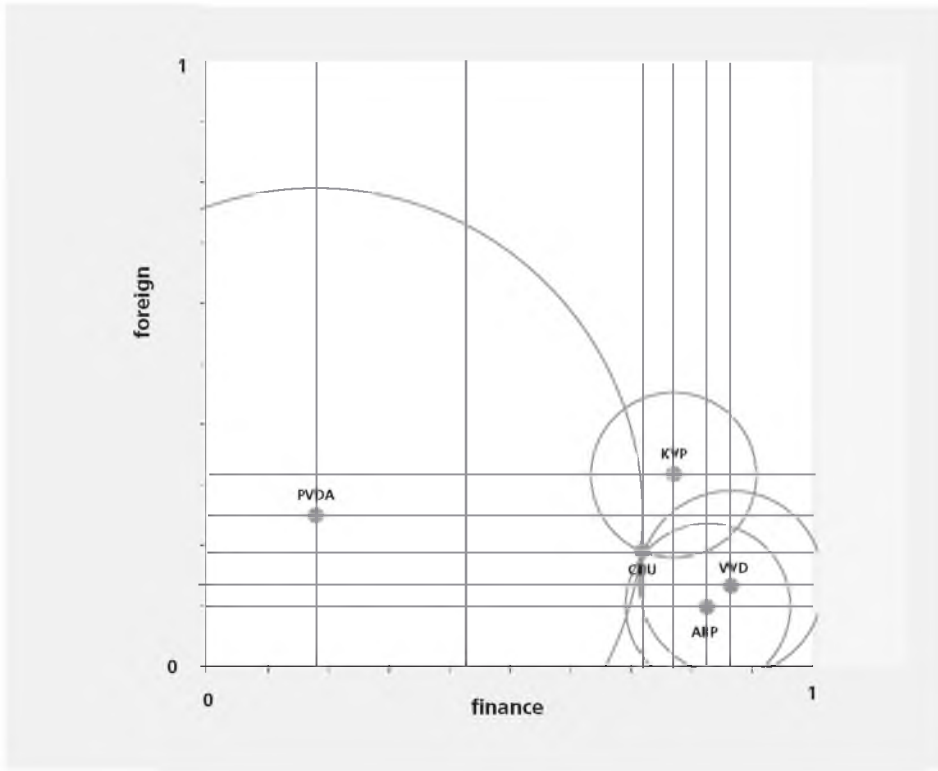


Figure 6.5
Legislature
1956
foreign vs.
finance

Since these two parties - PvdA and CHU - together do not form a winning coalition, the distances of the other parties toward the 'gut-coalition' of {PvdA, CHU} needs to be examined. After that, it is possible to determine which coalition will come about.

PARTY	WEIGHT	FINANCE	FOREIGN
KVP	33	0.771	0.312
VVD	9	0.868	0.128
PVDA	34	0.134	0.252
CHU	8	0.722	0.188
ARP	10	0.831	0.096
PVDA/CHU	42	0.246	0.240

Table 6.24
Party policy
positions
and weights
in 1956

DISTANCE	KVP	VVD	ARP
PVDA. CHU	0.530	0.631	0.602

Table 6.25
Distance table
according to
the winset
majority theory
in 1956

As can be seen in Table 6.25, the party that will join the coalition is the KVP. The coalition that will be formed based on the coalitional version of the Winset Theory is therefore: {PvdA, KVP, CHU}. This coalition however is not the historical coalition.

Cycles

The last example that will be studied is the 1986 coalition formation. The weighted majority game is [76; 2, 52, 9, 54, 27] and the parties from left to right are the PPR, PvdA, D66, CDA, and VVD.

These parties and accompanying positions on the portfolio dimensions do not lead to any kind of equilibrium. There is no strong party and no DDM with an empty winset. Since we can assume that in this case there are cycles throughout the whole portfolio space, no equilibrium can be found. However, I suggest that the theory would predict the Status Quo. After all, if there is no alternative portfolio allocation that can beat the status quo portfolio, the status quo will not be ‘overruled’. Hence, the same allocation as in 1982 will be predicted. The CDA holds both portfolios, which is actually the portfolio allocation that came about in 1986.

Since the CDA does not represent a majority, we continue to compute which party or parties are closest to the CDA in order to predict a winning coalition.

Table 6.26
Party policy positions and weights in 1986

PARTY	WEIGHT	FINANCE	FOREIGN
D66	9	0,658	0,520
PVDA	52	0,403	0,844
VVD	27	0,740	0,556
PPR(R)	2	0,262	0,612
CDA	54	0,727	0,644

Table 6.27
Distance table according to the winset majority theory in 1986

DISTANCE	D66	PVDA	VVD	PPR
CDA	0.142	0.380	0.089	0.466

The closest party will join the CDA, namely the VVD. The prediction based on the winning version of the Winset Theory is therefore {CDA, VVD}. This is the historical coalition.

The above examples provided an illustration of the Winset Theory. The strength of both hypotheses for coalition formation in the Netherlands can be found in Table 6.28. In the third column the number of possible portfolio distributions is given. Normally, the number of winning coalitions is sufficient but note that a portfolio of PvdA and KVP can be both {KVP, PvdA} or {PvdA, KVP}, and note that the winset allocation theory also predicts allocations that do not represent winning coalitions. Therefore, the number of all possible combinations of two parties and the possible 'one party hold both portfolios' combinations are added in this column. This means that the random chance that the correct portfolio is predicted for 1946 is 1 divided by 25. This in contradiction to the 'winset majority' coalitions version and most other theories where the chance of selecting the right coalition depends on the number of possible winning coalitions.

Table 6.28
Success of the
Winset Theory

	NUMBER OF WINNING COALITIONS		NUMBER OF PORTFOLIO ALLOCATIONS			
			HISTORICAL COALITION	WINSET MAJORITY COALITION	HISTORICAL PORTFOLIO ALLOCATION FIN-FOR	WINSET PORTFOLIO ALLOCATION FIN-FOR
1946	12	25	PVDA-KVP (PK)	KVP-PVDA	PVDA-KVP	KVP-PVDA
1948	12	25	PVDA-KVP-CHU-VVD (PKCV)	KVP-ARP-VVD	PVDA-VVD	KVP-KVP
1952	6	16	PVDA-KVP-ARP-CHU (PKA)	KVP-ARP-VVD	PVDA-PVDA	ARP-KVP
1956	15	25	PVDA-KVP-ARP-CHU (PKAC)	PVDA-KVP-CHU	PVDA-KVP	PVDA-CHU
1959	14	25	KVP-ARP-CHU-VVD (KACV)	PVDA-KVP	ARP-KVP	KVP-KVP
1963	13	25	KVP-ARP-CHU-VVD(KACV)	KVP-ARP-CHU	VVD-KVP	KVP-KVP
1967	24	36	KVP-ARP-CHU-VVD(KACV)	KVP-ARP-CHU-VVD	VVD-KVP	KVP-KVP
1971	6	16	CHRIS-DS70-VVD (CDV)	PROG-CHRIS	KVP-KVP	PROG-CHRIS
1972	7	16	CHRIS-PROG (CP)	CHRIS-DS70-PROG	PVDA-PVDA	CHRIS-CHRIS
1977	16	25	CDA-VVD (CV)	CDA-D66-VVD	CDA-VVD	CDA-CDA
1981	6	16	PVDA-D66-CDA (PDC)	CDA-VVD-D66	CDA-PVDA	CDA-CDA
1982	16	25	CDA-VVD (CV)	CDA-PPR-PVDA	CDA-CDA	CDA-CDA
1986	16	25	CDA-VVD (CV)	CDA-VVD	CDA-CDA	CDA-CDA
1989	15	25	PVDA-CDA (PC)	CDA-D66-VVD	PVDA-CDA	CDA-CDA
1994	11	25	PVDA-D66-VVD (PDV)	PVDA-D66-CDA	VVD-D66	PVDA-PVDA
1998*	14	25	PVDA-D66-VVD (PDV)	PVDA-D66-VVD	VVD-PVDA	VVD-VVD
SUCCESS RATE				$4/16$		$2/16$

*SINCE DIFFERENT DATA WERE USED FOR 1998, WE HAVE A DIFFERENT PORTFOLIO ALLOCATION, NAMELY **FIN-HOME**

The empirical results of the winset portfolio allocation and the winset majority version are not very promising. Note that the results are not worse than those for some other theories discussed in this chapter, and that the prediction set of each coalition formation is unique.

6.2.4.4 Competitive Solution

The Competitive Solution also starts with the idea that distances between parties and coalitions determine the preferences of parties. In evaluating the possible winning coalitions, the emphasis is put on the critical players. A critical players is a player who is member in ‘both’ coalitions that are compared. All coalitions are compared in pairs, and the goal is to determine whether the coalitions are viable. A coalition is viable against another coalition, if it is not the case that all critical players prefer one of the coalitions to the other. If all critical players strictly prefer one coalition to another, the first coalition is said to be strictly viable and this coalition may be a member of the Strong Competitive Solution.

This theory will be illustrated with the 1994 coalition formation. The following two hypotheses will be tested:

- Competitive Solution: Let $G = (N, W, R^M)$.
Then only coalitions from K - the Competitive Solution - will be formed.
- Strong Competitive Solution: Let $G = (N, W, R^M)$.
Then only coalitions from K^S - the Strong Competitive Solution - will be formed.

Table 6.29
Distances between parties and coalitions for the Competitive Solution in 1994

Based on the distances in Table 6.29, we start with checking {dpv} versus {dpc}: D66 prefers {dpc} and PvdA prefers {dpc}; so {dpv} is not viable. We continue with all other comparisons: {dpv} vs {dvc}: which are both viable. For further comparisons, I refer to the following list.

DISTANCES	DPV	DPC	DVC	PVC	PCG	DPVC	DPVG	DPCG	DVCG	PVCG	DPVCG
D66	0.475	0.090	0.485			0.304	0.483	0.152	0.427		0.300
PVDA	0.610	0.577		0.727	0.467	0.700	0.552	0.515		0.664	0.649
VVD	0.898		0.821	0.888		0.956	0.945		0.842	0.922	0.980
CDA		0.564	0.506	0.646	0.674	0.599		0.626	0.530	0.684	0.635
GRLINKS					1.134		1.148	1.182	1.549	1.299	1.297

{dpv} vs {pvc}: both viable	{pvc} vs {dpv}: both viable
{dpv} vs {pcg}: {dpv} not viable	{pvc} vs {dpcg}: {pvc} not viable
{dpv} vs {dpvc}: both viable	{pvc} vs {dvcg}: {pvc} not viable
{dpv} vs {dpvg}: both viable	{pvc} vs {pvcg}: both viable
{dpv} vs {dpcg}: {dpv} not viable	{pvc} vs {dpvcg}: both viable
{dpv} vs {dvcg}: {dpv} not viable	{pcg} vs {dpvc}: both viable
{dpv} vs {pvcg}: {pvcg} not viable	{pcg} vs {dpvg}: {dpvg} not viable
{dpv} vs {dpvcg}: both viable	{pcg} vs {dpcg}: both viable
{dpc} vs {dvc}: both viable	{pcg} vs {dvcg}: both viable
{dpc} vs {pvc}: {pvc} not viable	{pcg} vs {pvcg}: {pvcg} not viable
{dpc} vs {pcg}: both viable	{pcg} vs {dpvcg}: both viable
{dpc} vs {dpvc}: {dpvc} not viable	{dpvc} vs {dpvg}: both viable
{dpc} vs {dpvg}: both viable	{dpvc} vs {dpcg}: both viable
{dpc} vs {dpcg}: both viable	{dpvc} vs {dvcg}: both viable
{dpc} vs {dvcg}: both viable	{dpvc} vs {pvcg}: both viable
{dpc} vs {pvcg}: {pvcg} not viable	{dpvc} vs {dpvcg}: both viable
{dpc} vs {dpvcg}: {dpvcg} not viable	{dpvg} vs {dpcg}: both viable
{dvc} vs {pvc}: {pvc} not viable	{dpvg} vs {dvcg}: both viable
{dvc} vs {pcg}: {pcg} not viable	{dpvg} vs {pvcg}: both viable
{dvc} vs {dpvc}: both viable	{dpvg} vs {dpvcg}: both viable
{dvc} vs {dpvg}: both viable	{dpcg} vs {dvcg}: both viable
{dvc} vs {dpcg}: both viable	{dpcg} vs {pvcg}: {pvcg} not viable
{dvc} vs {dvcg}: both viable	{dpcg} vs {dpvcg}: {dpvcg} not viable
{dvc} vs {pvcg}: {pvcg} not viable	{dvcg} vs {pvcg}: both viable
{dvc} vs {dpvcg}: both viable	{dvcg} vs {dpvcg}: both viable
{pvc} vs {pcg}: both viable	{pvcg} vs {dpvcg}: both viable
{pvc} vs {dpvc}: both viable	

Now, it is possible to exclude the coalitions that are not viable. The remaining 'viable' coalitions are: {dpc, dvc, dpcg, dvcg}. Since these four coalitions are viable against each other, there cannot be a Strong Competitive Solution, since in that case one of these coalitions would be strictly better than another. Unfortunately, the Competitive Solution - {dpc, dvc, dpcg, dvcg} - does not include {dpv}, i.e. the historical coalition of 1994. The results of the Competitive Solution and its stronger version are presented in the Table 6.30. The Strong Competitive Solution is in almost all the cases that were tested empty. Remember that this is the case because the Strong Competitive Solution only exists if a coalition dominates all others.

NUMBER OF WINNING COALITIONS		COALITION	COMPETITIVE SOLUTION	STRONG COMPETITIVE SOLUTION
1946	12	PVDA-KVP (PK)	VAK, PAK, KAC, VPAK, VPCK, VACK, PACK, VPACK	
1948	12	PVDA-KVP-CHU-VVD (PKCV)	KCA	
1952	6	PVDA-KVP-ARP-CHU (PKA)	VAK	VAK
1956	15	PVDA-KVP-ARP-CHU (PKAC)	KVA, KCA, KVCA	
1959	14	KVP-ARP-CHU-VVD (KACV)	CAVK , CAVPK	
1963	13	KVP-ARP-CHU-VVD(KACV)	AKV, KCV, AKCV , APCV	
1967	24	KVP-ARP-CHU-VVD (KACV)	KCAD, KCAV , KCDV, KADV, KCADV, KCAPD, KAPDV, KCAPDV	
1971	6	CHRIS-DS70-VVD (CDV)	VDP, VDC , VDPC	
1972	7	CHRIS-PROG (CP)	CP , CDP, VCDP	
1977	16	CDA-VVD (CV)	CV , CRV, CRVD	
1981	6	PVDA-D66-CDA (PDC)	PDC , PVC, DCV, PDCV	
1982	16	CDA-VVD (CV)	PDC, VRDC, PRDC	
1986	16	CDA-VVD (CV)	CV , DVC, VRC, DVRC	
1989	15	PVDA-CDA (PC)	CV, DCV	
1994	11	PVDA-D66-VVD (PDV)	DPC, DVC, DPCG, DVCG	
1998	14	PVDA-D66-VVD (PDV)	GPC, GPDC, GPDV	
SUCCESS RATE			8/16	0

Table 6.30
Success of the
Competitive
Solution

6.2.4.5 Maximal Satisfaction Solution

This solution concept diverges from other theories in this chapter, because it starts with a notion of collective utility. The coalition with the smallest distance per member, i.e. the highest utility, is predicted. The main argument is that if we aim for a dominant coalition, i.e. a coalition preferred by all members to any other coalition, the result is often an empty prediction set. The reason for this is naturally that one coalition seldom assigns the highest utility to every player. The rational player will therefore agree to a coalition where the sum of utilities, based on distances and divided by the number of members in the coalition, is as large as possible.

The following hypothesis was derived:

- Maximal Satisfaction Solution: Let $G = (N, W, R^M)$.

Then only coalitions from W^{SAT} will be formed.

The coalition formation in 1972, is used to illustrate the Maximal Satisfaction Solution. The weighted majority game is [76; 56, 6, 48, 22] with respectively ‘Prog’, DS70, ‘Chris’ and VVD. Note that as we saw in an earlier example, ‘Prog’ and ‘Chris’ are progressive and Christian electoral alliances.

There are seven possible winning coalitions. The first part of Table 6.31 gives the distances of the parties towards the winning coalitions. In the lower part of Table 6.31, the distances are translated into utilities - for the formula see Section 4.2.4 - and are aggregated. The last row presents the aggregated distance, divided by the number of players per coalition, and generates the Maximal Satisfaction Solution. The prediction for 1972, according to the Maximal Satisfaction Solution, is coalition {cp}, since this coalition has the highest value, i.e. maximal satisfaction.

table 6.31
Maximal Satisfaction
Solution in 1972

DISTANCE	VP	CP	VCD	VCP	VDP	CDP	VCDP
VVD	1.962		1.520	2.073	1.902		2.030
CHRISTIAN		0.322	0.750	0.275		0.274	0.312
DS'70			0.491		0.789	1.335	0.933
PROGRESSIVE	0.771	0.276		0.676	0.831	0.335	0.717
UTILITY							
VVD	0.062		0.308	0.000	0.095		0.024
CHRISTIAN		0.974	0.736	1.000		1.001	0.980
DS'70			0.880		0.715	0.411	0.634
PROGRESSIVE	0.724	0.999		0.777	0.691	0.967	0.754
SUM UTILITY	0.786	1.973	1.924	1.777	1.501	2.379	2.393
MAXIMAL SATISFACTION SOLUTION	0.393	0.987	0.641	0.592	0.500	0.793	0.598

The historical coalition in 1972, was as coalition consisting of the progressive and Christian alliance, so for this case the Maximal Satisfaction Solution predicted correctly. In Table 6.32, the results of the Maximal Satisfaction Solution for our 16 cases are presented.

NUMBER OF WINNING COALITIONS		HISTORICAL COALITION	MAXIMAL SATISFACTION SOLUTION
1946	12	PVDA-KVP (PK)	PK
1948	12	PVDA-KVP-CHU-VVD (PKCV)	KCA
1952	6	PVDA-KVP-ARP-CHU (PKA)	PK
1956	15	PVDA-KVP-ARP-CHU (PKAC)	KCA
1959	14	KVP-ARP-CHU-VVD (KACV)	PK
1963	13	KVP-ARP-CHU-VVD(KACV)	AKV
1967	24	KVP-ARP-CHU-VVD (KACV)	KCAV
1971	6	CHRIS-DS70-VVD (CDV)	PC
1972	7	CHRIS-PROG (PC)	PC
1977	16	CDA-VVD (CV)	CV
1981	6	PVDA-D66-CDA (PDC)	PDC
1982	16	CDA-VVD (CV)	PDC
1986	6	CDA-VVD (CV)	CV
1989	15	PVDA-CDA (PC)	CV
1994	14	PVDA-D66-VVD (PDV)	PDC
1998	14	PVDA-D66-VVD (PDV)	PDV
SUCCESS RATE			7/16

Table 6.32
Success of the Maximal Satisfaction Solution

Like the majority version of the Winset Theory, the Maximal Satisfaction Solution also selects unique prediction sets, but it predicts more correct coalitions. Note however that in more than half the cases, the theory still does not predict the historical coalition.

6.3 Success Rate and Prediction Efficiency Compared

In this section, the predictive power of the coalition formation theories will be evaluated. In order to keep the comparisons as clear as possible, I have decided to remove some of the theories from our analysis. This concerns all ‘refined’ versions of the theories, and the normal version of the heart and winset allocation. The first group was deleted because the ‘refined’ versions, in general, do not perform very well. The latter twosome are deleted since in the normal versions of the heart and

the winset the number of possible coalitions diverges from the other theories in our testing. The Heart Solution since it allows minority cabinets and the Winset Theory allows for a difference between the number of possible portfolio allocations and the number of possible winning coalitions. For reasons of completeness, a table for all results - also of the versions of the theories that will not be discussed - is included in Appendix I.

In this section, I shall direct attention in particular to the predictive power of the different classes of theories. The emphasis on the different classes is necessary to answer our main research question, which is “*Do spatial coalition formation theories perform better empirically than non-spatial coalition formation theories?*”

Both the success rate and the prediction efficiency of the different classes of theories will be evaluated. The success rates of the theories have already been computed and sometimes discussed briefly in Section 6.2. The success rate is simply the number of correct predictions divided by the number of cases. This means that in this research, the success rate is some value divided by 16, since we studied 16 cases of coalition formation. The success rate is always between zero and one, and naturally a good theory has a success rate of one or almost one.

However, the success rate alone is not sufficient to evaluate coalition formation theories. There is a difference between theories with unique or small prediction sets, and theories with large prediction sets. Naturally, it is more difficult for a thrift theory to predict correctly than for a broad or naïve theory. In the latter case, if 10 coalitions out of 15 possible winning coalitions are predicted, using chance already leads to better results. To distinguish between the thrift and naïve theories, we introduce prediction efficiency. This is measured by dividing the number of correct predictions by the total number of predictions made by the theory. Both the Bargaining Set Theory - W^{BAR} - and the Maximal Satisfaction Solution, for instance, have a success rate of $7/16 = 0.44$, but Leiserson predicted a total of 28 coalitions for 16 cases, whereas the Maximal Satisfaction Solution has unique prediction sets and thus predicted 16 coalitions in total. Since we would be inclined to prefer a thrift theory with a high success rate to a more naïve theory with the same success rate, we compute the prediction efficiency for the theories that are still in our analysis.

The results will be presented in two tables. The first, 6.33, gives the success rates and prediction efficiency per theory, and the second, 6.34, presents average score per class of theories. For Table 6.34, four classes are taken into account: the office-seeking theories, the uni-dimensional policy-seeking theories, the actor-oriented theories and the spatial theories.

Table 6.33

Success rate and prediction efficiency of the main coalition formation theories

THEORY ¹	TOTAL AMOUNT OF		CORRECT PREDICTIONS	SUCCESS RATE	PREDICTION EFFICIENCY
	PREDICTED COALITIONS PREDICTED BY THE THEORY				
W ^{MIN}	66		9	0.563	0.136
W ^{SIZE}	19		2	0.105	0.105
W ^{BAR}	28		7	0.438	0.250
W ^{MC}	34		8	0.500	0.235
W ^{MINRANGE}	22		6	0.375	0.273
W ^{CORE}	82		8	0.500	0.098
DOMINANT PLAYER	19		3	0.188	0.158
CENTRE PLAYER	128		11	0.688	0.086
MAX SATISFACTION SOL	16		7	0.438	0.438
COMPETITIVE SOL	56		8	0.500	0.143
HEART MAJORITY	65		9	0.563	0.138
WINSET MAJORITY	16		4	0.250	0.250
PROTOCOALITION FORM	16		6	0.375	0.375

¹ The total number of possible winning coalitions based on the parties that are included in the testing is 203. The number of cases that are tested is 16

A criterion for a successful theory, based on the success rate, can be that the theory should predict more than half of the coalitions correctly. The following theories fit into this category:

- minimal winning theory
- centre player
- heart majority coalition

Unfortunately, these theories are also the theories with the largest prediction sets. A better procedure is to compare the prediction efficiency. Different theories score better on this criterion, which is in my opinion a better measure of the strength of these theories. The Protocoalition Formation Theory and the Maximal Satisfaction Solution perform relatively well on this criterion.

In order to compare the classes of theories we now study Table 6.34.

Table 6.34

Success of classes of theories compared (where m = number of ideological or policy dimensions)

COALITION FORMATION THEORIES	AVERAGE SUCCESS RATE	AVERAGE PREDICTION EFFICIENCY
OFFICE SEEKING	0.375	0.164
POLICY SEEKING (M=1)	0.458	0.202
ACTOR ORIENTED	0.438	0.122
SPATIAL THEORIES (M=2)	0.425	0.269

Based on Table 6.34, not much can be said about the differences between the average success rates of the classes of theories. A cautious conclusion may be that policy-seeking theories in general (uni-dimensional and spatial) are preferable to office-seeking theories. Moreover, if we consider the more exact criterion - the prediction efficiency - spatial theories perform better than other theories. From this point of view, compared to the other theories discussed in this research, developing spatial coalition formation theories is a worthwhile undertaking. The theory with the highest prediction efficiency - the Maximal Satisfaction Solution - also belongs to this category.

