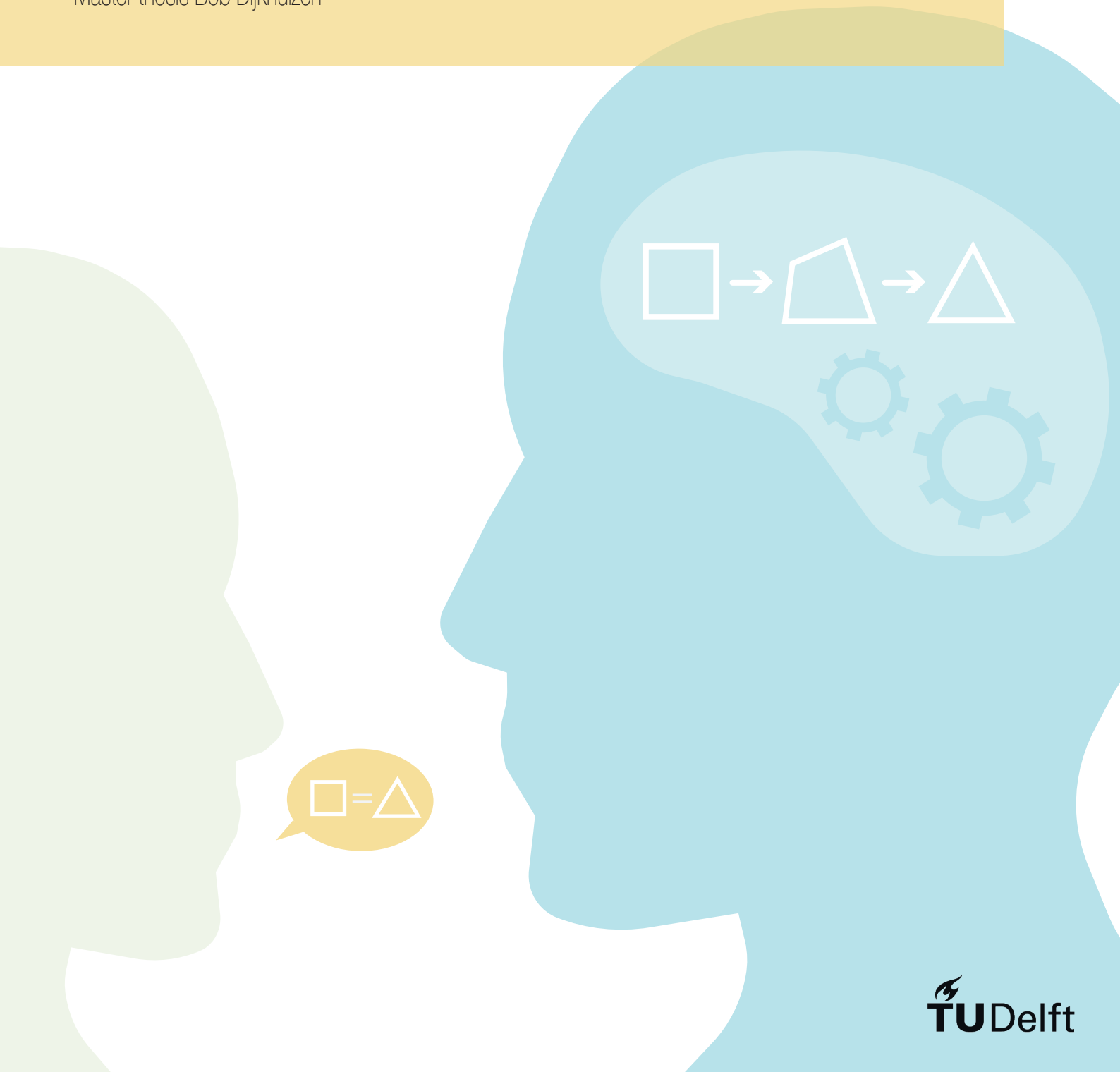# Shaping perceptions

Preparatory steps for using strategic behavior in agent-based modeling

Master thesis Bob Dijkhuizen

TUDelft

Shaping perceptions

Preparatory steps for using strategic behavior in agent-based modeling

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Preface

This thesis concludes the master's programme Complex System Engineering and Management and my time at the Delft University of Technology, faculty Technology, Policy and Management, the place where I have studied and worked for the last six and a half years. This thesis has been an interesting journey with many people helping me along the road. I would like to use the occasion to thank all of them.

First, I would like to thank Jeltsje Kemerink-Seyoum and Mohammad Gharesifard for letting me interview them about their experiences in the rural water services sector in African countries. It provided me with great examples of strategic behavior I have used in my thesis.

I would like to thank Deirdre Casella for helping me throughout the process. It all started mid-August in a project room where we explored potential topics, supported with a load of healthy and less healthy snacks to get us through the day. You always made time for me, gave me feedback and helped me when I had questions, sometimes even by not saying anything. Thank you for everything and I hope that this study will prove its worth for your own research.

I would like to thank Igor Nikolic for being the source of many ideas and angles that have shaped this thesis. I learned something about many theories and concepts, some were more useful than others, but without this constant stream of ideas the thesis would not have become what it is now. I would like to thank Pieter Bots for taking the time to discuss my thoughts, conceptualization and grammar with me, even if our appointments lasted a lot longer than planned. Your many questions during our meetings really made me think, forced me to weigh my words and be critical, which had enormous influence on the result. I would like to thank Hans de Bruijn for his interest in the topic and invested time, especially in the beginning of the process.

I would like to thank Martijn Warnier for his help during my orientation on a topic and for taking the time to clarify concepts that came up during this study, although it always resulted in discouraging me to use them.

I would like to thank Luuk for reviewing my draft and giving valuable feedback.

And last but not least, I would like to thank Kirsten, for reviewing, listening to my stories and thoughts and pushing me at the moments I needed it.

This thesis has been a great example of interdisciplinary research and I'm happy to have been a part of it.

Bob Dijkhuizen
Delft, February 21, 2018

Executive summary

In the Republic of Uganda an estimated 61% of the population does not have access to safe water and an estimated 80% does not have access to proper sanitation. One of the measures of the government to fight these problems is the Joint Sector Review, a convention where the most important problems in water and sanitation services are discussed, similar to a public policy process.

The first step in a public policy process is agenda setting: trying to get a topic on or off the agenda. In order to achieve this goal, actors use strategic behavior. This is behavior that is intentional, aimed at self-interest, (partly) camouflaged and aimed at shaping perceptions.

This study aims to conceptualize and formalize strategic behavior and its influence on agenda setting in order to be able to use strategic behavior in agent-based models. For these type of models, insight in the actions of the strategic actors and the interaction between the actors are essential. Therefore, this study tries to answer the following research question:

How can strategic behavior with regards to agenda setting be formalized in an agent-based model?

In order to study the influence of strategic behavior, forty five forms of strategic behavior have been identified. These are structured by dividing them over three levels of behavior: goals, strategies and tactics. The goals are related to the three streams of Kingdon (1995) and strategic actors try to achieve these goals by exerting strategies via the use of tactics.

To reduce the complexity of strategic behavior seven essential dimensions are identified to describe the different forms: the strategic actor, the action, the influenced actor, the perception of the influenced actor, the nature of the relation between the actors, the aim of the action (legitimize or delegitimize) and the object of the action.

These dimensions are used to construct an attribute grammar, which describes the strategic actor, the behavior, the perceiving actor and the goal. By decomposing these four elements of strategic behavior into lower level concepts, insights can be gained in the elements and variety of strategic behavior. Conditions are added to prevent impossible or illogical forms of behavior to be generated. A first validation of the grammar by means of face-validation and reflection on real world examples shows that the grammar is recognizable and able to describe forms of strategic behavior that are perceived in reality.

The interaction between the actors is based on the way these actions are exerted (camouflaged) and the way they are processed by the influenced actor. The camouflage of the strategic behavior is characterized by expressing a different goal than the actual goal. This goal always involves truth, can be combined with necessity and sometimes uses responsibility or morality as a third concept.

The influenced actors perceive the strategic behavior and have three different options for processing it and possibly adapting their own perception: stubborn processing (ignoring), compromising and conforming, with an increasing change in perception. The motivations for doing so can be divided in three groups: compliance, identification and internalization.

Compliance is based on potential effects, identification is both based on effect and on content and internalization purely embraces the content.

The grammar can be used in two different ways. They can be used as part of a larger algorithm aimed at studying strategic behavior. The grammar can also be used by everyone who wants to use, recognize or observe strategic behavior for their work or in their daily lives.

In conclusion, strategic behavior can be formalized in an agent-based model by identifying the different dimensions and developing an attribute grammar based on these dimensions. Together with insights in the processes of the influenced actor, this creates a solid basis for incorporating strategic behavior in agent-based models.

Future work should use the developed grammar in agent-based models, to improve the grammar and explore its usability. Furthermore, the amount of strategic behaviors that functions as a base for this study has to be expanded in order to increase the descriptive power. Lastly, this study limits the behavior to single forms of strategic behavior while in reality it is a strategic discourse. Future work should also study these combinations to see which forms of strategic behavior amplify or weaken each other and study the concept in a game theoretical sense, to identify the appropriate reactions to specific forms of strategic behavior.

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1. Introduction

One of the major challenges that the Republic of Uganda faces currently is insufficient and unsustainable access to water and sanitation services. An estimated 61% of the population does not have access to safe water, meaning that they have to use open water in their daily routines. An estimated 80% does not have access to proper sanitation, defined as the ability to use decent toilets (Wateraid, 2017).

Many NGOs are trying to make an impact in this topic. In 2012 203 local and international Non-Governmental Organizations (NGOs), Faith Based Organizations (FBO) and Community Based Organizations were registered members of the national umbrella organization in this sector, the Uganda Water and Sanitation NGO Network (UWASNET)(UWASNET, 2012).

To evaluate access to safe water and sanitation services, the government of Uganda established the minimal water service levels (see table 1). These water service levels dictate the quality, quantity and proximity of water points every citizen of Uganda is entitled to. Unfortunately, these water service levels are currently not met.

Despite these challenges, Uganda has been a model of good practice with regards to monitoring and evaluation mechanisms. One of these practices are the Joint Sector Reviews (JSR), which are held since 2000 with governmental bodies and development partners (WSP, 2011). In 2016 the 8th JSR was held with the aim:

- "To assess progress and performance of the sector in relation to the agreed key sector performance indicators and the 2015 JSR undertakings.
- To provide policy and strategic guidance to the Water and Environment Sector institutions and stakeholders.
- To develop key actions and undertakings for the forth-coming twelve-month period or beyond." (Ministry of Water and Environment, 2016, p. 3)

The JSR is one of the measures to transform the common view of increasing water service levels (Nimanya, Nabunnya, Kyeyune, & Heijnen, 2011). Meetings such as the JSR influence the plans and developments in the water sector. Therefore, the comparison can be made with a public policy process. A public policy process consists of the following steps:

- Agenda setting
- Policy formulation
- Policy adoption
- Policy implementation
- Policy evaluation (Kingdon, 1995)

The construction of the agenda is the first and an important step in the process, since it determines which topics will be discussed and which ones neglected. Agenda setting fulfills a gatekeeping function. When topics are unable to reach the agenda, a change in policy will be unlikely (Birkland, 2007; Capella, 2016). Therefore, the contents of the JSR are of great importance, since the topics that can be discussed are limited.

Table 1: WSL in Uganda: indicators and goals (adapted from del Carmen Nava Guerrero (2016) with data from International Monetary Fund (2010))

Indicator	Metric – National Standard (Goal)
Quality	
E. Coli, count/100mL	Not detected in min. 95% of samples. Not detected in max. 4% of samples. Count 1 in max. 1% of samples
TDS	500 mg/L
Turbidity	5 Nephelometric Turbidity Units
Quantity	
Quantity delivered	>=20 liters per person-day
Quantity accessed	No national standard specified
Accessibility	
Number of users	Borehole: 300 persons, 60 households Shallow well or spring: 200 persons, 40 households
Distance to facility	77% within 1 km of WP (rural) or 100% within 0,2 km (urban) 2014/2015
Walking time	No national standard specified
Reliability	
Uptime of source	No national standard specified

The actors that participate in the JSR have their own interests which could determine which topics they want to discuss or want to prevent being discussed at the JSR. In other words, they will act strategically with the aim of influencing the agenda of the JSR.

This strategic behavior with the aim to influence the process of agenda setting is the central topic of this thesis. First the two main concepts are described: paragraph 1.1 describes the concept of agenda setting and paragraph 1.2 is about strategic behavior. Then paragraph 1.3 elaborates on the research objective of this study. Paragraph 1.4 describes the research questions this thesis tries to answer. Subsequently, paragraph 1.5 briefly touches upon the philosophic and scientific perspective this thesis adopts. Lastly, paragraph 1.6 reveals the structure of this document.

1.1   Concept of agenda setting

The theory of agenda setting was originally invented in the field of journalism to study the influence of the mass media on the public opinion. It was first examined by McCombs & Shaw (1972), in their study of the influence of the mass media on the American presidential campaign in 1968.

The concept of agenda setting, consists of the agenda and the process of reaching it. An agenda is a common means to structure meetings and discussions. This means that the agenda is not objective, but a powerful tool to steer these processes.

First the concept of agenda will be discussed in paragraph 1.1.1. Then four influential theories on the process of agenda setting will be described in paragraph 1.1.2. Paragraph 1.1.3 will demarcate agenda setting for the purpose of this thesis.

1.1.1 The concept of an agenda

Different distinctions can be made in defining the agenda. One distinction is made based on the perception of the topic. Dearing & Rogers (1996) identify three different agendas: the media agenda, the public agenda and the policy agenda. The media agenda consists of every topic the media dedicates some form of attention to. The public agenda holds the topics people discuss in their daily lives. The policy agenda is formed by all the topics that are given attention by any governmental body. A topic can be on multiple agendas, but this is not necessarily the case (Dearing & Rogers, 1996).

Birkland (2007) identifies four layers of the agenda: the agenda universe, the systemic agenda, the institutional agenda and the decision agenda. The agenda universe consists of every possible idea, proposal or problem open for discussion. The systemic agenda, as described by Cobb & Elder (1985): "consists of all issues that are commonly perceived by members of the political community as meriting public attention and as involving matters within the legitimate jurisdiction of existing governmental authority" (Cobb & Elder, 1985, p. 85). Every idea that could be considered by political participants, is on the systemic agenda. The institutional agenda holds every topic that is seriously and actively considered by any government actor with authority. The institutional agenda is therefore bound by the resources available. The decision agenda consists of the topics on which action is required, such as decision-making by means of voting. When a topic fails to reach the decision agenda, chances are small that new policy is adopted (Birkland, 2007).

1.1.2 The process of agenda setting

Whether a topic reaches the decision agenda is determined by the process of agenda setting. Takeshita (2005) identifies two different agenda setting processes: deliberate agenda setting and automatic pseudo agenda setting. The first is about consciously trying to get a topic on the agenda, while the second is about an unconscious agenda setting process, caused by environmental (media) factors.

The agenda setting process has been studied by many scholars in history, but there are four major theories. The barrier model (Bachrach & Baratz, 1970), the expansion model (Cobb & Elder, 1985), the stream model (Kingdon, 1995) and the advocacy coalition framework (Sabatier, 1993). These theories will be described in this paragraph.

1.1.2.1 The barrier model

The barrier model originates in the notion that power is not only exerted in decision making, but also in non-decision making. This is described with the concept of "the two faces of power"(Bachrach & Baratz, 1962). According to Bachrach & Baratz (1970), power is relative and only present when exerted. Actors try to use power in times of conflict. In this case, conflict can be defined as "a struggle over scarce status, power and resources" (Harris & Smith, 1973, p. 2). The two faces of power acknowledges the first face of power, the participation in decision-making that affects others, but adds the second face of power: "But power is also exercised when A devotes his energies to creating or reinforcing social and political values and institutional practices that limit the scope of the political process to public consideration of only those issues which are comparatively innocuous to A" (Bachrach & Baratz, 1962, p. 948).

Later Lukes (2005) adds the third face of power: the power to shape other people's preferences in such a way that conflict is prevented. Even a combination of faces is possible, for example when a new bill is adopted to preserve the status quo (Schickler & Pearson, 2009).

The second face of power is the foundation of the barrier model. The barrier model describes the entire policy process, but due to the scope of this research, only the phase of agenda setting will be discussed. The barrier model identifies two barriers before a topic can reach the agenda. The first barrier is based on the values, beliefs and myths of the dominant group in society. In order to overcome this barrier, a topic has to comply with these values, beliefs and myths to prevent resistance. Both proponents and opponents of this topic will try to accelerate or block a problem by means of this barrier. The second barrier consists of customs, procedures and organizational bodies. Only the actors with legal authority can influence these barriers. When this barrier has been passed, the topic has reached agenda status.

1.1.2.2 The expansion model

The expansion model has been developed by Cobb & Elder (1985) and this theory states that the agenda status of an issue is only dependent on the amount of people that sympathize with the issue and to which degree: "The greater the size of the audience to which an issue can be enlarged, the greater the likelihood that it will attain systemic agenda standing and thus access to a formal agenda." (Cobb & Elder, 1985, p. 110).

The theory divides a community in four groups of people. Identification groups are the first group. This group consists of the people that strongly sympathize and identify themselves with the initial disputants. Attention groups are the second group: they identify with the disputants interest. The third group consists of the attentive public. The people in this group are relatively interested and informed. The last group is the general public. This group usually gets involved in conflicts last.

The issue is expanded to a larger audience when more groups are involved in the issue. In order to involve these groups in the issue, five dimensions have been identified that influence the degree to which people are involved. The first dimension is ambiguity. The more ambiguous an issue is, the more people will feel involved, since they recognize some aspect with which they can identify themselves. The second dimension is social significance: the more people are affected, the more people will be involved. The third dimension is temporal relevance, which is the time frame in which the issue will exist. The longer an issue will exist in reality, the more people will be involved. This should not be confused with the time an issue is on the agenda. The longer an issue is on the agenda, the lower the attention will be (Cook & Skogan, 1991; Downs, 1972). The fourth dimension is the simplicity of the problem. People will not feel involved if they do not understand the issue. The fifth and last dimension is the categorical precedence. When an issue is labeled as routine, fewer people will feel involved compared to an extraordinary issue that has not been identified before (Cobb & Elder, 1985).

When an issue reaches the attentive public, it has a reasonable chance of acquiring agenda status. When the general public is involved, the issue will automatically reach agenda status.

1.1.2.3 The stream model

The stream model has been introduced by Kingdon (1995) as a reaction to the linear agenda setting process, that the barrier model and the expansion model describe. According to the stream model, the agenda setting process is not linear, but much more chaotic.

The stream model describes three different streams. The first stream, the problem stream, consists of every problem that is perceived. Advocates of these problems try to acquire agenda status for their problem. The policy stream is the second stream. Every possible policy option is a part of this stream. However, to stay in this stream a policy option has to fulfill three criteria: it must be technically feasible, comply with the dominant norms, values and ideology of the public (influenced by the barrier model), and the policy should not generate more problems when implemented. The third and last stream is the political stream. This stream consists of the national mood, lobby or interest groups and governmental bodies (Kingdon, 1995).

In order to understand how policy is pushed forward, the concept of a window of opportunity is introduced. Changes in the political stream (e.g. elections) or increased attention for a particular problem creates a policy window. When the three streams are combined in a policy window, a window of opportunity is created and the problem reaches agenda status. Coupling these streams is an important task, which is done by policy entrepreneurs. They exist within the political stream, where they prepare the participants of the political process for their solution until a moment appears in which they have to act (Kingdon, 1995).

1.1.2.4 The advocacy coalition framework

The advocacy coalition framework is proposed by Sabatier (1993) and possesses some similarities to other agenda setting theories. Similar to the stream model it perceives the agenda setting process as non-linear and it resembles the barrier model in the way that it uses the concept of conflict.

The framework consists of exogenous variables and policy sub-systems. The exogenous variables can be divided in two categories: (relatively) stable and dynamic. The stable parameters are the attributes of the area in which the problem exists; the distribution of resources; the norms, values and social structure; and the governing legal institutions. The dynamic parameters are the socio-economic situation, the governing coalitions, the elected officials and influences from other sub-systems. These variables function as constraints and opportunities for a policy sub-system (Sabatier, 1993).

A policy sub-system consists of the actors involved with a particular policy problem. New policy sub-systems emerge when a particular problem is not reflected by current policy sub-systems. In these sub-systems coalitions are formed. As described by Sabatier, coalitions are: "composed of people from various governmental and private organizations who share a set of normative and causal beliefs and who often act in concert." (Sabatier, 1993, p. 18)

In these policy sub-systems conflict will arise when coalitions with competing beliefs are trying to translate their beliefs into policy. In such an occasion a policy broker, unrelated with any of the coalitions, will act. The role of the policy broker in the process is merely to mediate

and reduce conflict by achieving a compromise acceptable by both coalitions (Sabatier, 1988). Translating beliefs into policy goes via agenda setting: the issue first has to reach agenda status, before a government body can act on it. In a conflict the dominant coalition will see its topic on the agenda, possibly modified by the policy broker with elements from the dominated coalition.

1.1.3 Demarcation of agenda setting for this study

Agenda setting consists of the concept of an agenda and the process of agenda setting. In this study the definition of the decision agenda as described by Birkland (2007) will be used when speaking of the agenda.

Furthermore, the process of agenda setting will be the political process of deliberate agenda setting as described by Takeshita (2005). The influence of the mass media will be out of scope.

The theories of agenda setting will provide important elements for this study. Values and beliefs from the first barrier in the barrier model will play an important role in this study, as well as shaping perceptions, which is defined as the third face of power. The idea of making a problem visible and the identification group, will be used from the issue expansion model. The notion that the attention for issues diminishes the longer they exist on the agenda will be used in paragraph 6.1, when the application of the results are described. The stream model will provide the three elements for creating a window of opportunity, problems, policy and politics, but in a slightly different manner. In this study one actor or group of actors will be responsible for the construction of the agenda. In order to reach the agenda this actor or group of actors have to be convinced of the coupling of problems, policy and politics. This in contrast with the theory of Kingdon (1995), where coupling of the streams is equal to reaching the agenda.

The notion that a problem should not give more problems than it solves, derived from the stream model, is an intuitive condition which will return in paragraph 2.3.1, where the goals of strategic behavior are described.

An actor will try to either create or prevent a window of opportunity with his actions. In order to increase the effect of these actions, he will behave strategically. Strategic behavior plays an important role in agenda setting, since every actor will use everything in his power to reach his goals. The concept of strategic behavior will be further examined in paragraph 1.2.

1.2 Concept of Strategic behavior

The third important concept in this study is the concept of strategic behavior. This concept will be described by means of the comprehensive study of Ten Heuvelhof (2016).

Ten Heuvelhof (2016) starts with the relation between intention, behavior and impact as the basis for the research. Intention influences behavior and behavior results in impact.

Following these relations, Ten Heuvelhof (2016) identifies three conditions for strategic behavior. The first condition of strategic behavior is the fact that it serves the self-interest of the person who acts. It is possible that others benefit from this strategic behavior as well, but even in these situations the acting person benefits more than others. The second condition is

that strategic behavior is always intentional. It is possible to show behavior that is unintentional, which serves self-interest, but that does not qualify as strategic behavior. The third condition is that the strategic behavior has to be (partly) camouflaged for at least some time in order to be effective. When people see through the strategic behavior, the effect will decrease or disappear entirely (Ten Heuvelhof, 2016).

Strategic behavior has three different sources in which it is exerted. The first source is information. Gathering, modifying and providing information are all processes which can involve strategic behavior. Examples are espionage (gathering), changing time (modifying) and bluffing (providing). The second source of strategic behavior is time. When cause and effect are far apart in a situation, this could give opportunities for strategic behavior (e.g. moral hazard in insurance companies). Other examples of strategic behavior in which time plays a prominent role are so called salami tactics. A decision or negotiation divided in different rounds gives opportunities for salami tactics such as wait-and-see (wait for the right moment to make a proposal). The third source of strategic behavior is language. Every use of language provides opportunities for strategic behavior. An example of the use of strategic behavior in language is a metaphor. A good metaphor can be very effective when trying to convince others in a discussion. Effective use of strategic language has the following conditions: it is easy to remember, you intuitively agree with it, there is a clear division of roles (villain/hero), it connects with a societal gut feeling, it sounds catchy and the messenger should be reliable (Ten Heuvelhof, 2016).

Strategic behavior works in three different forms of decision making: simple individual decision-making, decision-making in networks and political-administrative decision-making. Simple individual decision-making can be influenced by the information on which the decision is based. Decision-making in networks is influenced by the behavior of other actors in the network. Political-administrative decision-making is influenced by fragmented or incremental decision-making, combined with gathering political support (Ten Heuvelhof, 2016).

To limit the scope of strategic behavior in this study, the perspective of Schelling (1960) on strategy is added to the definition. He states that "strategy is not concerned with the efficient application of force but with the exploitation of potential force" (Schelling, 1960, p. 5). This means that in his view strategy is about shaping perceptions of other actors. Strategic behavior intends a transformation of the perception of other actors on issues or other actors. This is in line with the definition of the third face of power of Lukes (2005). A visual representation of the demarcation of the concept of strategic behavior can be found in figure 1.

The concept of perception will be used as defined in Bots, van Twist, & van Duin (1999). They represent an actor's perception as a collection of a set of facts, links and goals. These concepts are not objective, but a consequence of the actor's interpretation of his environment (Bots et al., 1999). Instead of goals, values could also be used in an actor's perception since values are "desirable, transsituational goals, varying in importance, that serve as guiding principles in people's lives" (Schwartz, 1996, p. 122).

This condition will be added to the definition of strategic behavior, which means that strategic behavior, as used in this study, has the following conditions:

- Aimed at self-interest
- Intentional
- (Partly) camouflaged
- Aimed at shaping perceptions
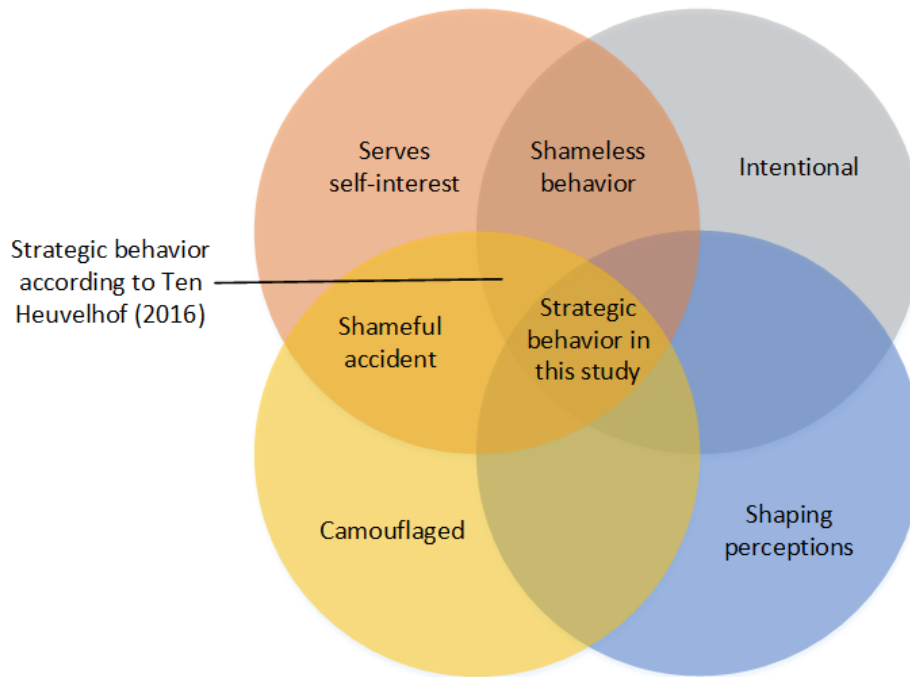
Figure 1: Demarcation of strategic behavior for this study

1.3   Research objective

This study aims to conceptualize and formalize strategic behavior and its influence on agenda setting processes. The conceptualization and formalization of the concepts of strategic behavior and agenda setting will increase the understanding of strategic behavior and enables the application of model-based studies on agenda setting, such as agent-based modeling. The use of agent-based models for studying strategic behavior can be an addition to the mostly qualitative research that is currently performed on this concept.

Agent based modeling is a type of modeling in which agents interact with each other and their environment by means of mathematical functions that transform input into output (van Dam, Nikolic, & Lukszo, 2013). An agent "is the software representation of some entity that completes an action or takes a decision" (van Dam et al., 2013, p. 5). So in order to use strategic behavior in agenda setting processes in agent based models, the actions an agent can perform have to be conceptualized and formalized, as well as the interaction with other agents (see figure 2).

The main focus of this study will be on the range of potential actions, executed by the strategic actor in an agenda setting context. The action is dissected in order to identify the essence of the behavior. This enables an easier comparison between the behaviors and highlights the

differences between them. The influence of these actions, the interaction with other actors, is also discussed. Furthermore, this study will provide a tool for empirical observation of strategic behavior.
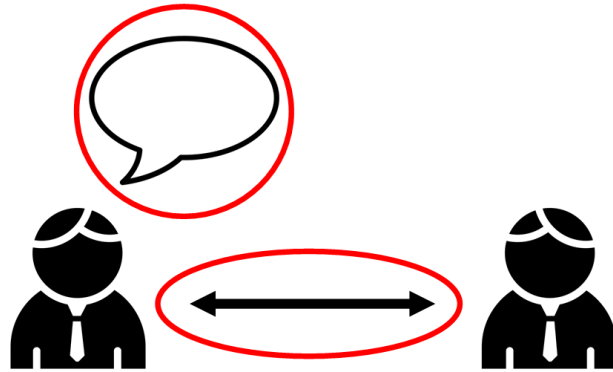
Figure 2: Visual representation of the research objective: conceptualizing and formalizing strategic behavior

1.4 Research questions

To reach the research objective, this study seeks to answer the following research question:

How can strategic behavior with regards to agenda setting be formalized in an agent-based model?

In order to answer this research question, the following sub-research questions are formulated:

1. What forms of strategic behavior with regards to agenda setting could occur?

2. What are essential characteristics of strategic behavior in agenda setting?

3. Can these forms of strategic behavior be formalized by means of a grammar, in order to be used in an agent-based model?