Note, furthermore, that the best theory among the spatial theories and the best office-seeking theory - that is, best according to its prediction efficiency - both apply a criterion for the number of players. The latter - the bargaining set - is actually the theory that selects the coalition(s) with as few players as possible, and in the Maximal Satisfaction Solution the number of players is taken into account, since we divide the aggregate utility by the number of players in the coalition. So, not the weight as such, but the number of players seems to be important in coalition formation

The overall conclusion, based on the empirical results, is that studying coalition formation within a game-theoretical approach may just not be good enough to tackle coalition formation. The advantage of clarity of the assumptions, and the ability to generalise does not countervail the bad empirical results. However, since the main goal here is not find the 'perfect' coalition formation theory, but to compare classes of theories and discuss whether the 'latest' fashion in coalition formation theory - the spatial theories - is a sensible development, we continue the discussion.

In general, since only sixteen cases have been tested empirically and since the differences in predictive power of the theories are quite small, we should be cautious when drawing conclusions. It is therefore a good idea to perform another kind of test in order to be able to conclude whether these theories are actually performing better than a random selection of coalitions would. In the next section we shall therefore simulate random selections of coalitions and determine whether or which of the theories are 'significantly' better than chance.

6.4 Simulating Coalition Formation; Empirical Results Compared to Random

In order to decide whether coalition formation theories perform better than a random selection based on probability would, a simulation is performed. This means that, based on the number of possible winning coalitions and the number of coalitions in the prediction set of a theory, we can assign a probability to a theory for every specific case. Thus, if a theory predicts 5 out of 18 possible coalitions, a random selection would have a chance of $5/18$ of predicting the historical coalition. We now want to decide whether the theory predicts better than a distribution based on these probabilities would. For every theory, the chance of predicting the historical coalition for every formation is determined, and based on this 50.000 cases are generated.

- The null hypothesis states that the probability based on simulation predicts the same number of historical coalitions as the theory.
- The alternative hypothesis states that the selection of historical coalitions by the theory is higher than the probability selection.

After generating the 50.000 cases, it is possible to perform a one-tailed test with an α of 5%, i.e. a 5% level of significance, and determine which of the hypotheses can be rejected. Rejection of the null hypothesis means that the theory performs better than a random selection based on probability. Further, if the success rate of the theory lies within the last five percent of the distribution gained by the probability distribution - based on the simulation - the null hypothesis is rejected. If, however, the results of the simulation lie within the first 95 % of the distribution, the alternative hypothesis is rejected, and the theory is not considered significantly better than the random probability distribution.

As I said, the 50.000 cases were obtained by simulation. Consider the minimal winning theory: in 1946, 4 out of 12 possible winning coalitions are predicted by the theory. The chance of predicting the historical coalition is $4/12$. A correct prediction is assigned the value 1, a false prediction 0. For all 16 cases a probability distribution is developed and 50.000 samples are generated. Then a frequency table on the number of correct predictions by the simulation is produced. With these frequency tables the hypotheses can be tested. For instance, in the last five percent of the 'correct predictions distribution' for the minimal winning theory, 10 or more historical coalitions should be predicted. The minimal winning theory predicted correctly in 9 out of 16 cases, and is thus not significantly better than the random probability distribution. This means that for the minimal winning theory the alternative

hypothesis is rejected, and we cannot claim that the theory predicts better than a random distribution does.

The frequency distributions of the simulation results are depicted for all theories and accompanying refinements in Appendix J. For our goal - i.e. examining whether the theories predict significantly better than the accompanying probability distributions - it is however sufficient to represent the results of the simulation in a table that simply denotes which hypothesis should be rejected. The same theories as in the previous section will be studied.

Table 6.35
Simulation results

THEORY	NULL HYPOTHESIS	ALTERNATIVE HYPOTHESIS
W^{MIN}		REJECTED
W^{SIZE}		REJECTED
W^{BAR}	REJECTED	
W^{MC}	REJECTED	
W^{MINRANGE}	REJECTED	
W^{CORE}		REJECTED
DOMINANT PLAYER		REJECTED
CENTRE PLAYER		REJECTED
MAX SATISFACTION SOL	REJECTED	
COMPETITIVE SOL		REJECTED
HEART MAJORITY	REJECTED	
WINSET MAJORITY		REJECTED
PROTOCOALITION FORM	REJECTED	

The null hypothesis, which states that the probability based on simulation predicts the same number of historical coalitions as the theory, is tested on a one-tailed distribution with a five percent significance level. If the null hypothesis is rejected, in Table 6.35, it is safe to assume that the theory is really better than a random selection based on the probability distribution. If the alternative hypothesis is rejected, the selection of historical coalitions by the theory is not significantly higher than the probability selection.

The theories that reject the null hypothesis are preferable to theories that do not reject this hypothesis. A comfortable finding is that - in general - theories that 'score' better on the prediction-efficiency criterion more often reject the null hypothesis. The two classes of theories that had the worst prediction-efficiency results for

instance, - i.e. the office-seeking and the actor-oriented theories - also reject the alternative hypothesis most often. The only outlier is the bargaining set theory, but note that this theory also had the best efficiency results of all theories in these classes.

Again, both the uni- and multi-dimensional policy-seeking theories have better results. More than half the theories in either class reject the null hypothesis. In the class of uni-dimensional policy-seeking theories, the worst theory in terms of efficiency - De Swaan's policy distance theory - is also the only theory from this class that does not reject the null hypothesis. Note, in reverse, that the two best theories according to the prediction efficiency criterion - the Maximal Satisfaction Solution and the Proto-coalition Formation Theory - both do reject the null hypothesis. The heart-winning solution also rejects the null hypothesis, and thus performs better than the probability distribution that belongs to this theory.

Even though comparing the results of the simulation based on the probability distributions and the empirical results does not provide very convincing evidence for any of the classes, policy-seeking theories still beat non policy-seeking theories. If all spatial theories would reject the null hypothesis, this would be better evidence for the superiority of these theories, especially since these spatial theories are less parsimonious and should as such lead to better prediction results anyway. This 'economy' argument is valid, only because I assume that information on the ideological positions of parties other than the uni-dimensional ideological positioning should lead to better coalition formation theories.

Nevertheless, it is still safe to assume that investing in spatial theories in order to invent a good coalition formation theory is a worthwhile effort. A successful coalition formation theory should have high results on both success-rate and prediction efficiency. A theory meeting these requirements will naturally beat a chance distribution, as in our simulation.

6.5 Empirical Results of the Spatial Theories for 1989 and 1994 based Expert Data

An inconvenience of empirical research is not only that the world seems unmanageable, but also that the data we use to study reality are often not as precise as we would like. In this research, especially the data on policy or ideological positions, which could be derived from different data sets and different scaling methods, are worrisome. A question that naturally follows from this reflection is whether different data sets lead to different coalition predictions.

Data obtained by surveys among experts on policy positions of political parties are available for 1989 and 1994, (Laver & Hunt, 1992; Laver 1995). From these data sets party positions on two dimensions - a left-right economic dimension and a dimension on social values - are obtained and the theories are again tested. The main finding is that the empirical results of spatial theories tend to improve when expert data are used. Naturally the number of cases is too small to be decisive, but the evidence still points in this direction. The (dis-)advantages of the expert data as compared to other data sets have already been discussed in the previous chapter.

Another important finding is that for most theories and for most refined versions of the theories, the prediction sets obtained with different data overlap but are not analogous. If the prediction sets of the theories, based on the different data, would exactly coincide, this would be all the better since this would imply that using different data sets would not influence the empirical tests. Unfortunately, this is not true, but note that at least the diversion is in one direction. If we consider the results of the five main spatial theories for 1989 and 1994, the only discrepancy is that the expert data for 1994 sometimes predict the correct coalition, whereas the testing based on the Manifesto data set did not. It is an unlucky circumstance that precisely these two cabinets formations are predicted falsely for almost all theories, which makes comparing the data sets more difficult.

Table 6.36 presents the results of the testing based on Manifesto and expert data for the main theories for the two formations. The presentation focuses on whether a theory has or has not predicted the historical coalition.

Both for the theories above, and for the theories no longer included in the analysis, it is true that the expert data never exclude the historical coalition in the prediction

SPATIAL THEORIES PREDICTION	1989	1989	1994	1994
	MANIFESTO DATA	EXPERT DATA control variable	MANIFESTO DATA	EXPERT DATA control variable
MAXIMAL	FALSE	FALSE	FALSE	CORRECT
SATISFACTION SOLUTION				
COMPETITIVE SOLUTION	FALSE	FALSE	FALSE	CORRECT
HEART MAJORITY SOLUTION	CORRECT	CORRECT	FALSE	CORRECT
WINSET COALITIONAL VERSION	FALSE	FALSE	FALSE	FALSE
PROTOCOALITION FORMATION	FALSE	FALSE	FALSE	FALSE

Table 6.36
Test results of
the manifesto
and expert data
compared

set (i.e. a 'false' score) if the Manifesto data has predicted the historical coalition. Moreover, sometimes the historical coalition is not predicted with the Manifesto data set but is predicted with the expert data set. The conclusions based on a comparison between the different data sets, is therefore that the choice of a data set still matters and that the expert data are preferable to the Manifesto data.

The problem of inaccurate data, which is also discussed in Chapter 5, is that we reach a stalemate; the empirical results can be bad because the theories are not good as coalition formation predictors, or the results can be bad because the data were inaccurate to start with. In theory, we could empirically test coalition formation theories only if the perfect data set is found, and the data would be an exact representation of reality.

6.6 Evaluation of the Empirical Findings of Spatial and non-Spatial Coalition Formation Theories

In this chapter the hypotheses were tested in two different manners. The first step was to test the hypotheses derived in Chapters 3 and 4 empirically and determine the success rate and prediction efficiency. If, the hypothesis for instance stated that in a weighted majority game a minimal winning coalition should be formed and not all cases generate a minimal winning coalition, the hypothesis could be rejected. This is true if we assume that there is no 'uncertainty' and there are no measurement errors. Since the maximal amount of correct predictions is 11 out of 16 cases, none of the theories in this research can, according to this criterion, be judged to be good coalition formation theories. Hereby, I refer to a good theory as a theory that always predicts correctly. Simply studying the success rate would lead to rejecting all hypotheses, but note that in this case the standard would be very high because the theories were tested against a hypothetically perfect theory. The same reasoning is applicable for the evaluation of prediction efficiency.

In general, some level of uncertainty is allowed for empirically testing theories. A statistical test was then performed. Since the number of cases in this research is too small to decide on a meaningful statistical standard, the best method is probably to descriptively compare the different levels of the success rate and prediction efficiency between the classes of theories, as is done in this chapter. In this case no decision about rejecting the hypotheses is made, but preferences between the classes of theories could be formulated. The policy-seeking theories and especially the spatial theories are preferred to the office-seeking and actor-oriented theories.

The second stage in the test of our hypotheses was a statistical test in which the theories were compared with the results based on a simulation. For this part of the testing, the standard was the 5% significance level. It was easy to determine which theories reject their null hypothesis and determine which theories predict better than the outcomes based on a probability distribution.

The spatial theories and the uni-dimensional policy oriented theories are also winners in this respect. Most policy-oriented theories rejected the null hypothesis whereas most theories rejected the alternative hypothesis for the other classes. From the 13 theories that were tested only the following six were able to reject the null hypothesis and thus come out as best theories in this research:

- Bargaining Set Theory
- Conflict of Interest Theory: W^{MC}
- Minimal Range Theory
- Maximal Satisfaction Solution
- Heart majority Solution
- Protocoalition Formation Theory

Only the first theory is an office-seeking theory, so an important conclusion of this research - even though it does not come as a surprise - is that policy-seeking theories are better than office-seeking theories. Furthermore, the Maximal Satisfaction Solution, which is based on a notion of aggregate utility turned out to be the best theory in this research. Even though it does not have the highest success rate, it has the best prediction efficiency, and simultaneously rejects the null hypothesis, and is thus better than the random distribution based on this theory.

7. Summary and Conclusions

“The game of science is, in principle, without end. He who decides one day that scientific statements do not call for any further test, and that they can be regarded as finally verified, retires from the game” (Popper, 1975, p 53).

7.1 Summary

This book began with an introduction to coalition formation and its importance in a multi-party democracy. Coalition formation lies at the heart of a multi-party system, yet is a process that is difficult to anticipate for the voters. Coalition formation involves uncertainty for the voters, since their act of voting is not directly translated into the choice for a government. More knowledge about coalition formation provides a better understanding of politics in a multi-party democracy.

Different classes of theories of coalition formation, based on different assumptions that are said to influence the process were studied in this research. The main research question of this study was *“do spatial theories of coalition formation perform better empirically than non-spatial theories of coalition formation”*. Spatial theories are a growing branch of coalition formation theories that have been developed in the last few decades in order to better explain and predict coalition formation. These theories start from a metric multi-dimensional policy or ideology space and predict that coalitions will be formed with distances between the parties and the coalitional ideal points in this space that are as small as possible. The distance between parties and the expected policy positions of coalitions is measured in spatial theories with the Euclidean distance metric. The theories that I denote as classical or non-spatial theories are theories based on power arguments, on powerful actors in the coalition formation process, or on policy or ideological preferences of parties for coalitions on a ordinal, usually uni-dimensional, scale. Coalition formation theories based on institutional constraints were also categorised as non-spatial theories. The research question was addressed with empirical instruments. In the first chapter of this research, the research question was elaborated and the outlines of this research presented.

In the Chapter 2 the focus was on the origins of the models of coalition formation. I argued that these models stem from theories on party or electoral competition. For coalition formation, the preferences, and in case of policy-oriented or spatial theories also the distances, should be considered to apply to parties and coalitions instead of voters and candidates.

The two main theories that take the policy or ideological positions of parties and coalitions into account, namely the classic Downsian (proximity)- and the directional theory, were then introduced. Based on the theoretical and empirical evidence it is not possible to be conclusive about which theory refutes the other. Empirical evidence shows a slight advantage for the directional theory, but theoretical evidence points in both directions. In policy-seeking or spatial coalition formation theories, parties want to maximise their utility by choosing the closest possible winning coalition. For spatial theories of coalition formation, a combination of the classical Downsian and the linkage (also called ideology) model was used. Since I understand the ideology model as an extension of the classical model, this is not problematic. Party and coalitional positions were derived with data reduction methods based on party positions on issues. The notion of underlying latent ideological dimensions, as in the ideology model, was employed in this research. Most spatial coalition formation theories are silent on the issue of selecting a spatial model, but they usually apply the classical or extended Downsian model and not the directional model.

In this chapter the game theoretical basis - the coalitional game - that was used to study coalition formation was also introduced. In a game theoretic model, the descriptive part of a theory determines how preferences of parties for coalitions come about, whereas the predictive or solution part of the theory predicts coalitions.

In the next chapters, - 3 and 4 - coalition formation theories are presented and hypotheses are derived to test the theories. The third Chapter presents the 'classical' coalition formation theories, whereas in Chapter 4 the spatial theories are presented.

The institutional theories are mostly non-formal theories, and therefore by definition do not comply with the requirements for a formal theory. These theories do not consist of series of assumptions that are simultaneously internally consistent, independent, sufficient and necessary. The fact that assumptions in these theories, especially in the theories discussed in Section 3.5.1, are not derived by deduction, and are constraints rather than axioms, leads to descriptive and not to predictive theories. Ruling out all coalitions that are not obeying the institutional constraints is not the same as formulating an axiomatic theory predicting which coalition should be formed. Moreover, in case of more comprehensive and predictive theories in this class, such as Baron's probability theory, the rules of the game should fit empirical reality before the theory can be tested. Baron's (1991/1993) and Austen-Smith & Banks' (1988) models, discussed in Section 3.5.2, are moreover difficult to extend to more complex situations, i.e. more policy dimensions or more parties than the authors describe. The Structure-Induced Equilibrium however does seem

to fit the requirements of a formal theory. Shepsle and Weingast (1981) suggest to have new proposals brought in in a vote against the status quo or/and to assign to a specific actor jurisdiction on a specific policy domain. Since these assumptions are very similar to the Winset Theory, which is studied in the class of spatial theories (Section 4.2.3), I decided to also remove this theory from the empirical analysis. This means that all institutional theories have been removed from the analysis.

The other theories discussed in Chapter 3 - the office-seeking, policy-seeking and actor-oriented theories - are simple axiomatic models. Office-seeking theories take only power arguments into consideration, and for instance search for the smallest possible winning coalition. Actor-oriented theories explain coalition formation through certain power properties of particular parties. Powerful players can receive this annotation by their size or ideological position, and are said to influence coalition formation more than other players in the game. Policy-seeking theories take both office and policy motives into account. These policy motives start from the idea that coalitions with ideological closeness are more likely to be formed than more diverse coalitions. In these uni-dimensional policy-oriented theories, the policy positions of parties and coalitions are ordinal positions on one ideological dimension. From the class of policy-seeking theories, only De Swaan's policy distance theory is problematic. The internal inconsistency of this theory is discussed in Section 3.3.3. The hypotheses that were derived in Chapter 3 were tested in Chapter 6.

In Chapter 4, the spatial theories of coalition formation were studied and for every theory a computation example was given. Common for this class of spatial theories is the behavioural assumption that players prefer a coalition that is as close as possible in a multi-dimensional ideology or policy space to their own position. The Proto-coalition Formation Theory is a straightforward theory that has few assumptions and is not difficult to test. Most striking about this theory is its assumption of subjective rather than symmetrical distances. The Maximal Satisfaction Solution is innovative since it introduces a collective notion of utility. The Competitive Solution also assumes preferences to be based on distances, but it often predicts more than one coalition. Interesting about this theory is its notion of critical players.

The Heart Solution is also a spatial solution concept. Its prediction depends on the party configurations. Quite a few additional assumptions are needed in order to test this solution concept. At first glance then, the set of axioms is not sufficient. The same is true for the last spatial theory - the Winset Theory - evaluated here. It is dissimilar to other spatial theories, since it assumes that coalition formation is based

on the distribution of ministerial portfolios. It is at the same time the most 'institutionally' oriented spatial coalition formation theory in our selection, since it emphasises the powerful position of the status quo. As I said, the Winset Theory and the Heart Solution do not contain enough assumptions to predict coalitions. However, predicting coalitions, instead of party configurations or instead of identifying key players, may not have been the goal of these theories. Both the Heart Solution and the Winset Theory determine key players. In the Winset Theory, the parties that hold the main portfolios are predicted. We may find this less attractive, but it cannot be said that, given their own goals, these theories are not good formal theories.

The empirical evaluation followed the same format as the classification of the theories. For every class, the theories were tested against coalition formations in the Netherlands since 1946, which led to a conclusion about which class of theories performs best.

Chapter 5 starts with a description of the Dutch political system. The Netherlands can be characterised as a parliamentary democracy and as a constitutional monarchy. Elections for parliament are held, as a rule, every 4 years. After elections, the process of coalition formation starts. Since no party usually gains the majority of the vote, cabinet formation is an important feature of our Dutch democracy. The Queen has an interesting role in this process. The Queen consults politicians and then appoints an informateur or formateur to lead the cabinet formation. This political role of the Queen in times of cabinet formation is a very peculiar feature of the Dutch parliamentary democracy.

Also in Chapter 5, party positions on a number of latent ideological dimensions and on the main portfolio dimensions were gathered, since these positions are needed to empirically test the theories. For most cases of coalition formation, manifesto content-analysis data were analysed by means of multidimensional scaling (MDS). The stress scores of the MDS results, which are statistical badness of fit scores, are fairly high (between .09 and .18), but they are not too bad. Moreover, the interpretability of the space with Profit, a property fitting method, provides reasonable results. However, I observed that the manifesto data were collected for another purpose than obtaining party positions, namely for determining issue saliency, and as a result of that I concluded that the quality of the data when translated into policy positions is not very high. The results from the analyses were however the best I can get. The party positions, induced by multi-dimensional scaling of the manifesto data, were later used for testing the spatial coalition formation theories.

Reliability analysis was also performed with the manifesto data in order to collect data on portfolio dimensions for the Winset Theory. The results are not very promising; the scalability scores are not good (.68, .65 and .67) but, unlike the MDS results, these dimensions do consist of issues that are expected to represent the main portfolios.

In order to also test the 1998 coalition formation a computer-coded content analysis was performed. The party manifestos of 1998 were analysed with the Laver and Garry (1998) procedure and scales were obtained. Party positions on an environmental scale, on a left-right and on a social values dimension were gathered. The computer-coded content analysis is innovative and might be a good way to obtain valid data on policy positions for other years as well. The cross-validation of the party positions derived by computer coding and the results of a 1998 expert survey were promising.

The last step was to study the Laver and Hunt (1992) data set. These expert data are unfortunately not fit for empirical testing here, since the survey has only been held twice. This is unfortunate, since positions of parties on a large number of important issues are examined, and since much information on positions on and importance of portfolios is also included. This makes the data set a valuable asset for testing spatial theories, but more cases are needed to put this idea into practice. This data set is therefore only used as control variable in order to measure the effects of different data sets used for testing the theories. The results of the MDS with the manifesto data and the results of the expert data were compared for 1989 and 1994. The positions of the parties on the left-right dimension are quite similar, but the positions on the values dimension in the Laver and Hunt data set and the positions on the vector 'freedom and human rights' in the MDS display great differences. A similar problem was found when the party positions of the manifesto data were compared to the expert data on the portfolio dimensions: again left-right seemed reliable but the Foreign Affairs portfolio caused problems.

Unfortunately, the party positions gained by the data sets in this research are not very reliable. The lack of reliable multi-dimensional data is a large handicap for empirically testing spatial coalition formation theories. However, I decided to continue with testing the theories and simultaneously keep a critical attitude towards the results.

In Chapter 6, the hypotheses were tested in two different ways: first, by measuring the success rate and prediction efficiency of the theories, and secondly by simulating coalition formation based on the probability distribution derived from coalition formation theories, and then comparing the simulation results with the empirical results.

The first approach then consisted of empirically testing the hypotheses derived in Chapters 3 and 4 and determining the success rate and prediction efficiency. If, for instance, the hypothesis states that in a weighted majority game a minimal winning coalition should be formed and not all cases generate a minimal winning coalition, the hypothesis should be rejected. This holds if we assume that there is no ‘uncertainty’ and there are no measurement errors. The highest amount of correct predictions is found in the centre player theory, which predicts correctly in 11 out of 16 cases, leading to a success rate of $11/16$ or .688. None of the theories in this research can therefore, according to this criterion, be judged good coalition formation theories. Simply studying the success rate would lead to rejecting all hypotheses, but note that the standard is very high if the theories are tested against a hypothetically perfect theory. The same reasoning is applicable for the evaluation of prediction efficiency.

In general, some uncertainty is allowed for empirically testing theories. One good method is to descriptively compare the different levels of the success rate and prediction efficiency between the classes of theories, as was done in Chapter 6. In this manner, no decision about rejecting hypotheses can be made but preferences between the classes of theories can still be formulated. An important benefit of the prediction efficiency method as compared to the success rate is that in the former both the degree of falsifiability and the compatibility with empirical research are measured. It is difficult to come to a conclusion about which class of theories is best solely based on the success rate. The highest average success rate is for the policy-seeking and actor-oriented theories, which have an average success rate of .438 and .458 respectively. The lowest success rate is for the office-seeking theories, which score .375. The average score of the spatial theories is .425. Based on the prediction efficiency, the policy-seeking theories (.202) and especially the spatial theories (.269) should be preferred to the office-seeking (.164) and actor-oriented theories (.122).