4. What are the effects of strategic behavior on agenda setting?

5. How can this grammar be utilized in order to foster understanding of strategic behavior in agenda setting processes?

Sub-questions 1-3 focus on the action, executed by the strategic actor. Sub-question 4 refers to the influence of these actions on other actors, the interaction. Sub-question 5 describes the potential applications of the findings of the study.

Answering these questions will foster the research on strategic behavior and answering the main research question of this study. The research methods used to answer these sub-questions and the deliverables of each sub-question can be found in table 2.

Table 2: Research methods and deliverables corresponding with the sub-research questions

Chapter	Sub-question	Research method	Deliverables
2	1	Literature study and design research	Structured list of forms of strategic behavior
3	2	Panel discussion and design research	List of essential dimensions of strategic behavior
4	3	Literature study on formal grammars and design research	An attribute grammar of strategic behavior in agenda setting, tool for empirical observation
5	4	Literature study	Insights in the way actors process strategic behavior and their motivations
6	5	Descriptive research based on results	An enumeration with descriptions of the potential application of the grammar and generator

1.5   Philosophic and Scientific perspective

Shaping perceptions is one of the conditions for strategic behavior as used in this study. A perception can be represented as a set of facts, links and goals (or values) in an actor's mind, based on the actor's interpretation of his surroundings (Bots et al., 1999). The interpretation of his surroundings, his environment, means that the actor is perceiving his environment and generates knowledge from this action. Epistemology is concerned with this process of knowledge gathering (Packer & Goicoechea, 2000).

One of the opposing views in epistemology, is the contrast between absolutism and relativism. Absolutism is defined as "the metaphysical view that there is an absolute reality, i.e., a reality that exists independently of human knowledge" (Kelsen, 1948, p. 906). Relativism contests this view: "Relativism, on the other hand, advocates the empirical doctrine that reality exists only within human knowledge, and that, as the object of knowledge, reality is relative to the knowing subject" (Kelsen, 1948, p. 906). This means that knowledge is either a perception of reality or a relative interpretation of reality. This perception of reality or interpretation of reality is a relevant contrast in observing strategic behavior. Behavior can be perceived, but arguments for the strategic intentions are added by the observer. This notion is strengthened by one of the conditions of strategic behavior: camouflage. The study of strategic behavior is therefore related to the school of relativism and subject to attribution and indirect evidence (Ten Heuvelhof, 2016).

In contract to the statement of Ten Heuvelhof (2016), this study assumes strategic behavior as an objective phenomenon in reality, independent of the human interpretation. This assumption enables a simplified discussion of strategic behavior and therefore fosters the process of formalization. Chapter 6 will return to this contrast to discuss the impact of human interpretation and the insights of this study for this interpretation.

1.6   Thesis structure

The study commences with a literature study of empirical research on strategic behavior. This provides forms of strategic behavior on which this study can build. This literature study and the structuring of the results can be found in chapter 2. Then the forms of strategic behavior are dissected to study the important dimensions of strategic behavior. This is done in chapter 3. Chapter 4 uses the forms of strategic behavior of chapter 2 and the essential dimensions of strategic behavior of chapter 3 to formulate an attribute grammar of strategic behavior. Consequently, chapter 5 examines the effects of strategic behavior, the interaction between actors. This provides insights in the way actors process strategic behavior, aimed at shaping their perception. The application of the grammar and value for research and practice will be discussed in chapter 6. The study and its results are discussed in chapter 7. The main conclusions and recommendations can be found in chapter 8.

2 Strategic behavior and hierarchy

In paragraph 1.2 strategic behavior has been briefly described and demarcated for this study. This chapter elaborates on strategic behavior and its relation to agenda setting. First, paragraph 2.1 discusses the literature search for the forms of strategic behavior relevant to this study. Paragraph 2.2 selects the forms of strategic behavior for this study. Then paragraph 2.3 describes the hierarchy in these forms of behavior. The literature describes the forms as if they are on the same level, while a certain hierarchy can be constructed, which increases the understanding of these behaviors.

2.1 Research method and keywords for finding forms of strategic behavior

The first step in this research is acquiring different forms of strategic behavior related to the agenda setting process. The forms of strategic behavior have been identified by means of a literature study, therefore the research method is desk research.

The literature was selected in two different ways. Starting points were the databases of Sciencedirect, Scopus, Web of Science and Google Scholar. The keywords in table 3 were used in these databases. Keywords related to agenda setting from the first column were combined with words from the second column. After the first results of the literature search it became clear that agenda setting is also a concept used to describe the influence of the media on the public agenda. These studies mostly describe specific examples of influence instead of strategies. Since the influence of the media is out of the scope of this study, the keyword media was excluded.

Table 3: Keywords used in literature search

Keywords on agenda setting	Keywords on strategic behavior	Excluded keywords
Agenda formation	Strategic behavior	Media
Agenda setting	Tactic	
Agenda institutions	Strategy	
Agenda procedure	Strategic action	
Agenda manipulation		
Centralized agenda process		
Open agenda process		
Agenda denial		
Agenda access		

This approach lead to the first major collection of strategic behavior, namely *Cultural strategies of agenda denial: avoidance, attack and redefinition* by Cobb & Ross (1997). The second book that included many forms of strategic behavior was suggested by prof. Hans de Bruijn: *Strategisch gedrag in Netwerken* (Strategic behavior in Networks) by Ten Heuvelhof (2016). These books together describe fifty eight forms of strategic behavior. Other studies that have been found elaborated on one of the forms in these books (such as Carr (1968) and Entman (1993)). Therefore, these two books and their fifty eight forms of strategic behavior are selected for this

study. There are two reasons for this choice: the amount of forms is considerable enough to work with, and small enough to work with in the available time for this study.

2.2   Selection of strategic behavior

Using the works of Ten Heuvelhof (2016) and Cobb & Ross (1997), fifty eight different forms of strategic behavior were identified. These forms of behavior are listed in table 4 and 5.

Table 4: Forms of strategic behavior selected from Ten Heuvelhof (2016)

Forms of strategic behavior (Ten Heuvelhof, 2016)	
Espionage	Procedural game
Unknowing informants	Ambiguity
Abuse of information	Metaphores
Change of scope	Archetypical narratives
Change of time	Causality as start of blame game
Bluffing	Priming
Information overload	Framing and association
Bottom line	Framing and spinning
Don't show your hand	Frame change
Tell him what he already knows	Imitation
Leaking	Consistency
Cold provision of information	Reciprocity
Frapper toujours	Incrementalism
Wait and see	Rejection-and-retreat
Positional game	

Table 5: Forms of strategic behavior selected from Cobb & Ross (1997)

Forms of strategic behavior (Cobb and Ross, 1997)	
Ignoring	Lies
Admit but exaggeration	Neutralize idea of victim
Admit but misunderstanding	Establish committee
Admit but assigning responsibility to natural causes	Create symbolic experience to show commitment
Disqualifying group	Co-optation of applicant member in proponent group
Preventing recognition as (public) problem	Stress measures already taken
Questioning premises on which problem is constructed	Postponement (difficult to deal with, refer to past)
Raise suspicion in public opinion on solution	Political threats
Antipatterning (incident)	Economic threats
Connect group to unpopular group	Legal threats
Question morality	Economic sanctions
Hold group responsible for own problems	Arrest
Fraud	Adopt bill to make issue illegal
False rumours	Organized violence
Slander	

Strategic behavior, as demarcated in this study (see paragraph 1.2), has four conditions, namely:

- Aimed at self-interest
- Intentional
- (Partly) camouflaged
- Aimed at shaping perceptions

When this definition of strategic behavior is applied to the listed forms of behavior in table 4 and 5, several behaviors rendered are out of scope. The forms that do not comply with the definition of strategic behavior can be found in paragraph 2.2.1, the elaborate explanation in appendix A. Paragraph 2.2.2 explains the exclusion of a form of strategic behavior, due to too much similarity. The remaining forms of strategic behavior are used in the hierarchy of paragraph 2.3.

2.2.1 Out of scope

When the definition of strategic behavior, delineated in paragraph 1.2, is applied, many forms of strategic behavior are out of scope. *Espionage*, *unknowing informants*, *abuse of information*, *positional game*, *procedural game*, *information overload*, *cold provisioning of information*, *imitation*, *consistency*, *incrementalism*, *rejection and retreat*, *ignoring* and *postponement* are not aimed at shaping perceptions. *Political, economic and legal threats*, *economic sanctions*, *arrest*, *adopt bill to make issue illegal* and *organized violence* are not camouflaged. Therefore, these forms of strategic behavior are excluded from this study. A more comprehensive explanation for these choices can be found in appendix A.

2.2.2 Overlapping forms of strategic behavior

Two of the forms of strategic behavior are highly similar. Therefore only one of these similar forms is used in this study.

Admit but misunderstanding (from Cobb & Ross (1997)) as a form of strategic behavior is very similar to *framing and spinning* (from Ten Heuvelhof (2016)): the aim of this behavior is to convince the influenced actor that he misunderstands the situation. This is very similar to *framing and spinning*, where a situation or story is framed in such a way that it benefits the interest of the strategic actor. Therefore only *framing and spinning* is taken into account.

Table 6 lists the forms of strategic behavior that are compliant with the definition as demarcated in paragraph 1.2. These forms serve as a basis for this study.

Table 6: Forms of strategic behavior selected from Ten Heuvelhof (2016) and Cobb & Ross (1997) compliant with the definition of strategic behavior in this study

Forms of strategic behavior (Ten Heuvelhof, 2016)	Forms of strategic behavior (Cobb and Ross, 1997)
Change of scope	Admit but exaggeration
Change of time	Admit but assigning responsibility to natural causes
Bluffing	Disqualifying group
Bottom line	Preventing recognition as (public) problem
Don't show your hand	Questioning premises on which problem is constructed
Tell him what he already knows	Raise suspicion in public opinion on solution
Leaking	Antipatterning (incident)
Frapper toujours	Connect group to unpopular group
Wait and see	Question morality
Ambiguity	Hold group responsible for own problems
Metaphores	Fraud
Archetypical narratives	False rumours
Causality as start of blame game	Slander
Priming	Lies
Framing and association	Neutralize idea of victim
Framing and spinning	Establish committee
Frame change	Create symbolic experience to show commitment
	Co-optation of applicant member in proponent group
	Stress measures already taken

2.3   Description of hierarchy

To create a structured overview of strategic behavior, the selected forms of paragraph 2.2 are divided over three levels: goals, strategies and tactics. Goals correspond to the three streams of Kingdon (1995). Based on military literature, a strategy can be defined as a set of tactics (von Clausewitz, 1965). Therefore, high level forms of strategic behavior are selected as strategies and more low level operations are selected as tactics.

This classification entails arbitrary choices, since some forms of strategic behavior can be considered a strategy as well as a tactic. This is based on a difference in interpretation of the behavior, caused by different definitions or assumptions. This phenomenon is explained by the concept of ontological relativity (Quine, 1968). Multiple classifications can exist that are coherent with an interpretation of reality. Since these classifications are based on specific definitions and interpretations, they are all debatable. However, they can be useful for the aim of the research and foster the formalization of strategic behavior in agenda setting processes.

The hierarchy is visualized in figure 3 and based on the forms of paragraph 2.2. Paragraph 2.3.1 describes the goals, 2.3.2 elaborates on the strategies and 2.3.3 lists the tactics.

Goal	Shaping perceptions in agenda setting							
Sub-goals	Prevent recognition as (public) problem	Promote recognition as (public) problem	Neutralize idea of victim	Promote idea of victim	Disqualify group	Qualify group	Raise suspicion on solution	Promote a solution
Strategies	Bluffing	Framing and association	Framing and spinning	Showcasing	Question premises of problem	Support premises of problem	Anti-patterning	Create a pattern
			Hold others responsible for problems	Hold responsible for own problems	Question morality	Promote morality		
Tactics	Change of scope	Change of time	Bottom line	Don't show your hand	Tell him what he already knows	Leaking	Frapper toujours	Ambiguity
	Metaphors	Archetypical narratives	Causality as start of blame game	Priming	Frame change	Admit but exaggeration	Admit but assign to natural causes	Slander
	Fraud	False rumors	Lies	Create symbolic experience	Establish committee	Stress measures already taken	Connect group to unpopular group	Connect group to popular group
				Co-optation of applicant member				

Figure 3: The three different levels of strategic behavior and its contents

2.3.1 Goals

The overarching goal is shaping perceptions. Sub-goals are what the behavior is aimed at specifically, what strategic actors want to achieve with their actions. Considering the agenda setting context, the stream model (Kingdon, 1995) provides the three streams as foundation of these goals.

From the forms of strategic behavior from chapter 2.2, four forms are identified as sub-goals: *prevent recognition as (public) problem*, *neutralize idea of victim*, *disqualify proponent group*, and *raise suspicion on solution*. *Prevent recognition as public problem* and *neutralize the idea of victim* are related to the problem stream. *Disqualify proponent group* is related to interest groups, which are part of the politics stream. *Raise suspicion on a solution* is associated with the policy stream.

Analyzing these four types of sub-goals, it becomes clear that these are all forms of negative agenda control: aimed at keeping problems off the formal agenda. However, there are also goals that are related to positive agenda control. Entman (1993) describes a positive goal in his definition of framing: "To frame is to select some aspects of a perceived reality and make them more salient in a communicating text, in such a way as to promote a particular problem definition, causal interpretation, moral evaluation and/or treatment recommendation for the item described" (Entman, 1993, p. 52). This definition refers to goals that are the opposite of the goals identified earlier. Promoting a problem definition or causal relation can be summarized as promoting recognition as (public) problem. Promoting a moral evaluation can be seen as the opposite of neutralize idea of victim, promote idea of victim, and as the opposite

of disqualifying a proponent group, qualifying a proponent group. Promoting a treatment recommendation (i.e. a solution) can be seen as the opposite of raising suspicion on a solution: promoting a solution.

These four goals are added to the four already identified, resulting in the following list of goals:

- Prevent recognition as (public) problem
- Promote recognition as (public) problem
- Neutralize idea of victim
- Promote idea of victim
- Disqualify proponent group
- Qualify proponent group
- Raise suspicion on solution
- Promote a solution

These goals combine elements of the agenda setting theories of paragraph 1.2. The norms and values of the barrier model (Bachrach & Baratz, 1970) are implicit in all of these goals and explicit in *neutralize* and *promote idea of victim* and *disqualify* and *qualify a proponent group*. The issue expansion model (Cobb & Elder, 1985) is related to the goals *promote recognition as (public) problem* and *promote idea of victim*. The identification group is equivalent to the proponent group as used in these goals. The stream model provides the streams which these goals are related to. Furthermore, the notion that a solution should solve more problems than it generates is part of the goal raise suspicion on solution.

In order to achieve these goals, strategies have to be chosen and carried out. These strategies are described in paragraph 2.3.2.

2.3.2 Strategies

In military literature, strategies are defined as a set of tactics (von Clausewitz, 1965). In other words: strategies are high-level plans, combinations of actions with the aim to achieve a goal. Eight forms of strategic behavior from paragraph 2.2 fit this definition: bluffing, framing and association, framing and spinning, showcasing, question premises of problem, anti-patterning, hold responsible for own problems and question morality. Looking at these forms, it becomes clear that some strategies, aimed at negative agenda control, also have a form aimed at positive agenda control. For instance, *question premises of a problem* is aimed at delegitimizing a problem, yet *supporting premises of a problem* could have the opposite effect. *Anti-patterning* has a strategic counterpart with the aim to put something on the agenda, namely *create a pattern*. The opposite of *question morality*, namely *promote morality*, legitimizes the claim of a proponent group. *Holding a group responsible for their own problems* can also be transformed in a strategy for positive agenda control: *holding other actors responsible for the problem*. These four strategies are added to the list, making it a list of twelve strategies in total. These strategies are:

- Bluffing
- Framing and association
- Framing and spinning
- Showcasing
- Question premises of problem
- Support premises of problem
- Anti-patterning
- Create a pattern
- Hold other actors responsible for problems
- Hold responsible for own problems
- Question morality
- Promote morality

Bluffing, framing and association, framing and spinning, showcasing are identified as strategies due to their generic nature: there are many ways to perform this action. These strategies are aimed at form: they all describe a way of doing something. *Question premises of the problem, support premises of the problem, anti-patterning, create a pattern, question morality, promote morality, hold responsible for own problems* and *hold other actors responsible for problems* are considered strategies, since they are high-level plans: multiple actions could be combined to execute this strategy. They are strategies on content: they describe what has to be done.

Some of these strategies are applicable in every situation, such as *bluffing, framing and association* and *framing and spinning*. Others are more specific and applicable in less situations, such as *showcasing*.

Descriptions of these strategies and more elaborate arguments for selecting them as strategies can be found in appendix B.

2.3.3 Tactics

The remainder of the forms of behavior are considered tactics. These are the low-level operations carried out in the execution of a larger strategy, aiming at the intended goal. They are either specific individual actions or generic actions in the execution of strategies. *Priming* and *leaking* for instance are not specific actions but they are used in the execution of higher-level plans, while *change of scope* is a more specific action. The tactics can also be divided in tactics on form and tactics on content, since some of the tactics describe a way of doing something, such as *lies*, while others describe what should be done, such as *admit but assign to natural causes*. Table 7 lists and describes the tactics that are used in this study.

2.3.4 Specific strategies and tactics related to the goals

Three different levels of strategic behavior have been identified with the respective forms on each level. This leads to the hierarchy of strategic behavior as can be seen in figure 3. The overarching goal is shaping perceptions in agenda setting, there are eight sub-goals, twelve strategies and twenty five tactics.

In this hierarchy not every goal can be achieved by using every strategy: some are more suited than others. And while some tactics could be used in order to carry out a strategy, in

Table 7: Description of tactics

Tactic on form	Description
Change of scope	Adjust scope of information
Change of time	Adjust time frame of information
Bottom line	Do not provide information on Best alternative to negotiated agreement (BATNA)
Don't show your hand	Do not provide information on available resources and BATNA
Tell him what he already knows	Provide information already known to actor to influence his perception of information available to you
Leaking	Provide new information to actor outside of the process
Frapper toujours	Provide the same information repeatedly
Ambiguity	Provide information with multiple interpretations
Metaphors	Provide information with an analogy
Archetypical narratives	Provide information with recognizable patterns
Causality as start of the blame game	Provide causal relation to influence perception of blame
Priming	Provide neutral information in an early stage to influence evaluation in a later stage
Frame change	Change the topic of conversation between personality, policy and principle frames.
Slander	Provide false information on an actor
Fraud	Falsify information
False rumors	Provide false information with a source as defense mechanism
Lies	Provide false information
Tactics on content	**Description**
Admit but exaggeration	Admit the opponent has a point, but exaggerates
Admit but assign to natural causes	Admit the opponent has a point, but assign the blame to a natural cause, so actors are not blamed
Create symbolic experience	Small public action to influence action-oriented behavior or perception of action-oriented behavior
Establish committee	Institutional action to assemble actors to investigate problem, shows action-oriented behavior
Stress measures already taken	Provide information on previous problem-solving measures and actions
Connect group to popular group	Create a relation between the proponent and a popular group, to qualify the proponent
Connect group to unpopular group	Create a relation between the proponent and an unpopular group, to disqualify the proponent
Co-optation of applicant member	Institutional action to involve an opponent in the problem-solving action

combination with the goal they might not be as useful: it depends on the goal which tactic(s) can be used to carry out a strategy.

The fact that different goals have different strategies and tactics, leads to eight different strategy trees. Every goal has its own set of strategies and tactics. The example of the goal *prevent recognition as (public) problem* can be found in figure 4. This figure shows that seven strategies can be used for this goal (four on form and three on content) and almost every tactic.

When choosing a strategy, a strategy on form (one of the top four in figure 4) is combined with a strategy on content (one of the lower eight in figure 4). The strategy on form is about how it is done (e.g. *bluffing*) and the strategy on content about what is done (e.g. *anti-patterning*). Both strategies have several tactics to choose from in order to carry out the strategy. A change of scope and fraud are two tactics that are linked with both strategies and could therefore be used to carry out the strategy. However, every amount of tactics could be used to execute a strategy. A hierarchical plan is constructed:

- Goal: Prevent recognition as (public) problem
    - Strategy on form: Bluffing
    - Strategy on content: Anti-patterning
        - Tactic 1: Change of scope
        - Tactic 2: Fraud

An elaborate description of this strategy tree and the strategy trees of the seven other goals can be found in appendices C – J.

This figure also has its limitations. It merely indicates the possibilities and does not indicate the most suitable choice for a specific situation. The figure also does not specify which combinations of strategies or tactics are appropriate, but merely shows potential strategies and tactics for a goal. Furthermore, due to the many tactics that can be used for this goal, the figure becomes hard to read. Despite these limitations, it gives a first impression of the execution of strategies and tactics for the intended goal.

Figure 4: The strategic behavior tree related to the goal prevent recognition as (public) problem
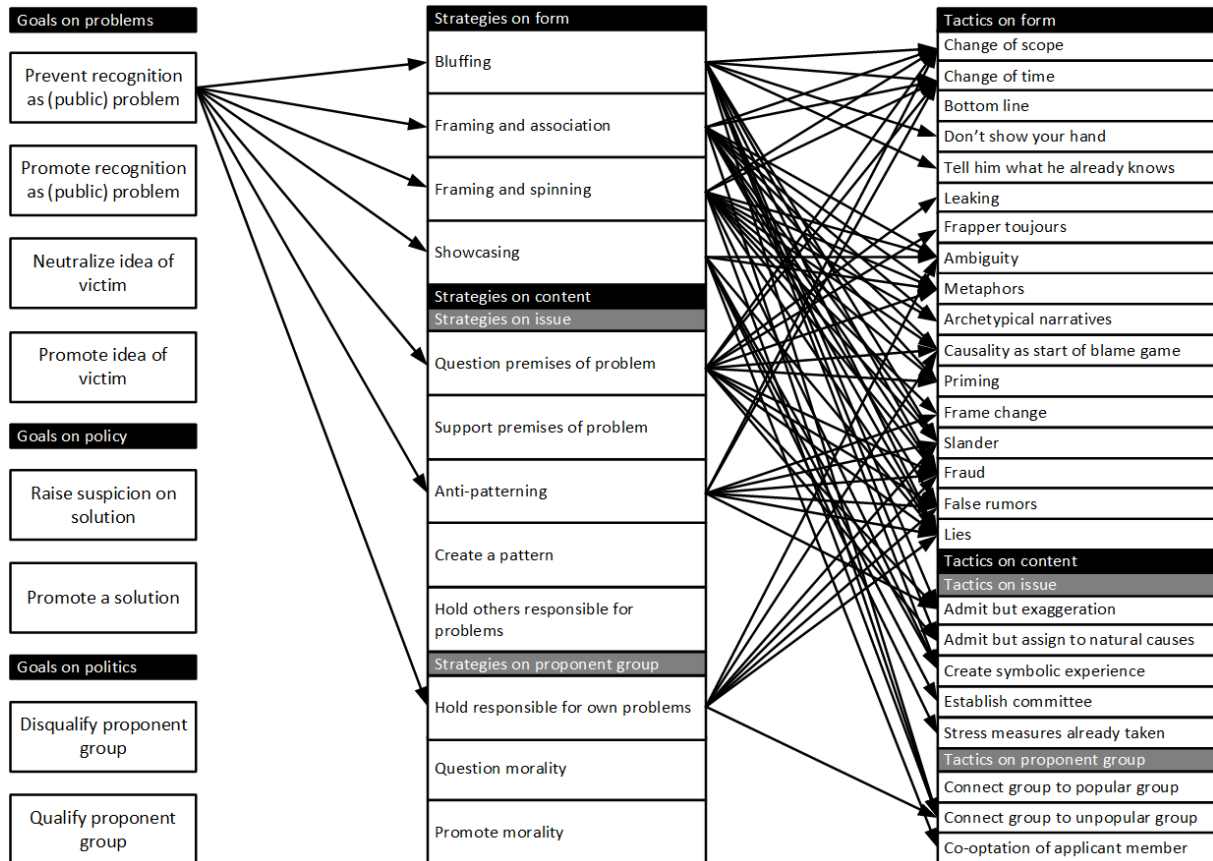
3. Dimensions of strategic behavior

Many different forms of strategic behavior and the structure within these forms have been described in chapter 2. However, the hierarchy and the definitions of the behaviors do not express the distinctive character of the different forms. The differences and uniqueness of forms of strategic behavior can be described when the essential dimensions of strategic behavior have been identified. This is done based on an analysis of the forms of strategic behavior of chapter 2. Paragraph 3.1 will discuss the set of elements that can be used to describe strategic behavior. Paragraph 3.2 discusses the applicability of these dimensions for this research, in order to select the appropriate dimensions for the grammar in chapter 4.

3.1   Classification of dimensions of strategic behavior

This classification has been constructed based on a discussion with experts (de Bruijn, Nikolic, & Bots, 2017) and is the result of an iterative process (for previous classifications, see appendix K and L).

The classification consists of the following dimensions:

- The strategic actor
- The action
- The influenced actor
- What element of perception is influenced
- Nature of relation between actors
- Access to actor
- Resource dependence
- Legitimize or delegitimize
- Object

The dimensions of the classification will be described in detail in the following sub-paragraphs.

3.1.1   The strategic actor

This dimension describes the actor (or group of actors) that behaves strategically. The strategic actor can either be the proponent or the opponent of a certain problem.

3.1.2   The action

The use of this dimension is based on the forms of behavior of chapter 2 and two different actions can be identified: communication or transaction. These actions are used to differentiate between the forms of behavior.

3.1.3   The influenced actor

This dimension describes the actor (or group of actors) that interacts with the strategic actor. This actor can be a proponent, an opponent or a third actor. The third actor is used in a broad sense: this can be any other actor, group of actors or even the general public.

3.1.4 Influenced element of perception

This dimension relates to the representation of perceptions of Bots, van Twist, & van Duin (1999) as described in paragraph 1.2. The three elements of a perception that are used in this dimension are:

- Facts
- Causality
- Values

These elements of a perception could be used and targeted by the strategic behavior.

3.1.5 Nature of relation between actors

This dimension explains the nature of the relation between the interacting actors. Some forms of strategic behavior occur in cooperative relations, others in conflictual relations. Some forms could also occur in both.

3.1.6 Access to actor

This dimension evaluates whether the behavior influences the access of the strategic actor to other actors. In this study, this is limited to access to the actors that make the agenda. They have to be influenced in order to have a topic on the agenda or prevent a topic from reaching the agenda.

3.1.7 Resource dependence

This dimension evaluates whether the behavior influences the resource dependence of the strategic actor on other actors. In this study, where the focus is on the influence of strategic behavior on agenda setting, the resource is agenda power: the power to make the decisions on what is on the agenda.

3.1.8 Legitimize or delegitimize

This dimension describes whether the strategy is aimed at legitimizing or delegitimizing an object (see 3.1.9). When proponents want a topic on the agenda, the aim will be legitimizing. This aim is related to the four goals of paragraph 2.3.1 with a positive effect: *promote recognition as public problem*, *promote idea of victim*, *qualify proponent group* and *promote solution*. Opponents who want to prevent a topic from reaching the agenda will try to delegitimize this topic. Goals related with the aim to delegitimize are *prevent recognition as public problem*, *neutralize idea of victim*, *disqualify proponent group* and *raise suspicion on solution*.

3.1.9 Object

The strategic behavior is aimed at legitimizing or delegitimizing something, which helps to have the topic on or off the agenda. There are five different objects: the strategic actor, the influenced actor, a third actor, a problem or a policy. These objects correspond to the three streams of Kingdon (1995) and the goals as defined in paragraph 2.3.1.

3.2 Demarcation of dimensions for the remainder of this study

The actors are assumed to have access to one another to execute their behavior. If they do not have this access, executing strategic behavior will be useless: without access you cannot shape the perception of the influenced actor. The resource on which the strategic actors are

dependent, is the agenda power: the power to decide which problems are on the agenda. This makes this dimension straightforward and equal for every form of behavior. Therefore, access and resource dependence will be excluded from the grammar, due to the fact that they are either assumed to be available (access) or equal for every form of behavior (resource dependence). The remaining seven dimensions will be used to construct the grammar in chapter 4.

4. An attribute grammar of strategic behavior

This chapter describes the construction of an attribute grammar of strategic behavior. This grammar is based on the dimensions of strategic behavior of chapter 3 with the input of the strategic behaviors of chapter 2. Paragraph 4.1 will first explain the theory behind attribute grammars. Paragraph 4.2 then formalizes strategic behavior by means of an attribute grammar. Paragraph 4.3 uses the grammar to create a strategic behavior generator. Paragraph 4.4 applies the grammar to nine real world examples considered strategic behavior, to study the added value of the grammar. Paragraph 4.5 concludes this chapter with some remarks on validity, based on the applicability of the grammar and face-validation of the grammar with the use of the generator.

4.1 Theory of an attribute grammar

The attribute grammar was introduced in 1968 by Donald Knuth in order to be able to specify the meaning of languages. This technique made it possible to add conditions and attributes to a formal grammar, i.e. to incorporate semantics (Knuth, 1968). A formal grammar describes how valid phrases are formed in natural or programming languages (Slonneger & Kurtz, 1995)).

An attribute grammar AG consists of three different elements: a context-free grammar (which is a formal grammar), attributes and semantic rules. The context-free grammar provides the basis, the syntax of the attribute grammar. Combined with attributes and semantic rules, that provide the semantics of the grammar, the following generic attribute grammar can be constructed: AG = (G, A, R).

A context free grammar G could be described as follows:

G = (N,T,P,D)

With:

- N as set of nonterminal symbols (symbols that could be expressed in one or more other symbols)
- T as set of terminal symbols (fundamental symbols, cannot be expressed in other symbols, indicated with underlining)
- P as set of productions (i.e. statements on transformations of nonterminals into terminals)
- D ∈ N (D is an element in set N) as starting point (Paakki, 1995; Slonneger & Kurtz, 1995).

Formal grammars are commonly expressed in the Backus-Naur Form (Backus et al., 1960). The following conventions on the syntax of the Backus-Naur Form are relevant for this study:

- ::=   - A connection symbol, the left hand element could be written as the (collection of) right hand element(s).
- < >   - This symbol explains that everything between these brackets is one variable.
- | - This symbol means "or".
- +   - The preceding variable can occur one or more times.

- *   - The preceding variable can occur zero or more times.