In Chapter 6, the second method applied to test the hypotheses is a statistical test in which the theories were compared with hypothetical results based on a simulation. For this part of the testing, a 5% significance level was introduced, and I determined which theories reject their null hypothesis - i.e. ‘the probability based on simulation predicts the same number of historical coalitions as the theory’. A theory rejects the null-hypothesis if the number of historical - read: correct - coalitions predicted by the theory is significantly higher than the number of correct predictions based on the probability distribution contrived by the simulation. From the 15 theories that were tested empirically, the following 6 theories rejected the null-hypothesis:

- Bargaining Set
- Conflict of Interest Theory
- Minimal Range Theory
- Heart Majority
- Protocoalition Formation
- Maximal Satisfaction Solution.

Hence, the spatial theories and the uni-dimensional policy oriented theories are also winners in this respect.

7.2 Conclusions

In this section, the initial research question *“do spatial theories of coalition formation perform better empirically than non-spatial theories of coalition formation”* will be answered.

I shall first briefly consider some theoretical issues and thereby reflect on whether the theories discussed here are actually fit for predicting coalitions. Next, I shall examine whether the classes of coalition formation theories are compatible with empirical research - as indicated by the success rate - and if the theories discriminate enough, which is indicated by the prediction efficiency. The latter means that if different theories predict correctly the same number of times, I prefer a theory that predicts only one or a few coalitions to a theory that has large prediction sets.

Theoretical Remarks

All theories included in the empirical part of this research are formal theories as defined by Popper (1975). From the non-spatial theories only De Swaan's Policy Distance Theory, from the class of 'policy-seeking' theories, was found to be inconsistent. Furthermore, two spatial theories - the Heart and the Winset - needed additional assumptions before they could be tested. According to the Popper (1974, see also Section 1.2) requirements this implies that 'the set of axioms is not sufficient'. However, note that these adjustments might be caused by the fact that these theories were not designed to predict coalitions. Obviously, I started from the notion that all theories in this research were designed to predict coalitions. Within the class of spatial theories this assumption is not always met. However, I believe that it is unfair to refute these theories because different goals were aimed at. All other theories in this research meet all requirements for a formal theory.

As the research question implies, I am more interested in the empirical quality of the theories. In particular I am interested in the question whether the new research programme, in the sense of Lakatos' view on scientific growth (1970), that is the group of spatial theories is preferable to the classical non-spatial theories.

Empirical Comparison

New coalition formation theories have not been developed for theoretical reasons. As I said, most theories are satisfactory on theoretical grounds, but do not perform as well as we would like them to do empirically. Ideally, a coalition formation theory predicts every case of coalition formation correctly. This led us to the research question: *“Do spatial coalition formation theories perform better empirically than the non-spatial theories”*.

For the first part of the empirical research, I studied descriptive measurement tools: the success rate and the prediction efficiency. In this concluding section, the focus is on prediction efficiency rather than on the success rate, even though the latter is also interesting. The success rate simply measures the number of times that a theory predicts the historical coalition divided by the number of coalition formations under consideration. The prediction efficiency measures the success rate of a theory in relation to the degree of falsifiability. The average success rate of most theories is rather low. Most theories predict correctly in less than the majority of the cases. Moreover, the difference between the average success rate of the non-spatial theories as compared to spatial theories is insignificant.

However, even though the average success rates among the classes of theories are not very dissimilar, the absolute number of times that theories predict the historical coalition is quite diverse. From the sixteen cases studied, the best theory according to the success rate - the centre player - predicts the correct coalition 11 times, whereas the worst theory in terms of the success rate - the Minimal Size Theory - predicts the correct coalition only twice. One of the actor-oriented theories then, the centre player, has the highest success rate in our research, namely .69. Yet, this does not make the 'centre player' concept a good coalition formation theory, since its prediction efficiency is very low, namely .086. This means that the number of correct predictions is high, but that this is caused by a low degree of falsifiability. In plain English: if we predict almost every possible winning coalition in a game, the chance that we predict the correct one is high. So predicting correctly, that is only considering the success rate, does not give sufficient information about the quality of a coalition formation theory.

Actually, in the two classes where theories violated the theoretical requirements for a good formal theory, we find the ‘best’ empirical results. In the class of policy-seeking and spatial theories, average prediction efficiency rates are .202 and .269 respectively, whereas the average prediction efficiency rates for the office-seeking and actor-oriented theories are .164 and .122 respectively. The average prediction efficiency for all theories in the so-called non-spatial class, that is the office-seeking, actor-oriented and policy-seeking theories - calculated as $((0.164 + 0.202 + 0.122) / 3)$ - is .163, whereas the average prediction efficiency for spatial theories is .269. The prediction efficiency rates are measured by dividing the number of correct predictions by the total number of predicted coalitions. It is moreover interesting that within the class of policy-seeking theories, the only inconsistent theory, the policy distance theory, performs worse than the others, and that in the class of spatial theories, the Heart Solution and the Winset Theory perform worse than two out of three other theories in that class.

The empirical results show the same pattern if we study the statistical test based on simulating coalition formation. The null hypothesis states that the probability based on simulation predicts the same number of correct coalitions as the theory. The alternative hypothesis states that the selection of historical coalitions by the theory is not significantly higher than the probability selection. If the null hypothesis is rejected, it is safe to assume that the theory predicts better than a probability distribution based on the theory would. The hypotheses obtained in Chapters 3 and 4 are rejected if the theory does not reject the null hypothesis in the simulation. The null hypothesis was rejected more often for policy-seeking and spatial theories than for the other classes of theories. The null hypothesis is not rejected for only one out of three theories - the Policy Distance theory- in the policy-seeking class, whereas in the spatial class two out of five theories - the Competitive Solution and the Winset Theory - do not reject the null hypothesis. From the list of theories below, the Conflict of Interest- and the Minimal Range theory belong to the class of policy-oriented theories. From the class of spatial theories, the Maximal Satisfaction Solution, the Heart Majority, and the Protocoalition Formation theory reject the null-hypothesis.

From the 13 theories that were tested only the following six reject the null hypothesis. These theories cannot, according to the statistical test, be rejected.

- Bargaining Set Theory
- Conflict of Interest Theory: W^{MC}
- Minimal Range Theory
- Maximal Satisfaction Solution
- Heart Majority
- Proto-coalition Formation Theory

Only the first theory is an office-seeking theory, so one of the conclusions based on this research is that policy-seeking theories perform better than office-seeking theories. Furthermore, the Maximal Satisfaction Solution, which is based on a notion of aggregate utility, is considered the best theory in this research. Even though it does not have the highest success rate, it has the highest prediction efficiency, namely .438, and beating the random distribution based on this theory, it simultaneously rejects the null hypothesis.

If, based on the simulation, the whole body of non-spatial theories is compared with the latest development in coalition formation theory, spatial theories, this leads to a preference for spatial theories. From the three classes within the group of non-spatial theories, only three out of eight theories reject the null hypothesis. From the spatial theories that are tested, the majority, three out of five, rejects the null hypothesis. In general, the theories that score best on prediction efficiency also more often reject the null hypothesis.

Based on the success rate and prediction efficiency, the coalition formation theories that include policy motives, such as the policy-seeking and spatial theories, perform better empirically than the other classes of theories. So, if the focus is on policy-seeking and spatial theories, and the number of times that the null hypothesis can be rejected is considered, these classes of theories end in a tie. Nevertheless, the spatial theories are slightly ahead of the uni-dimensional policy-seeking theories in terms of prediction efficiency. Considering these differences, I conclude that based on the empirical research, the spatial theories are also preferable to the policy-seeking theories within the class of non-spatial theories.

Reservations

Unfortunately, as I mentioned in Chapter 5, reservations about the empirical research must be made. Even for an optimist, the conclusion of the research on data reduction is that the party positions gained by the data sets in this research are not very reliable. The lack of reliable multi-dimensional data is a large handicap for testing spatial coalition formation theories.

Most spatial theories - the Heart, the Competitive Solution, Proto-coalition Formation and the Maximal Satisfaction Solution - were tested with data obtained by multi-dimensional scaling (MDS) of the Manifesto data set. The test for the last spatial theory - the Winset - also used the Manifesto data set but applied reliability analysis.

For the multi-dimensional scaling, proximities among party manifestos instead of correlations among party manifestos form the input of the analysis. Since the Manifesto data are content analysis data and the scores are based on the number of sentences dealing with an issue, these data are proximities. Hence, multi-dimensional scaling is preferable to for instance factor analysis, which requires correlations as input. However, remember that the Manifesto data were collected for measuring the salience of policy issues and not policy positions, even though I use the scaling output as such. Also, I found that important issues like inflation, unemployment or equal treatment policies were either missing in this data set or were part of a broader policy issue. The statistical indicators of the output of the multi-dimensional scaling showed fairly good results, as did the interpretation of the space with property fitting. However, we should be careful using these data and keep all reservations in mind.

For the Winset Theory, data on specific portfolio dimensions were necessary. This has led, in contrast to earlier reservations, to applying a data-reduction method that uses correlations among issues as its input. Reliability analysis is a straightforward scaling method based on correlations. Since the MDS of the manifesto data did not produce scales that could be applied to the most important portfolio jurisdictions, this side-step was necessary. Here, we should also remember these comments when evaluating the empirical quality of the Winset theory.

It is disconcerting to find that different data sets, more specifically the manifesto data and the Laver and Hunt data set (the latter is used as a device to check the influence of different data sources on the results) produce different party positions. These differences between the party positions of the data sets can simply be caused by the fact that the different issues in the data sets produce different scales or, in

other words, different latent dimensions. Another possibility is that the multi-dimensional scaling solutions of the Manifesto data are reliable, but the interpretation of the property vectors causes the deviance from the other data set. More likely, it is the case that the data just do not give a good representation of the empirical reality, which is more troublesome. As I said before, this is probably caused by the fact that the initial goal of the Manifesto data set was not to gather party positions on issues but to measure the saliency of issues. As I said in the discussion in Chapter 5, the different data sets produce more or less similar party positions on a left-right economic scale, but diverge on other dimensions. Unfortunately, I believe that the last reason, namely that the data do not provide good party positions, is the most probable reason for the diverging positions of the parties on similar issues or similar dimensions. Doubts about the empirical research also rise because the same spatial theories predict different coalitions if different data sets are used. This was further reviewed in Section 6.5. Slightly comforting is the discovery that the Manifesto data, which were used most in the empirical testing, do not predict correctly more often than the control data. This could be a coincidence, but it is comforting since it implies that the quality of the spatial coalition formation theories is not overestimated.

The last type of data describes the policy positions of parties for the 1998 cabinet formation. These data were obtained by computer-coded content analysis following the Laver and Garry (1998) procedure, and these data seem promising. A cross-validation of these data with the preliminary results of the 1998 expert survey showed high correlations between the party positions on similar dimensions. This method to obtain party positions might be a solution to our problems. More research on this method needs to be done and the procedure should be refined, but this could be a way forward in empirical political research.

A last comment that should be made in respect to the quality of the empirical part of this research relates to the ability to generalise the results. As I said in the introduction of this research, in an ideal situation all cases of coalition formation in multi-party democracies would be tested empirically. In this research, only coalition formation in the Netherlands was studied. The Netherlands is a good case because it is a stable democracy with a large number of effective parties. It is likely that the empirical results of the coalition formation theories will be comparable to results based on testing in other multi-party democracies. But obviously the only way to find out if this is true is to perform empirical testing for the same theories in other countries too. So, we must bear in mind that the conclusions of this research are only valid for the Netherlands.

General Comparison

Less than half of the theories in this research predict the historical coalition in a majority of cases. This is disturbing even for someone who is not studying coalition formation. As said before, there is little wrong with most spatial and non-spatial theories in terms of the theoretical requirements they should meet. Profound differences were found in the empirical part of this research. Even though caution is required because the data are not very reliable and because the Netherlands were the only empirical test-case, two conclusions can be drawn:

- Spatial theories are preferable to non-spatial theories of coalition formation.
- Coalition formation theories that include policy motives are preferable to coalition formation theories that do not include policy motives.

7.3 Contribution to Political Science and Further Research Topics

In this research, a small contribution to the field of political science was made. As expressed in the quote, with which I opened this concluding chapter, the game of science is in principle without end. It is an appropriate quote: more than having answers, as a result of this study, new questions have risen.

I have concluded that spatial theories better explain coalition formation than non-spatial theories, and also that theories that include policy motives - spatial theories as well as policy-oriented theories - better explain coalition formation than theories that do not include policy motives. But naturally, the aim of this research is above all to be a study of democracy. In order to better understand democracy, it is necessary to improve our understanding of coalition formation. Theoretically describing spatial theories and contributing to the field of spatial theories with the Maximal Satisfaction Solution, and empirically testing these lines of thought, has improved our knowledge on coalition formation.

Unfortunately, none of the theories in this research were able to explain coalition formation sufficiently. Boldly speaking, most theories do not predict much better than throwing a dice would. So, even though spatial theories may perform better than others, a large part of the coalition formation process remains still unexplained.

The question that now arises is what should we do to improve our results. My answer is twofold.

- First, the theories themselves need improvement, which can be done by adding new assumptions. However, I do not yet know of any assumption that is not idiosyncratic and could or should be included in these theories.
- Secondly, data on party positions need improvement. It is worthwhile to develop a good data set to further test spatial theories and to have at hand when testing improved theories.

The path towards improving coalition formation theories may lie in another new development in the field; the emergence of institutional theories. Including rules of the ‘game’ and including more substantial political knowledge of a particular country at a particular moment will probably lead to higher success rates for coalition formation theories. Now, it is true that including more specific rules and country- and time-specific elements, like whether or not the political leaders of the large parties like one another, will improve the prediction, but it also has a serious drawback. Theories including these kinds of restrictions cannot be generalised to other countries or other time periods, and are not logically derived from general definitions and behavioural assumptions. However, future research could examine whether a combination of institutional and spatial theories can better explain coalition formation, and whether this could lead to theories that transcend the level of description.

The empirical part of this research also needs improvement. An attempt has been made to empirically test several spatial theories. This had not been done in any systematic manner before. In this research, the empirical results on these theories of coalition formation are a contribution to the profession. Naturally, the problems that I have met in the empirical part of the research also lead to future research tasks. As said before, obtaining good data on multi-dimensional party positions is a major challenge for the future. The computer-coded content analysis, even though not yet performed perfectly in this research, can be a good starting point for obtaining this kind of data. A second empirical issue - namely the small number of cases that are tested here - can also be solved in future research. It would be interesting to extend the empirical testing of these theories to more cases and different countries, in order to find out whether the results will be the same.

Appendix A 1

Table 1. - Election results for all political parties from 1946 until 1998 in the Netherlands (the numbers represent the amount of seats in parliament)

PARTIES	CPN	PSP	PPR	GRLI	PVDA	D66	VVD	CDA	KVP	ARP	Ds70	CHU	SGP	KNP	GPV	RPF	BP	NMP	RKPN	EVP	CD	AOV	UNIE55+	SP
1946	10				29		6 ¹		32	13		8	2											
1948	8				27		8		32	13		9	2	1										
1952	6				30		9		30	12		9	2	2										
1956 ²	7				50		13		49	15		13	3											
1959	3	2			48		19		49	14		12	3											
1963	4	4			43		16		50	13		13	3	1			3							
1967	5	4			37	7	17		42	15		12	3	1			7							
1971	6	2	2		39	11	16		35	13	8	10	3	2			1	2						
1972	7	2	7		43	6	22		27	14	6	7	3	2			3		1					
1977	2	1	3		53	8	28	49			1		3	1			1							
1981	3	3	3		44	17	26	48					3	1	2									
1982	3	3	2		47	6	36	45					3	1	2					1	1 ³			
1986		1	2		52	9	27	54					3	1	1									
1989				6	49	12	22	54					3	2	1						1			
1994				5	37	24	31	34					2	2	3						3	6	1	2
1998				11	45	14	38	29					3	2	3									5

¹ The six seats in 1946 were actually for the 'party for freedom' - PvdV - but this party merged in the VVD in 1948.

² In 1956 the number of seats in parliament extended from 100 to 150.

³ Actually this seat was not for the CD but for the CP, but since these parties are very close to each other in terms of content, I did not take the CP into the table too, since it is the only time that it gained a seat.

The parties in the table are represented in arbitrary order. The party most to the left in the table - CPN - was the Communist party. The PSP was also a small left wing pacifist party. The next, the PPR, was also a progressive left-wing party. In 1989 the PPR together with three other small left-wing parties, the pacifist socialist party (PSP), the Christian left-wing party (EVP) and the communist party (CPN) merged into Green Left (GrLi). This is now a left-wing alternative for voters who find the social democrats (PvdA) too moderate. The average support for these parties (the PPR and GrLi) is about 3 or 4% of the electorate.

The next party on the list, the PvdA, which has its roots in the labour movement, is the largest left-wing party in the Netherlands. This social democratic party usually gains almost one third of the votes and has been a partner in 8 cabinets since 1946. The following party in the table is D66, Democrats '66, named after the year of their founding. This is a moderate left-wing liberal social party that originated as a party proposing constitutional reform. Its support ranges from 4% to 16% of the votes. The VVD is a right-wing secular liberal party and is the main opponent of the PvdA on social economic issues. In general, the PvdA and the VVD were alternating coalition parties for the main Christian Democratic Party. The average turnout of the VVD is 15%.

A Christian Democratic Party, the CDA, was officially founded in 1980 but already entered the elections of 1972 with a list. Three religious parties merged into the CDA. These parties are the KVP (catholic party, the largest of the three), the ARP (protestant party) and the CHU (also a protestant party). The CDA and before its founding the KVP is a center party and was a member in every cabinet until 1994. Its support ranges from approximately 20% to 35% of the vote.

The DS70 party was originally founded by discontented members of the PvdA but became a more right- than left-wing party. Its electoral support has always been small.

The SGP is the 'State Reformed Party'; it has a very small but stable electorate and represents the reformed religion, which can be seen as the strict part of the protestant religion. The next party in the table is the KNP - the Catholic National Party -, which was a schism of the KVP. Next in the table are the GPV - reformed political league - and the RPF - reformed political federation - both strict protestant parties. The RPF is said to be slightly more left wing on social economic issues. These parties have small but stable groups of voters.

The following party named BP - 'the farmers' party - was quite right wing. Next is the NMP - the trades-people party - representing the interests of the shopkeepers and otherwise self-employed trades- people. The RKNP - Roman Catholic Party of the Netherlands - has been an orthodox separation of the KVP. The EVP were Protestants that did not agree with the merger of the Protestant parties -ARP and CHU- with the Catholic Party (KVP). People in his party were progressive Protestants and later merged into the left-wing party Green Left. The CP and the CD are extreme right-wing racial prejudiced parties.

The AOV and UNIE55+ are parties protecting the interest of the elderly people in society. Finally the SP is the Socialist Party that advertises with "Vote Against the Establishment" Vote SP.

Of all parties in this table only nine of them occur in the empirical analysis of coalition formation in the Netherlands. Some parties are too small and are therefore not likely to become coalition members and other parties are anti-system parties (for instance the CPN, CP, CD) and are therefore not considered 'coalitionable'. A technical reason for not including many parties in the analysis is that I do not have information i.e. data on the policy positions of these parties. For a fair comparison of the spatial and non-spatial theories I preferred to include, also in the office seeking theories, only the parties that can be positioned on the dimensions.

Appendix A 2

Table 2 - Cabinets in the Netherlands

YEAR	COALITION	NAME CABINET	PRIME MINISTER	LARGEST PARTY	TOTAL DURATION
1946 - 1948	PVDA-KVP	BEEL I	KVP	KVP	766
1948 - 1951	PVDA-KVP-CHU-VVD	DREES - VAN SCHAIK	PVDA	KVP	950
1951 - 1952 'INTERIM'	PVDA-KVP-CHU-VVD	DREES I	PVDA	KVP	537
1952 - 1956	PVDA-KVP-ARP-CHU	DREES II	PVDA	KVP/PVDA	1502
1956 - 1958	PVDA-KVP-ARP-CHU	DREES III	PVDA	PVDA	800
1958 - 1959 'INTERIM'	KVP-ARP-CHU	BEEL II	KVP	PVDA	148
1959 - 1963	KVP-ARP-CHU-VVD	DE QUAY	KVP	KVP	1527
1963 - 1965	KVP-ARP-CHU-VVD	MARIJNEN	KVP	KVP	630
1965 - 1966 'INTERIM'	PVDA- KVP-ARP	CALS	KVP	KVP	587
1966 - 1967 'INTERIM'	KVP-ARP	ZIJLSTRA	KVP	KVP	134
1967 - 1971	KVP-ARP-CHU-VVD	DE JONG	KVP	KVP	1553
1971 - 1972	KVP-ARP-CHU-DS70-VVD	BIESHEUVEL I	ARP	PVDA	380
1972 - 1973 'INTERIM'	KVP-ARP-CHU-VVD	BIESHEUVEL II	ARP	PVDA	295
1973 - 1977	PVDA-PPR-D66-KVP- ARP	DEN UYL	PVDA	PVDA	1683
1977 - 1981	CDA-VVD	VAN AGT I	CDA	PVDA	1362
1981 - 1982	PVDA-D66-CDA	VAN AGT II	CDA	CDA	260
1982 - 1982 'INTERIM'	CDA-D66	VAN AGT III	CDA	CDA	159
1982 - 1986	CDA-VVD	LUBBERS I	CDA	PVDA	1348
1986 - 1989	CDA-VVD	LUBBERS II	CDA	CDA	1212
1989 - 1994	PVDA-CDA	LUBBERS III	CDA	CDA	1749
1994 - 1998	PVDA-D66-VVD	KOK I	PVDA	PVDA	1558
1998 -	PVDA-D66-VVD	KOK II	PVDA	PVDA	???

In this research not all cabinets that have been formed are included in the analysis. I have chosen to exclude the so-called 'interim cabinets'. These coalitions are not formed after elections and can for this reason not be viewed as coalition formation following new voting games. Interim cabinets usually govern after the premature 'death' of the former coalition. In these cases it is very well likely that an incident has occurred that has led to dissolution of the cabinet after which some parties do not want to govern together anymore.

Appendix A 3

Hypotheses

Power-oriented theories

Let $G = (N, \mathbb{W})$ be a simple game.

Then only coalitions from \mathbb{W}^{MIN} will be formed (Von Neumann & Morgenstern, 1990).

Let $[q; w_1, w_2, \dots, w_n]$ be a weighted majority game.

Then only coalitions from \mathbb{W}^{SIZE} will be formed (Riker, 1962).

Let $[q; w_1, w_2, \dots, w_n]$ be a weighted majority game.

Then only coalitions from \mathbb{W}^{BAR} will be formed (Leiserson, 1968).

Policy-oriented theories

Let G_θ be a policy game.

Then only coalitions from \mathbb{W}^{MC} will be formed (Axelrod, 1970; Van Deemen, 1997).

Let G_θ be a policy game and let $S, T \in \mathbb{W}$ and $\exists S \mid D_S < D_T \quad \forall T \in \mathbb{W}$,

Then only coalitions from S will be formed (Leiserson, 1966)

Let G_θ be a policy game.

Then only coalitions from the core will be formed (De Swaan, 1973)

Actor-oriented theories

Let $G = (N, \mathbb{W})$ be a simple game with one dominant player.

Then only coalitions from $D_{\mathbb{W}}(G)$ will be formed (Peleg, 1981).

Let $G = (N, \mathbb{W})$ be a simple game with one dominant player.

Then only coalitions from $D(G)$ will be formed (Van Deemen, 1989).

Peleg-Riker Principle Let $G = [q; w_1, w_2, \dots, w_n]$ be a dominated and proper weighted majority game.

Then only coalitions from $D \cap \mathbb{W}^{\text{size}}$ will be formed (Van Deemen, 1989).

In centralised policy games only coalitions with the centre player (C) will be formed (Van Deemen, 1991).

In centralised policy games only maximally balanced coalitions (B) will be formed (Van Deemen, 1997).