Besides these specific conventions, one other convention is relevant for this study, namely the syntax for describing a set. A set of *a* and *b* will be described as *(a,b)*.

The concept of a context-free grammar and this definition will be explained by a transportation-related example. Assume that there are two options to go home, by car or by train, and two different routes, via The Hague or Rotterdam. Using the elements of a context-free grammar and the conventions of the Backus-Naur Form, the following context-free grammar can be constructed:

G = (N,T,P,H)

H ::= M C
M ::= < train > | < car >
C ::= < The Hague > | < Rotterdam >

With:

H = Option to come home (nonterminal and starting point)
M = Modality (nonterminal)
C = City in between (nonterminal)

This grammar generates four different options: by train via The Hague, by train via Rotterdam, by car via The Hague and by car via Rotterdam. The fact that this grammar is context-free means that both modalities are possible with both cities to travel through. When a restriction is in place (i.e. a semantic rule), such as the fact that you can only travel via Rotterdam if the travelling is done by train, than a context-free grammar is insufficient to express this situation. Then the situation has to be expressed in an attribute grammar.

Consider the same example, with the addition that travelling via Rotterdam is only possible by train. This would result in the following attribute grammar:

AG = (G, A, R) with G = (N,T,P,H)

H ::= M C
M ::= < train > | < car >
C ::=   **Condition: if M = train**
            < The Hague > | < Rotterdam >
        Else:
            < The Hague >

With:

H = Option to come home
M = Modality
C = City in between

This grammar only generates three options: by train via The Hague, by train via Rotterdam and by car via The Hague due to the addition of a semantic rule. Attributes can be added when

multiple occurrences of a nonterminal result in different transformations. When you can only travel by car once, attributes are added to the modality (M_1 and M_2). This addition enables a check for the choice of travelling the first time, which could influence the options the second time (when the car is used the first time, the only option the second time will be the train).

4.2   Construction of an attribute grammar of strategic behavior

According to the definition of an attribute grammar, it consists of a context-free grammar, attributes and semantic rules: $AG = (G, A, R)$. First the context-free grammar will be described and then the semantics will be added.

The context free grammar of strategic behavior will describe every possible form of behavior within the scope of this research and is based on the dimensions of strategic behavior of chapter 3. Instead of strategic behavior, the highest level in this grammar will be a strategic discourse. This strategic discourse can consist of one or more forms of strategic behavior. Strategic behavior in this grammar consists of four elements: a strategic actor, the actual behavior, the perceiving actor and the goal (see figure 5). The strategic actor relates to the first dimension, the behavior combines the dimensions of the action and element of perception, the influenced actor combines the dimensions of the influenced actor and the nature of the relation between the actors and the goal combines the dimensions of legitimize or delegitimize and the object.
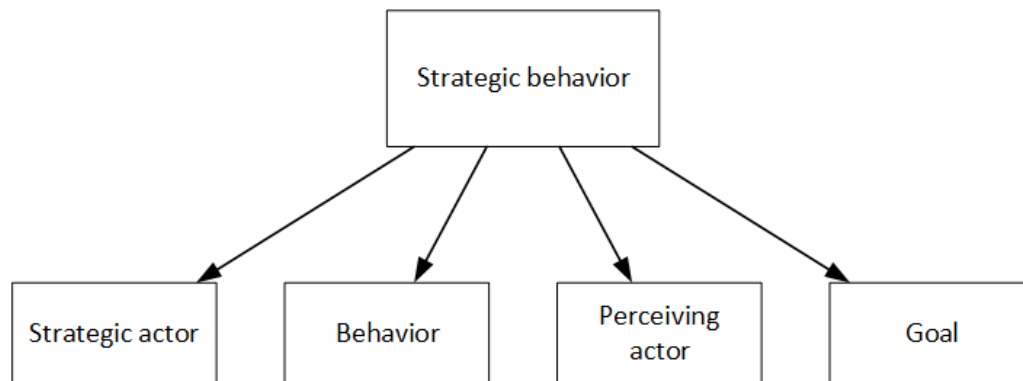
Figure 5: High level decomposition of strategic behavior

The forms of strategic behavior from the hierarchy in paragraph 2.3 can be divided in two categories: communications and transactions. Transactions can be compared with position rules (creating positions and describing these positions) and boundary rules (exit and entry rules for these positions) as defined by Ostrom (2011). Two instances of transactions have been described in this study: *the establishment of a committee* (i.e. assign new committee, related to position rules) and *co-optation of applicant member in a committee* (i.e. add to existing committee, related to boundary rules). Communication can be divided in two categories, true and false communication. It is important to notice that in this case true and false are not absolute: truth is related to the perception of the strategic actor. When he does not know that his communication is false, it does not qualify as strategic behavior, as it is not intentional. Communication can use four different types of statements. Three types of statements are related to the perception of the influenced actors, statements with facts, causal relations and
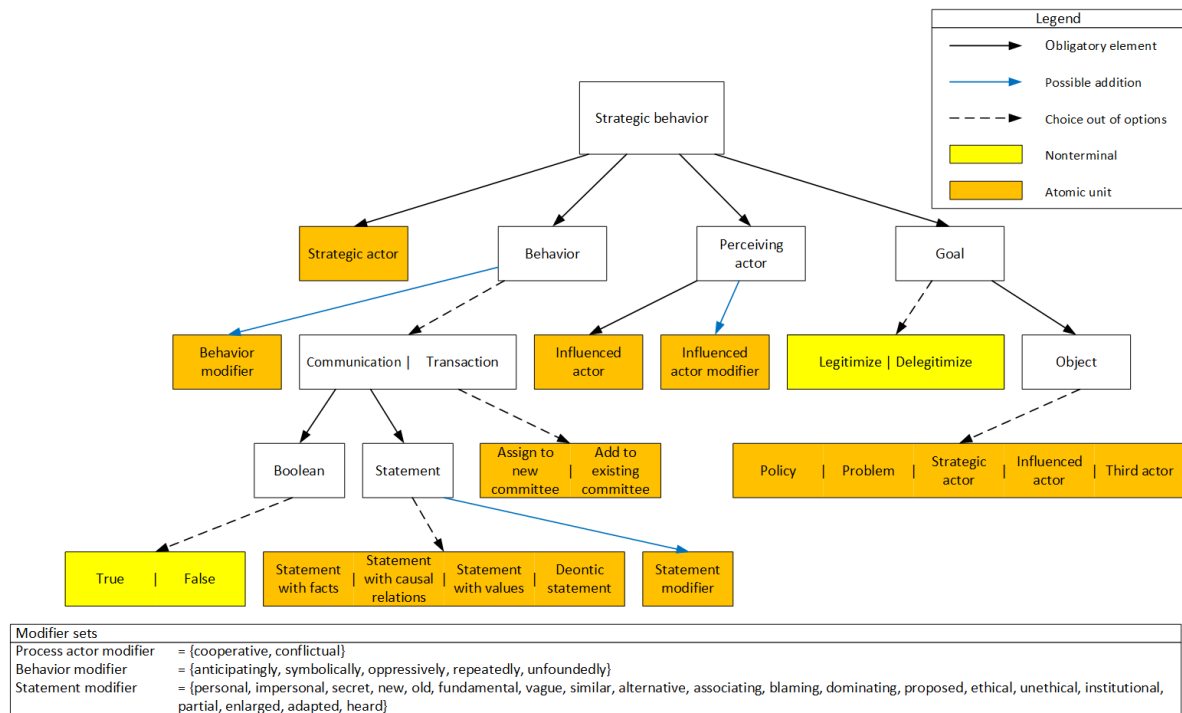
Figure 6: Detailed decomposition tree of strategic behavior

values, and the fourth type is a deontic statement. Deontic statements could contain the concepts of obligation, permission and prohibition (Hilpinen, 1968). Furthermore, the behavior could be combined with one or more behavior modifiers, words that add extra information to the behavior, and statements with one or more statement modifiers, words that add extra information to the type of statement. These modifiers are derived from the forms of strategic behavior of paragraph 2.3. Behavior modifiers could be repeatedly, vaguely, anticipatingly, symbolically and unfoundedly. Statement modifiers are personal, impersonal, secret, new, old, fundamental, vague, similar, alternative, associating, blaming, dominating, proposed, ethical, unethical, institutional, partial, enlarged, heard and adapted.

The perceiving actor is the actor that is influenced by the strategic behavior. This element consists of the influenced actor and a modifier, since the nature of the relation between the strategic and influenced actor could be added as influenced actor modifier to indicate details on their relation. Some strategic behaviors are aimed at cooperative actors, other at conflictual actors and some forms of behavior are indifferent for the position of the actor involved. The influenced actor could be part of the goal of the behavior. However, this is not necessarily the case.

The goal of the strategic behavior has two directions, legitimize or delegitimize, and five objects: the strategic actor, the influenced actor, an external actor, a problem or a policy (corresponding to the three streams in the theory of Kingdon (1995) and the goals in the hierarchical structure in paragraph 2.3). Every form of strategic behavior is aimed at one or more of these five objects.

The decomposition of strategic behavior is visualized in figure 6. Black arrows point towards obligatory elements, blue arrows towards optional elements and dotted arrows towards a

choice: from every block, only one of the options is used to replace the higher level variable. The yellow boxes indicate the lowest level variables, the terminals in this grammar, which cannot be replaced by something else. The orange boxes indicate atomic units: these units cannot be decomposed and are replaced with one specific terminal. The strategic actor and influenced actor can be replaced with specific actors (or software agents), the modifiers by one of the words in the sets of modifiers, the policy and problem by a specific policy and problem, the committees by specific committees and the statements with a specific statement. This figure should be read from left to right, from the top down.

Going through the different elements of strategic behavior from left to right will generate a sentence that describes a specific form of strategic behavior.

Based on the description in this paragraph and the decomposition tree in figure 6, the context-free grammar G = (N, T, P, SD) is constructed, with the following production lines:

- < SD > ::= < SB > +
- < SB> ::= (< A1 >, B, < PA >, G)
- G ::= < legitimize > O+ | < delegitimize > O+
- O ::= < TA > | < problem > | < policy >
- B ::= C <BM>* | T <BM>*
- T ::= < assign to new committee > | < add to existing committee >
- C ::= < makes a > < Boolean > S
- < Boolean > ::= < true > | < false >
- S ::= < statement with < SM >* facts > | < statement with < SM >* causal relations > | < statement with < SM >* values > | < SM >* < deontic statement >
- < PA > ::= < AM > < A2 >
- < TA > ::= < A1 > | < A2 > | < A3 >
- < SM > ::= < personal > | < impersonal > | < secret > | < new > | < old > | < fundamental > | < vague > | < similar > | < alternative > | < associating > | < blaming > | < dominating > | < proposed > | < ethical > | < unethical > | < institutional > | < partial > | < enlarged > | < adapted > | < heard >
- < AM > ::= < cooperative > | < conflictual > | < any >
- < BM > ::= < repeatedly > | < vaguely > | < anticipatingly > | < symbolically > | < unfoundedly >

With:

- SD = Strategic discourse
- SB = Strategic behavior
- A1 = Strategic actor
- G = Goal
- O = Object
- B = Behavior
- PA = Perceiving actor
- T = Transaction
- C = Communication

- S = Statement
- TA = Target actor
- SM = Statement modifier
- AM = Actor modifier
- BM = Behavior modifier

Then the semantic rules are added, which are aimed at preventing the occurrence of impossible combinations of elements. The grammar should only generate sentences that are internally consistent and logically make sense. The consistency and logic of the sentences are checked by using a tree that visualizes all possibilities, which can be found in figure 7. Every path represents a possible combination of the context free grammar. This tree is used to exclude sets of possibilities instead of having to check every single sentence the grammar generates. For instance, when the combination of strategic actor (as goal) and transaction is impossible, every combination that uses that arrow will be excluded.

The production lines are ordered in a certain manner and in this order the transformations will also take place. Figure 8 gives a visual image of the order of these transformations. The semantic conditions will also be given in this order, since every transformation can exclude some of the possible transformations in a later stage. The conditions that have to be taken into account by the grammar are listed in table 8.

The conditions in table 8 only suffice when the variables in the grammar with + (one or more appearances of the preceding variable) and * (zero or more appearances of the preceding variable) occur with a maximum of one time. When these variables occur more than once, many new combinations are generated. This causes an increase in complexity and therefore
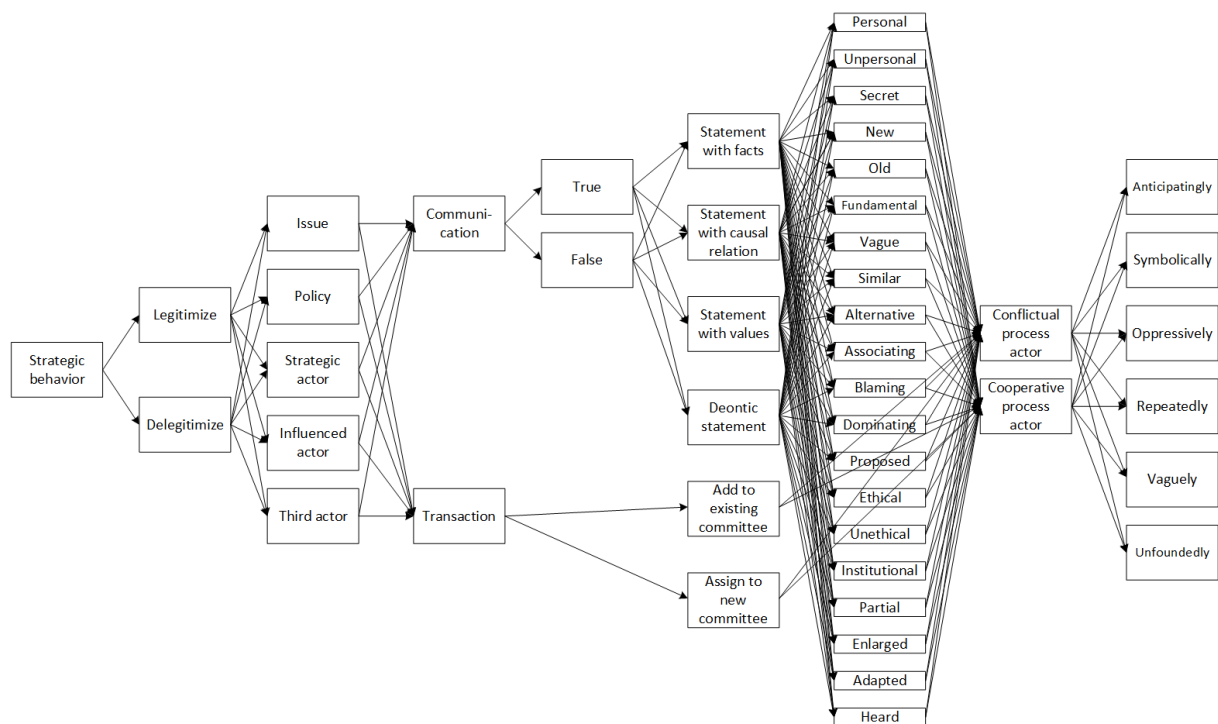
Figure 7: Tree used to check internal consistency and logic of all possible forms of strategic behavior
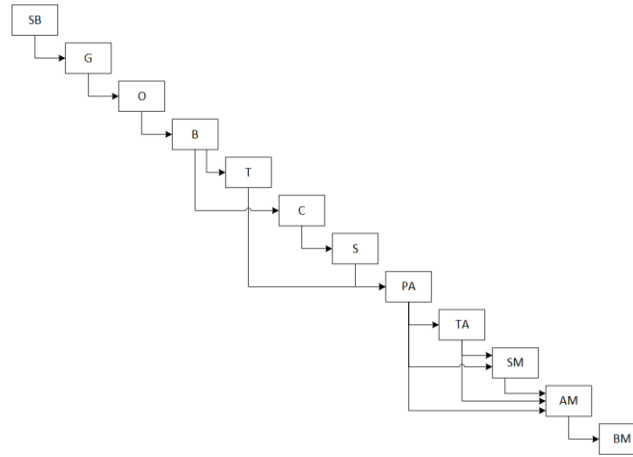
Figure 8: Order of transformations in attribute grammar

an expanded list of conditions. This limitation also makes the use of attributes superfluous, since only one instance of a nonterminal will occur.

In order to clarify how the attribute grammar works with the added conditions, one example will be explained. The complete attribute grammar can be found in appendix M. The transformation begins with SD and following the order of figure 8, the different nonterminals are transformed into atomic units and terminals:

1. SD
2. SB
3. A1 B PA G
4. A1 B PA legitimize O
5. A1 B PA legitimize TA
6. A1 C BM PA legitimize TA
   (G = legitimize, B can only be C)
7. A1 makes a Boolean S BM PA legitimize TA
8. A1 makes a false S BM PA legitimize TA
9. A1 makes a false statement with SM values BM PA legitimize TA
10. A1 makes a false statement with SM values BM AM A2 legitimize TA
11. A1 makes a false statement with SM values BM AM A2 legitimize A1
12. A1 makes a false statement with personal values BM AM A2 legitimize A1
    (O = TA, SM cannot be impersonal. S = statement with values, SM cannot be adapted. Boolean = false, SM cannot be partial or enlarged)
13. A1 makes a false statement with personal values BM any A2 legitimize A1
    (A2 is not the object, therefore AM = any)
14. A1 makes a false statement with personal values anticipatingly any A2 legitimize A1
    (B = C, BM cannot be oppressively)
15. A strategic actor makes a false statement with personal values anticipatingly to any influenced actor to legitimize himself
    (This is the result after the rewrite-procedure.)

Following the production lines of the grammar, line 15 could be the result. A specific example of this form of strategic behavior could be that an actor expresses the fact that he thinks

everyone is equal and deserves equal chances (although this does not reflect his actual opinion), to legitimize himself before he nominates himself for a position.

Table 8: List of constraints added to the attribute grammar

Constraints	Explanation
Transaction → Delegitimize and aimed at influenced actor, policy or problem	Transactions (add to existing or assign to new committee) are used to either damage an actor by letting him participate in the process, or constructing conclusions that benefit the strategic actor
G = delegitimize → O cannot be strategic actor	A strategic actor will not execute behavior that delegitimizes himself
Boolean = true → SM cannot be adapted/heard	Adapted and heard relate to fraud and false rumors, which are impossible combinations with a true statement.
Boolean = false → SM cannot be partial/enlarged	Partial and enlarged relate to change of scope or change of time. These statements are true, they only shape the argument in their advantage.
Object =! policy → SM cannot be proposed	Proposed can only be used in combination with policy, since proposed relates to proposals, options for policy.
Add to existing committee → Delegitimize influenced actor; Influenced actor → conflictual; BM → symbolically/oppressively	This act contaminates the influenced actor with the current policy, since he is being involved in making it. Since he is delegitimized, he can only be conflictual. The modifier can only be oppressively or symbolically, due to the nature of the act.
Object = influenced actor and aim = delegitimize → influenced actor = conflictual; Object = influenced actor and aim = legitimize → influenced actor = cooperative; Else → influenced actor = any	The influenced actor is only delegitimized if the nature of their relation is conflictual and only legitimized if their relation is cooperative. Otherwise the relation between the actors can be of any kind.
Object = problem/policy → SM cannot be personal	When a problem or policy is targeted, this cannot be done with a statement that is related to a person.
Object = strategic actor/ influenced actor/ third actor → SM cannot be impersonal	When an actor is targeted, it cannot be done with a statement that is unrelated to a person.
S = statement with values → SM cannot be adapted	Adapted is related to fraud and it is impossible to fraud with values.
SM = secret → BM cannot be vaguely, unfoundedly, symbolically	When secrets are used, it is not in the interest of the strategic actor to do this vaguely or symbolically, since it reduces its power, and unfoundedly is impossible, since these secrets are the foundation.
B = Communication and G = delegitimize and O = strategic actor/ influenced actor/ third actor → BM cannot be symbolically	A delegitimizing statement aimed at an actor cannot be made symbolically, since the definition of symbolically is that it stands for something else, which cannot be the case when the statement is made at this actor.

4.3   The construction of a strategic behavior generator

The attribute grammar of paragraph 4.2 (for the complete grammar, see appendix M) can serve as input for a strategic behavior generator. This generator will be able to generate and list all possible forms of behavior prescribed by the attribute grammar.

This generator has two functions. First, the generator creates an extensive list of all forms of strategic behavior described by the grammar. This enables an easier validation of the grammar. Second, the list generated by the generator could also be used by practitioners, since it might be more appealing than the decomposition graph (see figure 6) or attribute grammar (see appendix M). The construction of the generator does not add much to the understanding of strategic behavior, nor is it a complex construct. It merely generates a comprehensible list of forms of strategic behavior, which might be easier to use by practitioners then the underlying grammar.

In order to create the forms of strategic behavior, the generator follows the production lines of the attribute grammar (see appendix M) to replace nonterminals into terminals and atomic units. The exact implementation of this procedure is explained in appendix N.

However, in order to test the validity of the grammar it might be useful to be able to show forms of behavior with specific characteristics. Furthermore, practitioners who find a list of behaviors more appealing than the more technical decomposition graph (see figure 6) or attribute grammar, might want to indicate preferences for intended behavior. Some forms of behavior might be more suitable for certain situations than others. So besides generating every possible combination, the generator should also be able to generate specific forms of behavior or adjust the forms of behavior to the current situation, available information or personal preferences.

First, when a person has to be opposed, who is highly respected by the community, slander and personal attacks might cause more harm than that they benefit the cause. In that case, opposing the facts might be a better option. It should be able to insert this preference into the generator. Another example relates to the type of behavior. For certain behaviors you need some authority, power to make decisions. The behaviors in the transaction category for instance both need a person with authority to decide on these strategies. When the strategic actor lacks this power and does not have a person in his coalition with this power, this type of behavior is not possible. Therefore a possibility to indicate a preference in type of behavior should also be incorporated.

Second, availability of information could limit the options for strategic behavior. The available information steers the aim of the behavior for example. When there is only positive information available, the only aim could be to legitimize an actor, problem or policy.

Third, someone or something using the generator could also have personal preferences. A person with high morality could strongly oppose the option to lie. For this person it should be able to eliminate options with false statements.

Therefore, for practice it should be possible to insert the following preferences into the generator:

- The aim of the behavior (legitimize or delegitimize)
- The object (strategic actor, influenced actor, third actor, problem or policy)
- Type of behavior (transaction or communication)
- Nature of the statements (true, false)
- Content of statements (facts, causal relations, values or deontics)

These preferences can also be used for validation purposes, to check if the grammar generates the correct set of behaviors, whether it does not generate impossible combinations or leave out suitable combinations. Therefore, these features are added to the generator. How these features are implemented is described in appendix N.

4.4 Application of grammar on real world examples

To study the added value of the grammar, real world examples of statements that could be considered strategic behavior, have been acquired and compared with forms generated by the grammar. This comparison results in multiple interpretations of the real world example, related to multiple intentions that could be behind expressing the specific statement. Furthermore, it improved the quality of the grammar by showing new options: deontic statements (although none of the statement is considered a statement with a deontic) and the strategic actor as object have been added after the application on real world examples.

Paragraph 4.4.1 describes how these real world examples have been gathered and how the grammar can be applied to them. The application of the grammar reveals the multiple interpretations and thus the added value of the grammar. Paragraph 4.4.2 draws some preliminary conclusions on the added value of the grammar based on the applications on the real world examples.

4.4.1 Real world statements and translation into grammar

To get a feeling for the water sector in development countries and gather forms of strategic behavior exerted by the actors in it, interviews have been conducted with actors who are involved in this water sector. The interviewed people, and their relation to the water sector, are:

- Peter Magara, Learning and monitoring advisor of IRC Uganda.
- Deirdre Casella, PhD-candidate at the faculty Technology, Policy and Management with the role of social learning in rural water services in Uganda as main focus.
- Mohammad Gharesifard, PhD-candidate at the UNESCO-IHE Institute for Water Education researching the agricultural water domain in Kenya.
- Jeltsje Kemerink, senior lecturer in water governance at the UNESCO-IHE Institute for Water Education, mostly focusing on South Africa.

These interviews were informative and gave much information about the water sector. They also provided real world examples of strategic behavior in the water sector. There are nine examples that comply with the definition of strategic behavior in this study. The remainder of this paragraph will discuss and analyze three of these statements. The other six statements and their analysis can be found in appendix O. The statements are analyzed by comparing them with statements generated by the strategic behavior generator, in order to be able to draw

some conclusions on the validity. It should be noted that labeling these statements is subject to attribution: they look like strategic behavior, but it might not be the case. Furthermore, it is nearly impossible to check whether these statements are true or false. Therefore the context has been used to make an educated guess.

South Africa: village government vs. traditional leaders

> Statement 1: *"The village government is too weak to dominate the traditional leaders, because these leaders regard them as too young and inexperienced in farming to lead the negotiations over water."* (Kemerink, Ahlers, & van der Zaag, 2009)

This statement is made in the context of the reorganization of water governance after the Apartheid in South Africa by inhabitants of a village. New governance structures were implemented, but according to the people in the village, the government was too weak to dominate the traditional leaders.

The form of behavior is a statement, which may be true or false (it is impossible to check whether they actually believe this statement). The statement uses facts, it merely states what others think. In this statement one of the citizens blames others for the fact that the traditional leaders are still in charge. However the statement does not make explicit whether it blames the traditional leaders (for corrupting the transition process) or the village government (for being inexperienced and unable to dominate these leaders). One of these two is also the target of this statement and therefore delegitimized. This leads to the following statement:

A strategic actor makes a true or false statement with blaming facts to any influenced actor to delegitimize a third actor.

With:

- A1 = A strategic actor
- B = makes a statement
- Boolean = true or false
- S = with facts
- SM = blaming
- A2 = to influenced actor
- AM = any
- G = to delegitimize
- O = a third actor

The value of the grammar in this example lies in the fact that it shows multiple targets of the statement: the village government or the traditional leaders. Furthermore, it shows that the statement can be true and aimed at delegitimizing these actors, or false and aimed at delegitimizing these actors. The statement does not have to reflect the opinion of the strategic actor, it can just be aimed at legitimizing this third actor. The context has to provide the information to be able to weigh this statement and put it in perspective.

South Africa: Implementation of new water governance structures

> Statement 2: *"Representation in the management committee has to be directly related to land ownership."* (Kemerink, Méndez, Ahlers, Wester, & Van Der Zaag, 2013)

Similar to statement 1, this statement has been made in South Africa in the transition phase to new water governance structures as well. This statement has been made by a large farmer with the goal to legitimize a rule that will foster his own chances for gaining influence in the management committee. Therefore, he proposes a causal relation that links land ownership to influence, assuming that the rule has not been implemented already. When the rule had been implemented before this statement was made, it does not qualify as strategic behavior. Then it is just a statement aiming to have this rule enforced. It is again not possible say whether the strategic actor actually believes in this statement, so it can be a true or false statement. The modifier *anticipatingly* could be added when this statement is made before the discussing about the representation is held. This quote can be translated into the following statement:

A strategic actor makes a true or false statement (anticipatingly) with proposed causal relations to any influenced actor to legitimize policy (and therefore himself).

With:

- A1 = A strategic actor
- B = makes a statement
- Boolean = true or false
- S = with causal relations
- SM = proposed
- A2 = to influenced actor
- AM = any
- G = to legitimize
- O = policy (and therefore himself)

The added value of the grammar in this example lies in the fact that it points towards the consequences of implementing a certain policy. It makes you think about the fact that the policy could benefit the strategic actor in the long run (therefore the addition of the modifier *anticipatingly*).

Tanzania: morality of chairman of Water User Associations

> Statement 3: *"We don't get water if we don't sleep with the chairman"* (Kemerink, 2017)

This statement has been made by women in Tanzania. In Water User Associations there are many accusations of financial abuse and corruption, sometimes with evidence and sometimes without. However, most of these statements have been made with upcoming elections, which could attract more attention to the statement. However, the timing also raises the suspicion that the strategic actor knows that it is not true. These statements could also be aimed at damaging these chairmen. These statements unveil a unethical causal relation between sleeping with the chairman and receiving water in return. The modifier *anticipatingly* could be added when this statement has the specific aim to delegitimize chairmen in times of elections. This quote can be translated into the following statement:

A strategic actor makes a false statement with unethical causal relations (anticipatingly) to any influenced actor to delegitimize a third actor.

With:

- A1 = A strategic actor
- B = makes a statement
- Boolean = false
- S = with causal relations
- SM = unethical
- BM = anticipatingly
- A2 = to influenced actor
- AM = any
- G = to delegitimize
- O = a third actor

The added value of the grammar in this example lies in the realization that the statement can be anticipating to the upcoming elections. It makes you think about the reason behind this statement and it raises the possibility that the statement has not been made to unveil abuse of power, but to delegitimize the chairman for the upcoming elections.

4.4.2 Reflection on added value of grammar

Nine statements (considered strategic behavior) have been analyzed and translated in paragraph 4.4.1 and appendix O. The analysis of these statements resulted in multiple interpretations of these statements. Which interpretation is correct depends on the context and observers have to provide arguments why this interpretation is correct.

The added value of the grammar can be summarized in the following remarks:

- A statement does not have to reflect the perception of the strategic actor. The statement can also be chosen based on the intended goal.
- A statement can be aimed at a different, more indirect goal than the goal expressed in the statement.
- The behavior and statement modifiers indicate intentions which might not be thought about. *Anticipatingly* (as behavior modifier) for instance indicates priming as a strategy, while *alternative* (as statement modifier) indicates framing and spinning.
- The application of the grammar forces to use multiple angles and consider multiple interpretations in a systematic manner. This increases the chance of a correct observation.

These remarks show that the grammar reveals alternative interpretations of the behavior, which possibly reveal different intentions. These interpretations and intentions influence the appropriate response to such behaviors. For instance, when strategic actors make a true statement (according to their perception), which appears to be false, it might be a good strategy to convince them of the incorrectness of their statement. However, when strategic actors know that the statement is false, they cannot be convinced with arguments. Then it might be a better strategy to focus on the actors that the strategic actors try to influence with their statement.

4.5   Remarks on validity

Paragraph 4.4.1 applies the grammar of strategic behavior on real world examples. All nine statements can be translated into a form generated by the grammar, which shows the applicability of the grammar. Whether these translations are correct is hard to prove, since the exact circumstances and the information available to the person expressing the statement are unknown. However, the grammar is able to describe the quotes and their elements in a generic manner. These comparisons do not completely prove the validity of the grammar, but it is a promising first step in validating the grammar.

The second way of validation has been done via expert validation. The grammar and generator were discussed and, to some extent, face-validated during a meeting with prof. Hans de Bruijn. He agreed on the construction of the grammar and recognized most of the forms generated by the generator (de Bruijn, 2017).

5. Effects of strategic behavior on agenda setting

The research objective of this study was to conceptualize and formalize strategic behavior so that the concept could be used in agent-based models. In order to do so, the actions of the strategic actor and the interaction between the actors have to be conceptualized and formalized.

The previous chapters focused on the action: the forms that are perceived in reality, the dimensions of strategic behavior and a formalization by means of an attribute grammar. This chapter will focus on the interaction between the actors and the influence of the strategic behavior on the perception of the influenced actor.

Paragraph 5.1 identifies the underlying conceptual mechanisms in the different strategies and describes the camouflage mechanisms. Paragraph 5.2 concludes this chapter by explaining how strategic behavior is processed by the influenced actor.

Before the action takes place, a decision has to be made on which act is conducted. Although this is out of the scope of this research, appendix P gives a short introduction of variables that might influence this decision making process.

5.1   Description of conceptual mechanisms in strategies

In order to better understand the interaction that is involved in the strategies identified in paragraph 2.3.2, this paragraph elaborates on the conceptual mechanisms behind the strategies. Every strategy is aimed at shaping perceptions, but they all follow different steps in order to do so.

Every strategy is aimed at one of the eight goals described in paragraph 2.3.1. However, if strategic actors articulate this goal, the strategy will be less effective. Therefore they camouflage their actions, which is one of the conditions of strategic behavior. They articulate a more neutral goal, which will result in less resistance from other actors, and via the use of tactics they try to reach this articulated goal. This articulated goal will then, via a mediating factor, contribute to achieving the actual goal. This general mechanism is illustrated in figure 9.

To clarify this mechanism, the example of *bluffing* is given in figure 10. Instead of articulating its actual goal (which could be all eight identified goals of paragraph 2.3.1), it articulates an attempt by Actor A to convince Actor B of the truth of the perception of Actor A. This attempt is carried out by using (some of the) tactics in the two boxes. Note that not all tactics can be used for every goal: some tactics are only used for specific goals. By trying to convince Actor B of the truth of the perception of Actor A, the perception of Actor B can be influenced. This influenced perception could then lead to reaching the actual goal.
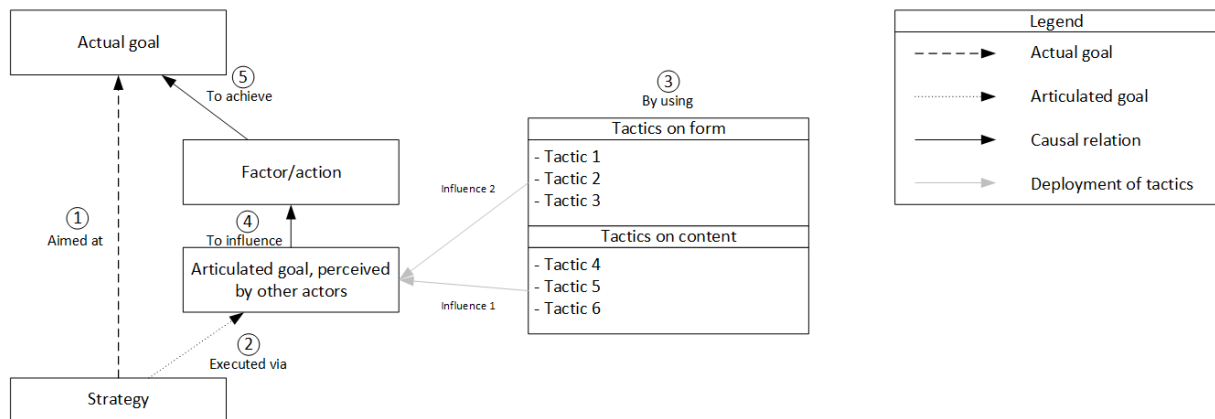
Figure 9: Generic conceptual mechanism of strategic behavior in agenda setting processes

This strategy uses the concept of the truth to influence the perception of Actor B, as well as some of the other strategies (*framing and association*, *framing and spinning*, *question premises of the problem* and *support premises of the problem*). The strategic actor tries to convince the influenced actor of the truth of this perception, in order to change his perception. However, there are strategies that use a second concept next to the concept of truth in their camouflage mechanism.

Anti-patterning and *create a pattern* invoke the concept of necessity (or urgency when time is relevant): when there is a pattern and multiple incidents can be linked, the necessity of addressing the problem increases. This concept of necessity is used besides truth. When the influenced actor does not believe in the perception, he will probably not see the necessity of addressing the problem. *Showcasing* also decreases the necessity by stating current policy or decreases urgency by delaying the process (by installing a committee for instance).

Hold responsible for own problems and *hold others responsible for problems* add the concept of responsibility to the concepts of truth and necessity: who is responsible for this problem and does this make it a problem that has to be publicly addressed? But without the influenced actor believing that the perception is true and that the necessity of addressing the problem is high enough, the concept of responsibility cannot be invoked.

Question morality and *promote morality* appeals to the concept of a moral duty next to necessity and truth: are the victims worth listening to? Again, the influenced actor has to be convinced of the truth of the perception and of the necessity to address the problem.

Each of these strategies follow a similar line of reasoning as bluffing in figure 10. For the extensive description of these strategies and their conceptual mechanism, see appendices Q – BB.
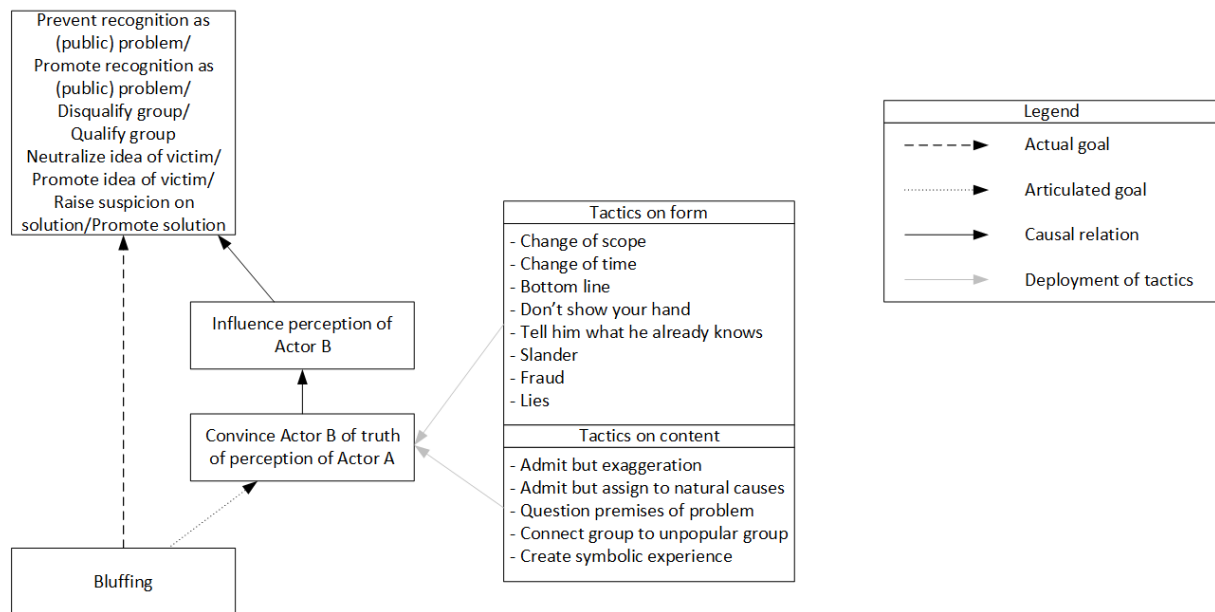
Figure 10: Conceptual mechanism of the strategy bluffing

5.2 Processing strategic behavior

The work until now purely focused on the strategic actor. This actor expresses information strategically, based on his personal perception, on a specific topic with the aim to shape the perception of other actors. However, for the influencing to be successful, the processing of the information by the other actor is just as important.

This other actor receives and processes the information and may or may not adapt his personal perception based on this information. Das, Gollapudi, & Munagala (2014) identified three different ways of processing information based on the work of Asch (1955):

- Stubborn processing; actors do not change their perception.
- Compromising; actors adapt their perception without giving up their original perception, they compromise.
- Conforming; actors adopt the other perception and ignore their original perception (Das et al., 2014).

The studies of Das, Gollapudi, & Munagala (2014) and Asch (1955) identify different ways of processing information and whether this leads to adapting personal perceptions. However, this does not explain why these changes occur, what drives an actor to adapt his/her perceptions.

Kelman (1961) distinguished three different processes that explain why actors change their perceptions. These processes are compliance, identification and internalization.

Compliance is not focused on the content of a perception, but on the reaction of the strategic actor. By accepting the influence and adopting the perception of the strategic actor, the actor hopes to receive a positive reaction of the strategic actor. This positive reaction could entail

receiving specific rewards or avoiding punishments that could be inflicted by the strategic actor. The influenced actor does not believe in the perception of the strategic actor, but sees the advantage of a positive reaction of the strategic actor.

Identification is aimed at a certain person or group and involves the desire to have a relation with this person or group. This desire to have a relation with this actor or group drives the acceptance of the perception of the actor/group. Similar to compliance, identification is not aimed at the content of the perception. Unlike compliance, the influenced actor does believe in the perception, but only for the purpose of this relation.

Internalization is aimed at the content of the perception. This perception is in agreement with his own beliefs and perception and therefore the influence is accepted and the perception is adopted. This is mostly the case when the strategic actor is an actor with credibility. The actor believes in the perception and internalizes this perception. The perception will be independent from the original source and not aimed at this source. The content on itself is convincing and the agent believes that internalizing this content is in his own interests (Kelman, 1961). A visual summary of the different ways of processing strategic behavior and the underlying motivations can be found in figure 11.

This paragraph briefly touches upon processing perceptions and the reasons for doing so. How this could work in a simulation model can be found in appendix CC, which describes a first attempt on a setup of a simulation model that uses the findings of this study.
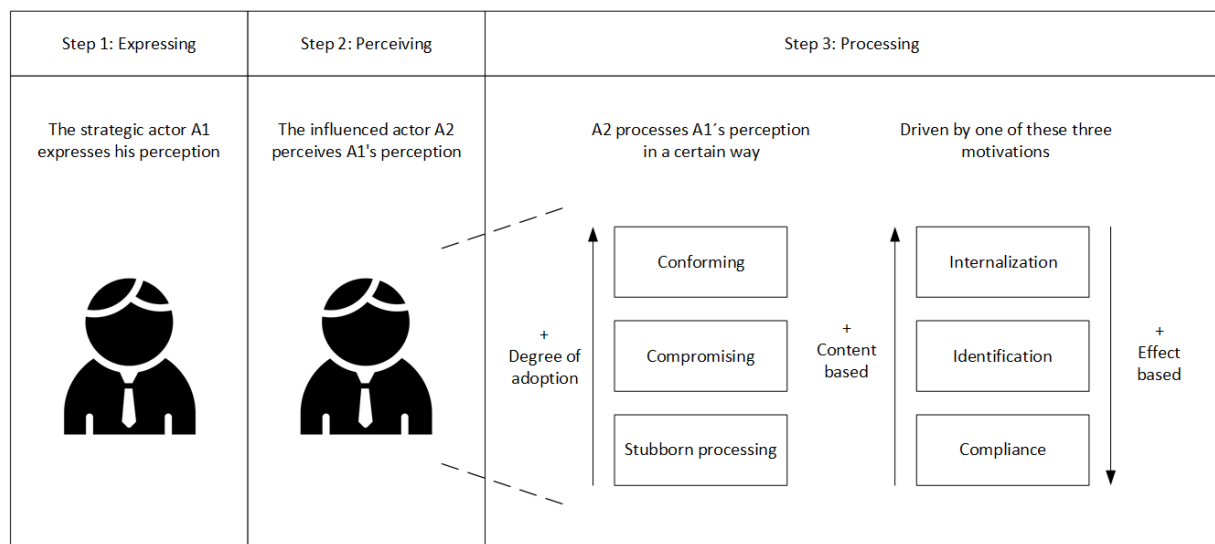
Figure 11: Visual representation of ways of processing strategic behavior and underlying motivations

6. Potential applications of the strategic behavior grammar

The strategic behavior grammar as constructed in chapter 4 is a tool that is ready to use. There are two potential areas of application. The first field of application is the use of the grammar in models, which will be explained in paragraph 6.1. The grammar can also be used as a tool for creating or observing strategic behavior. This second application will be described in paragraph 6.2.

6.1   Model-based application of the strategic behavior grammar

The first field of application is the application of the grammar in an agent-based model. Agent-based models simulate the actions of agents and the interaction between these agents and between the agents and their environment (van Dam, Nikolic, & Lukszo, 2013). The grammar constructed in this study systematically describes the actions a strategic actor can conduct in order to shape perceptions. Therefore, this grammar can function as a solid basis for an algorithm that explores the options of the strategic agents in a model that involves shaping perceptions or opinions. Combined with a decision making algorithm the grammar could be implemented in a wide range of models: agenda setting, political debate, image building, elections etc. Every model in which people have to be convinced, could make use of this grammar.

With the help of the grammar, the strategic agent can explore every option at its disposal, based on his goal and preferences. Combined with the insights of chapter 5 on the interaction between the actors, the grammar can be used to study the effects of strategic behavior on agenda setting, the degree to which actors are changing their perception. A description of how such a model could look like can be found in appendix CC.

6.2   Real-world application of the strategic behavior grammar

The grammar gives insight into the range of strategic behavior forms that could shape perceptions and the outcomes of agenda-setting processes. Paragraph 6.2.1 describes specific examples of potential use, when actors want to shape perceptions. However, shaping perceptions is not the only goal for which it can be used. Paragraph 6.2.2 elaborates on potential use for recognizing and observing strategic behavior.

6.2.1   Using the grammar: shaping perceptions

The first application of the grammar in a real-world situation is with the aim of shaping perceptions. In agenda setting processes the decision makers have to be convinced of a certain perception in order to have a problem on or off the agenda. This means that their perceptions have to be shaped to the advantage of the strategic actor.

For instance, forms of strategic behavior generated by the grammar, can be used by actors involved in a political debate or campaign. Political debates are about convincing other politicians (shaping their perception) and achieving a simple majority (or other portion of the parliament) when it comes to a vote. In order to achieve this majority, political actors express and convey their opinion with all forms of rhetorical strategies to increase the impact of their words. The grammar could enhance the possibilities of the political actor, since it gives a

systematic overview of statements instead of common used strategies known to the political actor or his staff. Preferences could be used as to keep the proposed forms of strategic behavior within personal limits or corresponding to a personal style. The grammar could also provide the political actor with less direct ways to achieve his goal. This increases the camouflage of his tactics, thereby decreasing the risk of a loss of personal credibility.

Related to political debates are political campaigns, where the constituency votes instead of the parliament. In political campaigns there is an important role for rhetoric, maybe even larger than the role of the truth. An illustrative quote from Plato supports this claim, where he grants rhetoric either "a significant, constitutive role in production of knowledge" or considers it "a form of flattery capable only of persuading the masses concerning subjects they know nothing about", which reflects more of his opinion (Plato, 1997, in Crick, 2014, p. 2). However, the use of rhetoric can be of great value in a political campaign, where candidates have to legitimize themselves, proving they are the best choice, while delegitimizing the opponent(s) in the process. The tools can give a systematic overview of the options at the disposal of the candidate. Improving his image by expressing his good deeds (facts), the consequences of these deeds (causal relations) and the personal motivations (values) behind these deeds and his plans for the future (deontics), as well as damaging the image of his opponent in a similar way could be done by means of these tools.

Besides the potential use of the tools by experienced politicians, it could also be of value for inexperienced (groups of) actors, trying to generate attention by shaping the perceptions of their problem. Interest groups for instance, fighting for the recognition of a problem, could be potential users of the tools. Unlike political parties and experienced politicians they probably do not rely on lawyers, speech writers and spin doctors to generate attention, convey their message and create an image. Furthermore, it could point out to them that a legitimized problem by itself is mostly not enough to have it addressed. Their own morality and responsibility as well as the expedience of the proposed policy, aiming to solve the problem, is equally important.

The forms of strategic behavior the grammar generates are rather generic. It generates types of statements that could be used instead of the actual statements: tailoring the behavior to the specific context and feeding the behavior with information from this context has to be done by the strategic actor. Tailoring and feeding the statements can be done without any knowledge of strategic behavior, although it probably fosters creating more effective actions.

6.2.2 Using the grammar: observing and recognizing strategic behavior

The previous paragraph depicted examples of actors who could use the tools to help them exert strategic behavior in order to achieve their goals. However, other actors could also use the tools to recognize strategic behavior which leads to a diminishing impact of strategic behavior.

Individual participants in a public policy process have their own agendas to which they are entitled. Nevertheless, their agendas become a problem when they are concealed and hinder the process. Unveiling these agendas and interests could lead to a more honest process, where

actual problems are discussed for the greater good, instead of pursuing personal gain at the cost of collective achievement.

A good example of an actor that wants to recognize strategic behavior is a facilitator of public policy processes. They want to reduce the impact of strategic behavior, which could be achieved by recognizing and unveiling this strategic behavior. However, it cannot only be used by facilitators: every actor who wants to recognize strategic behavior can use the grammar. This will give them insights in the strategic behavior of strategic actors and will help them to react appropriately.

To illustrate the use of the grammar for this end, statement 3 from paragraph 4.4.1 will be used as an example. The statement is as follows:

"We don't get water if we don't sleep with the chairman" (Kemerink, 2017)

This statement can be analyzed with the formal grammar. It is clear that the behavior is a form of communication with an unethical causal relation. The aim of the statement could be to legitimize the problem, or delegitimize the chairman. When the aim is to legitimize the problem, the statement is probably true, since the intention is to generate attention for the problem. When the aim is to delegitimize the chairman, it is unknown whether this statement is true or false, but both options have to be considered. Using the context of the situation, the upcoming elections of the water user associations have to be taken into account. Then it becomes clear that this statement could be a way to delegitimize the current chairman, as an anticipating act for the upcoming elections. So besides the option that this statement could be true, there is also a possibility that these statements are only expressed in order to delegitimize the current chairman. This knowledge can be used to put the behavior of the strategic actor in perspective and could influence the way the facilitator reacts to the strategic actor. The following three interpretations are identified by means of the grammar:

1. A strategic actor makes a true statement with an unethical causal relation to any influenced actor to legitimize the problem.
2. A strategic actor makes a true statement with an unethical causal relation (anticipatingly) to any influenced actor to delegitimize a third actor.
3. A strategic actor makes a false statement with an unethical causal relation (anticipatingly) to any influenced actor to delegitimize a third actor.

Looking at these interpretations, it appears that the first interpretation might not be strategic, since there is no camouflage involved. When this interpretation appears to be the right one, the statement does not qualify as strategic behavior.

Successfully recognizing strategic behavior could give leads to set up ground rules for the process, preventing some forms of strategic behavior from entering the process. This could lead to a content-driven process trying to solve problems, without opportunities for personal attacks, with aspects of the (very idealistic) power free communication as described by Habermas (1985). However, this is a difficult process, due to the hidden nature of strategic behavior. The fact that the grammatical structure of a certain behavior suggests the possibility of strategic behavior, does not mean it is necessarily exerted with strategic intentions (as can

be seen by the first interpretation of the statement in this paragraph). This hidden nature also hinders the implementation of ground rules that prevent strategic behavior.

This example explains the use of the grammar in a public policy process, which is only one of the areas in which it can be applied. The grammar can be used in all kinds of processes that involve agenda setting or shaping perceptions, since the added value is in the recognition of multiple possible interpretations, as the remarks on added value in paragraph 4.4.2 already state:

- A statement does not have to reflect the perception of the strategic actor. The statement can also be chosen based on the intended goal.
- A statement can be aimed at a different, more indirect goal than the goal expressed in the statement.
- The behavior and statement modifiers indicate intentions which might not be thought about. *Anticipatingly* (as behavior modifier) for instance indicates priming as a strategy, while *alternative* (as statement modifier) indicates framing and spinning.
- The application of the grammar forces to use multiple angles and consider multiple interpretations in a systematic manner. This increases the chance of a right observation.

Besides using the grammar in a specific context with the aim of recognizing and observing strategic behavior, it could also be used in a broader sense: to describe and study strategic behavior. Similar to the ADICO-framework, which describes institutions (Crawford & Ostrom, 1995), the grammar of strategic behavior introduces a systematic language able to describe strategic behavior in agenda setting processes. It describes the different dimensions of strategic behavior, which enables a more thorough analysis of and a comparison between the forms of strategic behavior. These characteristics could be of use for scholars of strategic behavior in their research.

7. Discussion

This chapter discusses the choices that are made, the limitations of the research and the implications for the results as presented in this study. Paragraph 7.1 is about the literature study. Paragraph 7.2 discusses the steps in the data manipulation, the reduction steps from the original forms of strategic behavior to the formal grammar. Paragraph 7.3 describes the production of the grammar. Then, paragraph 7.4 elaborates on the applicability before paragraph 7.5 concludes this chapter with some overall remarks.

7.1   Literature study

The literature study commenced with defining the main concepts: agenda setting and strategic behavior. The demarcation of agenda setting for this study influenced the scope greatly, since this excluded agenda setting by the media, which is a large research area with a vast body of literature. The definition of strategic behavior had much influence on the scope as well, since it highly influenced the manipulation of the data. Paragraph 7.2 elaborates on this influence.

The next step in the literature study was to identify forms of strategic behavior, which could function as basis for this research. However, only one book (Cobb & Ross, 1997) was found that actually combines the concepts of agenda setting and strategic behavior. The second book (Ten Heuvelhof, 2016) focuses on forms of strategic behavior without a direct link to agenda setting. The relation to agenda setting had to be constructed. The limited amount of sources considered relevant could be caused by the keywords used in the literature search. Many different synonyms of agenda setting have been used, but only few synonyms for strategic behavior could be found. Tactics, strategies and strategic action have been used to expand the list of sources, without considerable success. However, the fact that only two books were included that describe forms of strategic behavior has not been experienced as problematic, since these books contained many forms of strategic behavior and forms with the opposite effect were added as well. These books form a solid basis for this study, although the risk exists that these books created a biased image and selection of forms of strategic behavior.

7.2   Manipulating data

After the construction of the list of forms of strategic behavior, the first manipulation of the data was executed. The scope of strategic behavior within this research excluded many forms of behavior. The addition of *aimed at shaping perceptions* to the definition, resulted in the exclusion of many forms of strategic behavior. This addition created a more coherent selection of forms of strategic behavior, but also excluded many interesting forms, such as *positional game*. Some of these choices to exclude forms are rather arbitrary, such as the choice to exclude *incrementalism*. The decision to exclude this form is based on the fact that it is aimed at easier decision making and appeals to consistency of the decision makers. However, it could also be argued that *incrementalism* influences the perception of the proposal, by making it a smaller and easier decision. The choices in the selection process are made to create a more coherent selection, but these choices could also have been made differently.

The hierarchy has been made to show the differences and the relations between strategic behaviors, that some forms could be used to achieve others. However, the choice of three levels

of strategic behavior and the choice which form belongs on which level is arbitrary. Four levels could also have been used to describe the hierarchy:

- Goal: Disqualify group
  - Strategy: Question morality
    - Tactic: Slander
      - Action: Lies

The choice for three layers has been made based on the trade-off between descriptive power and elegance: four layers would make the hierarchy more complex, without adding that much descriptive power. Therefore, three layers have been used to construct the hierarchy.

The division of the forms over the three layers has been influenced by the three streams of Kingdon (1995): problems, policies and politics. The choice for another theory, such as the barrier model (Bachrach & Baratz, 1970) or the expansion model (Cobb & Elder, 1985), would have influenced the division of the forms of strategic behavior. When the expansion model was used as framework to divide the forms of strategic behavior, the goals would relate to the five characteristics to expand or prevent expansion of the problem: ambiguity, social significance, temporal relevance, non-technical issue definition and absence of categorical precedence (Cobb & Elder, 1985). Creating a pattern could then have been a strategy linked to promoting temporal relevance for instance and ambiguity would have been a goal instead of a tactic. Although the choice for the stream model is arbitrary, the choice has been made on logical grounds and has been instrumental for the remainder of the thesis.

Even with the choice for the stream model as foundation for the division of the behaviors over the three levels, some choices are rather arbitrary. This is one of the problems with classifications: different interpretations and definitions will lead to different classifications. This phenomenon is referred to as ontological relativity (Quine, 1968). Multiple classifications and ontologies can be coherent with reality given their corresponding set of assumptions and definitions. Therefore, multiple classifications can exist, as long as they are functional and substantiated.

One of the claims made in paragraph 2.3 is that a strategy on form is always combined with a strategy on content. This claim has been made based on the current sample of strategic behavior and might not hold when the sample is extended with new examples. Furthermore, this claim might also be somewhat straightforward: every form of strategic behavior related with language has some form of framing in it.

The causal mechanisms of the forms of strategic behavior have been discussed in paragraph 5.1. This revealed some concepts that are used as camouflage: truth, possibly combined with necessity, moral duty and/or responsibility. These four concepts relate to the camouflage of the twelve strategies in the sample used in this study. Other concepts could also be used to camouflage forms of strategic behavior, such as scarcity or dependency. In addition, reducing camouflage to one concept also reduces the rich description that comes with strategic behavior and thus reduces the amount of information. However, this is a necessary step towards quantitative modeling.

7.3   Construction of grammar

The grammar that is constructed in paragraph 4.2 entails many arbitrary choices. Some characteristics have been selected as elements, while similar characteristics are chosen as modifiers. The comparison between true/false and personal/impersonal is a illustrative example. The difference between true and false statements has been selected as an element of the grammar, while the difference between personal and impersonal is only indicated in the addition of different modifiers. There are logical and intuitive grounds for this choice, true or false was considered more fundamental than the others, but the choice remains arbitrary. The other words aimed at increasing the descriptive power are used as modifiers for pragmatic reasons. The generator already creates 6866 different forms and every element that is added will increase the amount of generated forms of behavior (approximately) with a factor two.

In the construction of the attribute grammar it is taken into account that strategic behavior is actually a strategic discourse and that there could be more modifiers of a specific type or goals per statement. However, the list of conditions does not check for multiple modifiers per type, multiple goals or combinations of behavior due to the increasing amount of possibilities and constraints. If every combination of modifiers or forms of strategic behaviors has to be checked, the list of conditions will increase enormously. The grammar indicates that combinations are possible, but does not check for these combinations. The benefits of this choice are a reasonable amount of behaviors generated by the grammar and a reasonable list of conditions. The drawbacks of these choices are the limited insights in the interaction between forms of strategic behavior and a simplified image of strategic behavior.

The validation of the grammar and generator has been a difficult step in the research. The validation has been done in two different ways: face-validation and real world examples. The face-validation, conducted with prof. Hans de Bruijn, showed that the forms of strategic behavior, generated by the grammar, are still recognizable. However, the face-validation has only been executed on a small sample of the forms generated by the generator.

The validation via real world examples was based on nine quotes, originating from literature and interviews. The examples from literature came with a thoroughly description of the quotes and the context. The examples from the interviews were quotes, which the interviewed scholars either remembered from their own research or heard from others. This decreases the reliability of these quotes and their context, strengthened by the fact that strategic behavior is already subject to attribution. However, besides all these drawbacks of this method of validation, it did show shortcomings of the grammar. Based on the validation, deontic statements have been added as well as legitimizing the strategic actor as goal. The improvements based on the validation proved the usefulness of the validation methods for this study. Furthermore, it gave some indication on the validity of the grammar, since every real world quote could be expressed in a generated form of strategic behavior.

7.4   Application of grammar

Chapter 6 discusses potential applications of the grammar. However, there are a few limitations in its use.

The first area of applications refers to the incorporation of the grammar in an agent-based simulation model and a first attempt for a setup of such a model has been constructed in appendix CC. These models are mathematical functions that transform input into output, which are in turn used to study the dynamics between agents and between agents and the environment. This always involves the risk of creating models with obvious results: models that give output but do not add to the understanding of the dynamics. For instance, when a model is used to examine the influence of a facilitator in a public policy process and the code prescribes that a facilitator diminishes the influence of strategic behavior, then the obvious conclusion is that a facilitator diminishes the impact of strategic behavior. However, this conclusion is driven by the hard coded influence of a facilitator, giving this conclusion little validity. This limitation is not specific for this model, but more a drawback of modeling in general. Modelers have to be careful that they do not draw conclusions that are highly influenced by the code they created.

The second area of applications is the use of the grammar by practitioners, either for shaping perceptions or recognizing and observing strategic behavior. The attribute grammar is a rather technical construct, describing forms of strategic behavior in a logical way. This will hinder the use of the grammar by practitioners in practice. Ways to make the use of grammar easier and more appealing, are the decomposition graph and the construction of the generator. These are ways to merely visualize or generate the forms of the grammar via a simple loop algorithm, but they increase the usability of the grammar. However, for the grammar to be used by practitioners, much work has to be conducted to make the use of it more appealing and intuitive.

The third area of applications is the use of the grammar by scholars of strategic behavior. However, the grammar is a first attempt of formalizing strategic behavior and based on a limited sample of behaviors. Therefore, the grammar has to be expanded with more forms of behavior in order to increase its descriptive capacity and applicability.

7.5   Overall remarks

In conclusion, this study has been a first step towards a more quantitative, modeling approach of strategic behavior. This could give new insights based on the already rich qualitative research. However, since it is a step which has not been done before, some of the choices are not supported by literature and therefore arbitrary. This also affects the conclusions drawn from this research.

The study started within the context of the delivery of rural water services in Uganda. However, the agenda setting theories in this study are mostly Western-oriented, describing policy processes in constitutional states that are shaped by many institutions. A similar process in sub-Saharan countries differs from a Western policy process due to the lack of proper institutions. This makes the agenda setting process ad hoc, driven by the elite or driven by external parties such as the IMF (Kalu, 2004). This raises the question to what extent this study and its results are applicable in a not Western context. The policy process is different with less formal institutions, which could entail some differences compared to the current set up and results of the study.