In centralised policy games only coalitions with maximal power excess will be formed (Van Deemen, 1997).

Spatial coalitional games

Let $G = (N, W, R^M)$:

- In a spatial coalitional game only coalitions in the Heart will be formed (Schofield, 1993b).
- In spatial coalitional games only winning coalitions from the Heart will be formed.
- In a spatial coalitional game the Heart coalition with the lowest aggregated distance will be formed (Schofield, 1997).
- The first protocoalition that represents a legislative majority of votes will be formed (Grofman, 1982)
- The first protocoalition from parties inside the Heart that represents a legislative majority of votes will be formed.
- In the Winset Theory, the equilibrium portfolio allocation that satisfies propositions 1 to 5 will come about.
- According to the winset theory, the parties or party that holds the main portfolios will govern. If this party or these parties do not represent a legislative majority, the closest party in the portfolio space will join it until this coalition becomes winning.
- In a spatial coalitional game a coalition from K - competitive solution- will be formed (McKelvey et al., 1978).
- In a spatial coalitional game a coalition from K^S - strong competitive solution- will be formed (McKelvey et al., 1978).
- In a spatial coalitional game a coalition from W^{SAT} - maximal satisfaction solution- will be formed (De Vries, 1999).

Appendix B

Manifesto Research Group - Content Analysis Variables:

DOMAIN 1: EXTERNAL RELATIONS

per 101

foreign special relationships: positive

Favourable mentions of particular countries with which the manifesto country has a special relationship. For example, in the British case: former colonies; in the German case: East-Germany; in the Swedish case: the rest of Scandinavia; the need for cooperation with and/or aid to such countries.

per 102

foreign special relationships: negative

Negative mentions of particular countries with which the manifesto country has a special relationship; otherwise as 101, but negative.

per 103 anti-imperialism

Negative references to exerting strong influence (political, military or commercial) over other states; negative references to controlling other countries as if they were part of an empire; favourable mentions of decolonization; favourable references to greater self-government and independence for colonies; negative references to the imperial behaviour of the manifesto and/or other countries.

per 104 military: positive

Need to maintain or increase military expenditure; modernising armed forces and improvement of military strength; rearmament and self-defence; need to keep military treaty obligations; need to secure adequate manpower in the military.

per 105 military: negative

Favourable mentions of decreasing military expenditures; disarmament; “evils of

war”; promises to reduce conscription, otherwise as 104, but negative.

per 106 peace

Peace as a general goal; declarations of belief in peace and peaceful means of solving crises; desirability of countries joining in negotiations with hostile countries.

per 107 internationalism: positive

Need for international co-operation; co-operation with specific countries other than those coded in 101; need for aid to developing countries; need for world planning of resources; need for international courts; support for any international goal or world state; support for UN.

per 108 european community: positive

Favourable mentions of European Community in general; desirability of expanding the European Community and/or increasing its competence; desirability of the manifesto country joining (or remaining a member).

per 109 internationalism: negative

Favourable mentions of national independence and sovereignty as opposed to internationalism; otherwise as 107, but negative.

per 110 european community: negative

Hostile mentions of the European Community; opposition to specific European policies which are preferred by European authorities; otherwise as 108, but negative.

DOMAIN 2: FREEDOM AND DEMOCRACY

per 210 freedom and human rights

Favourable mentions of importance of personal freedom and civil rights; freedom from bureaucratic control; freedom of speech; freedom of coercion in the political and economic spheres; individualism in the manifesto country and in other countries.

per 202 democracy

Favourable mentions of democracy as a method or goal in national and other organisations; involvement of all citizens in decision-making, as well as generalised support for the manifesto country's democracy.

per 203 constitutionalism: positive

Support for specific aspects of the constitution; use of constitutionalism as an argument for policy as well as general approval of the constitutional way of doing things.

per 204 constitutionalism: negative

Opposition to the constitution in general or to specific aspects; otherwise as 203, but negative.

DOMAIN 3: POLITICAL SYSTEM

per 301 decentralisation

Support for federalism or devolution; more regional autonomy for policy or economy; support for keeping up local and regional customs and symbols; favourable mentions of special consideration for local areas; deference to local expertise.

per 302 centralisation

Opposition to political decision-making at lower political levels; support for more centralisation in political and administrative procedures; otherwise as 301, but negative.

per 303 governmental and administrative efficiency

Need for efficiency and economy in government and administration; cutting down civil service; improving governmental procedures; general appeal to make the process of government and administration cheaper and more effective.

per 304 political corruption

Need to eliminate corruption, and associated abuse, in political and public life.

per 305 political authority

Favourable mentions of strong government, including government stability; manifesto

party's competence to govern and/or other party's lack of such competence.

DOMAIN 4: ECONOMY

per 401 free enterprise

Favourable mentions of free enterprise capitalism; superiority of individual enterprise over state and control systems; favourable mentions of private property rights, personal enterprise and initiative; need for unhampered individual enterprises.

per 402 incentives

Need for wage and tax policies to induce enterprise; encouragement to start enterprises; need for financial and other incentives.

per 403 market regulation

Need for regulations designed to make private enterprises work better; actions against monopolies and trusts, and in defence of consumer and small business; encouraging economic competition; social market economy.

per 404 economic planning

Favourable mentions of long-standing economic planning of a consultative or indicative nature, need for government to create such a plan

per 405 corporatism

Favourable mentions of the need for the collaboration of employers and trade union organisations in overall economic planning and direction through the medium of tripartite bodies of government, employers and trade unions.

per 406 protectionism: positive

Favourable mentions of extension or maintenance of tariffs to protect internal markets; other domestic economic protectionism such as quota restrictions.

per 407 protectionism: negative

Support for the concept of free trade; otherwise as 406, but negative.

per 408 economic goals

Statements of intent to pursue any economic goals not covered by other categories in domain 4. Note: this category is created to catch an overall interest of parties in economics and, therefore, covers a variety of economic goals.

per 409 keynesian demand management

Demand-oriented economic policy; economic policy devoted to reduction of depressions and/or to increase private demand through increasing public demand and/or through increasing social expenditures.

per 410 productivity

Need to encourage or facilitate greater production; need to take measures to aid this; appeal for greater production and importance of productivity to the economy; the paradigm of growth.

per 411 technology and infrastructure

Importance of modernisation of industry and methods of transport and communication; importance of science and technological developments in industry; need for training and research.

per 412 controlled economy

Central need for direct government control of economy; control over prices, wages, rents, etc.

per 413 nationalisation

Government ownership, partial or complete, including government ownership of land.

per 414 economic orthodoxy

Need for traditional economic orthodoxy, e.g. reduction of budget-deficits, retrenchment in crisis, thrift and savings, support for traditional economic institutions such as stock market and banking system; support for strong currency.

per 415 marxist analysis

Positive references (typically but not neces-

sary by communist parties) to the specific use of Marxist-Leninist terminology and analysis of situations which are otherwise uncodable.

per 416 anti-growth economy

Favourable mentions of anti-growth politics and steady state economy; ecologism; "Green Politics".

DOMAIN 5: WELFARE AND QUALITY OF LIFE

per 501 environmental protection

Preservation of countryside, forests, etc.; general preservation of natural resources against selfish interests; proper use of national parks, etc.; environmental improvement.

per 502 culture

Need to provide cultural and leisure facilities including arts and sport; need to spend money on museums, art galleries etc.; need to encourage worthwhile leisure activities and cultural mass-media.

per 503 social justice

Concept of equality; need for fair treatment of all people; special protection for underprivileged; need for fair distribution of resources; removal of class barriers; end of discrimination such as racial or sexual discrimination, etc.

per 504 welfare state expansion

Favourable mentions or need to introduce, maintain or expand social service or social security scheme; support for social services such as health service or social housing. Note: this category excludes education.

per 505 welfare state limitation

Limiting expenditure on social services or social security; otherwise as 504, but negative.

per 506 education expansion

Need to expand and/or improve educational provision at all levels. Note: This excludes technical training which is coded under 411.

per 507 education limitation

Limiting expenditure on education; otherwise as 506, but negative.

DOMAIN 6: FABRIC OF SOCIETY

per 601 national way of life: positive

Appeals to patriotism and/or nationalism; suspension of some freedoms in order to protect the state against subversion; support for established national ideas.

per 602 national way of life: negative

Against patriotism and/or nationalism; opposition to the existing national state; otherwise as 601, but negative.

per 603 traditional morality: positive

Favourable mentions of traditional moral values; prohibition, censorship and suppression of immorality and unseemly behaviour; maintenance and stability of family; religion.

per 604 traditional morality: negative

Opposition to traditional moral values; support for divorce, abortion etc.; otherwise as 603, but negative.

per 605 law and order

Enforcement of all laws; actions against crime; support and resources for police; tougher attitudes in courts.

per 606 social harmony

Appeal for national effort and solidarity; need for society to see itself as united; appeal for public spiritedness; decrying anti-social attitudes in times of crisis; support for the public interest.

per 607 multi-culturalism: positive

Cultural diversity, communalism, cultural plurality and pillarization; preservation of autonomy of religious, linguistic heritages within the country including special educational provisions.

per 608 multi-culturalism: negative

Enforcement or encouragement of cultural integration, otherwise as 606, but negative.

DOMAIN 7: SOCIAL GROUPS

per 701 labour groups: positive

Favourable references to labour groups, working class, unemployed; support for trade unions; good treatment of manual and other employees.

per 702 labour groups: negative

Abuse of power of trade unions; otherwise as 701, but negative.

per 703 agriculture

Support for agriculture and farmers; any policy aimed at specifically benefiting these.

per 704 middle class and professional groups

Favourable references to middle class, professional groups, such as physicians or lawyers; old and new middle class.

per 705 minority groups

Favourable references to underprivileged minority groups who are defined neither in economic nor in demographic terms, e.g. the handicapped, homosexuals, immigrants, etc.

per 706 non economic demographic groups

Favourable mentions of, or need for, assistance to women, old people, young people, linguistic groups, etc., special interest groups of all kinds.

Appendix C

Results of the MDS analysis

The highlighted coordinates are included in the 'testing file'.

Table C.1
Coordinates
of the parties on
two dimensions.
Stressvalue for
configuration
1946-1956 is .18

YEAR	PARTY	DIMENSION 1	DIMENSION 2
1946	VVD	0.24	0.67
1946	PVDA	-0.94	-0.26
1946	ARP	0.54	-0.30
1946	CHU	0.26	-1.16
1946	KVP	-0.19	-0.28
1948	VVD	0.93	1.03
1948	KVP	-0.15	-1.00
1948	PVDA	-0.84	0.02
1948	CHU	0.31	-0.96
1948	ARP	0.71	0.10
1952	VVD	0.47	1.87
1952	PVDA	-1.24	0.30
1952	ARP	0.32	-0.33
1952	KVP	0.09	-0.13
1956	KVP	-0.11	-0.06
1956	VVD	-0.21	1.19
1956	PVDA	-1.36	0.20
1956	CHU	0.90	-0.78
1956	ARP	0.27	-0.11

Table C.2
Coordinates
of the parties on
two dimensions.
Stressvalue for
configuration
1952-1959 is .11

YEAR	PARTY	DIMENSION 1	DIMENSION 2
1952	VVD	0.25	-1.61
1952	PVDA	-1.03	0.36
1952	ARP	0.79	0.35
1952	KVP	0.57	0.17
1956	KVP	0.09	0.24
1956	VVD	-0.33	-1.03
1956	PVDA	-1.01	0.24
1956	CHU	0.81	0.81
1956	ARP	0.71	0.17
1959	CHU	0.35	0.93
1959	ARP	0.51	-0.06
1959	VVD	0.44	-0.83
1959	PVDA	-1.27	0.56
1959	KVP	0.88	0.31

YEAR	PARTY	DIMENSION 1	DIMENSION 2
1956	KVP	0.15	0.33
1956	VVD	-1.12	-0.41
1956	PVDA	0.37	-0.79
1956	CHU	-0.01	1.31
1956	ARP	-0.40	0.74
1959	CHU	0.56	0.91
1959	ARP	-0.13	0.65
1959	VVD	-1.19	0.28
1959	PVDA	0.97	-0.75
1959	KVP	-0.61	-0.85
1963	ARP	0.15	0.22
1963	KVP	-0.13	-0.86
1963	PVDA	0.57	-1.12
1963	CHU	1.29	0.49
1963	VVD	-0.49	-0.15

Table C.3
Coordinates of the parties on two dimensions. Stressvalue for configuration 1956-1963 is .14

YEAR	PARTY	DIMENSION 1	DIMENSION 2
1959	CHU	1.186	.679
1959	ARP	.934	.209
1959	VVD	1.135	-.572
1959	PVDA	-.401	.988
1959	KVP	.475	-1.096
1963	ARP	.437	.199
1963	KVP	.083	-.807
1963	PVDA	-.794	-.053
1963	CHU	.431	.957
1963	VVD	.380	-.345
1967	KVP	-.038	-.223
1967	CHU	-.235	.342
1967	ARP	.017	.184
1967	PVDA	-1.585	.230
1967	D66	-1.732	-.314
1967	VVD	-.293	-.380

Table C.4
Coordinates of the parties on two dimensions. Stressvalue for configuration 1959-1967 is .16

Appendix

Table C.5

Coordinates of the parties on two dimensions. Stressvalue for configuration 1963-1972 is .15

YEAR	PARTY	DIMENSION 1	DIMENSION 2
1963	ARP	.330	-1.023
1963	KVP	.846	-.666
1963	PVDA	-.600	-.046
1963	CHU	-.147	-1.427
1963	VVD	.759	-.347
1967	KVP	.291	-.438
1967	CHU	-.112	-.461
1967	ARP	-.254	-.712
1967	PVDA	-1.459	-.100
1967	D66	-1.194	.514
1967	VVD	.420	-.148
1971	VVD	.293	.307
1971	DS70	.333	1.023
1971	PRG3	-.335	.758
1971	CHR3	-.159	-.033
1972	VVD	1.693	.906
1972	CHR3	-.346	.445
1972	DS70	.626	.756
1972	PRG3	-.987	.691

Table C.6

Coordinates of the parties on two dimensions. Stressvalue for configuration 1967-1977 is .12

YEAR	PARTY	DIMENSION 1	DIMENSION 2
1967	KVP	-.618	-.896
1967	CHU	-.362	-.799
1967	ARP	.108	-1.061
1967	PVDA	1.244	-.871
1967	D66	1.188	-.330
1967	VVD	-.794	-.667
1971	VVD	-.502	-.219
1971	DS70	-.422	.903
1971	PRG3	.486	.516
1971	CHR3	.123	-.112
1972	VVD	-1.844	.527
1972	CHR3	.381	.079
1972	DS70	-.723	.567
1972	PRG3	.886	.400
1977	CDA	-.224	.035
1977	DS70	-.191	.389
1977	PPR	1.080	.551
1977	VVD	-1.068	-.135
1977	D66	.295	.732
1977	PVDA	.959	.391

YEAR	PARTY	DIMENSION 1	DIMENSION 2
1971	VVD	-.780	-.055
1971	DS70	-.459	.764
1971	PRG3	.671	-.041
1971	CHR3	.102	.194
1972	VVD	-2.094	.636
1972	CHR3	.767	-.426
1972	DS70	-.735	-.629
1972	PRG3	1.096	.112
1977	CDA	-1.155	-.504
1977	DS70	-.220	-.293
1977	PPR	1.377	-.003
1977	VVD	-1.397	-.205
1977	D66	.334	.566
1977	PVDA	1.149	.283
1981	PVDA	.764	.512
1981	D66	.210	-.040
1981	VVD	-.916	-.265
1981	CDA	.287	-.604

Table C.7
Coordinates of the parties on two dimensions.
Stressvalue for configuration 1971-1981 is .14

YEAR	PARTY	DIMENSION 1	DIMENSION 2
1977	CDA	-.515	.328
1977	DS70	-.641	.146
1977	PPR	.203	1.161
1977	VVD	-1.281	-.213
1977	D66	-.514	1.132
1977	PVDA	.350	.991
1981	PVDA	.417	.783
1981	D66	-.093	.446
1981	VVD	.783	-.234
1981	CDA	-.129	.265
1982	VVD	-4.469	-1.461
1982	PVDA	.904	-.582
1982	PPR	2.541	-.340
1982	D66	.182	-.249
1982	CDA	.085	-.231
1986	D66	.067	-.566
1986	PVDA	.312	-.287
1986	VVD	-.362	-.675
1986	PPR	.244	.043
1986	CDA	.348	-.456

Table C.8
Coordinates of the parties on two dimensions.
Stressvalue for configuration 1977-1986 is .11

Table C.9

Coordinates of
the parties on
two dimensions.
Stressvalue for
configuration
1981-1989 is .13

YEAR	PARTY	DIMENSION 1	DIMENSION 2
1981	PVDA	.848	.812
1981	D66	.299	.424
1981	VVD	-.202	-.742
1981	CDA	.423	.042
1982	VVD	-.497	-1.401
1982	PVDA	.793	-.521
1982	PPR	2.980	-.358
1982	D66	-.173	.158
1982	CDA	-.171	-.116
1986	D66	-0.374	-0.058
1986	PVDA	-0.048	0.068
1986	VVD	-0.635	-0.319
1986	PPR	-0.009	0.310
1986	CDA	-0.547	-0.214
1989	D66	-.737	.345
1989	GRLINKS	.016	1.023
1989	VVD	-.757	-.051
1989	CDA	-.770	.194
1989	PVDA	-.440	.404

Table C.10

Coordinates of
the parties on
two dimensions.
Stressvalue for
configuration
1986-1994 is .09

YEAR	PARTY	DIMENSION 1	DIMENSION 2
1986	D66	-0.07	0.34
1986	PVDA	0.37	0.47
1986	VVD	-0.65	0.38
1986	PPR	0.62	0.65
1986	CDA	-0.51	0.59
1989	D66	-0.10	0.73
1989	GRLINKS	1.24	0.15
1989	VVD	-0.44	0.78
1989	CDA	-0.31	0.61
1989	PVDA	0.20	0.53
1994	D66	-0.19	-0.70
1994	PVDA	0.38	-1.04
1994	VVD	-0.94	-1.71
1994	CDA	-0.60	-0.45
1994	GRLINKS	0.99	-1.32

Appendix D Party positions on the portfolio dimensions, data for testing the Winset Theory

Table D.1
Standardised
scores of parties
on three portfolio
dimensions, 1946

YEAR	PARTY	Z-FINANCE	Z-FOREIGN	Z-HOME AFFAIRS
1946	PVDA	-1.24	-1.00	-0.09
1946	VVD	0.26	-1.16	-0.31
1946	KVP	-1.19	-0.66	-0.75
1946	ARP	0.36	-1.69	0.36
1946	CHU	-0.15	-1.69	0.37

Table D.2
Standardised
scores of parties
on three portfolio
dimensions, 1948

YEAR	PARTY	Z-FINANCE	Z-FOREIGN	Z-HOME AFFAIRS
1948	PVDA	-1.24	-0.83	0.85
1948	VVD	0.66	-0.86	-0.66
1948	KVP	.09	-0.57	-0.11
1948	ARP	0.18	-1.51	-0.39
1948	CHU	-0.06	-1.69	0.63

Table D.3
Standardised
scores of parties
on three portfolio
dimensions, 1952

YEAR	PARTY	Z-FINANCE	Z-FOREIGN	Z-HOME AFFAIRS
1952	PVDA	-1.83	0.81	-1.14
1952	VVD	1.53	-1.42	-1.17
1952	KVP	1.04	-0.82	-0.28
1952	ARP	0.62	-1.62	-0.63

Table D.4
Standardised
scores of parties
on three portfolio
dimensions, 1956

YEAR	PARTY	Z-FINANCE	Z-FOREIGN	Z-HOME AFFAIRS
1956	PVDA	-1.64	-0.83	-1.09
1956	VVD	1.24	-1.26	-1.12
1956	KVP	0.86	-0.63	-0.68
1956	ARP	1.10	-1.37	-0.54
1956	CHU	0.66	-1.05	-0.60

Table D.5
Standardised
scores of parties
on three portfolio
dimensions, 1959

YEAR	PARTY	Z-FINANCE	Z-FOREIGN	Z-HOME AFFAIRS
1959	PVDA	-0.43	0.20	-1.43
1959	VVD	1.44	-1.62	-0.75
1959	KVP	0.38	-0.52	-1.61
1959	ARP	0.57	-1.51	-1.04
1959	CHU	0.35	-1.46	-0.80

Table D.6

Standardised scores of parties on three portfolio dimensions, 1963

YEAR	PARTY	Z-FINANCE	Z-FOREIGN	Z-HOME AFFAIRS
1963	PVDA	-1.87	1.49	-1.24
1963	VVD	0.45	-1.04	-1.24
1963	KVP	-0.14	0.56	-1.61
1963	ARP	0.51	0.24	-1.53
1963	CHU	0.29	1.67	-1.61

Table D.7

Standardised scores of parties on three portfolio dimensions, 1967

YEAR	PARTY	Z-FINANCE	Z-FOREIGN	Z-HOME AFFAIRS
1967	PVDA	-1.46	0.44	-1.20
1967	D66	-0.93	1.17	-0.68
1967	VVD	1.20	0.11	-0.16
1967	KVP	0.49	0.49	-0.74
1967	ARP	0.07	1.72	-0.63
1967	CHU	0.61	0.64	-0.20

Table D.8

Standardised scores of parties on three portfolio dimensions, 1971

YEAR	PARTY	Z-FINANCE	Z-FOREIGN	Z-HOME AFFAIRS
1971	VVD	0.79	-0.47	0.23
1971	DS70	-0.14	-0.38	0.04
1971	PROG	-1.34	0.55	0.06
1971	CHRS	-0.95	1.28	-0.52

Table D.9

Standardised scores of parties on three portfolio dimensions, 1972

YEAR	PARTY	Z-FINANCE	Z-FOREIGN	Z-HOME AFFAIRS
1972	VVD	1.30	-1.46	-0.04
1972	DS70	0.48	-0.15	-0.05
1972	PROG	-2.17	1.36	-0.19
1972	CHRS	-0.72	0.15	-0.37

Table D.10

Standardised scores of parties on three portfolio dimensions, 1977

YEAR	PARTY	Z-FINANCE	Z-FOREIGN	Z-HOME AFFAIRS
1977	PPR	-2.06	1.56	-0.93
1977	PVDA	-2.01	1.53	-0.02
1977	D66	-0.52	-0.34	-0.79
1977	VVD	1.34	-0.30	1.11
1977	CDA	0.37	0.60	0.75
1977	DS70	-0.39	0.05	1.36

YEAR	PARTY	Z-FINANCE	Z-FOREIGN	Z-HOME AFFAIRS
1981	PVDA	-1.92	1.31	-0.78
1981	D66	-1.07	0.78	-0.08
1981	VVD	0.92	0.38	0.45
1981	CDA	-0.07	0.56	0.15

Table D.11
Standardised scores of parties on three portfolio dimensions, 1981

YEAR	PARTY	Z-FINANCE	Z-FOREIGN	Z-HOME AFFAIRS
1982	PPR	-0.03	0.71	-0.31
1982	PVDA	-0.32	1.47	0.58
1982	D66	-0.22	0.03	0.76
1982	VVD	1.37	-0.03	0.79
1982	CDA	0.11	1.15	1.42

table D.12
Standardised scores of parties on three portfolio dimensions, 1982

YEAR	PARTY	Z-FINANCE	Z-FOREIGN	Z-HOME AFFAIRS
1986	PPR	-1.14	0.40	0.24
1986	PVDA	-0.59	1.19	1.02
1986	D66	0.41	0.08	1.21
1986	VVD	0.73	0.21	1.53
1986	CDA	0.68	0.51	0.78

table D13
Standardised scores of parties on three portfolio dimensions, 1986

YEAR	PARTY	Z-FINANCE	Z-FOREIGN	Z-HOME AFFAIRS
1989	GRLI	-1.42	0.98	0.61
1989	PVDA	-0.46	1.36	1.21
1989	D66	0.01	0.23	1.26
1989	VVD	0.52	-0.55	1.99
1989	CDA	0.37	0.27	1.80

table D.14
Standardised scores of parties on three portfolio dimensions, 1989

YEAR	PARTY	Z-FINANCE	Z-FOREIGN	Z-HOME AFFAIRS
1994	GRLI	0.43	0.76	1.05
1994	PVDA	0.99	0.33	1.77
1994	D66	1.07	0.79	1.92
1994	VVD	1.76	-0.22	2.48
1994	CDA	1.14	1.00	1.36

table D.15
Standardised scores of parties on three portfolio dimensions, 1994

Appendix E

Wordlists used for Content Analysis of the party manifestos in 1998¹

E.1.1 Economic Policy Domain - Wordlist left

overheid	zekerheid	uitkering
sociale	gezondheidszorg	uitkeringen
sociaal	vervoer	minimumloon
zorg	koppelen	armoede
zorgen	koppeling	armoedeval
werk	ontkoppeling	armoedebestrijding
investeren	gekoppeld	anti-armoedebeleid
zekerheid	gekoppelde	solidariteit
basis	koppelingswet	bijstand
staat	arbeid	minimum
draagvlak	instellingen	herverdeling
voorzieningen	betaald	basisvoorzieningen
investeringen	betalde	

E.1.2 Economic Policy Domain - Wordlist right

infrastructuur	industrie	ontplooiën
lastenverlichting	financieringstekort	ontplooiing
individuele	vrijheid	deregulering
beperking	zelfstandig	flexi...
groei	staatsschuld	veiligheid
particuliere	tekort	afdrachten
versterking	concurrentiepositie	orde
keuzevrijheid	concurrentie	marktsector
besparingen	stimuleren	

¹ These wordlists contain words that are not complete, or more precise, there are words that miss letters at the end. This is due to the maximum number of letters that *Kwalitan* can represent. The dots after the word 'flexi' mean that all words that begin with 'flexi' - like flexibel - will be counted.