A less formal policy process could result in a different, less formal actor that has to be convinced in an agenda setting process compared to the Western process. The authority to perform a transaction, such as invoking position rules or entry rules (Ostrom, 2011), could be reserved to different actors. The forms of strategic behavior might also have to be performed in a more informal situation. However, the forms of strategic behavior described by the formal grammar are universal and applicable in every context. The impact might differ per situation (personal allegations might cause more harm in one country/culture than in another), but the action itself is applicable in every situation.

As described in paragraph 1.5, strategic behavior is subject to attribution: behavior is observed, but the observer adds the label of strategic behavior. Due to camouflage and hidden agendas strategic behavior cannot be perceived. The observer perceives the behavior and provides arguments why the behavior must be strategic. This also means that behavior that fits the grammar does not necessarily qualify as strategic behavior, since strategic behavior must comply with the four conditions (intentional, self-serving, camouflaged and aimed at shaping perceptions). Furthermore, behavior that cannot be described by the grammar can still be strategic behavior. The grammar is based on fifty eight forms of strategic behavior, which is only a small sample of forms that can be perceived in reality. Nevertheless, the grammar provides a systematic manner for observing, describing and discussing strategic behavior and therefore resembles to some extent the ADICO-framework, which describes institutions (Crawford & Ostrom, 1995).

In conclusion, this study combines strategic behavior, public policy, logic and simulation. Given this combination, this setup makes it difficult to do every research area justice. Concessions have to be made in order to be able to make this combination. These concessions cause a loss in the rich description of strategic behavior and public policy, might make the constructed grammar not fully compliant with the conventions of logic and probably result in a complex simulation model. However, these concessions make it possible to conduct this study and increase the understanding of strategic behavior. It highlights the differences between different forms of strategic behavior and clarifies the conceptual mechanisms. But due to these concessions, this quantitative modeling approach should be an addition to the qualitative research and not be a replacement.

8. Conclusion and recommendations

This chapter concludes this research by giving the answer to the research questions. In order to do so, first the sub-research questions are answered. Then these answers are used to give a conclusion on the research question.

8.1 Answers to sub-research questions

This paragraph gives the answers to the sub-questions formulated in the introduction. Paragraph 8.2 will use these answers to answer the main research question.

8.1.1 What forms of strategic behavior with regards to agenda setting could occur?

This study identified forty five forms of strategic behavior, divided over three levels, that relate to agenda setting. There are eight goals: *prevent recognition as public problem*, *promote recognition as public problem*, *neutralize idea of victim*, *promote idea of victim*, *disqualify proponent group*, *qualify proponent group*, *raise suspicion on solution* and *promote solution*.

These goals can be achieved by executing one of the four strategies on form with one of the eight strategies on content. The four strategies on form are: *bluffing*, *framing and association*, *framing and spinning* and *showcasing*. The eight strategies on content are: *question premises of the problem*, *support premises of the problem*, *anti-patterning*, *create a pattern*, *hold others responsible for problems*, *hold responsible for own problems*, *question morality* and *promote morality*.

These twelve strategies can be carried out by executing one of the twenty five tactics, of which seventeen are a tactic on form and eight are focused on content. The seventeen tactics aimed at form are: *change of scope*, *change of time*, *bottom line*, *do not show your hand*, *tell him what he already knows*, *leaking*, *frapper toujours*, *ambiguity*, *metaphors*, *archetypical narratives*, *causality as start of blame game*, *priming*, *frame change*, *slander*, *fraud*, *false rumors* and *lies*. The eight tactics on content are: *admit but exaggeration*, *admit but assign to natural causes*, *create symbolic experience*, *establish committee*, *stress measures already taken*, *connect group to popular group*, *connect group to unpopular group* and *co-optation of applicant member*.

Not every strategy can be used to aim for achieving one of the goals, every goal has its own set of potential strategies. Not every strategy can be executed by every tactic as well. The available tactic to carry out a strategy also depends on the goal that is aimed for. Furthermore, every strategy on form is combined with a strategy on content, to achieve their aim.

8.1.2 What are essential characteristics of strategic behavior in agenda setting?

The forty five forms of strategic behavior have been analyzed and the following dimensions are identified as essential for describing strategic behavior:

- The strategic actor
- The action
- The influenced actor
- Influenced element of perception
- Nature of relation between actors

- Access to actor
- Resource dependence
- Legitimize or delegitimize
- Object

In this agenda setting context, resource dependence is the authority to decide on the agenda. Furthermore, actors are assumed to have access to each other. Therefore, these two dimensions are of less importance in this study.

8.1.3 Can these forms of strategic behavior be formalized by means of a grammar, in order to be used in an agent-based model?

Using the dimensions of chapter 3 as a basis, strategic behavior can be formalized in an attribute grammar. This attribute grammar consists of four elements: the strategic actor (which is the first dimension), behavior, the perceiving actor and the goal.

The behavior can either be a transaction or communication, combined with a modifier. The transaction has two options: add actor to existing committee or add actor to new committee. Communication can either be a true or false statement and a statement can be a statement with facts, causal relations or values or a deontic statement. These facts, causal relations, values and deontics can be combined with a modifier. The behavior combines the dimensions *the action* and *the influenced element of perception*.

The perceiving actor combines the dimensions *influenced actor* and *nature of relation between actors* by adding the modifier any, cooperative or conflictual.

The goal of the strategic behavior is to legitimize or delegitimize an object. This object can be the strategic actor, the influenced actor, a third actor, the problem or policy. The goal combines the dimensions *legitimize or delegitimize* and *object*.

Conditions are added in the grammar to prevent impossible combinations.

A first attempt to validate the grammar via face-validation and reflection on real world examples has shown promising results.

8.1.4 What are the effects of strategic behavior on agenda setting?

The actions as described by the grammar result in interaction between the strategic actor and the influenced actor(s). The strategic actor tries to camouflage the strategic behavior by invoking four concepts: truth, potentially combined with necessity, responsibility and moral duty. Their actions combined with this camouflage shape the perceptions of the influenced actors. The more their perceptions are shaped to the advantage of the strategic actor, the higher the influence on the agenda setting process.

The influenced actor has three different ways of processing the actions: stubborn processing (the perception remains the same), compromising (the perception of the strategic actor is partially adopted) and conforming (the perception of the strategic actor is fully adopted).

There are three reasons for adopting the perception of the strategic actor: compliance (the perception is adopted to benefit from potential consequences), identification (the perception

is adopted to create a relationship with a person or group) and internalization (the perception is adopted, since it complies with the belief system of the influenced actor).

8.1.5 How can this grammar be utilized in order to foster understanding of strategic behavior in agenda setting?

The grammar can be utilized in two different ways: as an element of a larger simulation model and as a tool in itself, with the aim to exert, recognize and observe strategic behavior.

First, it can be used as a part of a larger simulation that researches strategic behavior aiming at shaping perceptions. It could be used in an algorithm with the aim to explore all the options of an agent in an agent-based model, combined with the insights on the interaction of chapter 5. This could increase the understanding of the dynamics of agenda setting and the influence of strategic behavior on this agenda setting process.

Second, the grammar can be used by practitioners. Actors who exert strategic behavior can use the grammar to systematically explore their options in social, political or other transactions where agenda setting plays a role. Facilitators of public policy processes can use the grammar to recognize strategic behavior, in order to react properly and diminish its impact. Furthermore, scholars of strategic behavior can use the grammar as a systematic language to observe and describe forms of strategic behavior.

The added value of the grammar lies in the fact that it proposes possible interpretations of behavior, which might not be thought of otherwise, such as indirect goals and hidden intentions.

8.2 How can strategic behavior with regards to agenda setting be formalized in an agent-based model?

Strategic behavior in agenda setting processes can be formalized by means of an attribute grammar. This grammar describes the essential dimensions of strategic behavior, together with the different options per element.

The formalization of strategic behavior starts with making a clear distinction between goals, strategies and tactics, since the tactics are the low level operations that are used to influence other actors. This influence is aimed at agenda setting: the perception of actors of problems, policies and politics. The goals are related to these three streams, since actors try to legitimize or delegitimize these streams in order to achieve their goals.

These strategic behaviors are decomposed into seven dimensions: the strategic actor, the action, the influenced actor, the element of the perception that is influenced, the nature of the relation between the actors, the aim of the behavior and the object. These dimensions are then used to construct an attribute grammar. This grammar systematically describes the dimensions of strategic behavior and the different options that are available to the strategic actor.

The strategic behavior described by the grammar results in interaction between the strategic actor and the influenced actor. This strategic behavior is camouflaged via four different concepts: truth, necessity, responsibility and morality. It can be processed in three different

ways, corresponding to three different degrees of influence: stubborn processing (no influence), compromising (moderate influence) and conforming (high influence). These ways of processing can be motivated by three reasons: compliance, identification and internalization.

The attribute grammar can be applied in two different ways: simulations and practice. The grammar can be used as part of an algorithm in an agent-based model that examines the influence of strategic behavior on the dynamics of an agenda setting process. The strategic behaviors conducted by agents and the interaction in which it result could foster the understanding of strategic behavior in agenda setting processes.

In practice the grammar can also be used by practitioners who want to exert strategic behavior, since it provides them with every option they have to shape perceptions of decision makers and thus influence the agenda setting process. Furthermore, the grammar can be used to observe and recognize strategic behavior, in order to interpret the behavior correctly and react appropriately.

8.3 Recommendations for future research and practice

This study was a first step in combining agenda setting and strategic behavior with an analytical and quantitative approach. Since it was a first step, the used literature was qualitatively oriented, aiming at describing a rich picture of strategic behavior. This qualitative literature describes forms of strategic behavior by looking at it and describing what can be perceived. However, there is a lack of structure and comparisons between forms are quite simplistic. Combining this qualitative research with a more quantitative modeling approach will force researchers to reduce strategic behavior to the very essence in order to make it possible to model. This reduction step can increase the understanding of strategic behavior. The use of the grammar as a systematic language for describing and analyzing strategic behavior could foster this process, similar to the use of the ADICO-framework for the analysis and design of institutions (Crawford & Ostrom, 1995).

The next step is to use this increased understanding to create models of the influence of strategic behavior on agenda setting. The grammar could be used as a building block of such a model in order to explore the options of the agents. This will further improve the understanding of strategic behavior in two ways. The first way is that by making these models the modeler is forced to think about the essence and dynamics of strategic behavior and to quantify the effects of it. The second way is by using the created models and study their outcomes. Using the grammar will test its value and usability, which could lead to improvements for future use.

This study recognized the fact that strategic behavior mostly adopts the form of a strategic discourse, combining forms of strategic behavior in order to achieve the goal. Although this notion is implemented in the grammar, the list of conditions is insufficient for checking for consistency in strategic discourses. These drawbacks create a simplified image of strategic behavior. Future work should study the concept of a strategic discourse to increase the understanding of a strategic discourse in a game theoretical sense. It could give insights in combinations of strategic behavior that amplify or weaken their effect. These insights will also

improve the estimation of risk and opportunity as they are suggested in appendix CC, due to the added interaction effects.

Furthermore, the grammar of strategic behavior as constructed in this study could be expanded by analyzing other forms of strategic behavior that have not been used in this study. This could discover new forms of camouflage, dynamics, strategies and tactics, which could lead to an expanded and improved grammar.

These recommendations are all aimed at academia, while the results of this thesis could also be used for practice. Interest groups fighting to have their problem on the agenda could use the generator to explore their options and adapt their strategies accordingly. Politicians or other participants in a policy process could use the grammar to choose an approach to shape the perceptions of other politicians in their benefit and recognize the behavior of others. Facilitators could use the grammar to increase their understanding of strategic behavior in order to increase the chance of recognizing it in multi-actor policy negotiation or planning processes. This could lead to improved moderation of the processes in which these actors are involved. The use of the grammar by practitioners will generate feedback on its use, which will be a valuable source of input for future improvements and the understanding of strategic behavior.

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Appendix A: Explanation of exclusion of forms of strategic behavior

This appendix gives the elaborate explanation for the exclusion of forms of strategic behavior of paragraph 2.2, that do not comply with the definition, delineated in paragraph 1.2. These behaviors will therefore not be used in the remainder of this study.

Espionage

Espionage is aimed at self-interest, intentional and camouflaged in order to avoid legal actions. However, espionage is aimed at gathering information, which can be used in a different context. Therefore the aim of espionage is not shaping perceptions of others, and therefore it does not qualify as strategic behavior in this study.

Unknowing informants

The reason why a strategy of running unknowing informants is out of scope in this study follows a similar line of reasoning as the reason for espionage. This strategy is aimed at self-interest, intentional and camouflaged, but is not aimed at shaping perceptions. Gathering information is the primary goal.

Abuse of information

Abusing information, by using information which is gathered for end A for end B, does not qualify as strategic behavior in this study. Although it is intentional, aimed at self-interest and camouflaged, it is also aimed at information gathering and not at shaping perceptions.

Positional game

This behavior is intended to create a better position by making a proposal on content. This better position could later be used to promote your personal perception. However, this behavior itself is not aimed at shaping perceptions and therefore neglected in the remainder of this study.

Procedural game

This behavior aims at creating a more beneficial procedure or exploiting the current procedure. It is aimed at increasing the power of your proposal or delaying processes. Since the aim is not at shaping perceptions, this behavior will be out of scope.

Information overload

Creating an information overload when another actor asks for information is aimed at delaying the process, not at influencing perceptions of other actors. Therefore, this behavior will be out of scope.

Cold provision of information

This behavior is about giving information, which an actor demands, in such a subtle manner that the weight of the information is neglected. This behavior is not aimed at shaping perceptions, but at avoiding blame (possible in a later stage) and therefore neglected in this study.

Wait and see

Wait and see is about waiting for the right moment to make a proposal. Therefore it is aimed at creating support and not at shaping perceptions. Therefore it will be out of scope.

Imitation

Imitation is about being similar to others in such a way that you might be able to invoke similar privileges. Therefore it aimed at creating a stronger position and not at shaping perceptions. Imitation will not be taken into account in the remainder of this study.

Consistency

Consistency is about regularity of decisions. It is either aimed at creating a better position by being reliable or aimed at generating support by appealing on consistency. It is not aimed at shaping perceptions and therefore out of scope.

Incrementalism

Incrementalism is aimed at easier decision making by cutting large decisions into several smaller ones. It is not aimed at shaping perceptions and thus out of scope.

Reciprocity

Reciprocity is aimed at creating a better position by having other actors that are inclined to support you, because you have supported them in the past. Since this is aimed at creating a better position and not at shaping perceptions, this form will be out of scope.

Rejection and retreat

The behavior of rejection and retreat is an example of the use of reciprocity. Therefore rejection and retreat is out of scope, just as reciprocity itself.

Ignoring

Ignoring is aimed at delaying the process. As long as the problem is not addressed, there will be no change in policy. However, it is not aimed at shaping perceptions and therefore out of scope.

Postponement

Postponement is not aimed at shaping perceptions, but aimed at a delay in the process. Therefore, this behavior will be neglected in this study.

Political, economic and legal threats

Threats are aimed at self-interest and intentional. However, threats should not be camouflaged since the subject of the threats has to know he is threatened in order to be effective. Therefore, threats are out of the scope of the study

Economic sanctions

Issuing economic sanctions does not qualify as strategic behavior, since it does not fulfill the four conditions of the definition. Economic sanctions are not camouflaged, since they are official policy and published as such.

Arrest

The behavior of arresting a person also does not qualify as strategic behavior. It serves self-interest and is intentional, but it is not camouflaged and therefore out of scope.

Adopt bill to make issue illegal

Adopting a bill to make an issue illegal is aimed at self-interest and intentional. However, it does not fulfill the condition of camouflage, since it is official policy and therefore published. Therefore, this form of behavior is out of scope.

Organized violence

Following the same line of reasoning as arrest, organized violence is out of scope for not being camouflaged.

Appendix B: Description of strategies and arguments for selecting them as strategies

This appendix elaborates on the forms of strategic behavior selected as strategies in paragraph 2.3.2.

Bluffing

Bluffing is defined as "conscious misstatements, concealment of pertinent facts, or exaggeration … to persuade others to agree with them" (Carr, 1968, p. 144). This means that bluffing is aimed at promoting personal perceptions by hiding information or providing (edited) information that might or might not be true. Bluffing is considered a strategy, since it is a generic concept: there are many different ways to bluff. Bluffing is not a specific action, but bluffing can be executed by claiming someone is exaggerating for instance.

Framing and association

According to Entman (1993), "frames highlight some bits of information about an item that is the subject of a communication, thereby elevating them in salience" (Entman, 1993, p. 53). Salience in this case means "making a piece of information more noticeable, meaningful, or memorable to audiences" (Entman, 1993, p. 53). In this strategy a specific bit of information is framed to create an associative relation between two objects to influence the perception of actors of one of the objects (or both) (Ten Heuvelhof, 2016). Framing and association is considered a strategy, since it is a generic concept that has to be operationalized via other actions. Examples of such actions are *connect to an unpopular group* for instance.

Framing and spinning

When using the strategy framing and spinning, an actor tries to create a dominant frame, a dominant perspective on a situation by highlighting specific parts of the situation that will create a positive image for himself (Ten Heuvelhof, 2016). Framing and spinning is considered a strategy, due to the generic nature of the concept. Tactics such as *admit but exaggeration* and *ambiguity* could be the execution of the strategy.

Showcasing

This is a strategy in which actors admit the existence of a problem but allocate very few resources to deal with a problem: it is a symbolic gesture. By showing some problem solving behavior, the opposition will become less fierce, while no actual problem solving effort is being done (Cobb & Ross, 1997). Showcasing is a generic strategy that needs a specific action as execution. An example of a tactic that can be used for this strategy is *establish a committee*

Question premises of problem

The perception of a problem can be represented by facts, causal relations and norms/values (Bots et al., 1999). When the underlying facts or causal relations are questioned, the legitimacy of the problem will decrease (Cobb & Ross, 1997). This form of strategic behavior is considered a strategy due to the many ways this can be reached. Examples of tactics that can be used for this strategy are *fraud* and *causality as start of the blame game.*

Support premises of problem

This mechanism in this strategy is similar to the strategy of questioning premises of a problem, but this strategy supports the premises. When the underlying facts and causal relations are supported, the legitimacy of the problem increases. As form of strategic behavior with the opposite effect of *question premises of problem*, this form is considered a strategy as well. *False rumors*, *metaphors* and *leaking* are tactics that can be used in this strategy.

Anti-patterning

Anti-patterning tries to raise suspicion on the facts behind a problem. The strategy tries to isolate cases from each other, in order to decrease the power of the frame that links the incidents. When the problems are isolated, there is no overarching problem definition and therefore, the problem cannot be dealt with (Cobb & Ross, 1997). Many forms of strategic behavior can be used to perform this strategy. Examples are *lies* and *change of scope*.

Create a pattern

Where anti-patterning tries to isolate cases from each other, creating a pattern tries to link them in order to increase the urgency of the problem. When there are more known cases of a problem and they are similar (have the same underlying mechanism), there is a higher change of the problem being addressed. As the behavior with the opposite effect of *anti-patterning*, this form is considered a strategy as well. *Change of scope* and *change of time* are tactics that can be used in this strategy.

Question morality

With this strategy the behavior of a group of actors or their leaders is questioned. When questions rise about the morality of the actors involved, the call for action in the general public will decrease (Cobb & Ross, 1997). This form is considered a strategy due to the generic nature of the behavior. It is a strategy that combines tactics with the aim to attack an actor's integrity. Tactics that can be used for this strategy are *connect to unpopular group*, *archetypical narratives* and *leaking*.

Promote morality

The impact of the opposite strategy of questioning morality, promote morality, is inversed. The impeccable morality of the proponents is emphasized and therefore the call for action will increase. As the behavior with the opposite effect of *question morality*, this form is also considered a strategy. *Connect group to a popular group* is a tactic that can be used in this strategy.

Hold responsible for own problems

When actors can hold a group responsible for their own problems, the call for action decreases. This is mostly done by linking a problem to the shortcomings of the particular group (Cobb & Ross, 1997). This is more a high-level plan, executed by actions, than a low-level operation and therefore, this form is considered a strategy. *Causality as start of the blame game* is a typical tactic in the execution of this strategy.

Hold other actors responsible for problems

When there are problems that the involved actors cannot do anything about, the call for action increases, especially when there are other actors that can do something about it. This is the

strategy with the opposite effect of *hold responsible for own problems* and typical tactics in this strategy are *causality as start of the blame game* and *lies*.

Appendix C: Strategy tree of *prevent recognition as public problem*

This appendix presents the strategy tree of the goal *prevent recognition as (public) problem* as an addition to paragraph 2.3.4. The goal *prevent recognition as (public) problem* can be achieved via seven different strategies: bluffing, framing and association, framing and spinning, showcasing (all strategies on form), question premises of the problem, anti-patterning and hold responsible for own problems (all strategies on content). These strategies are carried out by tactics and for achieving this goal only one of the available twenty five tactics cannot be used: connect group to popular group. The entire strategy tree can be found in figure 12.
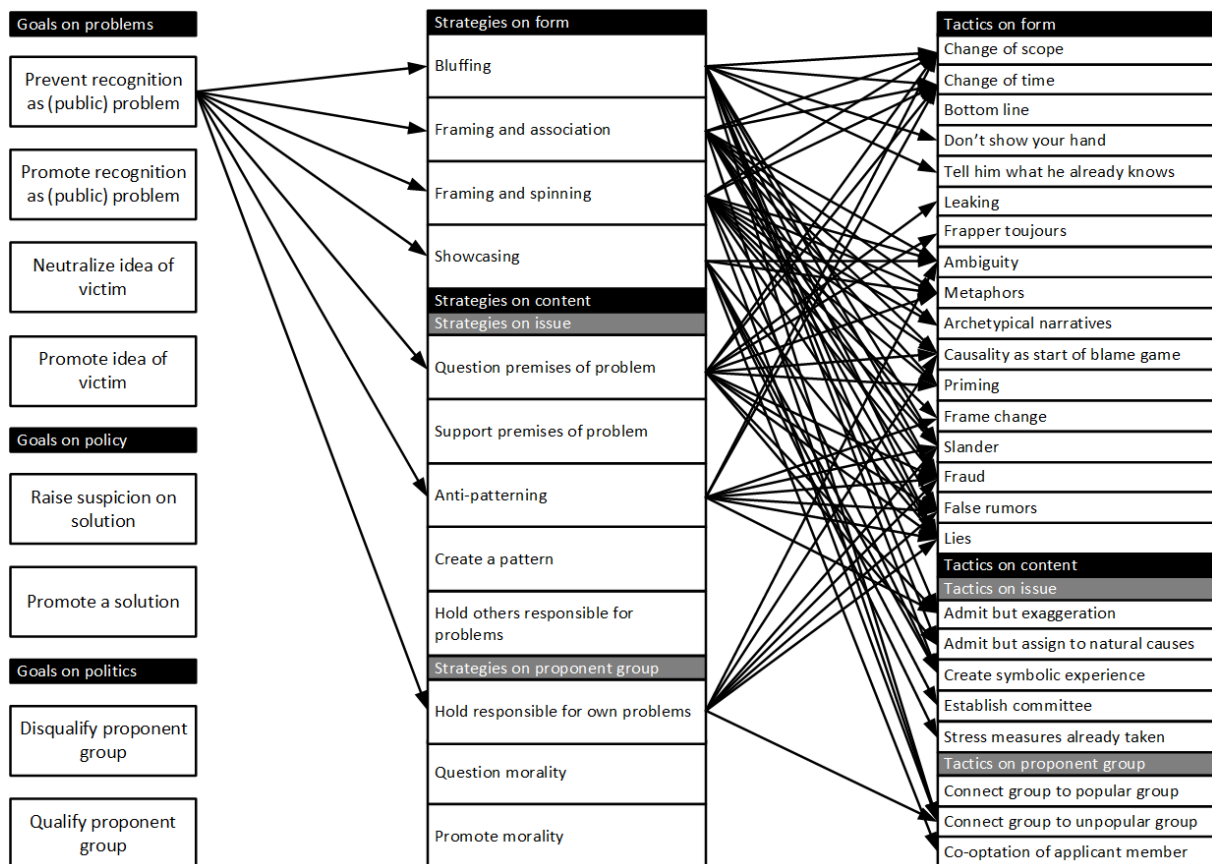

Figure 12: The strategic behavior tree related to the goal prevent recognition as (public) problem

Appendix D: Strategy tree of *promote recognition as public problem*

This appendix presents the strategy tree of the goal *promote recognition as (public) problem* as an addition to paragraph 2.3.4. The goal *promote recognition as (public) problem* can be achieved via six different strategies: bluffing, framing and association, framing and spinning (all strategies on form), support premises of the problem, create a pattern and hold others responsible for problems (all strategies on content). These strategies are carried out by tactics and for achieving this goal sixteen of the available twenty five tactics can be used. The available tactics are mostly on form, since most strategies on content are aimed at negative impact. The entire strategy tree can be found in figure 13.
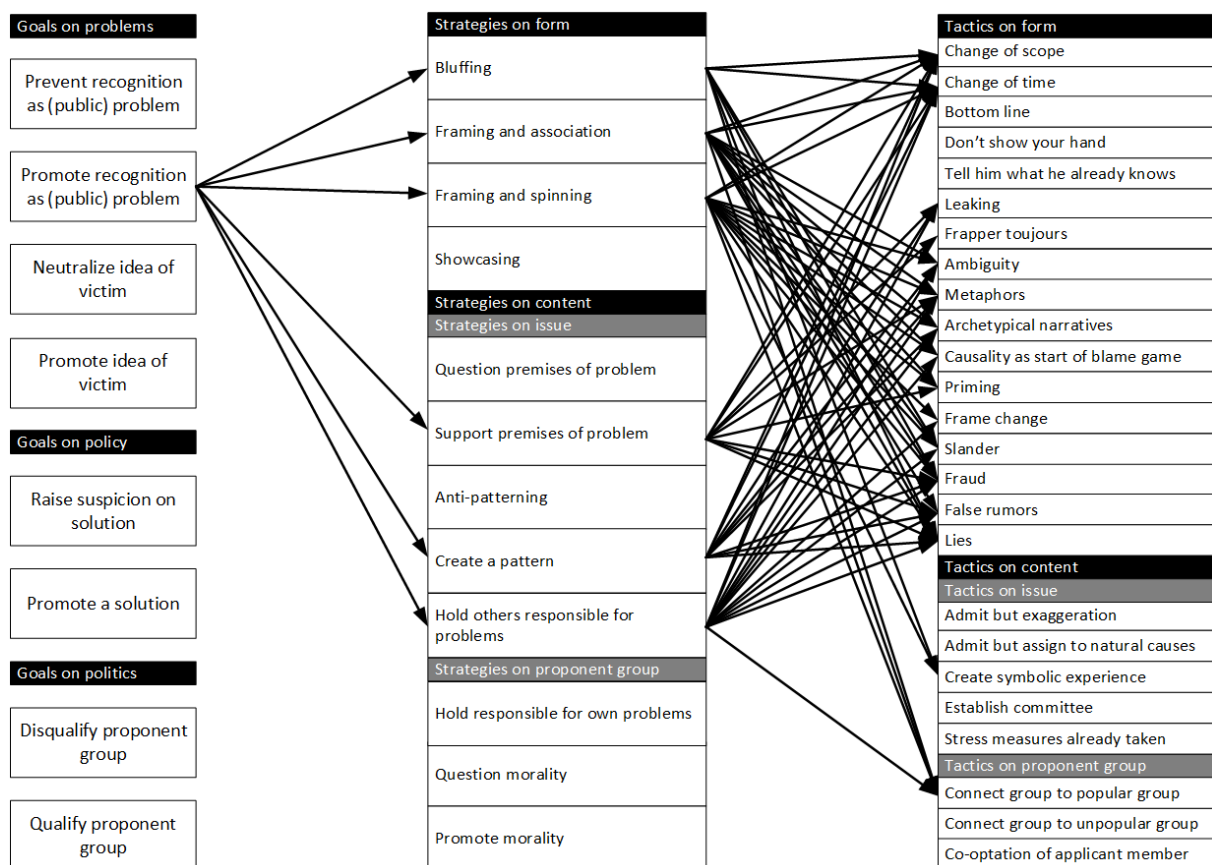

Figure 13: The strategic behavior tree related to the goal promote recognition as (public) problem

Appendix E: Strategy tree of *neutralize idea of victim*

This appendix presents the strategy tree of the goal *neutralize idea of victim* as an addition to paragraph 2.3.4. The goal *neutralize idea of victim* can be achieved via seven different strategies: bluffing, framing and association, framing and spinning (all strategies on form), question premises of the problem, anti-patterning, hold responsible for own problems and question morality (all strategies on content). These strategies are carried out by tactics and for achieving this goal twenty of the available twenty five tactics can be used. The entire strategy tree can be found in figure 14.

Figure 14: The strategic behavior tree related to the goal neutralize idea of victim

Appendix F: Strategy tree of *promote idea of victim*

This appendix presents the strategy tree of the goal *promote idea of victim* as an addition to paragraph 2.3.4. The goal *promote idea of victim* can be achieved via seven different strategies: bluffing, framing and association, framing and spinning (all strategies on form), support premises of the problem, create a pattern, hold others responsible for problems and promote morality (all strategies on content). These strategies are carried out by tactics and for achieving this goal seventeen of the available twenty five tactics can be used. The entire strategy tree can be found in figure 15.

Figure 15: The strategic behavior tree related to the goal promote idea of victim

Appendix G: Strategy tree of *raise suspicion on solution*

This appendix presents the strategy tree of the goal *raise suspicion on solution* as an addition to paragraph 2.3.4. The goal *raise suspicion on solution* can be achieved via six different strategies: bluffing, framing and association, framing and spinning (all strategies on form), question premises of the problem, anti-patterning and question morality (all strategies on content). These strategies are carried out by tactics and for achieving this goal eighteen of the available twenty five tactics can be used. The entire strategy tree can be found in figure 16.
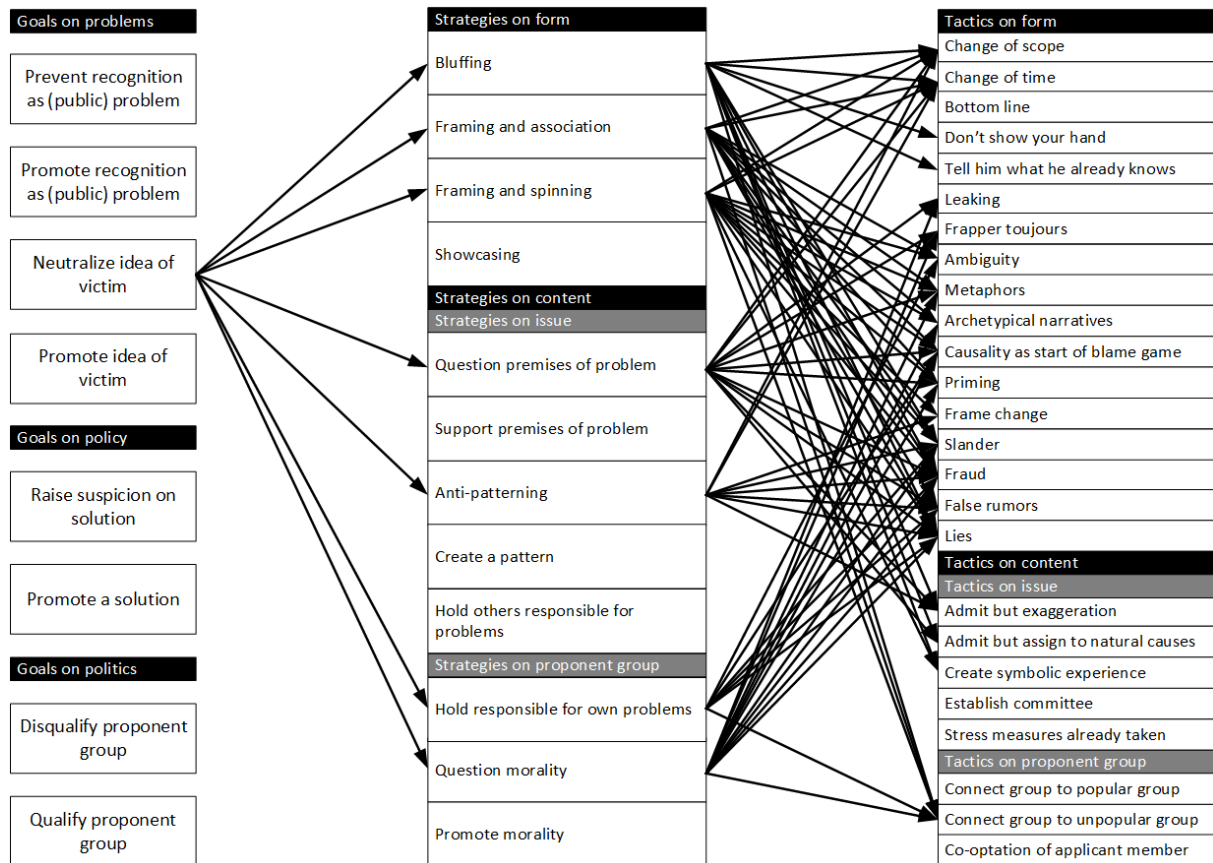

Figure 16: The strategic behavior tree related to the goal raise suspicion on solution

Appendix H: Strategy tree of *promote solution*

This appendix presents the strategy tree of the goal *promote solution* as an addition to paragraph 2.3.4. The goal *promote solution* can be achieved via six different strategies: bluffing, framing and association, framing and spinning (all strategies on form), support premises of the problem, create a pattern and promote morality (all strategies on content). These strategies are carried out by tactics and for achieving this goal seventeen of the available twenty five tactics can be used. The entire strategy tree can be found in figure 17.
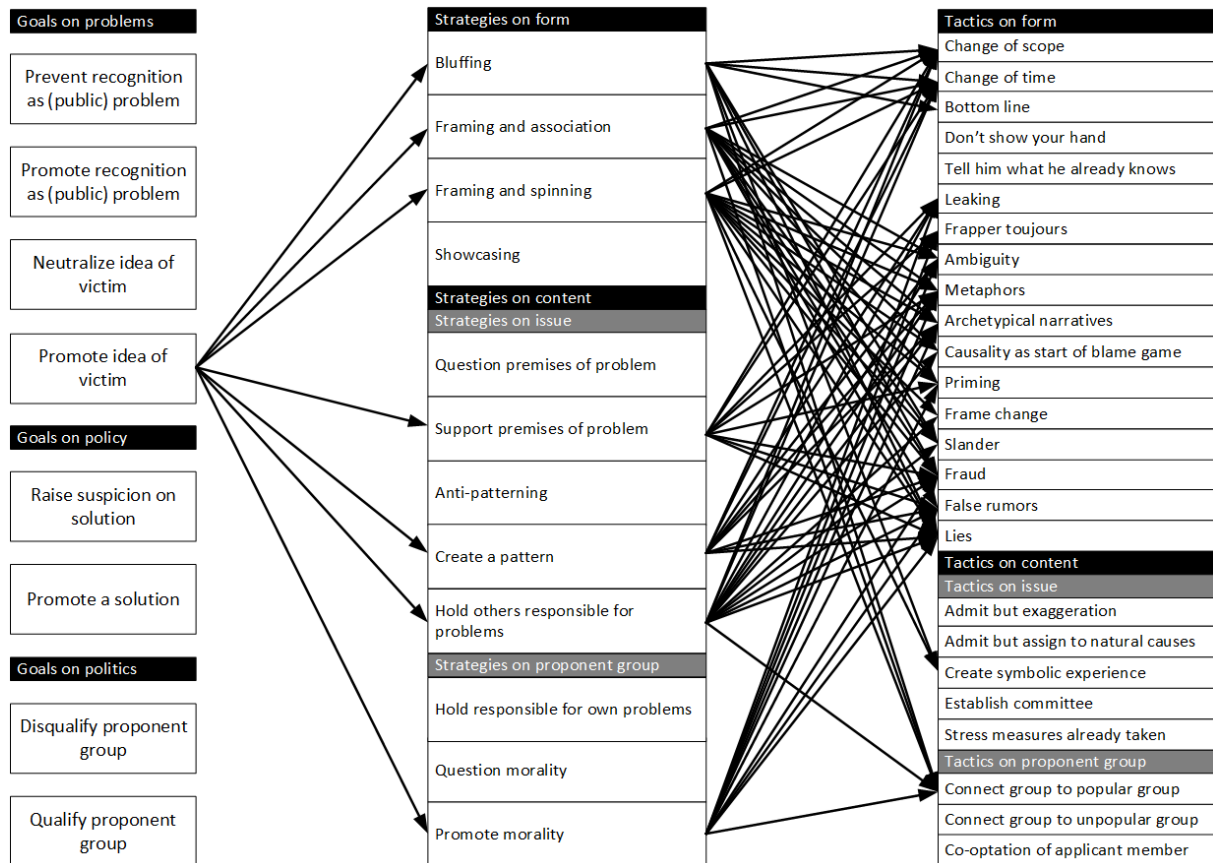

Figure 17: The strategic behavior tree related to the goal promote a solution

Appendix I: Strategy tree of *disqualify proponent group*

This appendix presents the strategy tree of the goal *disqualify proponent group* as an addition to paragraph 2.3.4. The goal *disqualify proponent group* can be achieved via five different strategies: bluffing, framing and association, framing and spinning (all strategies on form), hold responsible for own problems and question morality (all strategies on content). These strategies are carried out by tactics and for achieving this goal seventeen of the available twenty five tactics can be used. The entire strategy tree can be found in figure 18.
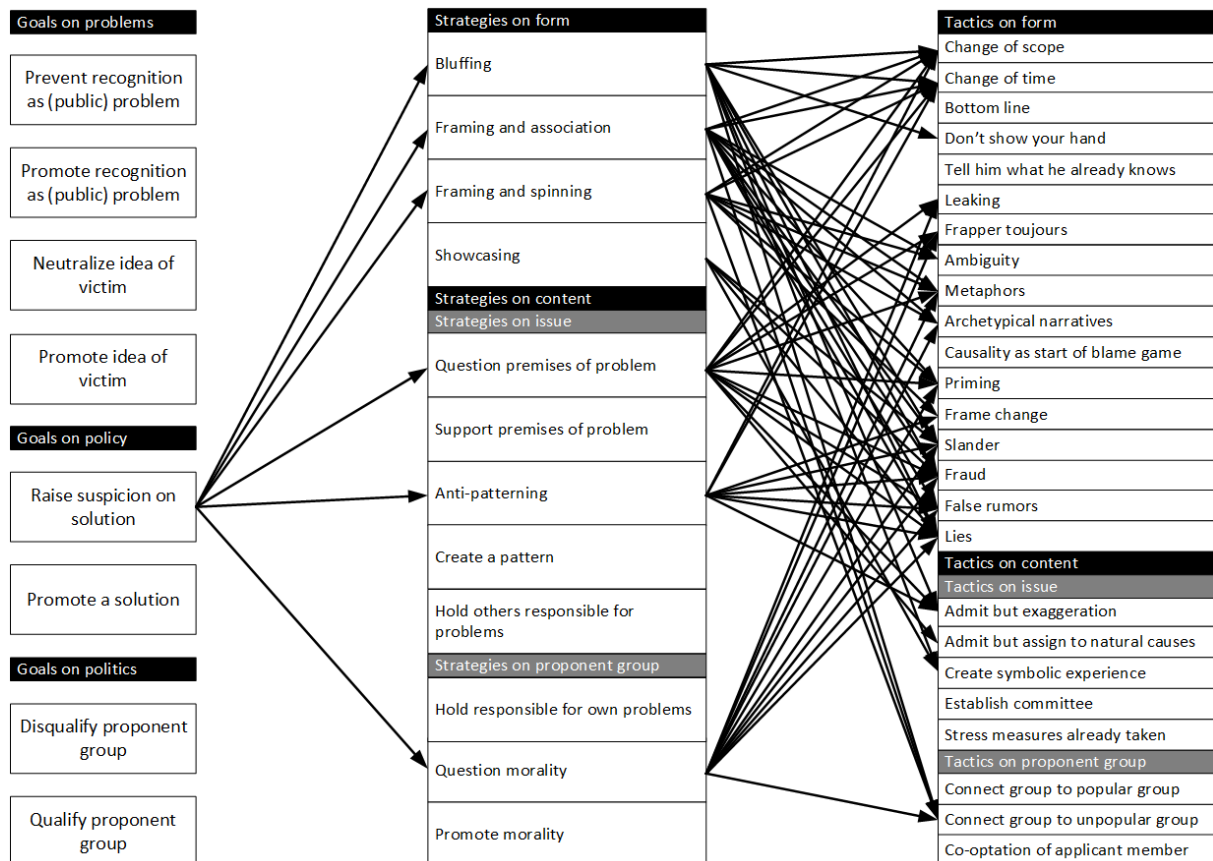

Figure 18: The strategic behavior tree related to the goal disqualify proponent group

Appendix J: Strategy tree of *qualify proponent group*

This appendix presents the strategy tree of the goal *qualify proponent group* as an addition to paragraph 2.3.4. The goal *qualify proponent group* can be achieved via four different strategies: bluffing, framing and association, framing and spinning (all strategies on form) and promote morality (strategy on content). These strategies are carried out by tactics and for achieving this goal seventeen of the available twenty five tactics can be used. The entire strategy tree can be found in figure 19.
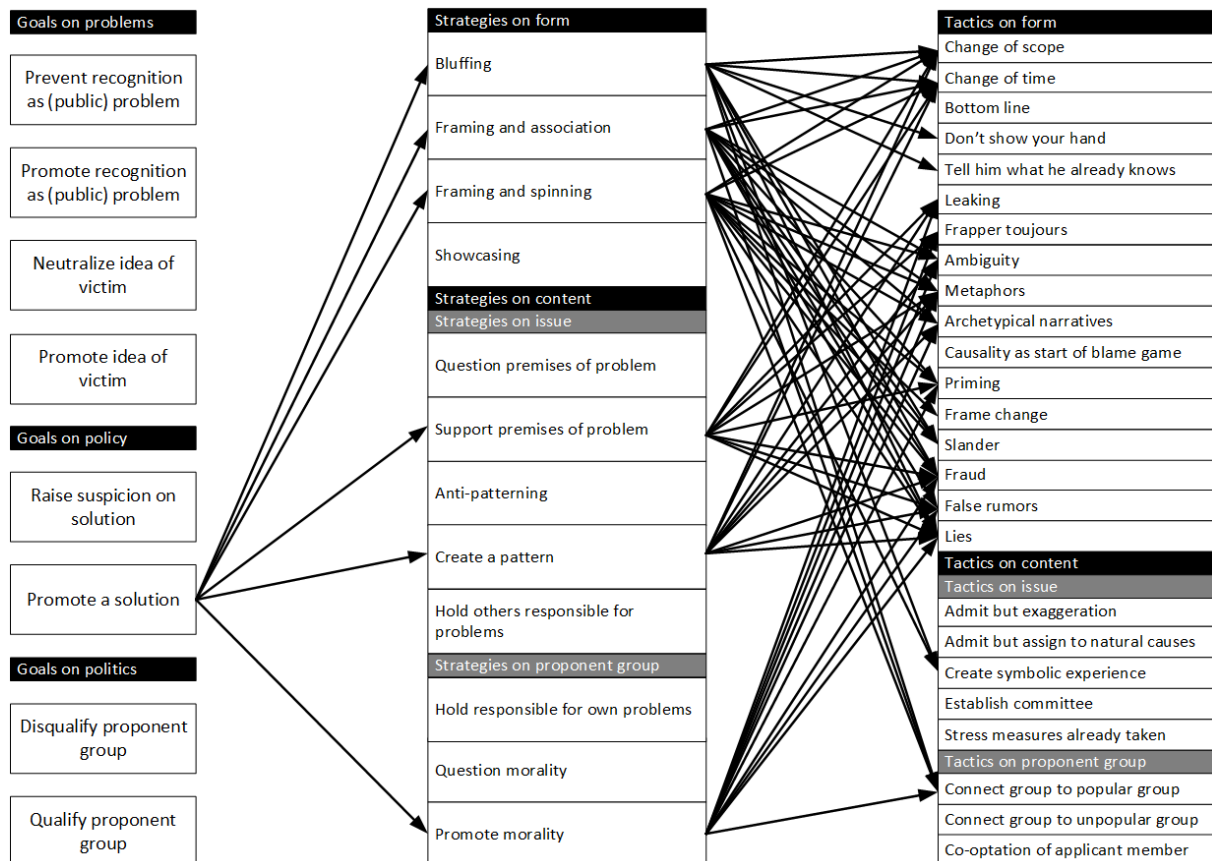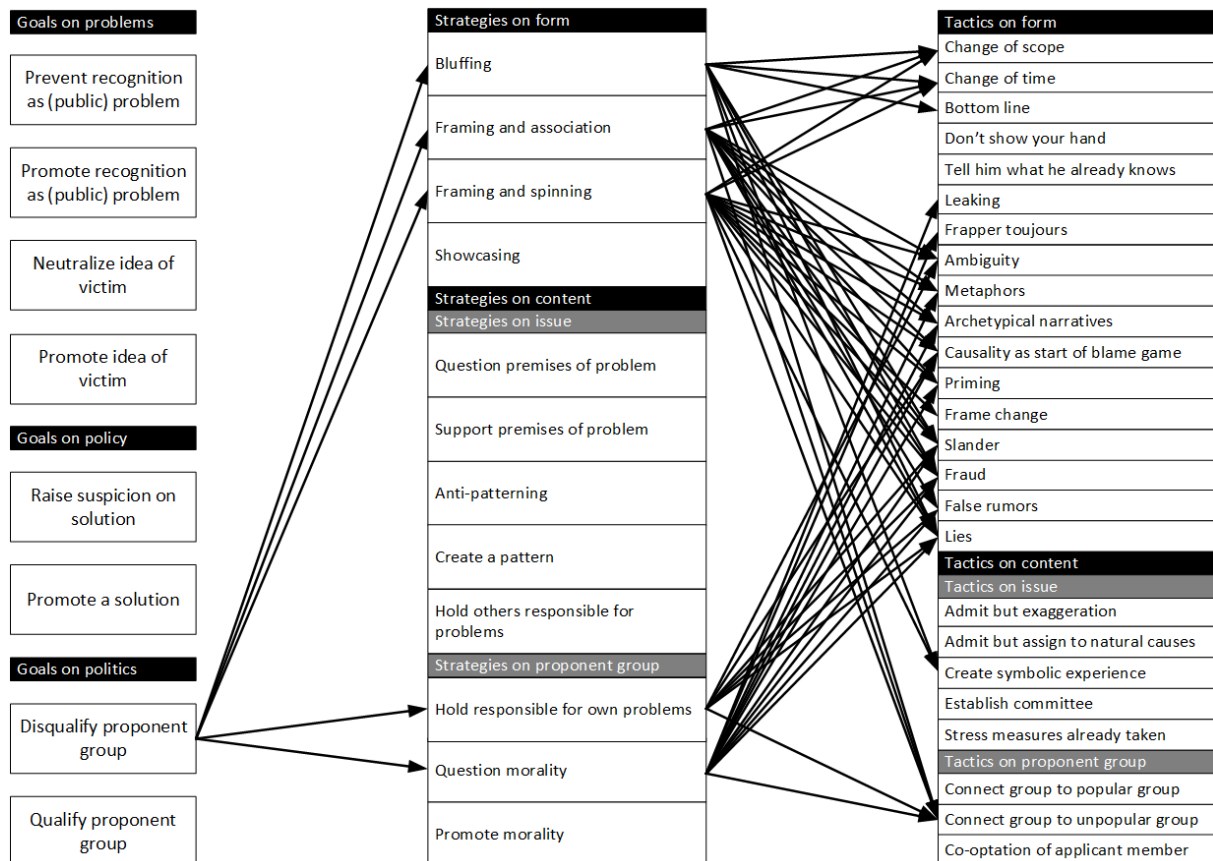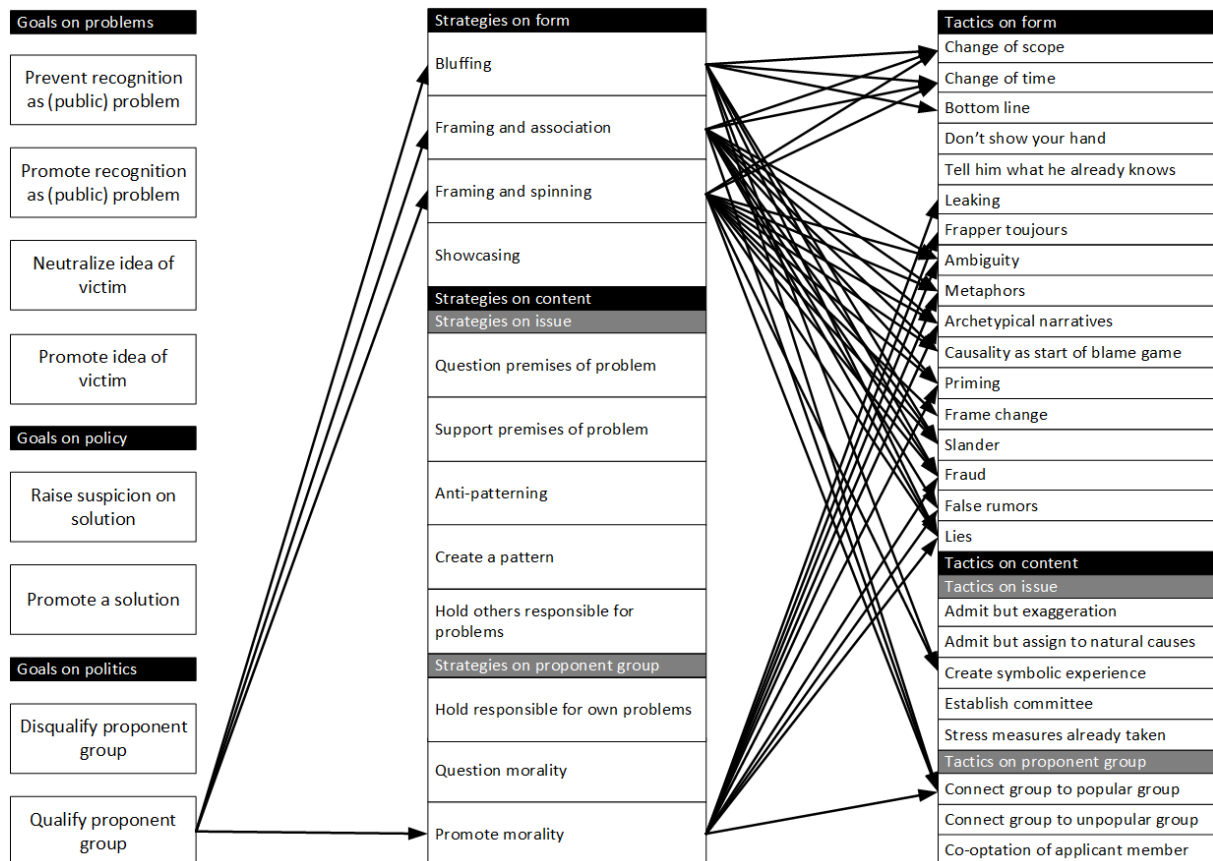

Figure 19: The strategic behavior tree related to the goal qualify proponent group

Appendix K: Classification 1 of dimensions of strategic behavior

This appendix elaborates on the first attempt of constructing a classification for the description of strategic behavior in chapter 3.

The first classification consists of the following dimensions:

- Who
- Does what
- On what
- When
- Where
- Related to which level in information hierarchy
- Stake
- Negative adverse effects
- Pre-conditions
- Goal.

Who acts

This is the actor who performs the specific type of strategic behavior. There are two types of actors defined who act. The actor who tries to get a topic on the agenda is defined as the proponent. The actor who tries to block the access to the agenda is defined as the opponent.

Action

The action describes in a generic manner what the actor does. There are five categories:

- Display information
- Create confusion
- Influence (public) opinion
- Make proposal
- Decrease urgency

On what/Whom

This variable describes the object of the action. Three different objects of strategic behavior have been identified:

- Proponent; the actor who tries to get access to the agenda.
- Opponent; the actor trying to block the access to the agenda.
- Problem; the problem in which the proposer want to make a change.

When

This variable describes when the strategic behavior is exerted, compared to a negotiation. Three time frames have been identified: prior, during and after a negotiation.

Where

This variable describes the location of the action. The location can be a physical location or a more conceptual "space". The locations that are identified are:

- Negotiation table; the place where the proposer, opponent, defender and supporter meet.
- Media; the place participants can use to provide information for the general public.
- Institutional space; the location opponents use for policy and decision making.
- Public space; these are physical locations, that are not included in other categories.

Level in information hierarchy

This variable refers to the DIKW hierarchy as described in Rowley (2007), in which the relation between data, information, knowledge and wisdom is described. In this paper, the following conclusions are drawn based upon the comparison of definitions:

- "Data lacks meaning or value, is unorganized and unprocessed" (Rowley, 2007, p. 171).
- "Information is defined in terms of data, and is seen to be organized or structured data. This processing lends the data relevance for a specific purpose or context, and thereby makes it meaningful, valuable, useful and relevant" (Rowley, 2007, p. 172).
- "Knowledge might be viewed as a mix of information, understanding, capability, experience, skills and values, but it is important to note that not all authors mention all of these elements" (Rowley, 2007, p. 174).

There is less consensus on a definition for wisdom. Three attempts at defining wisdom state that wisdom is the ability to apply concepts from one domain to another, that wisdom is the ability to see beyond the horizon, or that wisdom is the ability to act ethically (Rowley, 2007).

This variable describes which level of the DIKW hierarchy the behavior influences.

Stake

This variable describes qualitatively how much the actor puts at stake by exerting a specific form of strategic behavior. The higher the stake, the more reluctant an actor will be to use a specific strategy.

Negative adverse effects

This variable describes possible negative side effects of a specific strategy. These side effects could harm the interests of the acting person.

Pre-conditions

This variable describes what means, characteristics, structures and knowledge a specific form of strategic behavior requires. Without these conditions it is either impossible or useless to exert these forms of strategic behavior.

Goal

This variable explains the goal that each form of behavior reaches for. The following goals have been identified:

- Increase power of proposal
- Decrease power of proposal
- Increase power of proponent
- Decrease power of proponent

- Increase power of coalition
- Ignore proposal
- Increase confusion

Problems with this classification

This classification has ten dimensions but does not have the ability to differentiate between every form of strategic behavior on dimensions such as stake, negative adverse effects and pre-conditions. Some of the dimensions (negative adverse effects and pre-conditions) are unique with every form of behavior, which makes them not useful for classifying strategic behavior. A classification of strategic behavior depends on similarities on some dimensions and differences in others. This means that the forms cannot be grouped and structured in a useful manner. The DIKW-hierarchy does not contribute much to the understanding of strategic behavior compared to the elements that can be defined as part of a perception as defined in Bots, van Twist, & van Duin (1999).

Appendix L: Classification 2 of dimensions of strategic behavior

This appendix elaborates on the second attempt of constructing a classification for the description of strategic behavior in chapter 3.

The second classification neglects the dimensions that are unique for every form of behavior. Furthermore, the DIKW-hierarchy has been replaced with the elements of a perception, the goal has been formulated in an different dimension, namely legitimizing or delegitimizing, and more emphasis has been placed on the relation between the actors. This classification has been constructed based on a discussion with experts (de Bruijn et al., 2017). This classification consists of the following dimensions:

- What of perception is influenced
- What is influenced of actor
- Nature of relation between actors
- Access to actor
- Resource dependence
- Legitimize or delegitimize

Influence on perception

This dimension relates to the representation of perception of Bots, van Twist, & van Duin (1999) as described in paragraph 1.2. The three elements of a perception that are used in this dimension are:

- Facts
- Causality
- Values

What is influenced of actor

This dimension describes what the influence on the perception has to achieve. There are two different achievements: influencing the perception or influencing the attitude.

Nature of relation between actors

This dimension explains the nature of the relation between the actors. Some forms of strategic behavior occur in cooperative relations, others in conflictual relations. Some forms could also occur in both.

Access to actor

This dimension evaluates whether the behavior influences the access to other actors.

Resource dependence

This dimension evaluates whether the behavior influences the resource dependence on other actors.

Legitimize or delegitimize

This dimension describes whether the strategy should legitimize or delegitimize something.

Problems with this classification

This classification has fewer dimensions and a similar descriptive power as the first classification. However, it still does not have the power to differentiate between all forms of strategic behavior. For instance, these dimensions cannot describe the difference between fraud and false rumors:

- Element of perception: facts, causality or values
- What is influenced: perception
- Nature of relation: any
- Access to actor: no
- Resource dependence: no
- Legitimize or delegitimize: both

Furthermore, this classification lacks the action that is executed, which is an essential element of the behavior. Furthermore, it lacks the objects (actors) that are involved in the strategic behaviors.

Appendix M: Attribute grammar of strategic behavior

This appendix contains the full attribute grammar as an addition to paragraph 4.2. First, the constraints will be repeated in table 9, before they are implemented in the grammar.

Table 9: Repeated list of constraints added to the attribute grammar

Constraints	Explanation
Transaction → Delegitimize and aimed at influenced actor, policy or problem	Transactions (add to existing or assign to new committee) are used to either damage an actor by letting him participate in the process, or constructing conclusions that benefit the strategic actor
G = delegitimize → O cannot be strategic actor	A strategic actor will not execute behavior that delegitimizes himself
Boolean = true → SM cannot be adapted/heard	Adapted and heard relate to fraud and false rumors, which are impossible combinations with a true statement.
Boolean = false → SM cannot be partial/enlarged	Partial and enlarged relate to change of scope or change of time. These statements are true, they only shape the argument in their advantage.
Object =! policy → SM cannot be proposed	Proposed can only be used in combination with policy, since proposed relates to proposals, options for policy.
Add to existing committee → Delegitimize influenced actor; Influenced actor → conflictual; BM → symbolically/oppressively	This act contaminates the influenced actor with the current policy, since he is being involved in making it. Since he is delegitimized, he can only be conflictual. The modifier can only be oppressively or symbolically, due to the nature of the act.
Object = influenced actor and aim = delegitimize → influenced actor = conflictual; Object = influenced actor and aim = legitimize → influenced actor = cooperative; Else → influenced actor = any	The influenced actor is only delegitimized if the nature of their relation is conflictual and only legitimized if their relation is cooperative. Otherwise the relation between the actors can be of any kind.
Object = problem/policy → SM cannot be personal	When a problem or policy is targeted, this cannot be done with a statement that is related to a person.
Object = strategic actor/ influenced actor/ third actor → SM cannot be impersonal	When an actor is targeted, it cannot be done with a statement that is unrelated to a person.
S = statement with values → SM cannot be adapted	Adapted is related to fraud and it is impossible to fraud with values.
SM = secret → BM cannot be vaguely, unfoundedly, symbolically	When secrets are used, it is not in the interest of the strategic actor to do this vaguely or symbolically, since it reduces its power, and unfoundedly is impossible, since these secrets are the foundation.
B = Communication and G = delegitimize and O = strategic actor/ influenced actor/ third actor → BM cannot be symbolically	A delegitimizing statement aimed at an actor cannot be made symbolically, since the definition of symbolically is that it stands for something else, which cannot be the case when the statement is made at this actor.

These constraints are only sufficient when the variables with + (one or more appearances of the preceding variable) and * (zero or more appearances of the preceding variable) occur with a maximum of one time. When these variables occur more than one time, the complexity of the generated sentence and therefore the amount of possible combinations increases. The conditions required to prevent impossible or illogical combinations of different forms of strategic behavior or multiple goals or modifiers in a form of strategic behavior have not been identified, due to the increasing complexity of such a list of constraints.