E.2.1 Social Values Domain - Wordlist conservative

alleenstaanden	gezinsplanning	naturalisatie-
allochtone	gezinsverantwoordel	naturaliseren
allochtonen	gezinsvoogden	norm
allochtoon	gezinsvoogdij-inste	normatieve
alleenstaande	gezinsvorming	normen
asiel	gezinsvriendelijk	normvervaging
asiel-	gezinsvriendelijke	opvoeden
asielaanvragen	gezinsvriendelijke	opvoeding
asielfunctie	gezin_	opvoedings-
asielverzoek	godsdienst-	opvoedingsaspect
asielverzoeken	godsdiensten	opvoedingsklimaat
asielzoeker	huwelijk	opvoedingsondersteu
asielzoekers	huwelijkse	ouder
asielzoekerscentra	immigranten	ouderbetrokkenheid
beginsel	immigrantenkinderen	ouders
bordeelverbod	immigratie	religie
burgerlijk	immigratie-	religieuze
burgerlijke	inburge-	remigratie
burgermaatschappij	inburgering	respect
defensie	inburgeringsbeleid	respecteert
defensie-	inburgeringscontrac	respecteren
defensie-identiteit	inburgeringscursus	re_integratie
defensie-industrie	inburgeringsprogram	re_integratiebeleid
defensie-uitgaven	inburgeringstraject	toelatingsbeleid
defensiecapaciteit	kerk	toelatingsregeling
defensiepersoneel	kerkdiensten	traditie
defensieuitgaven	kerkelijk	tradities
doormigratie	kerkelijke	traditioneel
echtgenoot	kerken	traditionele
evangelie	koningin	verantwoorde
familie	koninklijk	verantwoordeli
familieband	koninklijke	verantwoordelijk
familiebedrijven	koninkrijk	verantwoordelijkheid
familiebeleid	koninkrijksverband	verantwoordelijkheid
familieleden	koninkrijksverhoudi	verantwoording
familieverband	levensbeschouwelijke	verantwoordingen
familievriendelijke	levensbeschouwelijk	verboden
gehuwden	levensbeschouwing	waarden
gelijkgezinde	migranten	waardengemeenschap
geloof	migrantenbeleid	zingeving
geloofwaardig	migrantenkringen	zingevingsvragen
geloofwaardige	migrantenvraagstuk	medisch-ethische
geloofwaardiger	migratie	klonen
geloofwaardigheid	migratie-	gentherapie
gezin	migratie-effecten	genetische
gezinnen	migratieoverschot	euthanasie
gezins-	migratiestromen	euthanasie/hulp
gezinsbeleid	migratievraagstuk	zelfdoding
gezinslid	monarchie	

E.2.2 Social Values Domain - Wordlist liberal

alleengaande	liberalen	samenlevingsvormen
alleengaanden	liberalisatie	samenwonen
anti-discriminatieb	liberalisering	samenwonenden
anti-discriminatiew	medeburger	seksueel
anti-racisme	medeburgers	seksuele
antidiscriminatiebe	meningsuiting	sexueel
antidiscriminatieco	meningsuitingen	subcultuur
antifoltercommissie	mens	tolerantie
bewustwordingsproce	mens-	tolereert
bewustzijn	menselijke	verdraagzaamheid
civil	mensen	vluchtelingen
discriminatie	mensenhandel	vluchtelingen-
discrimineren	mensenrechtelijke	vluchtelingenorgani
discriminerend	mensenrechten	vrede
draagmoederschap	mensenrechten-	vredeonderhandel in
eiceldonatie	mensenrechtenaspect	vredeproces
emancipatie	mensenrechtenbeleid	vrije
emancipatiebeleid	mensenrechtencommis	vrijheid
emanciperen	mensenrechtengroep	vrijheidszin
etniciteit	mensenrechtennormen	zelfbeschikking
etnisch	mensenrechtenorgani	
etnische	mensenrechtenpoliti	
gelijk	mensenrechtenschem	
gelijkberechtiging	mensenrechtensituat	
gelijke	mensenrechtenstanda	
gelijkgestemde	mensenrechtenverdra	
gelijkgestemden	mens_	
gelijkheid	minderheden	
gelijkheidsbeginsel	minderhedenbeleid	
gelijkwaardig	minderheid	
gelijkwaardige	minderheidsgroepen	
gelijkwaardigheid	minderheidsgroep	
gerechtigd	minderheidsrechten	
gerechtigden	multiculturaliteit	
gerechtigheid	multicultureel	
gerechtvaardigd	multiculturele	
gerechtvaardigde	non-conformisme	
gescheiden	onderdrukking	
gezinshereniging	partner	
grondrecht	partnerregistratie	
grondrechten	partners	
homoseksuele	partners/samenwonen	
humanitaire	partnervoogdijschap	
keuzevrijheid	prostitutie	
leefvormen	racisme	
lesbische	racistisch	
levensbe_indiging	rolpatronen	
levensvormen	samenlevingen	
liberale	samenlevingsvorm	

E.3 Environmental Protection

aardbol	dienstfietsen	energiekeurmerk
aarde	diesel	energiekwaliteit
aardgas	dodewaard	energieleveranciers
aardgasbaten	drinkwater	energiemarkt
aardgasvoorraden	drinkwater-voorzien	energieoverschotten
aardolie	drinkwaterbedrijven	energieprestatienor
aardwarmte	drinkwatervoorzieni	energieprijzen
afval	dumpen	energieproducenten
afvalberg	duurzaam	energieproductie
afvalproductie	duurzaamheid	energiesector
afvalrecycling	duurzaamheidsaspect	energiesystemen
afvalstoffen	duurzaamheidseisen	energieverbruik
afvalstoffenheffing	duurzame	energievoorziening
afvalstromen	duurzamer	energievoorzieninge
ammoniak	eco-tax	energiezuinig
anti-verdrogingsbel	ecologie	energiezuinige
atoomenergie	ecologisch	energiezuiniger
bedrijfsmilieuplan	ecologische	erodeert
bestrijdingsmiddele	ecologiseren	fiets
bio-industrie	ecologisering	fiets-
biodiversiteit	ecopolis	fietsen
biodiversiteitsverd	ecotax	fietser
biologische	ecotoerisme	fietsers
biomassa	emissie	fietspaden
biotechnologische	emissiearme	fietsroutes
bodem-	emissieplafonds	fietsverkeer
bodembescherming	emissierechten	gasprijs
bodems	emissiereducties	geluidhinder
bodemsanering	emissies	geluidshinder
bodemvervuiling	energie	geluidsnormen
brandstof	energie-	groen
brandstofdrager	energie-accijns	groene
brandstoffen	energie-afhankelijk	groenfondsen
broeikaseneffect	energie-efci_nite	groenstructuren
broeikasgassen	energie-efci_ntie	grondbeleid
broeikassen	energie-extensiveri	grondgebied
chemicali_n	energie-intensieve	grondgebruik
chemische	energie-intensiteit	grondstof
co2-	energie-opwekking	grondstofbesparing
co2-beleid	energiebedrijven	grondstoffen
co2-emissie	energiebehoefte	grondstofvoorraden
co2-emissies	energiebelastingen	grondwater
co2-gemeenschap	energiebeleid	grondwateronttrekki
co2-uitstoot	energiebesparing	herbebossing
co2	energiebronnen	herbruikbaar
congestie	energiedistributien	herbruikbaar
congestieproblemen	energiedragers	hergebruik
congestiegebieden	energiegebruik	hergebruiken
delfstoffen	energieheffing	hergebruiksector

hergebruikt	milieubestemmingshe	milieuregelgeving
kernafval	milieubeweging	milieuregels
kerncentrale	milieubewegingen	milieurendement
kerncentrales	milieuco	milieuruimte
kernenergie	milieuconvenanten	milieuschade
kernkwaliteit	milieucriminaliteit	milieuschadelijke
kerosine	milieudelicten	milieutechnologie
klimaat	milieudiplomatie	milieuterrein
klimaatsysteem	milieudiplomatiek	milieuterreinen
klimaatverandering	milieudoel	milieutraject
kooldioxide	milieudoelen	milieuvastrechtkaar
krachtcentrale	milieudoelstelling	milieuverantwoord
kringloopcentra	milieudoelstellinge	milieuverantwoorde
kringloopfuncties	milieudruk	milieuverbetering
kringlopen	milieueffectrapport	milieuverbeteringen
kunstmest	milieueisen	milieuverbruik
kustgebied	milieufactor	milieuverdragen
kuststroken	milieugebied	milieuvergunningen
kustuitbreiding	milieugebruik	milieuverklaring
kustvaart	milieugebruiksruimt	milieuvernietiging
leidingwater-afvalw	milieuge drag	milieuverontreinigi
lozingen	milieugegevens	milieuverplichtinge
luchtvervuiling	milieugelden	milieuverslag
mest	milieugerichte	milieuversterking
milieu	milieugevaarlijke	milieuvervuilende
milieu-	milieugevolgen	milieuvervuiling
milieu-activist	milieugrenzen	milieuvoordelen
milieu-afval	milieugroepen	milieuvoorwaarden
milieu-effecten	milieugulden	milieuvriendelijk
milieu-efficiency	milieuguldens	milieuvriendelijke
milieu-eisen	milieuheffing	milieuvriendelijker
milieu-heffing	milieuheffingen	milieuvriendelijkhe
milieu-innovatie	milieuhinder	milieuwaarheid
milieu-investeringe	milieujaarverslag	milieuwinst
milieu-onvriendelij	milieukaders	milieuzorg
milieu-oogpunt	milieukosten	natuur
milieu-overtredinge	milieukwaliteit	natuur-
milieu-vriendelijke	milieukwaliteitseis	natuur/
milieubegroting	milieulast	natuur/milieu
milieubeheer	milieulasten	natuur/wonen
milieubelang	milieumaatregelen	natuurbeheer
milieubelastende	milieunormen	natuurbehoud
milieubelasting	milieuorganisaties	natuurbeleid
milieubelastingen	milieuplafonds	natuurbeleving
milieubeleid	milieupolitie	natuurbescherming
milieubeleidsplan	milieupolitiek	natuurbouw
milieubeleidsplanne	milieuprobleem	natuurbouwprojecten
milieubesef	milieuproblemen	natuurcompensatie
milieubeslag	milieuprojecten	natuureisen

natuurgebied	waterbodems
natuurgebieden	watergebruik
natuurherstel	waterhuishouding
natuurkwaliteiten	waterkwaliteit
natuurontwikkeling	waterschappen
natuurontwikkelings	waterspoor
natuurproductie	watersystemen
natuursparende	watervoorziening
natuurvoorwaarden	waterwinning
natuurvriendelijke	wereldklimaatconfer
natuurwaarden	wereldmilieufonds
natuurzuivere	windenergie
nitraat-richtlijn	windenergieplan
nucleaire	windmolens
nul-emissie-situati	windpark
oppervlaktewater	zee
oppervlaktewateren	zeehaven
radioactief	zeemilieu
recycling	zoetwatervoorzienin
regenwouden	zonne-energie
rijwielpaden	zonne-energie-insta
ruimtebeheer	zonnecellen
ruimteclaims	zonnepanelen
ruimtegebruik	zuiderzee-hsl
ruimtetoedeling	zwavelverbindingen
schone	
schoner	
schonere	
schoon	
spuitbussen	
statiegeldsysteem	
statiegeldsystemen	
temperatuurstijging	
uitlaatgassen	
uitstoot	
vervuilde	
vervuilende	
vervuiler	
vervuilers	
vervuiling	
vervuilingsrechten	
verzurende	
verzuring	
warmte-krachtkoppel	
warmtekracht	
warmtekrachtkoppeli	
water	
water-	
waterbeheer	

Appendix F

Results of the computer-coded content analysis of the 1998 manifestos in the Netherlands

Table F.1

Normalised scores on the economic 'left-right' scale, the liberal-conservative value scale and the environmental protection scale.

NORM. SCORES	ECONOMIC POLICY	SOCIAL VALUES	ENVIRONMENT
GROENLINKS	0	.86	1
PVDA	.18	1	.42
D66	.45	.93	.47
CDA	.22	0	.10
VVD	1	.81	0

Appendix G

Control data for the Netherlands in 1989 and 1994 based on the Laver and Hunt (1992) and Laver (1995) expert data sets

PARTY	LEFT-RIGHT	SOCIAL POLICY
GROENLINKS	-1.26	-0.93
PVDA	-0.59	-0.68
D66	0.06	-0.69
CDA	0.49	0.74
VVD	1.04	-0.40

Table G.1
Policy positions of the parties in 1989 on the left right and social policy dimension

When the data for 1989 were collected the Green Left (groenlinks) party was not included. Since this party was the fifth largest party in the election of 1989, I have decided to include it in this analysis. Its score is the average score of the scores of the three parties (PSP, PPR, CPN) that later merged into Green Left.

PARTY	FINANCE	FOREIGN AFFAIRS
GROENLINKS	-1.26	-1.06
PVDA	-0.59	-0.58
D66	0.06	-0.27
CDA	0.49	-0.01
VVD	1.04	0.48

Table G.2
Portfolio positions of the parties in 1989 on the Finance and Foreign Affairs portfolios

PARTY	LEFT-RIGHT	SOCIAL POLICY
GROENLINKS	-1.49	-1.37
PVDA	-0.44	-1.06
D66	0.09	-1.20
CDA	0.53	0.49
VVD	0.65	-0.84

Table G.3
Portfolio positions of the parties in 1994 on the left right and social policy dimension

PARTY	FINANCE	FOREIGN AFFAIRS
GROENLINKS	-1.48	-0.89
PVDA	-0.43	0.54
D66	0.09	0.76
CDA	0.53	0.98
VVD	0.65	1.27

Table G.4
Portfolio positions of the parties in 1994 on the Finance and Foreign Affairs portfolios

Appendix H

Winset Programme Output

Note that WINSET represents the parties by the first and last letter of the abbreviation that we usually apply: so the {kvp} becomes {kp} etceteras.

1948: Investigating the status quo (PvdA, KVP)

				.-----finance						
				/	.-----foreign					
				/	/					

Investigating :		pa		kp						

									Preferred by:	
Winpoint no.	:		kp		kp		kp	ap	cu	vd
	:		kp		pa		kp	ap	cu	vd
	:		kp		ap		kp	ap	cu	vd
	:		kp		vd		kp	ap	cu	vd
	:		pa		pa		pa	ap	cu	vd
	:		pa		vd		pa	ap	cu	vd
	:		ap		kp		kp	ap	cu	vd
	:		ap		pa		kp	ap	cu	vd
	:		ap		ap		kp	ap	cu	vd
	:		ap		vd		kp	ap	cu	vd
	:		cu		kp		kp	ap	cu	vd
	:		cu		pa		kp	ap	cu	vd
	:		cu		ap		kp	ap	cu	vd
	:		cu		vd		kp	ap	cu	vd
	:		vd		kp		kp	ap	cu	vd
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	:		vd		ap		kp	ap	cu	vd
	:		vd		vd		kp	ap	cu	vd

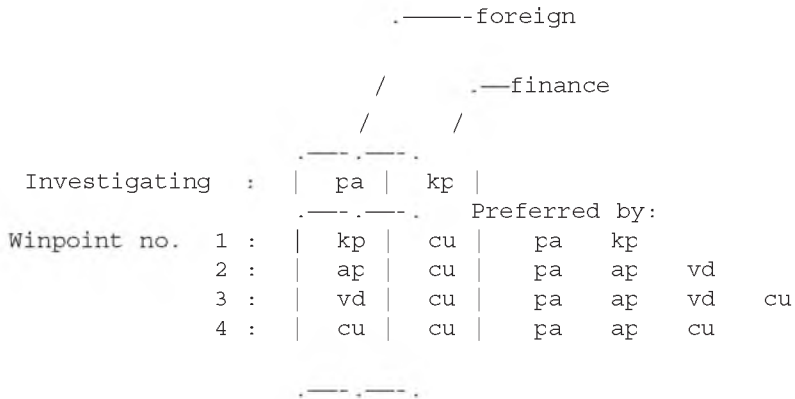
1948: Winset of the DDM (KVP, PvdA)

				.-----finance					
				/	.-----foreign				
				/	/				

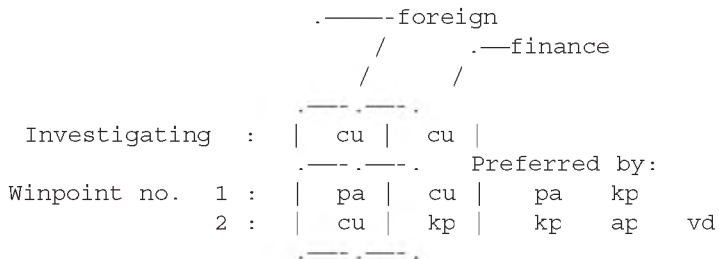
Investigating :		kp		pa					

									Preferred by:
Winpoint no.	:		cu		kp		kp	pa	

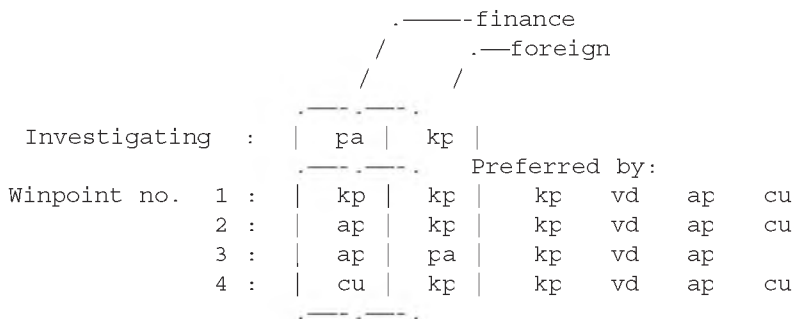
1956: Winset of the DDM



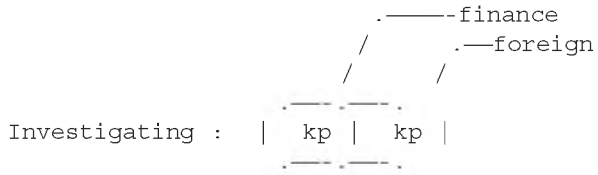
1956: Winset of the strong party



1959: Winset of the 1956 status quo: {PvdA, KVP}

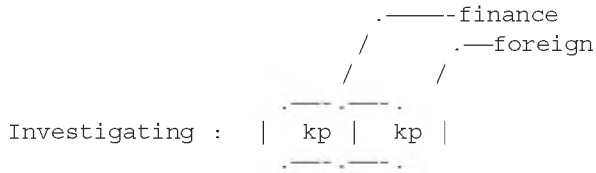


1959 DDM



This point has an empty winset.

1959 (very) strong party



Note: the VSP {KVP} has an empty winset and its ideal point is predicted.

Appendix I

Success Rate and Prediction Efficiency

theory (nr possible winning coalitions is 203)	total amount of predicted coalitions predicted by the theory	cases	correct predictions	success rate	prediction efficiency = nr correct pred/total predicted coalitions
W^{MIN}	66	16	9	0.563	0.136
W^{SIZE}	19	16	2	0.125	0.105
W^{BAR}	28	16	7	0.438	0.250
W^{MC}	34	16	8	0.5	0.235
$W^{MINRANGE}$	22	16	6	0.375	0.273
W^{CORE}	82	16	8	0.500	0.098
$D_W(G)$	42	16	5	0.313	0.119
$D(G)$	19	16	3	0.188	0.158
$D(G) \cap W^{SIZE}$	16	16	0	0	0
$W(c)$	128	16	11	0.688	0.086
$W^{MAX BAL}$	16	16	0	0	0
$W^{POW EXCESS}$	16	16	3	0.188	0.186
MAX SAT	16	16	7	0.438	0.438
COMP SOL	56	16	8	0.500	0.143
STRONG COM SOL	16	16	0	0	0
HEART	83	16	9	0.562	0.108
HEART 'WINNING'	65	16	9	0.562	0.138
HEART (REFINED)	16	16	3	0.187	0.187
WINSET ALLOCATION	16	16	2	0.125	0.125
WINSET COALITION	16	16	4	0.250	0.250
PROTO COAL.FORM	16	16	6	0.375	0.375
PROTO+HEART	16	16	5	0.313	0.313

The number of predicted coalitions by each theory is at least 16 since we have 16 cases, but in some cases we have included an empty prediction set. Some years did not have a dominant or center party and did not predict anything.

Appendix J

Simulation results

Minimal Winning Theory

Simulatie exacte kans van theorie bij combinatie van verkiezingen'.

subtitle 'theorie MINWIN'.

SPSS JOB

```

input program.
loop case=1 to 50000.
compute y46=uniform(1.0) . /* 1946 4 van de 12.
recode y46 (lo thru .3333333=1)(else=0).
compute y48=uniform(1.0) . /* 1948 4 van de 12.
recode y48 (lo thru .3333333=1)(else=0).
compute y52=uniform(1.0) . /* 1952 3 van de 6.
recode y52 (lo thru .5000000=1)(else=0).
compute y56=uniform(1.0) . /* 1956 6 van de 15.
recode y56 (lo thru .4000000=1)(else=0).
compute y59=uniform(1.0) . /* 1959 5 van de 14.
recode y59 (lo thru .3571428=1)(else=0).
compute y63=uniform(1.0) . /* 1963 5 van de 13.
recode y63 (lo thru .3846153=1)(else=0).
compute y67=uniform(1.0) . /* 1967 7 van de 24.
recode y67 (lo thru .2916666=1)(else=0).
compute y71=uniform(1.0) . /* 1971 3 van de 6 .
recode y71 (lo thru .5000000=1)(else=0).
compute y72=uniform(1.0) . /* 1972 3 van de 7.
recode y72 (lo thru .4285714=1)(else=0).
compute y77=uniform(1.0) . /* 1977 3 van de 16.
recode y77 (lo thru .1875000=1)(else=0).
compute y81=uniform(1.0) . /* 1981 3 van de 6.
recode y81 (lo thru .5000000=1)(else=0).
compute y82=uniform(1.0) . /* 1982 3 van de 16.
recode y82 (lo thru .1875000=1)(else=0).
compute y86=uniform(1.0) . /* 1986 3 van de 16.
recode y86 (lo thru .1875000=1)(else=0).
compute y89=uniform(1.0) . /* 1989 4 van de 15.
recode y89 (lo thru .2666666=1)(else=0).
compute y94=uniform(1.0) . /* 1994 5 van de 11.
recode y94 (lo thru .4545454=1)(else=0).
compute y98=uniform(1.0) . /* 1998 5 van de 14.
recode y98 (lo thru .3571428=1)(else=0).
end case.
end loop.
end file.
end input program.
formats y46 to y98(f1.0).
count nsuc=y46 to y98(1).
formats nsuc(f2.0).
list var=y46 to nsuc /cases = from 1 to 100.

freq var=nsuc /stat=all /barchar.