The list of conditions will be added to the context-free grammar of paragraph 5.2.2 to construct the attribute grammar AG = (G, A, R) with G = (N, T, P, SD) with the following production lines:

- < SD > ::= < SB > +
- < SB > ::= (< A1 >, B, < A2 >, G)
- G ::= < legitimize > O+ | < delegitimize > O+
- O ::= < TA > | < problem > | < policy >
- B ::= **condition: if G = delegitimize**

    C <BM>* | T <BM>*

    Else:

    C <BM>*
- T ::= **condition: if O = < problem > or < policy >**

    < assign to new committee > |

    Else:

    < add to existing committee >
- C ::= < makes a > < Boolean > S
- < Boolean > ::= < true > | < false >
- S ::= < statement with < SM >* facts > | < statement with < SM >* causal relations > | < statement with < SM >* values > | < SM >* < deontic statement >
- < PA > ::= < AM > < A2 >
- < TA > ::= **condition: if B = T**

    < A2 >

    Else:

    If G = legitimize

    < A1 > | < A2 > | < A3 >

    Else:

    < A2 > | < A3 >
- < SM > ::= **condition: if C = false and (S = statement with facts or S = statement with causal relations) and O = TA**

    < secret > | < new > | < old > | < fundamental > | < vague > | < similar > | < alternative > | < associating > | < blaming > | < dominating > | < ethical > | < unethical > | < institutional > | < heard > | < adapted > | < personal >

Else:

if C = false and (S = statement with facts or S = statement with causal relations)
and   O = P

> < <u>secret</u> > | < <u>new</u> > | < <u>old</u> > | < <u>fundamental</u> > | < <u>vague</u> > | < <u>similar</u> > | < <u>alternative</u> > | < <u>associating</u> > | < <u>blaming</u> > | < <u>dominating</u> > | < <u>ethical</u> > | < <u>unethical</u> > | < <u>institutional</u> > | < <u>heard</u> > | < <u>adapted</u> > | < <u>impersonal</u> > | < <u>proposed</u> >

Else:

if C = false and (S = statement with facts or S = statement with causal relations)
and   O = I

> < <u>secret</u> > | < <u>new</u> > | < <u>old</u> > | < <u>fundamental</u> > | < <u>vague</u> > | < <u>similar</u> > | < <u>alternative</u> > | < <u>associating</u> > | < <u>blaming</u> > | < <u>dominating</u> > | < <u>ethical</u> > | < <u>unethical</u> > | < <u>institutional</u> > | < <u>heard</u> > | < <u>adapted</u> > | < <u>impersonal</u> >

Else:

If C = false and O = TA

> < <u>secret</u> > | < <u>new</u> > | < <u>old</u> > | < <u>fundamental</u> > | < <u>vague</u> > | < <u>similar</u> > | < <u>alternative</u> > | < <u>associating</u> > | < <u>blaming</u> > | < <u>dominating</u> > | < <u>ethical</u> > | < <u>unethical</u> > | < <u>institutional</u> > | < <u>heard</u> > | < <u>personal</u> >

Else:

If C = false and O = P

> < <u>secret</u> > | < <u>new</u> > | < <u>old</u> > | < <u>fundamental</u> > | < <u>vague</u> > | < <u>similar</u> > | < <u>alternative</u> > | < <u>associating</u> > | < <u>blaming</u> > | < <u>dominating</u> > | < <u>ethical</u> > | < <u>unethical</u> > | < <u>institutional</u> > | < <u>heard</u> > | < <u>impersonal</u> > | < <u>proposed</u> >

Else:

If C = false and O = I

> < <u>secret</u> > | < <u>new</u> > | < <u>old</u> > | < <u>fundamental</u> > | < <u>vague</u> > | < <u>similar</u> > | < <u>alternative</u> > | < <u>associating</u> > | < <u>blaming</u> > | < <u>dominating</u> > | < <u>ethical</u> > | < <u>unethical</u> > | < <u>institutional</u> > | < <u>heard</u> > | < <u>impersonal</u> >

Else:

If C = true and O = P

> < <u>secret</u> > | < <u>new</u> > | < <u>old</u> > | < <u>fundamental</u> > | < <u>vague</u> > | < <u>similar</u> > | < <u>alternative</u> > | < <u>associating</u> > | < <u>blaming</u> > | < <u>dominating</u> > | < <u>ethical</u> > | < <u>unethical</u> > | < <u>institutional</u> > | < <u>proposed</u> > | < <u>impersonal</u> > | < <u>enlarged</u> > | < <u>partial</u> >

Else:

If C = true and O = TA

    < <u>secret</u> > | < <u>new</u> > | < <u>old</u> > | < <u>fundamental</u> > | < <u>vague</u> > | < <u>similar</u> > | < <u>alternative</u> > | < <u>associating</u> > | < <u>blaming</u> > | < <u>dominating</u> > | < <u>ethical</u> > | < <u>unethical</u> > | < <u>institutional</u> > | < <u>personal</u> > | < <u>partial</u> > | < <u>enlarged</u> >

Else:

If C = true and O = I

    < <u>secret</u> > | < <u>new</u> > | < <u>old</u> > | < <u>fundamental</u> > | < <u>vague</u> > | < <u>similar</u> > | < <u>alternative</u> > | < <u>associating</u> > | < <u>blaming</u> > | < <u>dominating</u> > | < <u>ethical</u> > | < <u>unethical</u> > | < <u>institutional</u> > | < <u>impersonal</u> > | < <u>enlarged</u> > | < <u>partial</u> >

- < AM > ::= **Condition: if B = T and T = add to existing committee**

    < <u>conflictual</u> >

Else:
If B = T and T = assign to new committee

    < <u>cooperative</u> >

Else:
If G = delegitimize and O = TA and TA = A2

    < <u>conflictual</u> >

Else:
If G = legitimize and O = TA and TA = A2

    < <u>cooperative</u> >

Else:
If SM = secret

    < <u>cooperative</u> >

Else:

    < <u>any</u> >

- < BM > ::= **Condition: if B = T and T = add to existing committee**

    < <u>oppressively</u> > | < <u>symbolically</u> >

Else:
If B = T and T = assign to new committee

    < <u>symbolically</u> >

Else:

If B = C and G = delegitimize and O = TA and (SM = secret or SM = adapted)

< <u>repeatedly</u> > | < <u>anticipatingly</u> >

Else:

If B = C and G = delegitimize and O = TA and (SM =! secret and SM =! adapted)

< <u>repeatedly</u> > | < <u>anticipatingly</u> > | < <u>unfoundedly</u> > | < <u>vaguely</u> >

Else:

If B = C and ((G = delegitimize and O =! TA) or (G = legitimize)) and (SM =! secret and SM =! adapted)

< <u>repeatedly</u> > | < <u>anticipatingly</u> > | < <u>symbolically</u> > | < <u>unfoundedly</u> > | < <u>vaguely</u> >

Else:

If B = C and ((G = delegitimize and O =! TA) or (G = legitimize)) and (SM = adapted)

< <u>repeatedly</u> > | < <u>anticipatingly</u> > | < <u>symbolically</u> >

Else:

If B = C and ((G = delegitimize and O =! TA) or (G = legitimize)) and (SM = secret)

< <u>repeatedly</u> > | < <u>anticipatingly</u> >

With:

- SD = Strategic discourse
- SB = Strategic behavior
- G = Goal
- O = Object
- B = Behavior
- T = Transaction
- C = Communication
- S = Statement
- PA = Perceiving actor
- TA = Target actor
- SM = Statement modifier
- AM = Actor modifier
- BM = Behavior modifier

Appendix N: Implementation of the strategic behavior generator

This appendix explains the implementation of the generator of paragraph 4.3. The generator is based on the attribute grammar of strategic behavior and its production lines (see paragraph 4.2 for the description of the attribute grammar and appendix M for the complete grammar). These production lines are looped in order to generate every possible option.

The assumption has been made that the variables with + (one or more appearances of the preceding variable) and * (zero or more appearances of the preceding variable) occur once. When these variables occur more than once, the current list of conditions will not be sufficient due to the increased complexity. For instance, with this assumption the generator generates 6866 combinations. When behavior modifiers could occur twice, the amount of combinations would (approximately) increase with a factor four (there are 5 behavior modifiers and a combination with the same modifier twice would not make sense). When statement modifiers could occur twice, the amount of combinations would increase with a factor nineteen, since there are twenty statement modifiers (it will probably increase less due to violated conditions). When two forms of strategic behavior would be combined the total amount of combinations would be $6866^2 = 47.141.956$. In this case a combination with the same form of strategic behavior twice would be possible, due to the fact that there are atomic units that are used twice, which could still be different from each other (compared to modifiers, which are nonterminals). Therefore, this generator only generates forms of strategic behavior with one modifier per type and no combinations within a form of behavior. This does not mean that the forms of strategic behavior could not be combined, it means that they are not combined by default and the conditions do not check for impossible or illogical combinations.

The generator starts with the first production line, transforming SB into A1, B, A2 and G. Then it continues to replace the next nonterminal according to the order indicated in figure 8. Before every first transformation in a procedure, the original string at the beginning of this procedure is stored in a public variable. Before the second transformation in this procedure, the algorithm restores the string to the original string before the first transformation. This makes it possible to perform a different transformation of the nonterminal variable the second time.

Before the algorithm reaches the print procedure, it executes the rewrite procedure. This procedure aims to improve the readability of the generated behaviors. Some of the automatically generated sentences are inconsistent with the normal construction of sentences with regards to order and combination of words. This procedure rearranges certain combinations of words and replaces atomic units with words in order to create normal sentences.

When the algorithm has finished the print procedure, it returns to the nearest procedure where a different transformation can be used to create a new form of strategic behavior. In other words, the loop is executed bottom-up. This loop can return to almost every procedure after printing, except the procedure in which the nonterminal T is replaced. This is due to the fact that the transformation of T is determined by the transformation of O, which is two procedures higher in the order of transformation. When O is replaced with I or P (the target of the strategic

behavior is the problem of policy), T can only be transformed into *add to new committee*. When O is replaced with TA (the target is an actor), T can only be transformed into *add to existing committee*. Therefore the algorithm never returns to the replace T procedure.

Furthermore, every replace procedure is extended with conditional transformations, used when preferences have been indicated. This prevents the generator from generating forms of strategic behavior that are not compliant with the indicated preferences and limits the amount of behaviors. Figure 20 shows a visual representation of the created algorithm.
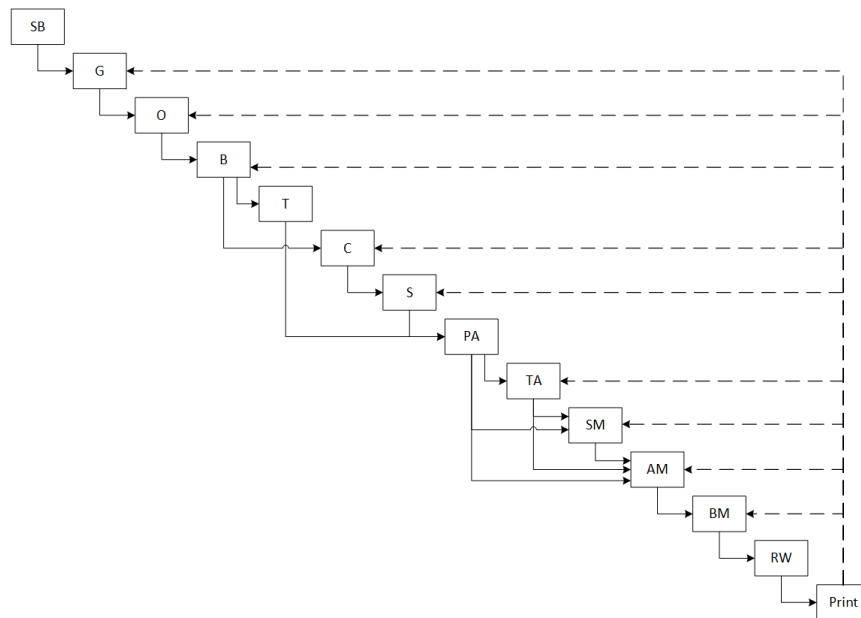

Figure 20: Visual representation of the transformation algorithm

Appendix O: Analysis of remaining statements

This appendix analyses the remaining six statements of paragraph 4.4.1, gathered via interviews and in literature.

South Africa: Implementation of new water governance regulations

> Statement 4: *"It is not a problem of redistribution, it's a shortage. We don't have enough water."* (Kemerink, 2017)

This statement has been made by white farmers in South Africa after the reorganization, who were in charge of the water governance bodies. Legislation forced them to redistribute the water shares between black and white farmers, since white farmers had a historic advantage in these shares. Instead of giving part of their share to the smaller black farmers, they reframed the problem of distribution into a shortage, while they knew this wasn't true, according to Kemerink (2017). They presented an alternative view on the problem in order to delegitimize the claims of the black farmers about the redistribution. This quote can be translated into the following statement:

A strategic actor makes a false statement with alternative facts to any influenced actor to delegitimize the problem.

With:

- A1 = A strategic actor
- B = makes a statement
- Boolean = false
- S = with facts
- SM = alternative
- A2 = to influenced actor
- AM = any
- G = to delegitimize
- O = the problem

The added value of the grammar in this example lies in the fact that it shows that they want to steer the attention away from their part in the problem and delegitimize the problem itself. It shows that the strategic actors want to tell an alternative story in order to have their right to a portion of the water supply untouched.

Kenya: change in legislation for small farmers

> Statement 5: *"If you give every single farmer a permit, it will create much more work for you. It is a lot easier to process if you only have to give permits to associations."* (Kemerink, 2017)

In Kenya it was mandatory for large farmers to have a permit for their water use. After a change in legislation, it was also mandatory for small farmers to have a permit. This would increase the administrative workload of the government. The large farmers, who already had a permit, lobbied for a new policy, which forced small farmers to unite in associations before they could apply for a permit. It was in the interests of the large farmers that small farmers

would not get a permit, since this would increase their share. This new policy would increase the hassle for the small farmers, which would lead to less granted permits to small farmers and more water for the large farmers. Since this statement reflects a straightforward causal relation, the large farmers agree with their own statement, thus this is a true statement. This quote can be translated in the following statement:

A strategic actor makes a true statement with proposed causal relations to any influenced actor to legitimize policy.

With:

- A1 = A strategic actor
- B = makes a statement
- Boolean = true
- S = with causal relations
- SM = proposed
- A2 = to influenced actor
- AM = any
- G = to legitimize
- O = policy

The added value of the grammar in this example lies in the fact that it makes you think one step further than the normal statement. The statement looks normal, indicating a causal relation. However, when you think about the possibility that it could be aimed at legitimizing or delegitimizing something, then it becomes clear that it is a possibility that the strategic actor wants to legitimize the policy to secure his own water supply.

Kenya: Government county officials accuse inhabitants of greed

Statement 6: *"There is no limit to what they want. They still need more. They have mobile phones. They have enough money."* (Gharesifard, 2017)

Government officials from Kenya from the county, a lower level form of government, made this claim about the citizens of their county. According to these officials, the citizens are greedy: they have enough money but they still complain. This quote aims at delegitimizing these citizens. They are supporting their claim by saying that the citizens have mobile phones, which should say something about their wealth. However, phones are relatively cheap and currently also used for information provision and services such as money transfers. Therefore, the modifier unfoundedly could be added. It is unknown, whether this is the actual opinion of the officials, so the statement can be true or false. This statement is a factual statement. The quote can be translated to the following statement:

A strategic actor makes a true or false statement with facts (unfoundedly) to any influenced actor to delegitimize a third actor.

With:

- A1 = A strategic actor
- B = makes a statement

- Boolean = true or false
- S = with facts
- BM = unfoundedly
- A2 = to influenced actor
- AM = any
- G = to delegitimize
- O = a third actor

The added value of the grammar in this example is in the realization that this statement does not have to reflect the perception of the government officials, but could just be aimed at delegitimizing these citizens. The aim of delegitimizing these citizens is straightforward, but it adds the possibility that the government officials do not have this perception. It could be a bluff in order to convince the influenced actor.

Kenya: Government officials conceal parts of the benefits

> Statement 7: *"If we focus on conservation, you will benefit, you will have tourists, work, more turnover. It is in your best interest."* (Gharesifard, 2017)

This statement has been made by government officials during a discussion with inhabitants on the focus on conservation and tourism. According to the government the inhabitants would benefit from a focus on conservation, which would lead to more tourism. However, they do not mention the fact that the government benefits as well and probably even more than the inhabitants. They conceal a part of the consequences and therefore they use a partial causal relation. The government officials probably believe in this statement, although they know that the government benefits more. The person they express this statement to is a conflictual influenced actor, since these inhabitants do not agree with this government policy. The goal of this statement is to legitimize the policy. The modifier vaguely could be added, since the statement is quite vague. Every inhabitant wants to earn more money but more turnover does not necessarily mean that the inhabitants receive more money. This quote can be translated into the following statement:

A strategic actor makes a true statement with partial causal relations (vaguely) to a conflictual influenced actor to legitimize policy.

With:

- A1 = A strategic actor
- B = makes a statement
- Boolean = true
- S = with causal relations
- SM = partial
- BM = vaguely
- A2 = to influenced actor
- AM = conflictual
- G = to legitimize
- O = policy

The added value of the grammar in this example is in the fact that it shows that the strategic actor emphasizes the positive (partial) side of the policy in order to legitimize the policy.

Kenya: Inhabitants react on benefits by emphasizing a different consequence

Statement 8: *"We know that tourists are good, but there are roads, fences, we have more conflict with wildlife, because of decreasing living areas."* (Gharesifard, 2017)

This was the response from the inhabitants to statement 7 of the government. They try to bring in another side of the story. Instead of focusing on economic benefits, they express the problems they will encounter in their daily lives. They try to spin the story by emphasizing other consequences of the new policy. The strategic actor presumably believes this statement, they only emphasized on another part of the consequences. This statement has been made to the government officials, whose policy they want to delegitimize. Therefore, this quote can be translated into the following statement:

A strategic actor makes a true statement with alternative causal relations to conflictual influenced actor to delegitimize policy

With:

- A1 = A strategic actor
- B = makes a statement
- Boolean = true
- S = with causal relations
- SM = alternative
- A2 = to influenced actor
- AM = conflictual
- G = to delegitimize
- O = policy

The added value of the grammar in this example lies in the realization that the citizens emphasize another part of the consequences of the policy, in order to delegitimize it. They tell an alternative story to convince the influenced actor.

Uganda: Pride of technical staff of the Ministry of Water and environment

Statement 9: *"We are engineers. We are experts, we are not going to learn again."*
(Casella, 2017)

This claim was made by senior engineers of the Ministry of Water and Environment, directorate of water development, involved in water services delivery in Uganda. They refused the training that was offered to them, since they were, in their opinion, the experts. This statement tries to delegitimize potential training, as if it could not teach them anything. It is unknown whether they actually believe in this statement, or just do not want to follow the extra training. Therefore, the statement can be true or false. Furthermore, it creates a link between learning and experts. However this link does not prove that they actually do not have to learn. It is a bluff, which could be expressed by adding the modifier (unfoundedly) This quote can be translated to the following statement:

A strategic actor makes a true or false statement with associating causal relations (unfoundedly) to any influenced actor to delegitimize policy

With:

- A1 = A strategic actor
- B = makes a statement
- Boolean = true or false
- S = with causal relations
- SM = associating
- BM = unfoundedly
- A2 = to influenced actor
- AM = any
- G = to delegitimize
- O = policy

The added value of the grammar in this example is in the fact that it shows that the statement can be aimed at an indirect goal, namely policy. When the statement is analyzed on itself, without the grammar, it would not have been linked to the aim of delegitimizing policy.

Appendix P: Variables that influence the decision for a specific form of strategic behavior

This appendix shows a first selection of variables that might influence the decision making process, as an addition to chapter 5. The grammar of strategic behavior from chapter 4 can be used to explore the different forms of strategic behavior that can be exerted by strategic actors. However, it does not describe the process of choosing a specific form of strategic behavior and the variables that influence that choice.

This decision making process could be explained by the theory of reasoned action (Fishbein & Ajzen, 1975) and the theory of planned behavior (Ajzen, 1985). The theory of reasoned action uses the concepts of attitude and social norm to explain how decisions are made. The theory of planned behavior adds the concept of perceived behavioral control (the perception of the control you have over the situation). These concepts influence the intention actors have, which in turn influences the actual behavior (Ajzen, 1985; Fishbein & Ajzen, 1975).

This appendix aims to briefly introduce variables that might influence these three main concepts (attitude, social norm and perceived behavioral control) and thus the choice for a specific form of behavior. These variables might have to be taken into account when the grammar is implemented in a simulation model or used by practitioners who want to shape perceptions.

The following variables could influence the choice for a form of behavior:

- Authority
- Availability of information
- Moral compass
- (Perceived) risk
- (Perceived) opportunity
- Willingness to take risks
- Personal credibility

The following sub-paragraphs explain the influence of these variables in the selection process.

Authority
The first variable that influences that choice is authority. Transactions require a certain level of authority to have the power to make the transactions happen. The assembly of an official committee for instance, requires formal authority. Therefore, transactions are only available to strategic agents, who have this power.

Availability of information
Availability of information is the second variable that influences the decision for a type of strategic behavior. Some strategic actors might only have information on the policy, or only information on facts or personal values. This highly influences the options at its disposal. When the strategic actor is willing to bluff, this variable will be less important.

Moral compass

The variables used so far have been about restrictions, what was possible or not possible in a certain situation. There are also probabilities playing a role in the choice for the type of action. The choice between a true or false statement will be made based on the moral compass of the strategic agent. Actors with a strong moral compass probably refuse to make false statements in order to reach their goals, while actors with a weaker moral compass might have the opinion that the end justifies the means.

Perceived opportunity and risk

The fourth and fifth variable that might influence the decision, are perceived opportunity and risk. Opportunity is the combination of utility and chance and risk the combination of negative impact and chance. When the strategic agent has decided whether a true or a false statement is going to be made, a choice has to be made for a specific statement. This choice is influenced by the perceived opportunity and risk of these statements, since the effects of the strategic behavior is influenced by these variables. These variables will be explained together, since a choice mostly comes down to a payoff (and thus trade-off) between the two.

A strategic agent evaluates the perceived opportunity of the statements at its disposal. The next step will be to evaluate the corresponding perceived risks of the statements with the highest opportunity. The opportunity and risk of the statements will be determined by their content. Every element of a statement will have a corresponding opportunity and risk. Some considerations on these variables are:

- Statements have a smaller risk than a transaction, but a transaction will have a higher opportunity. A strategic actor could lose his or her authority and credibility with a transaction, which is a risk. However, when this strategic behavior works, the opportunity is probably higher.
- Making unfounded statements will have a higher risk, than an anticipating statement for instance. Unfounded statements can be falsified, which damages the credibility of the strategic actor
- A true statement and a false statement will have similar utilities, but a false statement entails a much higher risk. When other actors find out the statement was wrong, the impact of the statement decreases as well as the credibility of the strategic actor.
- Statements on values will have a higher opportunity and risk than a factual statement. Factual statements appear less as an attack, which decreases the risk. On the other hand, successful attacks might have more impact.
- Statements with personal facts will have a higher opportunity, but also a higher risk than statements with impersonal facts, due to a similar reason as the difference between factual statements and statements with values: they appear less threatening.
- Behavior aimed at a conflictual actor will have a higher risk but a lower opportunity, compared to behavior aimed at a cooperative actor. Cooperative actors will be more willing to change their perception (for a more comprehensive description of this process, see paragraph 5.3) and less inclined to reveal and react on the strategic intentions.

- Delegitimizing as a goal will have a higher risk and similar opportunity compared to legitimizing. The actions will be perceived as an attack, which comes with a higher risk.
- The opportunity and risk that the objects entail will be dependent on the specific object. The opinion of the general public will be an important factor here: delegitimizing an unpopular group comes with a lower risk compared with delegitimizing a popular group for instance.

Willingness to take risks

The evaluation of the perceived risks is influenced by the willingness to take risks. Some actors might be willing to take higher risks to reach their goal. For instance, a strategic actor that experiences a certain problem might be willing to take higher risks compared with strategic actors that identify themselves with a victim group.

Personal credibility

A variable that influences the willingness to take risks is the personal credibility of the strategic agent. The higher the credibility of the agent, the lower the chance that the risk will have negative impact. However, this impact will be higher due to the loss of credibility. This relation can be illustrated by an example of a bluff. When a strategic actor with a high credibility bluffs, chances are higher that the bluff is believed, compared to a bluff made by a strategic actor with a lower credibility. When the statement is checked and falsified, the impact of the statement will diminish.

Appendix Q: Conceptual mechanism of strategy *bluffing*

This appendix presents the conceptual mechanism of the strategy *bluffing* as an addition to paragraph 5.1. The strategy *bluffing* can be used for achieving all eight goals that are identified in this study. The strategy invokes the concept of the truth: bluffing is about convincing actors by means of an unfounded statement. Thirteen out of the twenty five tactics could be used in the bluffing strategy, but they cannot be used for reaching every goal. The conceptual mechanism can be seen in figure 21.
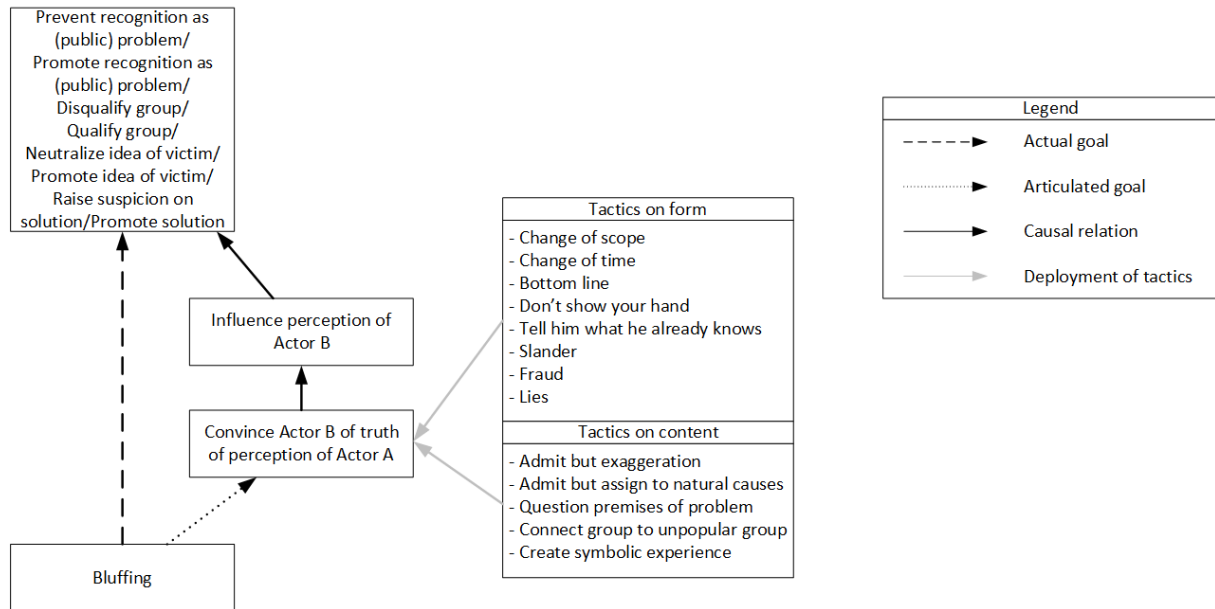

Figure 21: Conceptual mechanism of the strategy bluffing

Appendix R: Conceptual mechanism of strategy *framing and association*

This appendix presents the conceptual mechanism of the strategy *framing and association* as an addition to paragraph 5.1. The strategy *framing and association* can be used for achieving all eight goals that are identified in this study. The strategy invokes the concept of the truth: framing and association is about convincing actors by creating a specific connection between the problem, actor or policy and something else, which is beneficial for the strategic actor. Thirteen out of the twenty five tactics could be used in this strategy, but they cannot be used for reaching every goal. The conceptual mechanism can be seen in figure 22.
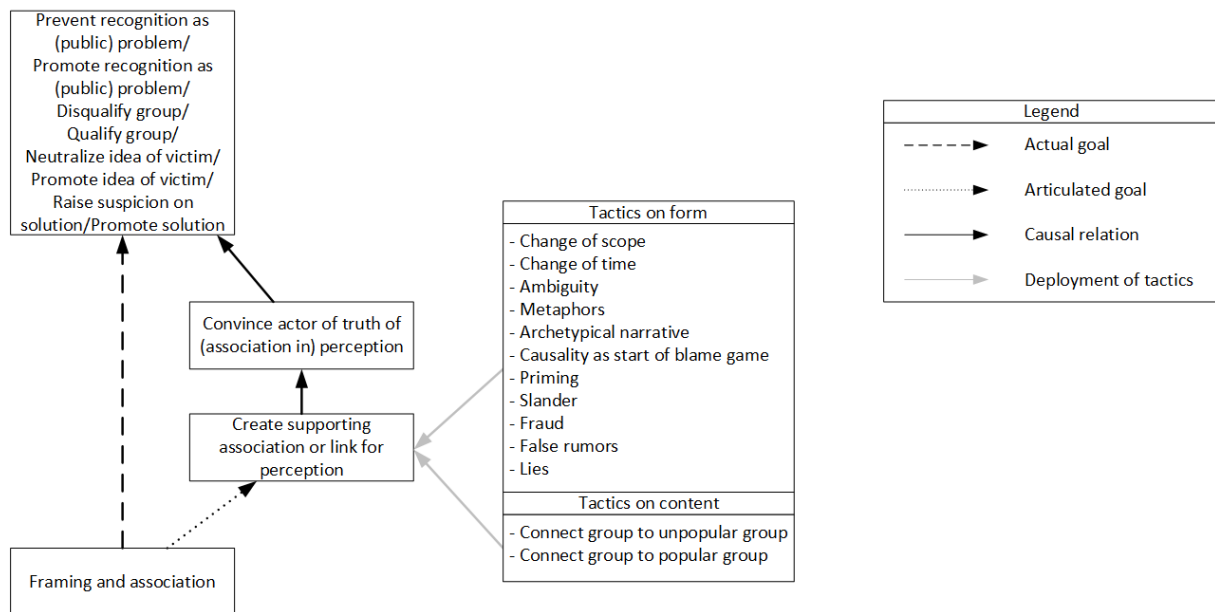