```

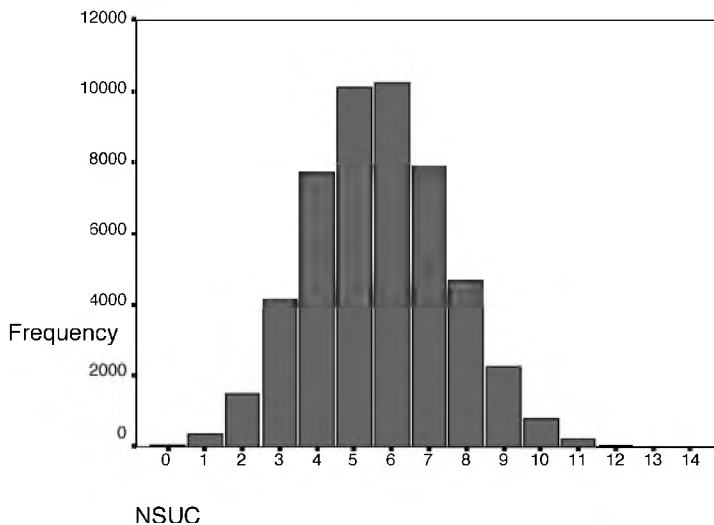
Minimal Winning Theory

The minimal winning theory predicted 9 historical coalitions. Since the cumulative percentage until eight correct predictions is 93.3, and our $\alpha = 5\%$ the null hypothesis can not be rejected. The prediction based on the theory is not significantly better than the prediction based on random⁴.

Frequency table of correct predictions of the simulation of the minimum winning theory

		FREQUENCY	PERCENT	VALID PERCENT	CUMULATIVE PERCENT
VALID	0	38	.1	.1	.1
	1	339	.7	.7	.8
	2	1485	3.0	3.0	3.7
	3	4153	8.3	8.3	12.0
	4	7706	15.4	15.4	27.4
	5	10117	20.2	20.2	47.7
	6	10256	20.5	20.5	68.2
	7	7888	15.8	15.8	84.0
	8	4675	9.4	9.4	93.3
	9	2269	4.5	4.5	97.9
	10	808	1.6	1.6	99.5
	11	207	.4	.4	99.9
	12	50	.1	.1	100.0
	13	8	.0	.0	100.0
14	1	.0	.0	100.0	
TOTAL		50000	100.0	100.0	

Distribution of correct predictions - NSUC- of the simulation of the minimum winning theory



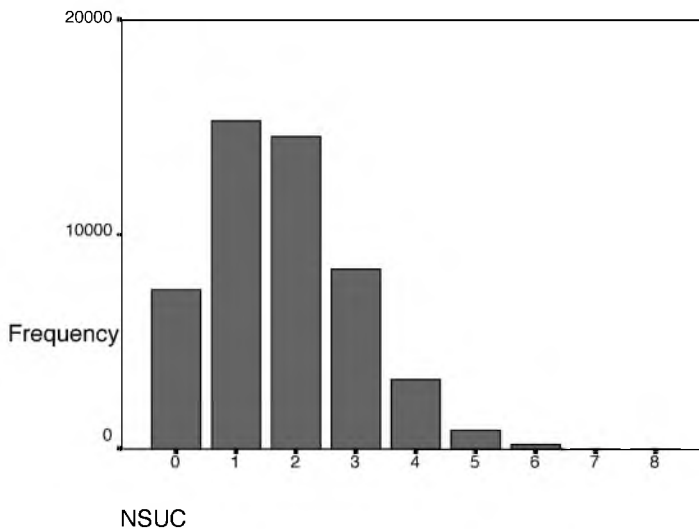
⁴ In the figure of the distribution of correct prediction based on simulation belonging to the minimal winning theory and in all other distribution figures 'NSUC' stands for the number of successful predictions with the simulation.

Minimum Size Theory

The success rate of the minimal size theory is 2/16. This is not significantly better than the number of correct predictions based on random. The null hypothesis is therefore not rejected.

		FREQUENCY	PERCENT	VALID PERCENT	CUMULATIVE PERCENT
VALID	0	7416	14.8	14.8	14.8
	1	15321	30.6	30.6	45.5
	2	14556	29.1	29.1	74.6
	3	8351	16.7	16.7	91.3
	4	3240	6.5	6.5	97.8
	5	868	1.7	1.7	99.5
	6	211	.4	.4	99.9
	7	26	.1	.1	100.0
	8	11	.0	.0	100.0
	TOTAL	50000	100.0	100.0	

Frequency table of correct predictions of the simulation of the minimum size theory



Distribution of correct predictions - NSUC- of the simulation of the minimum size theory

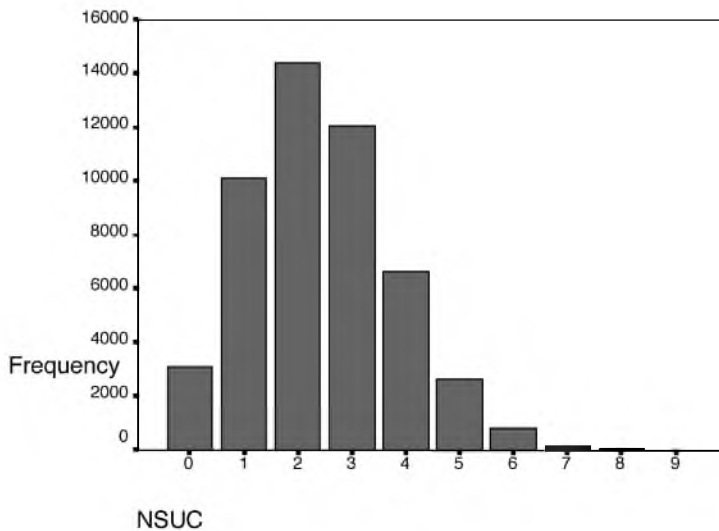
Bargaining Set Theory

The success rate of the bargaining set is 7/16. The percentage of correct predictions at 6 in the simulation is 99.6. The null hypothesis should therefore be rejected and we conclude that the bargaining set theory predicts significantly better than a random probability distribution.

Frequency table of correct predictions of the simulation of the bargaining set theory

		FREQUENCY	PERCENT	VALID PERCENT	CUMULATIVE PERCENT
VALID	0	3138	6.3	6.3	6.3
	1	10122	20.2	20.2	26.5
	2	14438	28.9	28.9	55.4
	3	12034	24.1	24.1	79.5
	4	6644	13.3	13.3	92.8
	5	2618	5.2	5.2	98.0
	6	806	1.6	1.6	99.6
	7	159	.3	.3	99.9
	8	38	.1	.1	100.0
	9	3	.0	.0	100.0
	TOTAL	50000	100.0	100.0	

Distribution of correct predictions - NSUC- of the simulation of the bargaining set theory

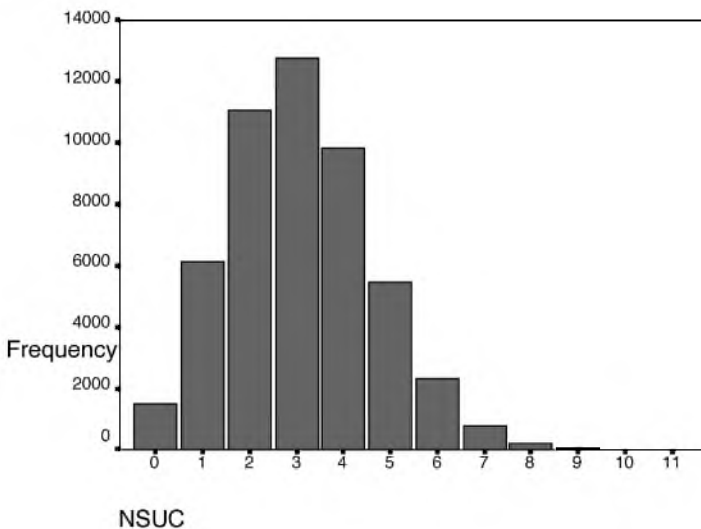


Minimal Connected Winning Theory

The number of historical coalitions predicted by this theory - it is eight - lies in the last five percent of the distribution based on random. Therefore, the null hypothesis is rejected.

		FREQUENCY	PERCENT	VALID PERCENT	CUMULATIVE PERCENT
VALID	0	1479	3.0	3.0	3.0
	1	6117	12.2	12.2	15.2
	2	11064	22.1	22.1	37.3
	3	12760	25.5	25.5	62.8
	4	9806	19.6	19.6	82.5
	5	5445	10.9	10.9	93.3
	6	2291	4.6	4.6	97.9
	7	775	1.6	1.6	99.5
	8	213	.4	.4	99.9
	9	45	.1	.1	100.0
	10	4	.0	.0	100.0
TOTAL		50000	100.0	100.0	

Frequency table of correct predictions of the simulation of the minimal connected winning theory



Distribution of correct predictions - NSUC - of the minimal connected winning theory

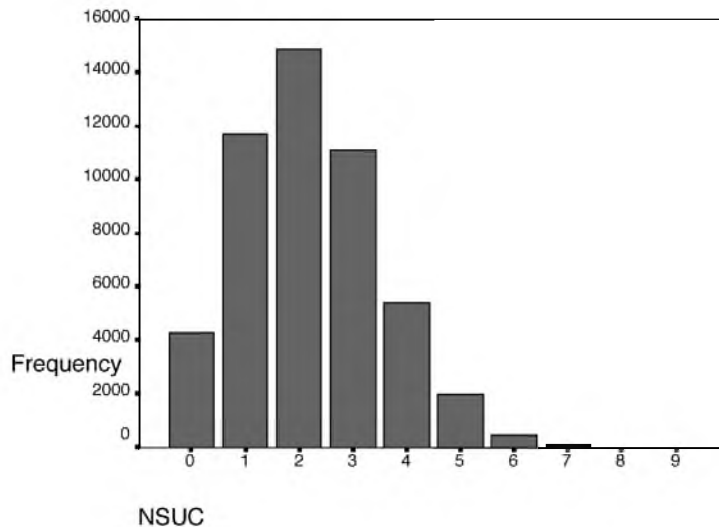
Minimal Range Theory

The number of successful predictions by the minimal range theory is 6. The percentage of correct of predictions by the simulation at 5 is 99, so the null hypothesis is rejected. The number of historical predictions by the theory is significantly better than by random.

Frequency table of correct predictions of the simulation of the minimal range theory

		FREQUENCY	PERCENT	VALID PERCENT	CUMULATIVE PERCENT
VALID	0	4307	8.6	8.6	8.6
	1	11716	23.4	23.4	32.0
	2	14892	29.8	29.8	61.8
	3	11109	22.2	22.2	84.0
	4	5417	10.8	10.8	94.9
	5	1985	4.0	4.0	98.9
	6	462	.9	.9	99.8
	7	98	.2	.2	100.0
	13		.0	.0	100.0
	9	1	.0	.0	100.0
TOTAL		50000	100.0	100.0	

Distribution of correct predictions - NSUC- of the simulation of the minimal range theory

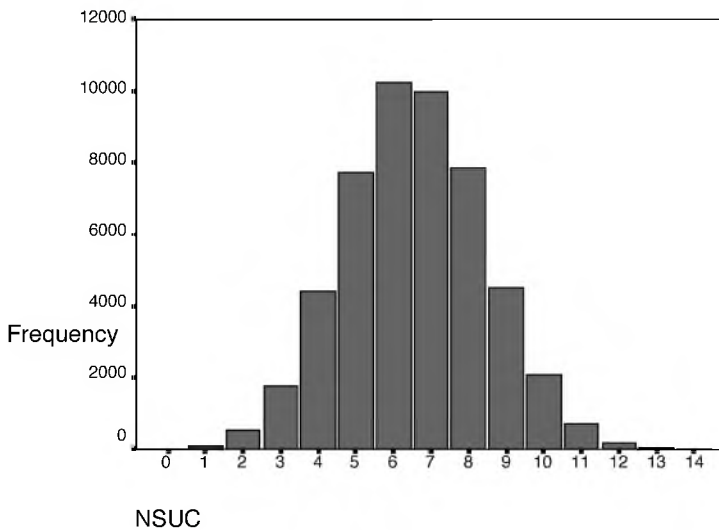


Policy Distance Theory

The number of historical coalitions predicted by the policy distance theory is eight. This result is not significantly better than the prediction that is based on the probability distribution. Therefore, the null hypothesis is not rejected.

		FREQUENCY	PERCENT	VALID PERCENT	CUMULATIVE PERCENT
VALID	0	9	.0	.0	.0
	1	81	.2	.2	.2
	2	519	1.0	1.0	1.2
	3	1766	3.5	3.5	4.8
	4	4412	8.8	8.8	13.6
	5	7732	15.5	15.5	29.0
	6	10214	20.4	20.4	49.5
	7	9972	19.9	19.9	69.4
	8	7833	15.7	15.7	85.1
	9	4490	9.0	9.0	94.1
	10	2083	4.2	4.2	98.2
	11	690	1.4	1.4	99.6
	12	169	.3	.3	99.9
	13	25	.1	.1	100.0
	14	5	.0	.0	100.0
TOTAL		50000	100.0	100.0	

Frequency table of correct predictions of the simulation of the policy distance theory



Distribution of correct predictions - NSUC- of the policy distance theory

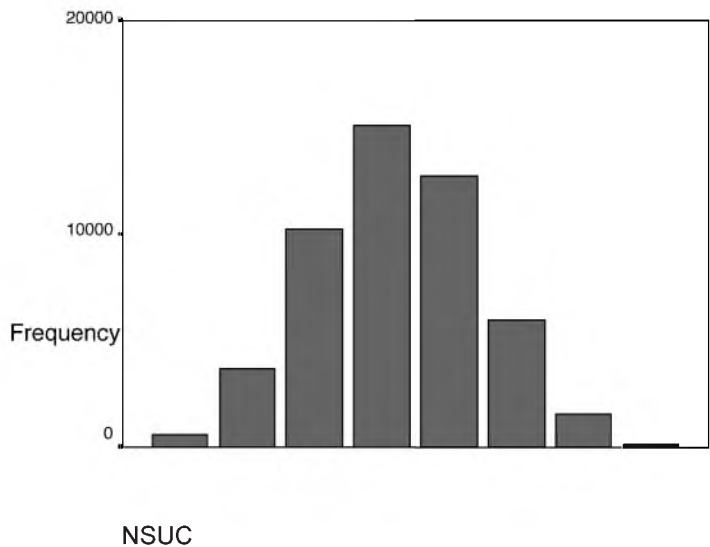
Weak Dominant Player Theory

The theory based on the weak version of the dominant player predicted the correct coalition five times. This is less than can be expected based on the simulation. The null hypothesis is therefore not rejected.

Frequency table of correct predictions of the simulation of the weak dominant player theory

		FREQUENCY	PERCENT	VALID PERCENT	CUMULATIVE PERCENT
VALID	0	580	1.2	1.2	1.2
	1	3677	7.4	7.4	8.5
	2	10210	20.4	20.4	28.9
	3	15088	30.2	30.2	59.1
	4	12737	25.5	25.5	84.6
	5	5981	12.0	12.0	96.5
	6	1554	3.1	3.1	99.7
	7	173	.3	.3	100.0
TOTAL		50000	100.0	100.0	

Distribution of correct predictions - NSUC- of the simulation of the weak dominant player theory

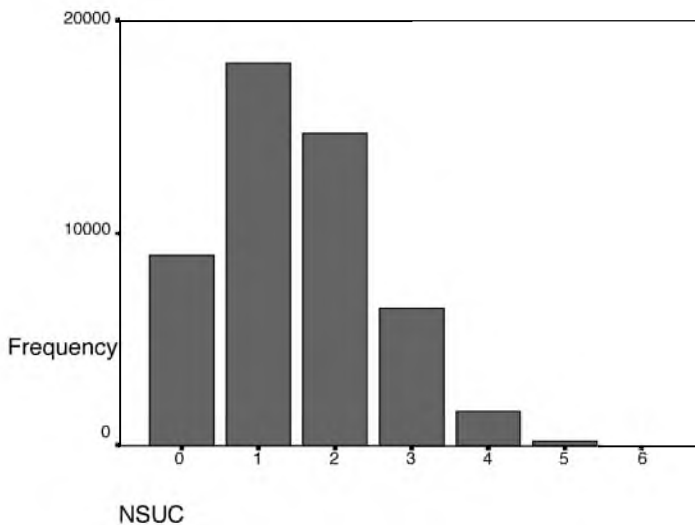


Dominant Player Theory

The success rate of the dominant player is 3/16. This not significantly better than prediction based on simulation and the null hypothesis can thus not be rejected.

		FREQUENCY	PERCENT	VALID PERCENT	CUMULATIVE PERCENT
VALID	0	8995	18.0	18.0	18.0
	1	17982	36.0	36.0	54.0
	2	14672	29.3	29.3	83.3
	3	6479	13.0	13.0	96.3
	4	1640	3.3	3.3	99.5
	5	223	.4	.4	100.0
	6	9	.0	.0	100.0
	TOTAL	50000	100.0	100.0	

Frequency table of correct predictions of the simulation of the dominant player theory



Distribution of correct predictions - NSUC- of the dominant player theory

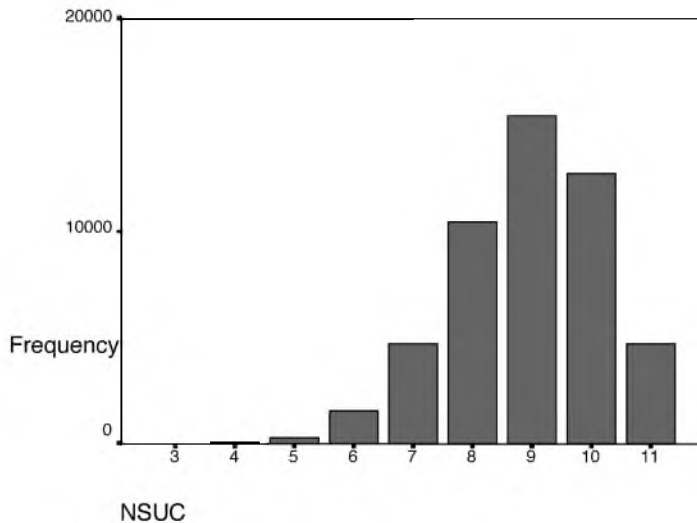
Centre Player Theory

The centre player theory predicted 11 historical coalitions. The prediction based on the probability distribution by simulation shows that the results of the theory are not significantly better than the prediction by the simulation. The null hypothesis is not rejected.

Frequency table of correct predictions of the simulation of the centre player theory

		FREQUENCY	PERCENT	VALID PERCENT	CUMULATIVE PERCENT
VALID	3	4	.0	.0	.0
	4	47	.1	.1	.1
	5	309	.6	.6	.7
	6	1565	3.1	3.1	3.9
	7	4701	9.4	9.4	13.3
	8	10462	20.9	20.9	34.2
	9	15459	30.9	30.9	65.1
	10	12716	25.4	25.4	90.5
	11	4737	9.5	9.5	100.0
	TOTAL	50000	100.0	100.0	

Distribution of correct predictions - NSUC- of the simulation of the centre player theory

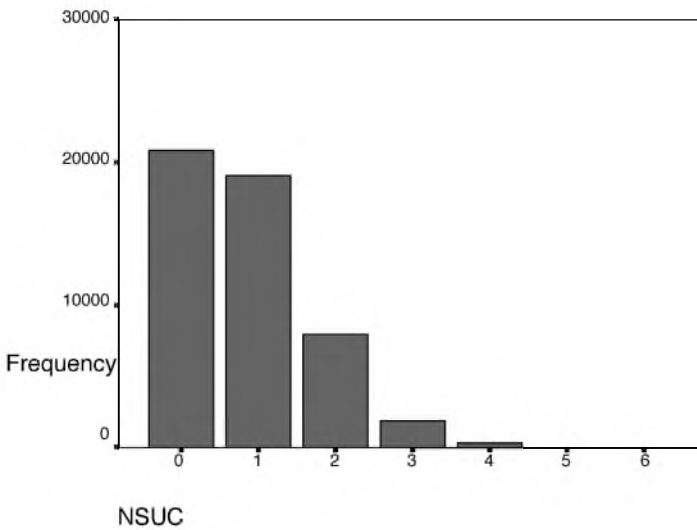


Power Excess Theory

The power excess theory predicted three historical coalitions. This is enough to reject the null hypothesis.

		FREQUENCY	PERCENT	VALID PERCENT	CUMULATIVE PERCENT
VALID	0	20796	41.6	41.6	41.6
	1	19039	38.1	38.1	79.7
	2	7894	15.8	15.8	95.5
	3	1907	3.8	3.8	99.3
	4	322	.6	.6	99.9
	5	41	.1	.1	100.0
	6	1	.0	.0	100.0
	TOTAL	50000	100.0	100.0	

Frequency table of correct predictions of the simulation of the power excess theory



Distribution of correct predictions - NSUC - of the power excess theory

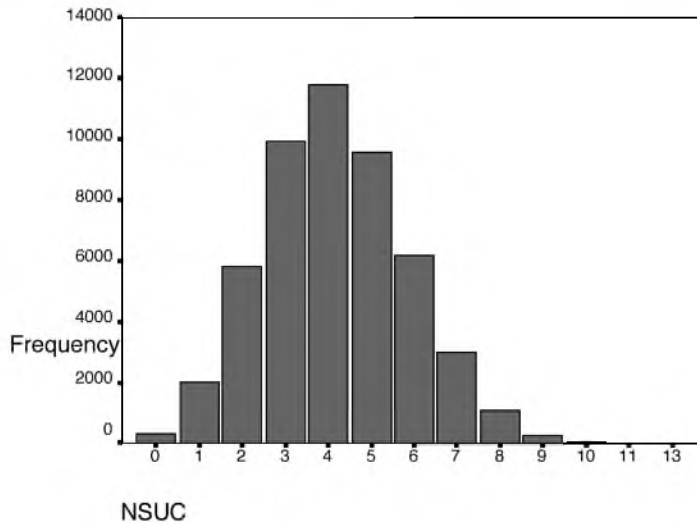
Heart Solution

The heart solution predicted the correct coalition in 9 of the 16 cases. This is more than can be expected based on our simulation. The null hypothesis is therefore rejected. Note that the probability distribution is different from other theories - not only because the different size of the prediction set in relation to other theories - but also because this theory accepts minority coalitions which enhances the number of possible coalitions.

Frequency table of correct predictions of the simulation of the heart solution

		FREQUENCY	PERCENT	VALID PERCENT	CUMULATIVE PERCENT
VALID	0	324	.6	.6	.6
	1	2020	4.0	4.0	4.7
	2	5802	11.6	11.6	16.3
	3	9909	19.8	19.8	36.1
	4	11777	23.6	23.6	59.7
	5	9587	19.2	19.2	78.8
	6	6193	12.4	12.4	91.2
	7	2974	5.9	5.9	97.2
	8	1072	2.1	2.1	99.3
	9	275	.6	.6	99.9
	10	58	.1	.1	100.0
	11	8	.0	.0	100.0
	13	1	.0	.0	100.0
TOTAL		50000	100.0	100.0	

Distribution of correct predictions - NSUC- of the simulation of the heart solution

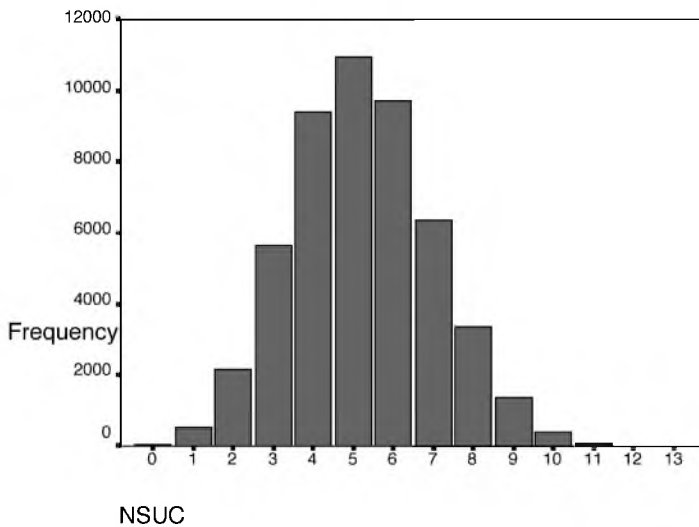


Heart Winning Theory

The success rate of the heart winning theory is 9/16, and is better than what can be expected based on the simulation. The null hypothesis is rejected.

		FREQUENCY	PERCENT	VALID PERCENT	CUMULATIVE PERCENT
VALID	0	53	.1	.1	.1
	1	526	1.1	1.1	1.2
	2	2179	4.4	4.4	5.5
	3	5625	11.3	11.3	16.8
	4	9401	18.8	18.8	35.6
	5	10926	21.9	21.9	57.4
	6	9720	19.4	19.4	76.9
	7	6339	12.7	12.7	89.5
	8	3345	6.7	6.7	96.2
	9	1379	2.8	2.8	99.0
	10	391	.8	.8	99.8
	11	100	.2	.2	100.0
	2	13	.0	.0	100.0
13	3	.0	.0	100.0	
TOTAL		50000	100.0	100.0	

Frequency table of correct predictions of the simulation of the Heart winning theory



Distribution of correct predictions - NSUC - of the Heart winning theory

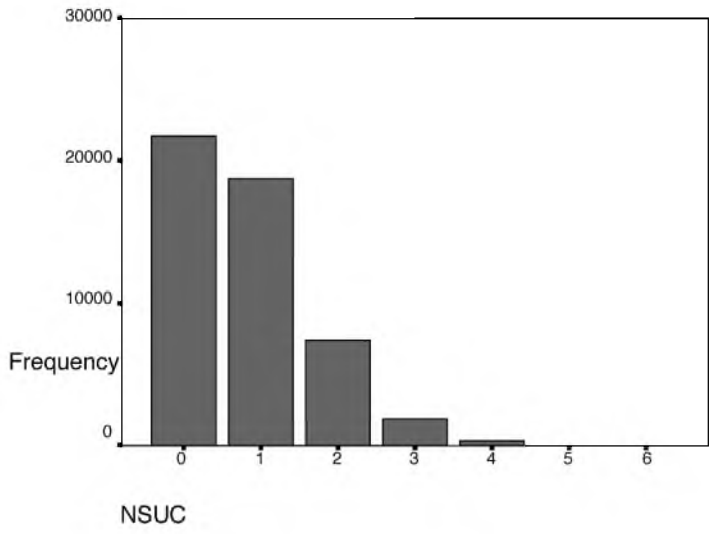
Heart Solution refined version

The heart-refined version is also compared to all possible combinations of two or more parties since the refined version also allows minority cabinets. The three historical coalitions that are predicted by the refined version of the heart solution are more correct predictions than could be expected based on the simulation. The null hypothesis is rejected.

Frequency table of correct predictions of the simulation of the heart solution refined version

		FREQUENCY	PERCENT	VALID PERCENT	CUMULATIVE PERCENT
VALID	0	21756	43.5	43.5	43.5
	1	18700	37.4	37.4	80.9
	2	7370	14.7	14.7	95.7
	3	1857	3.7	3.7	99.4
	4	286	.6	.6	99.9
	5	30	.1	.1	100.0
	6	1	.0	.0	100.0
TOTAL		50000	100.0	100.0	

Distribution of correct predictions - NSUC- of the simulation of the heart solution refined version

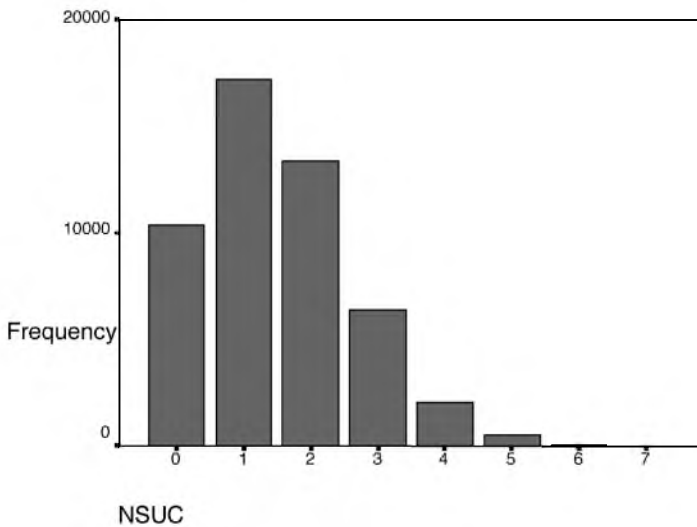


Protocoalition Formation

The number of correct coalitions predicted by the protocoalition formation theory - 6 - is larger than the number of correct predictions expected by the probability distribution based on the simulation results. Therefore, the null hypothesis is rejected.

		FREQUENCY	PERCENT	VALID PERCENT	CUMULATIVE PERCENT
VALID	0	10379	20.8	20.8	20.8
	1	17229	34.5	34.5	55.2
	2	13382	26.8	26.8	82.0
	3	6365	12.7	12.7	94.7
	4	2061	4.1	4.1	98.8
	5	480	1.0	1.0	99.8
	6	98	.2	.2	100.0
	7	6	.0	.0	100.0
TOTAL		50000	100.0	100.0	

Frequency table of correct predictions of the simulation of the protocoalition formation theory



Distribution of correct predictions - NSUC - of the protocoalition formation theory

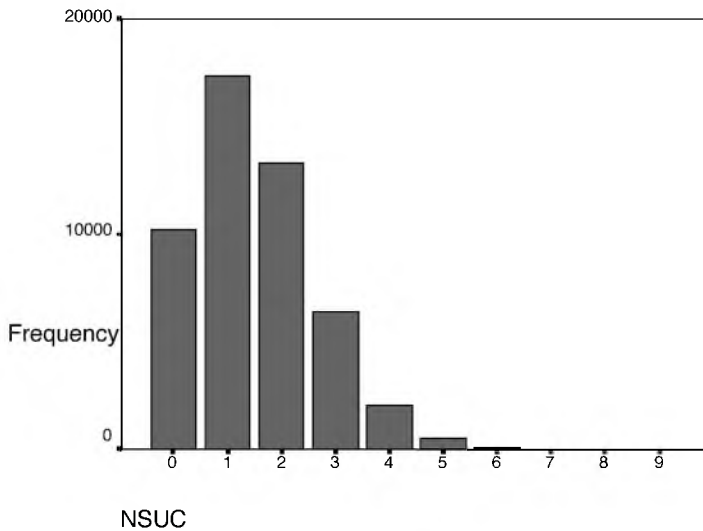
Proto Coalition Formation & Heart Solution

The success-rate of these combined theories is 5/16, and is in the last five percent of the distribution based on simulation. The null hypothesis can be rejected and thus the theory predicts better than random.

Frequency table of correct predictions of the simulation of the combination of the proto-coalition formation and heart theory

		FREQUENCY	PERCENT	VALID PERCENT	CUMULATIVE PERCENT
VALID	0	10248	20.5	20.5	20.5
	1	17378	34.8	34.8	55.3
	2	13290	26.6	26.6	81.8
	3	6371	12.7	12.7	94.6
	4	2075	4.2	4.2	98.7
	5	512	1.0	1.0	99.7
	6	110	.2	.2	100.0
	7	12	.0	.0	100.0
	8	3	.0	.0	100.0
	9	1	.0	.0	100.0
TOTAL		50000	100.0	100.0	

Distribution of correct predictions - NSUC-of the simulation of the combination of the proto-coalition formation and heart theory

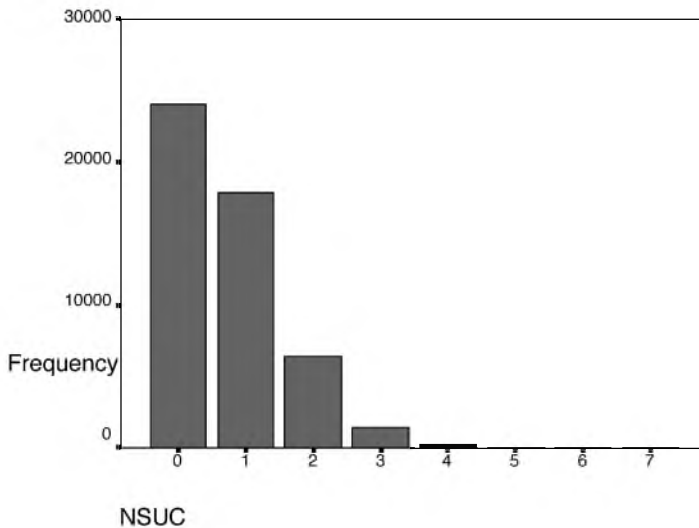


Winset Theory

The number of correct predictions by the winset theory, namely 2, is not greater than most predictions done by the simulation. Therefore, the null hypothesis can not be rejected. Note that the number of possible portfolios is all possible two-portfolio combinations. (i.e, aa, ab, ba, bb, etc.)

		FREQUENCY	PERCENT	VALID PERCENT	CUMULATIVE PERCENT
VALID	0	24027	48.1	48.1	48.1
	1	17902	35.8	35.8	83.9
	2	6397	12.8	12.8	96.7
	3	1416	2.8	2.8	99.5
	4	230	.5	.5	99.9
	5	26	.1	.1	100.0
	6	1	.0	.0	100.0
	7	1	.0	.0	100.0
TOTAL		50000	100.0	100.0	

Frequency table of correct predictions of the simulation of the winset theory



Distribution of correct predictions - NSUC- of the winset theory

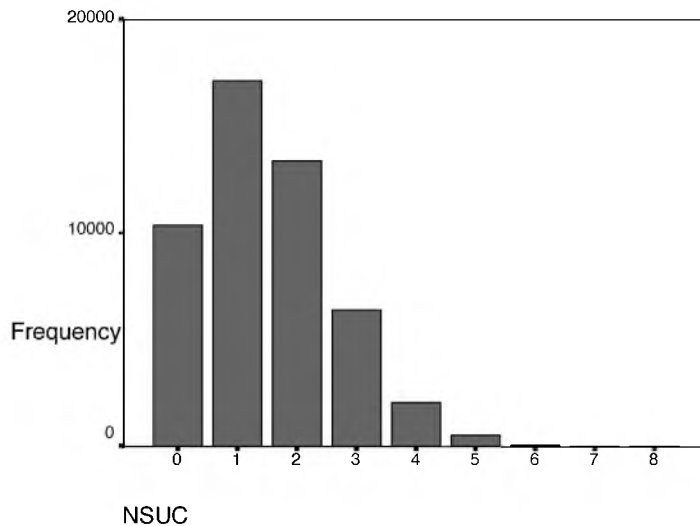
Winset winning Theory

The winning - coalitional - version of the winset theory does not predict significantly better than the random distribution based on this theory does. The deviance from the significance level is very small but the alternative hypothesis must still be rejected.

Frequency table of correct predictions of the simulation of the winset winning theory

		FREQUENCY	PERCENT	VALID PERCENT	CUMULATIVE PERCENT
VALID	0	10344	20.7	20.7	20.7
	1	17161	34.3	34.3	55.0
	2	13388	26.8	26.8	81.8
	3	6427	12.9	12.9	94.6
	4	2065	4.1	4.1	98.8
	5	502	1.0	1.0	99.8
	6	96	.2	.2	100.0
	7	15	.0	.0	100.0
	8	2	.0	.0	100.0
TOTAL		50000	100.0	100.0	

Distribution of correct predictions - NSUC-of the simulation of the winset winning theory

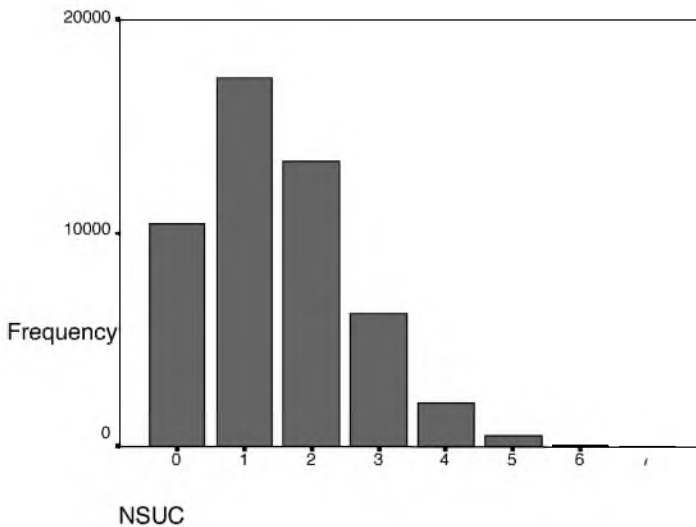


Maximal Satisfaction Solution

The success-rate of the maximal satisfaction solution is 7/16, and is higher than can be expected based on the distribution found by simulations. The null hypothesis is therefore rejected.

		FREQUENCY	PERCENT	VALID PERCENT	CUMULATIVE PERCENT
VALID	0	10434	20.9	20.9	20.9
	1	17303	34.6	34.6	55.5
	2	13363	26.7	26.7	82.2
	3	6276	12.6	12.6	94.8
	4	2050	4.1	4.1	98.9
	5	488	1.0	1.0	99.8
	6	78	.2	.2	100.0
	7	8	.0	.0	100.0
	TOTAL	50000	100.0	100.0	

Frequency table of correct predictions of the simulation of the maximal satisfaction solution



Distribution of correct predictions - NSUC - of the maximal satisfaction solution

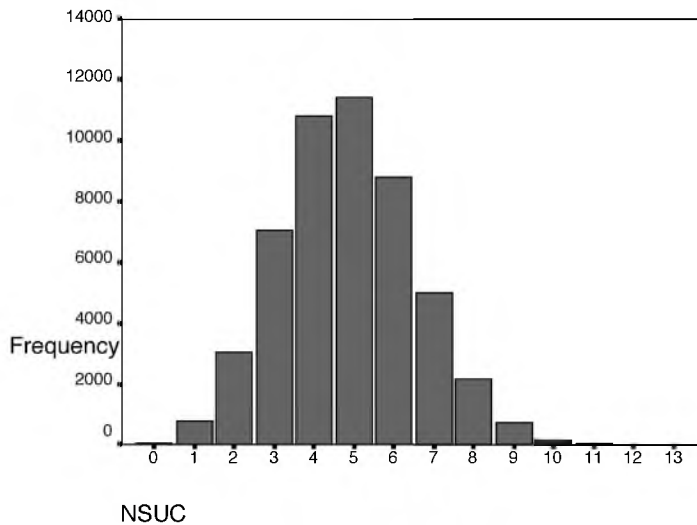
Competitive Solution

The results of the competitive solution, eight correct predictions, do not give a reason to reject the null hypothesis. The theory is not predicting significantly better than the simulation distribution based on the probability distribution.

Frequency table of correct predictions of the simulation of the competitive solution

		FREQUENCY	PERCENT	VALID PERCENT	CUMULATIVE PERCENT
VALID	0	61	.1	.1	.1
	1	758	1.5	1.5	1.6
	2	3035	6.1	6.1	7.7
	3	7051	14.1	14.1	21.8
	4	10793	21.6	21.6	43.4
	5	11417	22.8	22.8	66.2
	6	8815	17.6	17.6	83.9
	7	4986	10.0	10.0	93.8
	8	2156	4.3	4.3	98.1
	9	723	1.4	1.4	99.6
	10	161	.3	.3	99.9
	11	37	.1	.1	100.0
	12	6	.0	.0	100.0
	13	1	.0	.0	100.0
TOTAL		50000	100.0	100.0	

Distribution of correct predictions - NSUC-of the simulation of the competitive solution



Appendix K

List of symbols and abbreviations

- coalition	S, T
- complement of coalition S	S^c
- set of winning coalitions	\mathcal{W}
- value of coalition S	$v(S)$
- actor / player	i
- weight of player i	w_i
- normalised weight of player i	λ_i
- quota	q
- set of players	N
- strict preference	P
- (weak) preference	R
- indifference	I
- coalition S is preferred by i to coalition T	$SP_i T$
- most preferred policy position of a player i	x_i
- expected policy position of a coalition S	x_S
- distance between x_i and x_S	$d(x_i, x_S)$
- (also) distance between x_i and x_S	$\ x_i - x_S\ $
- number of dimensions	m
- m -dimensional Euclidean space	R^M
- dominates	Δ
- for which it holds that	$ $
- policy order	θ
- function	f
- greater than	$>$
- less than	$<$
- summation	Σ
- implication	\Rightarrow
- for all	\forall
- there exists	\exists
- negation	\neg
- conjunction, and	\wedge
- inclusive disjunction, or	\vee
- absolute value of x	$ x $
- cardinality of S	$\# S$
- is element of	\in
- subset	\subseteq
- is unequal to	\neq
- empty set	\emptyset
- union	\cup
- intersection	\cap

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Regeren met je naaste buur

Een evaluatie van ruimtelijke coalitietheorieën

In Nederland is de zetelverdeling over de verschillende politieke partijen na afloop van Tweede Kamerverkiezingen wel bekend, maar de vraag wie met wie zal gaan regeren is daarmee nog niet beantwoord. Meer inzicht in het proces van coalitievorming in een democratie met een meer-partijstelsel is wenselijk. Een theorie die op basis van de op dat moment beschikbare informatie de uitkomst van het coalitievormingsproces voorspelt kan daartoe bijdragen.

1. Onderzoeksvraag en onderzoeksontwerp

In dit onderzoek worden verschillende soorten theorieën over coalitievorming bestudeerd, die gebaseerd zijn op verschillende gedragsassumpties. Het doel van theorieën over coalitievorming is de uitkomst van deze fase in het democratische proces te voorspellen. Eén van de laatste ontwikkelingen betreft de zogenaamde ruimtelijke theorieën van coalitievorming. Ruimtelijke theorieën voorspellen coalities waarvoor geldt dat de afstand tussen de posities van partijen in de coalitie en de verwachte positie van de coalitie zo klein mogelijk is. Deze theorieën gaan uit van een metrische meerdimensionale ideologische of beleidsruimte waarin politieke partijen zich bevinden. De afstand tussen partijen en de verwachte positie van een coalitie wordt met behulp van Euclidische afstandsmetriek berekend.

Doel van de ruimtelijke theorieën is uiteraard beter in staat te zijn kabinetsformatie te voorspellen dan de andere coalitievorming theorieën. De doelstelling van dit onderzoek heeft betrekking op verschillende klassen van kabinetsformatietheorieën en luidt als volgt:

Voorspellen ruimtelijke coalitievormingtheorieën coalitievorming beter dan niet-ruimtelijke coalitievormingtheorieën?

Voor de ruimtelijke theorieën worden geregeld nieuwe concepten ontworpen, die wiskundig gezien steeds complexer worden. Deze theorieën zijn echter nog niet eerder getoetst. In dit onderzoek toets ik ruimtelijke en niet-ruimtelijke theorieën om de empirische kwaliteit van beide klassen te vergelijken. De volgende ruimtelijke theorieën van coalitievorming worden bestudeerd:

- Heart oplossing
- Protocoalitievorming
- Winset theorie
- Competitieve oplossing
- Maximale satisfactie oplossing

De eerste vier theorieën in deze opsomming zijn reeds bestaande theorieën. De maximale satisfactie oplossing betreft een nieuw oplossingsconcept.

De theorieën die in dit onderzoek worden aangeduid als ‘niet-ruimtelijke theorieën’ zijn onder te verdelen in de volgende groepen:

- machtsgerichte theorieën
- actor-gerichte theorieën
- één-dimensionale beleidsgerichte theorieën
- institutionele theorieën.

Uit de groep van de zogenaamde ‘niet-ruimtelijke theorieën’ wordt een aantal machtsgerichte, beleidsgerichte en actor-gerichte theorieën empirisch getoetst. De toetsing heeft betrekking op kabinetsformaties in Nederland vanaf 1946 tot heden. De resultaten van deze empirische toets worden vervolgens vergeleken met de resultaten voor de vijf ruimtelijke theorieën.

In dit onderzoek ligt de nadruk dus op de empirische kwaliteit van de ruimtelijke coalitieformatie theorieën in vergelijking met de niet-ruimtelijke. In het inleidende hoofdstuk zijn de onderzoeksvraag en het ontwerp van dit onderzoek behandeld.

2. Speltheorie en ruimtelijke modellen

In Hoofdstuk 2 worden drie ruimtelijke modellen van partijconcurrentie geïntroduceerd. Deze modellen worden eerst geïntroduceerd omdat coalitieformatietheorieën gebaseerd zijn op partijconcurrentiemodellen. Het gedrag en de voorkeuren van de kiezers en de relatie tussen kiezers en partijen vertonen grote overeenkomsten met het gedrag en de voorkeuren van de partijen en de verhouding tussen partijen en de coalities. Met andere woorden: de kiezer prefereert een politieke partij met beleidsstandpunten die dichtbij de eigen voorkeur liggen en een partij prefereert een coalitie waarvoor geldt dat de verwachte beleidspositie dicht bij de eigen positie ligt.

Het klassieke nabijheidsmodel (Downs, 1957) en het directionele model (Rabinowitz & McDonald, 1989) zijn de twee belangrijkste theorieën over partijcompetitie die uitgaan van voorkeuren die gebaseerd zijn op beleidsposities. In de afgelopen jaren zijn deze modellen veelvuldig besproken en empirisch getoetst. Geen van beide modellen kwam echter als ‘winnaar’ uit de bus. De empirische resultaten geven het directionele model een lichte voorsprong, terwijl beide modellen met behulp van theoretische argumenten ondersteund kunnen worden. Een derde partijconcurrentie model is het linkage model ofwel ideologie model (Enelow & Hinich, 1984).

In de beleidsgerichte en ruimtelijke coalitiefomatietheorieën wordt verondersteld dat partijen hun nut maximaliseren door de coalitie te kiezen die het dichtst bij hun eigen positie ligt. Deze theorieën maken gebruik van de zogenaamde ‘kleinste-afstandshypothese’. Voor de modellering van de ruimtelijke theorieën wordt gebruik gemaakt van een combinatie van het nabijheidsmodel en het derde - ideologie - model. Ik beschouw het ideologiemodel als een uitbreiding van het klassieke nabijheidsmodel. In het nabijheidsmodel wordt bijvoorbeeld een sociaal economische links-rechts dimensie beschouwd als de belangrijkste ideologische dimensie waarop de partijen met elkaar om de gunst van de kiezer concurreren. Deze dimensie wordt - hoewel de partijposities daar slechts ordinaal geordend zijn - ook in de unidimensionale beleidsgerichte theorieën van kabinetsformatie gebruikt. Het ideologiemodel stelt vervolgens dat er één of meer belangrijke dimensie(s) zijn, maar voegt toe dat deze dimensie(s) voorspellend zijn voor beleidsposities op issues voor partijen en kiezers. Dit werkt als volgt: een partij met een zogenaamde ‘rechtse’ positie op de sociaal economische links-rechts dimensie, zal op het beleidsissue ‘belastingtarieven’ met grote waarschijnlijkheid een positie innemen tegen het verhogen van belasting.

Wanneer we echter, zoals in dit onderzoek, de partij- en coalitieposities verkrijgen door middel van data reductie methoden die worden toegepast op scores op issues, dan wordt eigenlijk het ideologie- model toegepast. Het concept ideologie wordt zowel in het linkage- ofwel ideologiemodel, als in de data reductie methode - de multidimensionale schaaltechniek - als onderliggende voorspellende dimensie voor posities op allerlei issues verondersteld.

Het directionele model wordt niet toegepast in de bestaande ruimtelijke coalitiefomatietheorieën. Dit model gaat - zoals de naam al aangeeft - uit van de richting van beleidsposities. Zowel de richting, ruwweg het voor of tegen x of y zijn, als de intensiteit van de voorkeur wordt gemeten. Vernieuwend is dat er niet van de kiezer wordt verwacht dat deze precies weet waar de partijen zich bevinden, en dus precies de afstanden tussen haar eigen positie en de partijposities kan berekenen, terwijl dit bij het nabijheidsmodel wel wordt verondersteld. Een tweede opvallend verschil met de modellen die uitgaan van de kleinste-afstandshypothese is dat in het directionele model het centrum van een dimensie geen reëel beleidsalternatief is, omdat kiezers en partijen worden verondersteld *voor* of *tegen* te zijn. In het directionele model heeft een kiezer voorkeur voor een extreme partij aan de goede kant van het ‘nulpunt’, terwijl in het nabijheidsmodel een kiezer een partij prefereert die zo dicht als mogelijk bij zijn eigen positie ligt. Dit leidt ertoe dat het directionele model vaker partijen met extreme beleidsposities voorspelt.

Samenvattend: het is nog altijd onbeslist welk model een betere indicator is voor het gedrag van partijen en kiezers. In het nieuwe ruimtelijke oplossingsconcept zal

ik om twee redenen gebruik maken van het nabijheidsmodel. In de eerste plaats wordt er in coalitiefmatietheorieën nog altijd uitgegaan van de kleinste-afstandshypothese en staat deze hypothese ook centraal in de ruimtelijke theorieën. Ten tweede omdat ik het construct dat wordt gebruikt in het directionele model om te extreme partijen te weren - de zogenaamde 'grens van aanvaardbaarheid' - onacceptabel vind, omdat het ad hoc wordt toegepast.

3. Coalitiefmatietheorieën

De zogenaamde 'niet-ruimtelijke' klassen van coalitiefmatietheorieën worden in Hoofdstuk 3 gepresenteerd. Van de vier klassen niet-ruimtelijke theorieën - machtsgerichte, beleidsgerichte, actorgerichte en institutionele theorieën - worden de institutionele theorieën als enige groep niet getoetst. De institutionele theorieën bestaan niet - zoals de andere theorieën in deze studie - uit verzamelingen van veronderstellingen die tegelijkertijd voldoen aan de vereisten voor interne consistentie, onafhankelijkheid, voldoende en noodzakelijkheid. Met andere woorden: de institutionele theorieën zijn geen formele theorieën. De assumpties in de institutionele theorieën - vooral de theorieën in Paragraaf 3.5.1 - zijn niet afgeleid door middel van deductie, maar hebben eerder het karakter van beperkende voorwaarden.

De institutionele theorieën die wel formele voorspellende theorieën zijn, kennen andere beperkingen. Deels zijn het theorieën die gedragsassumpties maken die in strijd zijn met de Nederlandse politieke werkelijkheid, deels zijn het theorieën die de complexe werkelijkheid - van veel partijen en issues - niet kunnen modelleren. Een uitzondering is het Structure-Induced Equilibrium dat wel voldoet aan de eisen van een formele theorie en toepasbaar zou zijn op coalitievorming in Nederland. Omdat de gedragsassumpties in deze theorie nagenoeg gelijk zijn aan de assumpties in de Winset theorie (Laver & Shepsle, 1996), een ruimtelijke theorie die wordt behandeld in het volgende hoofdstuk, zal het structuur-geïndiceerd evenwicht niet worden getoetst in dit onderzoek.

De drie andere klassen theorieën in dit hoofdstuk - de machtsgerichte, actorgerichte en beleidsgerichte coalitiefmatietheorieën - zijn eenvoudige axiomatische modellen die in dit onderzoek wel empirisch worden getoetst.

De machtsgerichte theorieën zijn theorieën die alleen machtsargumenten in overweging nemen. Kenmerkend is dat deze theorieën zo klein mogelijke coalities voorspellen. De achterliggende gedragsassumptie is dat partijen de 'regeringsmacht' met zo weinig mogelijk andere partijen willen delen.

Actorgeoriënteerde coalitiefmatietheorieën verklaren coalitievorming op basis

van eigenschappen van machtige spelers. Enerzijds betreft dit actoren - politieke partijen - die heel machtig zijn door hun electorale positie, anderzijds betreft dit actoren die machtig zijn door hun centrale positie in de ideologische of beleidsruimte. In beide gevallen gaat het om spelers die meer dan gemiddelde macht hebben in het coalitieformatieproces en hiermee de kabinetsformatie beïnvloeden.

De laatste groep theorieën in de verzameling 'niet-ruimtelijke theorieën' is die van de beleidsgerichte coalitieformatietheorieën. Deze theorieën houden rekening met zowel machts- als beleidsmotieven van de spelers in het coalitieformatie proces. Een beleidsmotief is bijvoorbeeld dat ideologisch gezien 'uniforme coalities' beter kunnen samenwerken en meer kans maken om te worden gevormd dan ideologisch heterogene coalities. In deze klasse theorieën wordt dus gebruik gemaakt van de kleinste-afstandshypothese.

De één-dimensionale beleidsgerichte theorieën hebben dus met de ruimtelijke theorieën gemeen dat ze uitgaan van de assumptie dat voorkeuren van partijen voor coalities mede gebaseerd zijn op verenigbaarheid van beleidsstandpunten. De uni-dimensionale theorieën onderscheiden zich echter van de ruimtelijke theorieën doordat eerstgenoemde uitgaan van een ordinale ruimte, terwijl de laatstgenoemde uitgaan van een Euclidische metriek.

4 Ruimtelijke coalitieformatietheorieën

In Hoofdstuk 4 worden de ruimtelijke theorieën van coalitieformatie bestudeerd, en bij de bespreking van elke theorie wordt een uitgebreid rekenvoorbeeld gegeven. Gangbaar voor deze klasse theorieën is de gedragsassumptie dat partijen coalities prefereren die in een multidimensionale ideologische of beleidsruimte zo dicht mogelijk bij de eigen positie liggen.

Het meest opvallende kenmerk van de Protocoalitieformatie theorie is dat ze uitgaat van subjectieve - in plaats van symmetrische - afstanden. In een subjectieve ruimte kan partij *A* dicht bij *B* liggen dan andersom, als *A* bijvoorbeeld meer macht heeft dan *B*. Verder onderscheidt deze theorie zich van de andere theorieën in dit hoofdstuk, doordat deze theorie coalitieformatie als een dynamisch 'multi-stage' spel modelleert. Als twee partijen dicht bij elkaar liggen dan bij andere partijen, waarbij geldt dat partij *A* het dichtst bij *B* ligt en vice versa, dan vormen deze partijen een protocoalitie. Als deze protocoalitie winnend is, dat wil zeggen de meerderheid in de Tweede Kamer vertegenwoordigt, dan wordt deze coalitie voorspeld. Indien dit niet het geval is, gaat het proces de volgende fase in en wordt de protocoalitie als zelfstandige speler - met een nieuwe beleidspositie - beschouwd. Het proces herhaalt zich totdat een winnende coalitie gevormd wordt.

De Competitieve oplossing gaat uit van de kleinste-afstandshypothese en gebruikt Euclidische metriek. Het oplossingsdeel van de theorie is afwijkend van andere theorieën, omdat bij het voorspellen van kabinetten spilspelers worden geïntroduceerd. Coalities worden paarsgewijs vergeleken. Een speler is een spilspeler als deze lid is van beide mogelijke kabinetten die met elkaar worden vergeleken. Vervolgens is een coalitie levensvatbaar in vergelijking met een andere coalitie, als niet alle spilspelers de laatstgenoemde coalitie prefereren boven de eerstgenoemde. Met behulp van de spilspelers en het paarsgewijs vergelijken van coalities wordt in de competitieve oplossing onderzocht welke coalities levensvatbaar zijn. De competitieve oplossing voorspelt dan de verzameling levensvatbare coalities.

De Heart theorie onderscheidt zich van de bovenstaande theorieën omdat gezocht wordt naar ongedomineerde beleidsposities. De Heart oplossing is te vinden door een geometrische representatie van de partijen op basis van de posities in de ideologische of beleidsruimte te tekenen. De eerste stap is dan het selecteren van mediaan lijnen. Een mediaan lijn is een lijn die partijen verbindt waarvoor geldt dat zich op deze lijn of aan elke zijde van deze lijn een meerderheid bevindt. Indien er een zogenaamde core-partij aanwezig is - dit is een partij waarvoor geldt dat de positie van deze partij een mediaan in alle richtingen vormt - dan zal een coalitie met deze partij worden voorspeld. Indien er geen core-partij is dan worden coalities voorspeld met partijen die op mediaan lijnen liggen. Aangezien de Heart oplossing ook minderheidscoalities voorspelt en deze in Nederland alleen in zeer uitzonderlijke - interim - situaties voorkomen, heb ik een aantal aanvullende assumpties toegevoegd. Met behulp van deze assumpties is een Heart – meerderheids - versie van deze theorie ontstaan, waardoor de voorspellende waarde van deze theorie beter te vergelijken is met de andere theorieën in dit boek.

Dit laatste geldt ook voor de Winset theorie. Deze theorie onderscheidt zich van de andere ruimtelijke theorieën, doordat ze er van uitgaat dat onderhandeld wordt over portefeuilles van ministers. Voor de Winset theorie wordt een aantal belangrijke portefeuilles onderscheiden waarover onderhandelingen plaatsvinden. De partijen die vervolgens deze portefeuilles krijgen zullen in het kabinet plaatsnemen. Het is mogelijk dat deze partijen (of partij) geen meerderheid vormen. In dat geval zijn ook additionele assumpties nodig om een 'meerderheidsvoorspelling' te doen. Zoals eerder opgemerkt is de Winset theorie de meest institutionele theorie in de klasse ruimtelijke theorieën. Bij de onderhandelingen over de portefeuilles wordt namelijk steeds als uitgangspunt de status quo portefeuillevdeling genomen. Slechts indien een meerderheid een nieuwe portefeuillevdeling prefereert boven de oude, wordt de status quo verdeling vervangen.

Ik heb dus bij de Heart oplossing en bij de Winset theorie additionele assumpties geïntroduceerd. Deze zijn toegevoegd omdat ik graag meerderheidskabinetten wil

voorspellen. Het oorspronkelijke doel van deze theorieën is eerder het aanwijzen van belangrijke spelers in het formatieproces, dan het voorspellen van coalities. De aanvullende assumpties moeten dan ook niet worden gezien als een poging tot het ‘verbeteren’ van deze theorieën, maar veeleer als een middel waardoor de verschillende theorieën in deze studie beter met elkaar kunnen worden vergeleken.

De laatste theorie in de klasse van ruimtelijke theorieën is de Maximale satisfactie oplossing. Ook dit concept gaat uit van de kleinste-afstandshypothese en gebruikt Euclidische metriek om de afstanden te berekenen. Vernieuwend in dit concept is de introductie van collectieve satisfactie. Partijen prefereren coalities op basis van de afstand tussen de eigen positie en de verwachte coalitiepositie, maar erkennen dat het meestal onmogelijk is om een coalitie te vormen die voor alle partijen tegelijkertijd favoriet is. Er ontstaan zogenaamde ‘cycli’ van voorkeuren. Om dit probleem op te lossen wordt op basis van individuele voorkeuren, maar met het besef van de mogelijkheid van het ontstaan van cycli, per coalitie uitgerekend hoe hoog het gemiddelde nut voor de spelers in de coalitie is. De coalitie met het hoogste gemiddelde nut wordt door de Maximale satisfactie oplossing voorspeld.

5. Nederlandse politiek, partijen en hun posities

Hoofdstuk 5 begint met een beschrijving van het Nederlandse partijsysteem als constitutionele monarchie en parlementaire democratie. Hierin worden de formele en informele regels met betrekking tot de coalitieformatie bestudeerd. De eigenaardige rol van de Koningin in de Nederlandse kabinetsformatie komt aan de orde. In de formatie heeft zij onder meer door de benoeming van de (in)formateur een duidelijke politieke rol.

Het grootste deel van dit hoofdstuk bespreekt de voorbereiding van de confrontatie van de theorieën met de empirie. Voor het toetsen van de ruimtelijke theorieën zijn metrische partij posities op meerdere latente ideologische dimensies nodig en daarom worden in Hoofdstuk 5 verschillende data reductie methoden op verschillende datasets toegepast.

Voor het toetsen van de coalitieformatietheorieën voor kabinetsformaties in Nederland van 1946 tot en met 1994 zijn de Manifesto data geanalyseerd. Deze dataset bevat scores van politieke partijen op issues verkregen door inhoudsanalyse van partijprogramma's. Vervolgens is een multi-dimensionale schaaltechniek toegepast om de posities van de partijen op deze issues te modelleren in een sterk gereduceerd aantal dimensies. De resultaten van deze analyses zijn partijposities op een tweetal dimensies. De kwaliteit van de analyses, weergegeven in stress-scores, zijn redelijk te noemen. Daarnaast levert property fitting, een regressie methode waarmee

de gereduceerde ruimte geïnterpreteerd kan worden, ook redelijke resultaten op.

De Manifesto data zijn verzameld om het belang van issues te meten, reden waarom deze data eigenlijk niet geschikt zijn voor het verkrijgen van partijposities. Echter, omdat de Manifesto dataset de enige dataset is die tegelijkertijd een groot aantal cases bevat en indirect informatie bevat over issueposities, wordt deze toch in dit onderzoek gebruikt.

Voor het toetsen van de winset theorie zijn partijposities ten aanzien van de belangrijkste ministeriële portefeuilles nodig. Om deze te verkrijgen is dezelfde dataset gebruikt, maar was de multidimensionale schaling als data reductie techniek niet toepasbaar. De multi-dimensionale schaaltechniek die is toegepast voor het verkrijgen van partijposities zoals hierboven beschreven, levert posities op een tweetal belangrijke dimensies op. De posities van de partijen die op deze manier zijn verkregen, zijn echter geen posities op de portefeuilles Financiën en Buitenlandse Zaken. Daarom is voor het toetsen van de winset theorie een schaaltechniek op basis van correlaties tussen issues - de zogenaamde reliability analysis - gebruikt. De kwaliteit van de gevonden posities op de twee portefeuilles is niet echt goed te noemen. De schaalbaarheidsscores liggen tussen .65 en .68, maar in ieder geval betreffen de resultaten posities op de portefeuille dimensies.

Om de coalitievorming in 1998 te toetsen is een andere methode van inhoudsanalyse gebruikt. De partijprogramma's van 1998 zijn geanalyseerd met behulp van procedures voor 'gecomputeriseerd coderen'. Deze methode is ontwikkeld door Laver en Garry (1998) en is betrouwbaarder en minder arbeidsintensief dan de handmatige inhoudsanalyse zoals toegepast bij de Manifesto data. Met behulp van deze methode zijn voor de partijen in 1998 posities op de volgende drie dimensies verkregen: links-rechts, sociale waarden, en milieu. Deze methode van inhoudsanalyse waarbij het aantal woorden die bij een dimensie horen worden geteld met behulp van de computer is innovatief en veelbelovend. De resultaten van het cross-valideren met een andere dataset voor 1998 zijn goed. Daarom is deze methode wellicht geschikt om in de toekomst en in retrospectief partijposities te verzamelen.

De 'Laver en Hunt (1992) dataset' is een expert dataset met informatie over partijposities op belangrijke dimensies, en informatie over partij posities op de belangrijkste ministeriële portefeuilles. Helaas waren deze data tijdens dit onderzoek alleen beschikbaar voor het toetsen van de coalitievorming in 1989 en 1994. Daarom is deze verder zeer waardevolle dataset niet geschikt voor het toetsen van coalitievorming vanaf 1946. De dataset is wel gebruikt als controle middel om te onderzoeken of verschillende datasets en verschillende analysemethoden leiden tot verschillende partijposities.

De partijposities op de links-rechts dimensie uit de Laver & Hunt dataset vertonen grote overeenkomsten met de links-rechts posities verkregen met de Manifesto data.

De 'sociale waarden' dimensie in de expert data en de posities op bijvoorbeeld 'mensenrechten' in de Manifesto dataset, en de 'buitenlandse zaken' posities in de expert data en de 'externe relaties van een staat' posities in de Manifesto dataset, vertonen echter grote verschillen.

Kortom, het verkrijgen van partijposities die betrouwbaar en valide zijn, en daarmee het toetsen van coalitieformatietheorieën mogelijk maken, is niet gemakkelijk. De partijposities in dit onderzoek zijn het best haalbare, gezien de huidige databestanden, maar een kritische houding ten aanzien van de resultaten van deze stap in het onderzoek, en derhalve over de volgende stap - het toetsen - is dus noodzaak.

6. Een empirische toetsing van coalitieformatietheorieën

De hypothesen die zijn verkregen in de Hoofdstukken 3 en 4 worden in Hoofdstuk 6 getoetst. De eerste toetsing betreft het berekenen van de succesratio. Dit is het aantal goede voorspellingen gedeeld door het totaal aantal casussen getoetst door de theorie. In de tweede fase wordt de voorspellingsefficiëntie berekend. Dit betreft het aantal goede voorspellingen gedeeld door het totaal aantal coalities dat door de theorie is voorspeld. Dit laatste getal is vaak afwijkend van het totaal aantal casussen omdat veel theorieën in dit onderzoek per formatie niet één enkele coalitie, maar een verzameling coalities voorspellen. Een voordeel van dit criterium boven de succesratio is dat hierbij zowel het aantal goede voorspellingen als de voorspellende kracht worden gemeten.

De hoogste succesratio's zijn gemeten voor de unidimensionale beleidsgerichte, en actorgerichte theorieën: respectievelijk gemiddeld .458 en .438. De laagste succesratio is voor de machtsgerichte theorieën: .375. De gemiddelde score voor de ruimtelijke theorieën is .425.

Het beeld verandert wanneer we de voorspellingsefficiëntie bestuderen. De beleidsgerichte (.202) en met name de ruimtelijke theorieën (.269) scoren beter dan de machtsgerichte (.164) en actorgerichte (.122) theorieën.

Deze gegevens zijn echter niet voldoende om tot een eindoordeel te komen. In vergelijking met de hypothetische 'ideale' theorie zou de conclusie zijn dat alle theorieën moeten worden verworpen. Geen van de theorieën voorspelt alle coalities correct. In tegendeel, de beste theorie volgens de succesratio voorspelt slechts 11 van de 16 keer de juiste coalitie.

Om op basis van statistische criteria - ondanks het kleine aantal casussen - toch een oordeel te kunnen geven over de empirische kwaliteit van de theorieën, is besloten om coalitiefinitie te simuleren. De toets betreft de vergelijking tussen het aantal juist voorspelde coalities in de 16 casussen, en het aantal juist voorspelde coalities - op basis van de kansverdeling gebaseerd op de theorie - bij een simulatie van 50.000 coalitiefinities. De nulhypothese stelt dat de simulatie op basis van de kansverdeling behorende bij een theorie hetzelfde aantal correcte coalitiefinities voorspelt als de theorie. Wanneer een theorie vaker correct voorspelt dan in 95% van de gesimuleerde gevallen, dan wordt de nulhypothese verworpen en voorspelt de theorie dus beter dan op basis van de kansverdeling zou worden verwacht.

Op basis van deze statistische toetsing blijken coalitiefinitietheorieën die gebaseerd zijn op beleidsposities - zowel uni- als multidimensionaal - het beter te doen dan theorieën die geen beleidsvoorkeuren als gedragsassumpties gebruiken. De groepen theorieën met een hogere voorspellingsefficiëntie zijn dus ook de theorieën die het beter doen bij de statistische toets. Drie theorieën uit de klasse ruimtelijke theorieën voorspellen significant beter dan op basis van de bijbehorende kansverdeling kan worden verwacht. Deze theorieën zijn:

- Heart-meerderheids oplossing
- Protocoalitieformatie
- Maximale satisfactie oplossing

7. Conclusies

De vraag: voorspellen ruimtelijke coalitiefinitietheorieën coalitiefinitie beter dan niet-ruimtelijke coalitiefinitietheorieën, kan nu worden beantwoord.

Van de in totaal 15 theorieën die zijn getoetst, zijn er zes theorieën die beter voorspellen dan op basis van kans kan worden verwacht. Van deze zes theorieën zijn er drie ruimtelijk, twee unidimensionaal beleidsgericht en één machtsgericht. Van deze theorieën hebben de ruimtelijke theorieën de beste voorspellingsefficiëntie score. Het antwoord op de bovenstaande vraag is daarom positief.

- De ruimtelijke coalitiefinitietheorieën voorspellen coalitiefinitie beter dan de niet-ruimtelijke theorieën.
- Een tweede bevinding is dat coalitiefinitietheorieën die beleidsvoorkeuren bevatten beter voorspellen dan theorieën die niet gebaseerd zijn op beleidsvoorkeuren. De unidimensionale beleidsgerichte theorieën hebben een hogere voorspellingsefficiëntie en verwerpen vaker de nulhypothese dan andere niet-ruimtelijke theorieën.

Naar aanleiding van de bevindingen in dit onderzoek zijn twee belangrijke onderzoekstaken ontstaan. De eerste betreft het tekort aan goede data over partijposities. Om in de toekomst coalitieformatie beter te kunnen toetsen, zullen beter datasets moeten worden ontwikkeld. De gecomputeriseerde inhoudsanalyse is hiervoor een geschikt instrument.

De tweede vraag betreft de coalitieformatietheorieën. Ook de ruimtelijke theorieën van coalitieformatie voorspellen nog steeds niet vaak goed. Nieuwe assumpties over coalitieformatie zullen dus moeten worden toegevoegd om de theorieën te verbeteren.

Curriculum Vitae

Miranda de Vries is geboren op 7 januari, 1970 te Egmond-Binnen. In 1987 haalde zij haar HAVO en in 1989 haar VWO examen aan het Bonhöeffer college te Castricum. Vanaf 1989 tot 1995 studeerde zij politicologie aan de Katholieke Universiteit Nijmegen (KUN). Haar specialisatie in deze studie was democratie en politieke besluitvorming. In 1993 heeft zij een semester doorgebracht met het volgen van een viertal vakken op het terrein van de internationale betrekkingen aan de vakgroep 'staatswetenschap' aan de universiteit van Umeå in Zweden. Na haar afstuderen in 1995 is zij gestart met haar promotie onderzoek naar coalitieformatie bij de vakgroep politicologie aan de KUN. Als onderdeel van haar post-doctorale opleidingsprogramma volgde zij onder andere in 1995 een Summerschool in kwantitatieve statistische methoden van het ICPSR aan de University of Michigan in de Verenigde Staten. In het najaar van 1996 heeft zij een aantal maanden doorgebracht op werkbezoek bij Prof. M. J. Hinich aan de University of Texas in de Verenigde Staten.

Vanaf juli 1999 is zij werkzaam als adviesmedewerker bij de Raad voor het Openbaar Bestuur en de Raad voor de Financiële Verhoudingen in Den Haag.