Figure 22: Conceptual mechanism of the strategy framing and association

Appendix S: Conceptual mechanism of strategy *framing and spinning*

This appendix presents the conceptual mechanism of the strategy *framing and spinning* as an addition to paragraph 5.1. The strategy *framing and spinning* can be used for achieving all eight goals that are identified in this study. The strategy invokes the concept of the truth: framing and spinning is about convincing actors by highlighting a specific element of the problem, actor or policy, which is beneficial for the strategic actor. Fourteen out of the twenty five tactics could be used in this strategy, but they cannot be used for reaching every goal. The conceptual mechanism can be seen in figure 23.
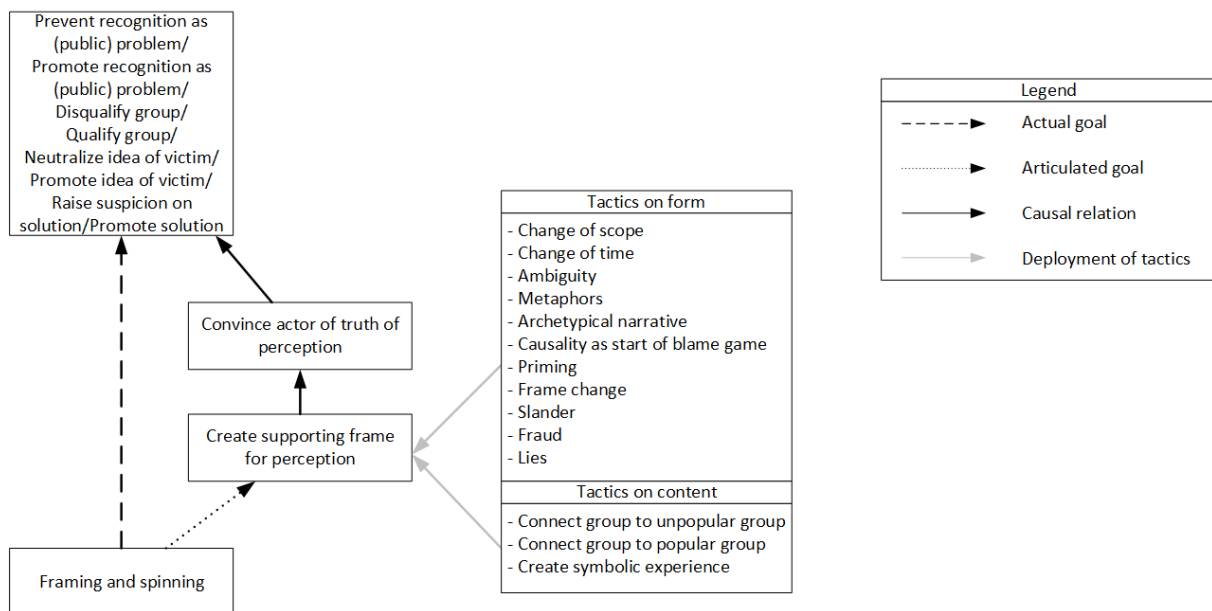

Figure 23: Conceptual mechanism of the strategy framing and spinning

Appendix T: Conceptual mechanism of strategy *showcasing*

This appendix presents the conceptual mechanism of the strategy *showcasing* as an addition to paragraph 5.1. The strategy *showcasing* can be used for achieving the goal *prevent recognition as (public) problem*. The strategy invokes the concept of necessity or urgency (when time also plays a role) besides the truth: showcasing is about convincing actors action-oriented behavior is being exerted. Seven out of the twenty five tactics could be used in this strategy. The conceptual mechanism can be seen in figure 24.
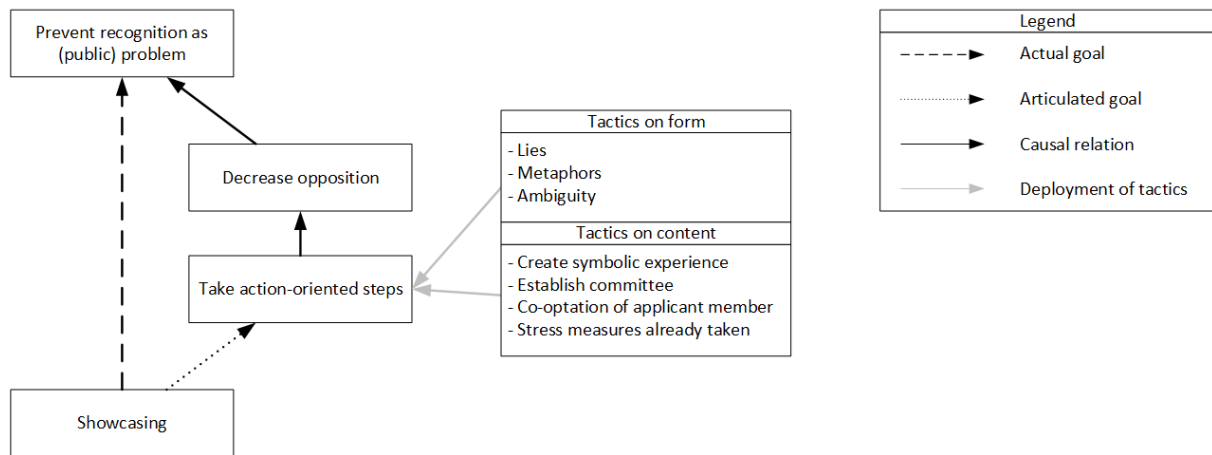

Figure 24: Conceptual mechanism of the strategy showcasing

Appendix U: Conceptual mechanism of strategy *question premises of the problem*

This appendix presents the conceptual mechanism of the strategy *question premises of the problem* as an addition to paragraph 5.1. The strategy *question premises of the problem* can be used for achieving the goals *prevent recognition as public problem, neutralize idea of victim and raise suspicion on solution*. The strategy invokes the concept of the truth: the foundation on which the problem is constructed is attacked. Twelve out of the twenty five tactics could be used in this strategy, but they cannot be used for reaching every goal. The conceptual mechanism can be seen in figure 25.
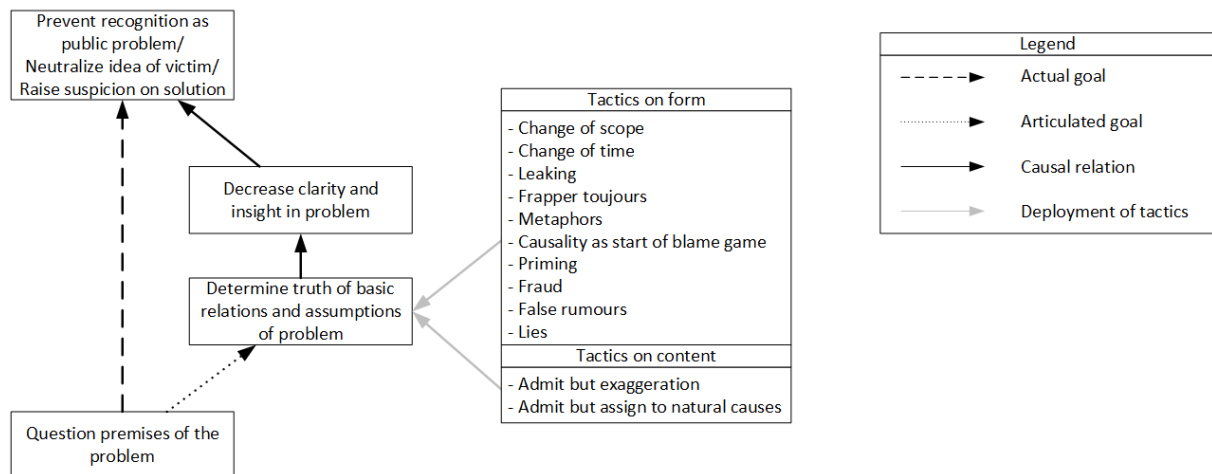
Figure 25: Conceptual mechanism of the strategy question premises of the problem

Appendix V: Conceptual mechanism of strategy *support premises of the problem*

This appendix presents the conceptual mechanism of the strategy *support premises of the problem* as an addition to paragraph 5.1. The strategy *support premises of the problem* can be used for achieving the goals *promote recognition as public problem, promote idea of victim and promote solution*. The strategy invokes the concept of the truth: the foundation on which the problem is constructed is supported. Nine out of the twenty five tactics could be used in this strategy, but they cannot be used for reaching every goal. The conceptual mechanism can be seen in figure 26.
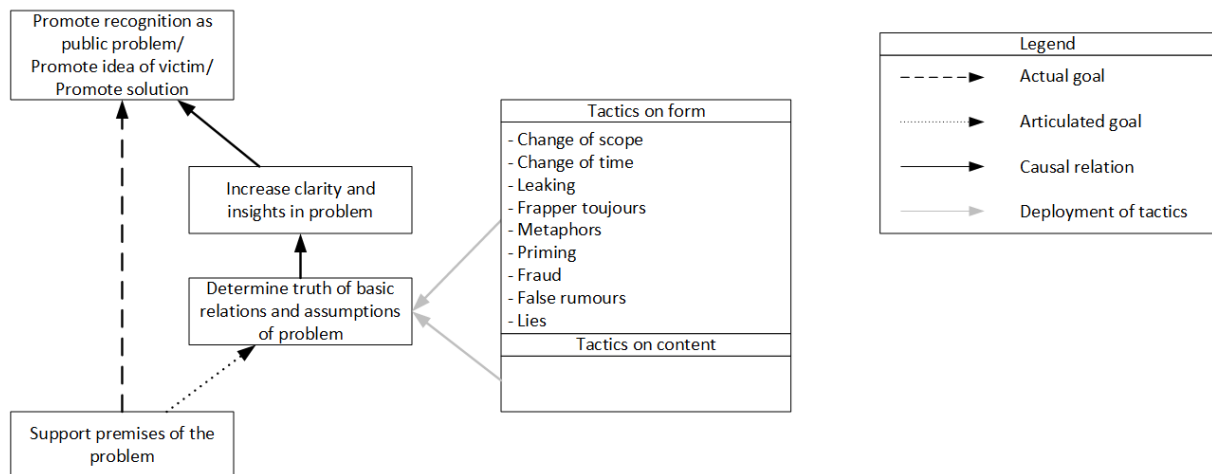

Figure 26: Conceptual mechanism of the strategy support premises of the problem

Appendix W: Conceptual mechanism of strategy *anti-patterning*

This appendix presents the conceptual mechanism of the strategy *anti-patterning* as an addition to paragraph 5.1. The strategy *anti-patterning* can be used for achieving the goals *prevent recognition as public problem, neutralize idea of victim and raise suspicion on solution*. The strategy invokes the concepts necessity and truth: the relation between multiple events is attacked. When this relation becomes uncertain, the necessity of addressing it as one problem and the expediency of the solution decreases. Eight out of the twenty five tactics could be used in this strategy, but they cannot be used for reaching every goal. The conceptual mechanism can be seen in figure 27.

Figure 27: Conceptual mechanism of the strategy anti-patterning

Appendix X: Conceptual mechanism of strategy *create a pattern*

This appendix presents the conceptual mechanism of the strategy *create a pattern* as an addition to paragraph 5.1. The strategy *create a pattern* can be used for achieving the goals *promote recognition as public problem*, *promote idea of victim and promote solution*. The strategy invokes the concepts of necessity and truth: the relation between events is strengthened, to increase the necessity of addressing it as one problem or prove the expediency of the solution. Nine out of the twenty five tactics could be used in this strategy, but they cannot be used for reaching every goal. The conceptual mechanism can be seen in figure 28.
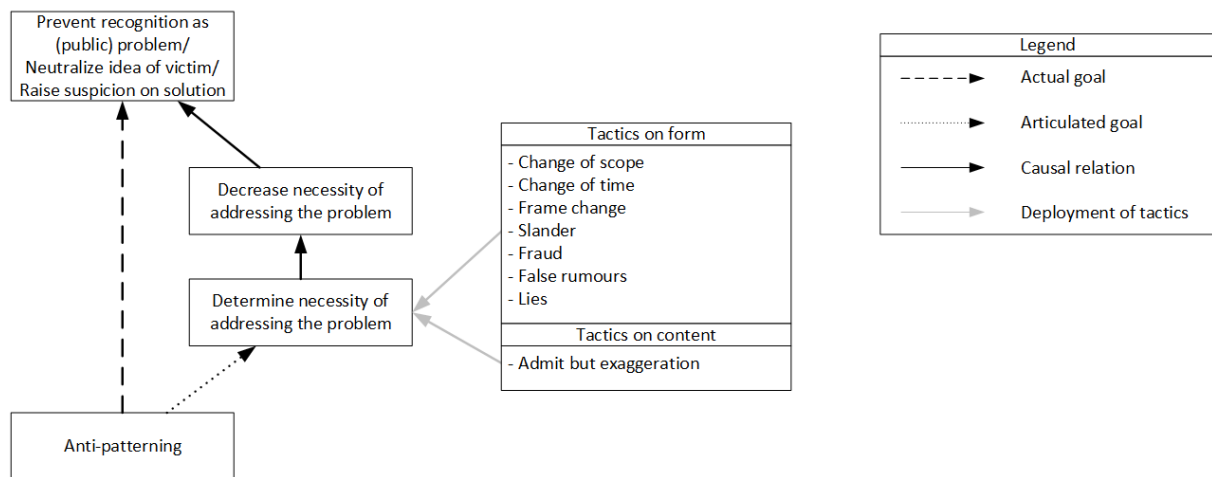

Figure 28: Conceptual mechanism of the strategy create pattern

Appendix Y: Conceptual mechanism of strategy *hold others responsible for problems*

This appendix presents the conceptual mechanism of the strategy *hold others responsible for problems* as an addition to paragraph 5.1. The strategy *hold others responsible for problems* can be used for achieving the goals *promote recognition as public problem and promote idea of victim*. The strategy invokes the concept of responsibility, besides the concepts of truth and necessity: actors are responsible for causing the problem and something has to be done about it. Thirteen out of the twenty five tactics could be used in this strategy, but they cannot be used for reaching every goal. The conceptual mechanism can be seen in figure 29.
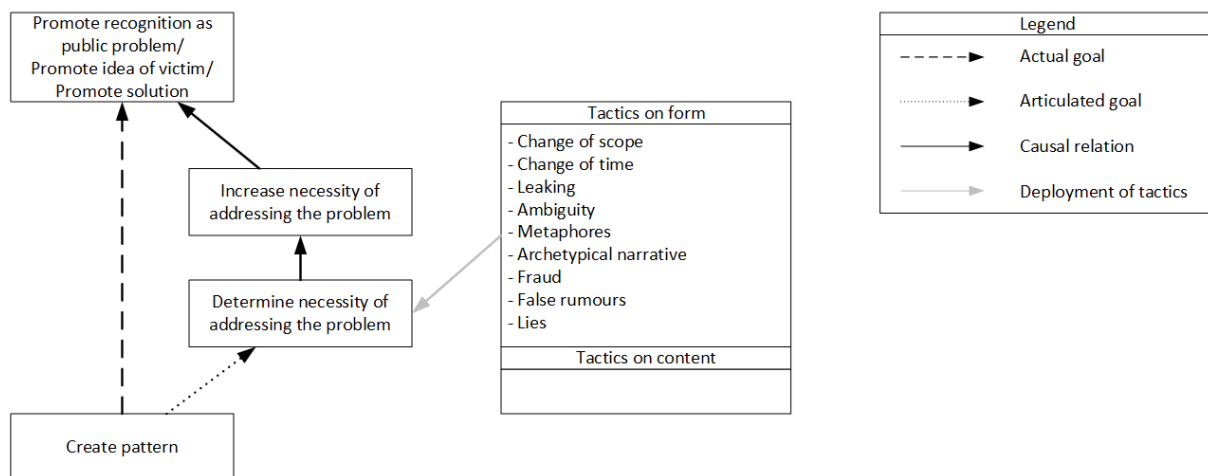

Figure 29: Conceptual mechanism of the strategy hold others responsible for problems

Appendix Z: Conceptual mechanism of strategy *hold responsible for own problems*

This appendix presents the conceptual mechanism of the strategy *hold responsible for own problems* as an addition to paragraph 5.1. The strategy *hold responsible for own problems* can be used for achieving the goals *prevent recognition as public problem, disqualify group and neutralize idea of victim*. The strategy invokes the concepts of responsibility, necessity and truth: the strategy aims to hold the actors that experience the problem responsible for causing the problem. Eight out of the twenty five tactics could be used in this strategy, but they cannot be used for reaching every goal. The conceptual mechanism can be seen in figure 30.
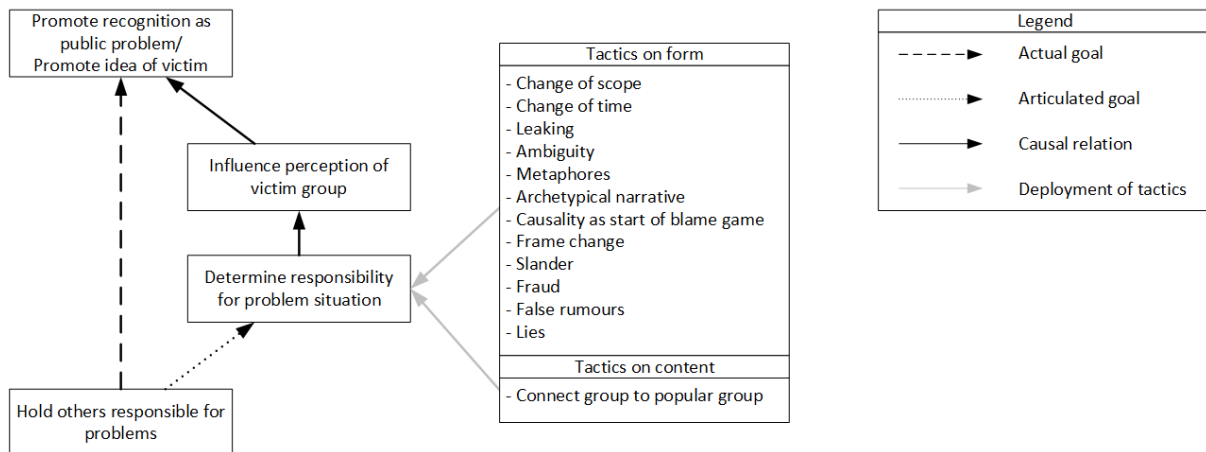

Figure 30: Conceptual mechanism of the strategy hold responsible for own problems

Appendix AA: Conceptual mechanism of strategy *question morality*

This appendix presents the conceptual mechanism of the strategy *question morality* as an addition to paragraph 5.1. The strategy *question morality* can be used for achieving the goals *disqualify group and neutralize idea of victim*. The strategy invokes the concepts of morality, necessity and truth: by questioning the morality of the actors experiencing the problem, the necessity of addressing the problem decreases. Eleven out of the twenty five tactics could be used in this strategy, but they cannot be used for reaching every goal. The conceptual mechanism can be seen in figure 31.
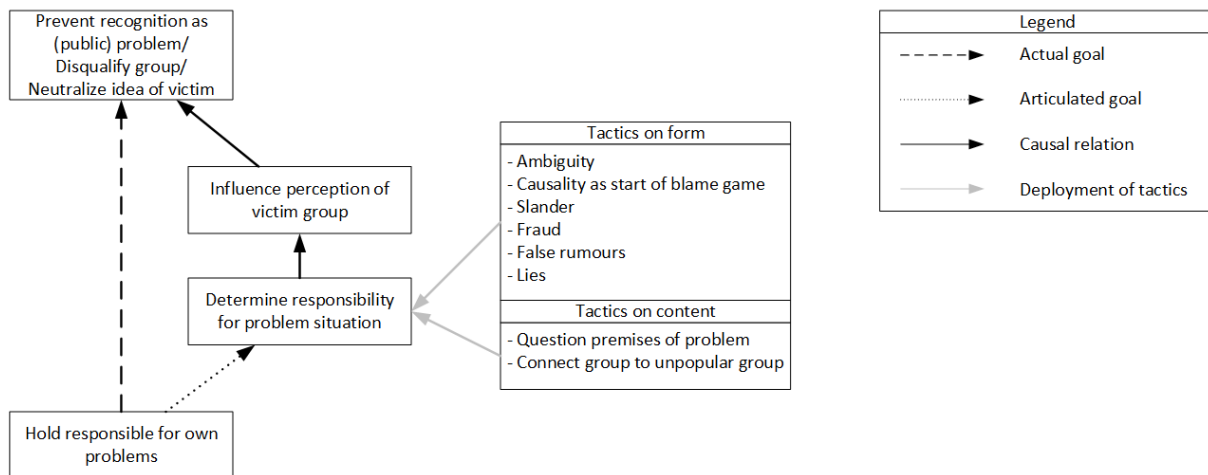

Figure 31: Conceptual mechanism of the strategy question morality

Appendix BB: Conceptual mechanism of strategy *promote morality*

This appendix presents the conceptual mechanism of the strategy *promote morality* as an addition to paragraph 5.1. The strategy *promote morality* can be used for achieving the goals *qualify group, promote idea of victim and promote solution*. The strategy invokes the concepts of morality, necessity and truth: by promoting the morality of the actors experiencing the problem, the necessity of addressing the problem increases. Ten out of the twenty five tactics could be used in this strategy, but they cannot be used for reaching every goal. The conceptual mechanism can be seen in figure 32.
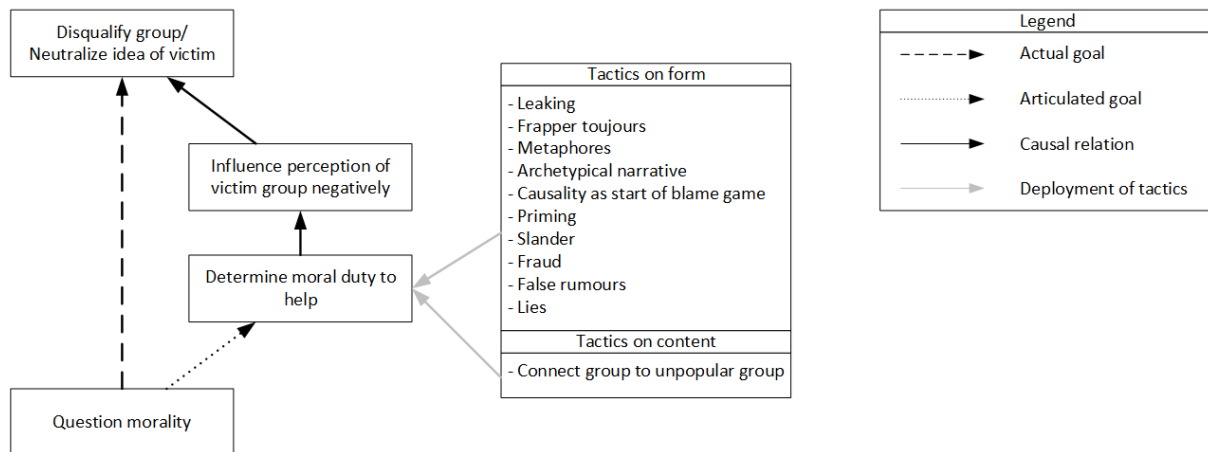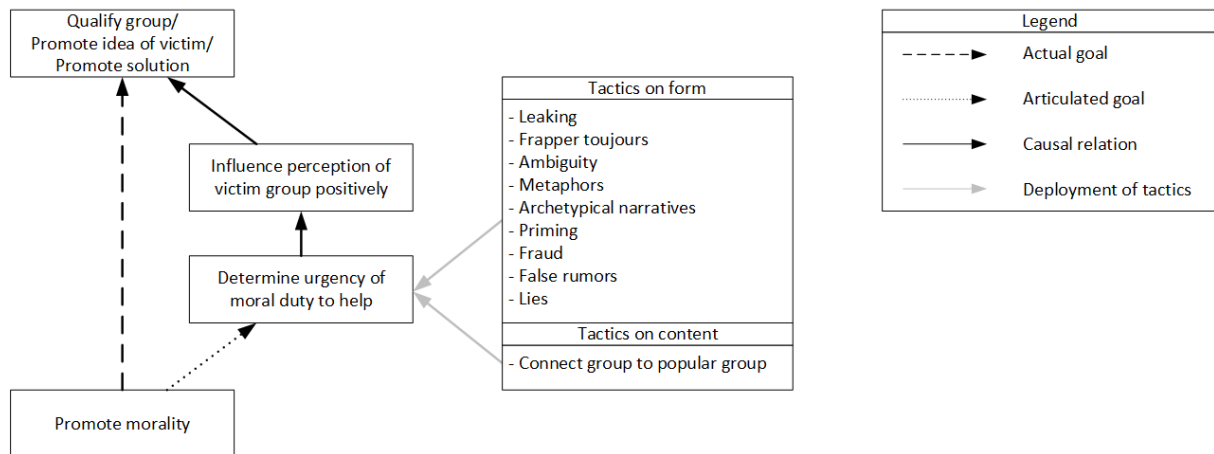

Figure 32: Conceptual mechanism of the strategy promote morality

Appendix CC: Setup of agent-based model with strategic behavior grammar.

This appendix describes a first setup of an agent-based model, used to study the influence of strategic behavior on agenda setting processes, as an addition to paragraph 6.1. To show how the use of the algorithm might work, this paragraph will extensively describe how such a model would look like. For instance, the algorithm could be used in an agent-based model, created in the programming language Netlogo (Wilensky, 1999), aiming to investigate the impact of strategic behavior on agenda setting. The following research question could be answered with such a model:

Does strategic behavior distort the agenda and under which conditions does this occur?

An agent-based model consists of social agents with states and behavioral rules, interaction between these agents and the environment (see figure 33). Time can also play an important role (van Dam et al., 2013).

The model will have two different types of agents: strategic agents and non-strategic agents (addressed as the influenced actors in this study) in charge of the agenda. The aim of the strategic agents will be to have their problem on the agenda by influencing and convincing the non-strategic agents in charge of the agenda.

Every non-strategic actor has a perception, consisting of a 3-tuple that represents facts, causal relations and values, of an arbitrary amount of elements in the three streams identified by Kingdon (1995). The non-strategic actors thus perceive an arbitrary amount of problems, policies and politics, which is reduced to interest groups in this specific case. Every problem
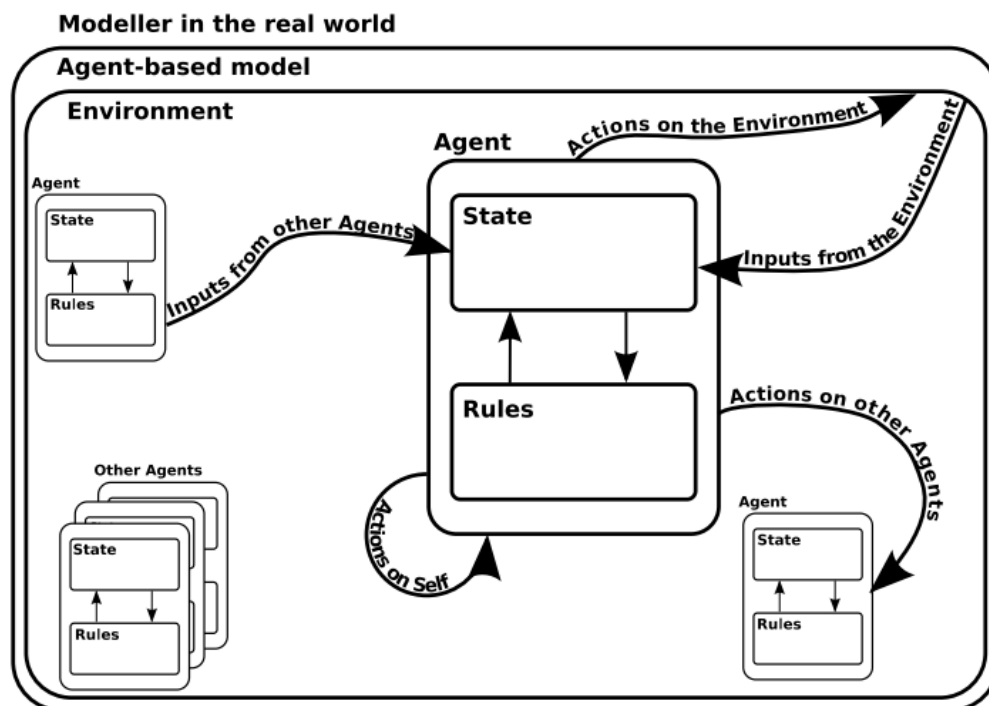

Figure 33: Visual representation of the dynamics in an agent-based model

relates to a policy and an interest group (unlike Kingdon (1995) in which policies could be used to solve different problems).

The values of the 3-tuple of problems relate to the necessity of addressing the problem, between 0-10. The values of the 3-tuple of policies relate to the expediency of these policies for solving the related problem, between 0-10. The values of the 3-tuple of politics describe the credibility of and moral duty to help the interest groups related to the problem (which is similar to the identification group of Cobb & Elder (1985)), between 0-10. The non-strategic agents merely perceive the actions of the strategic agents, (possibly) adapt their perception and construct an agenda. The construction of the agenda will take place at the end of every tick after an arbitrary warm-up period, in which strategic actors can influence the perceptions. A topic reaches the agenda when the average of the tuple values of the perception of every stream element (the corresponding problem, policy and interest group) reaches a value higher than 8. The values of these tuples start at their actual height, resembling the necessity, expediency and credibility/moral duty in reality.

Every strategic agent will behave strategically in order to have his problem on the agenda, or prevent a problem from reaching the agenda. A strategic agent will not be equal to an interest group, he is merely driven by their cause. Strategic agents will try to legitimize or delegitimize elements of the 3-tuple corresponding with a problem, policy or interest group via actions generated with the strategic behavior algorithm.

The strategic agents will be linked to a problem, of which they try to influence the perception, and a direction to which they want to steer the perception (up or down, legitimize or delegitimize). Therefore the strategic agents will have a string-type variable in which their problem is stored. A Boolean-type variable will describe whether their aim is to legitimize or delegitimize this problem. Strategic agents who want to legitimize the problem will have to legitimize all three streams in order to reach the agenda, while strategic agents who want to delegitimize the problem only have to delegitimize one of the streams. A problem only reaches agenda status when the three streams are legitimized and therefore above the value 8. When the aim is to delegitimize the problem, only one of the streams has to be below this value of 8 in order to be successful.

A strategic agent aiming at legitimizing a problem will first look for a target, which could be the problem, policy or interest group. The choice for a target could be one of the following:

- A strategic agent chooses the stream, which average values related to the perception of the stream by the non-strategic agents are the lowest: this target needs the most attention.
- A strategic agent chooses the stream, which average values related to the perception of the stream by the non-strategic agents are closest to but under the threshold: this is a quick win.

Both options assume that the strategic agent has full knowledge, that the agent knows the average values of the streams corresponding to his problem. When the agent does not have full knowledge, the choice can be made randomly.

A strategic agent aiming at delegitimizing a problem also first identifies his target. His choice for a target could be one of the following:

- A strategic agent chooses the stream, which average values related to the perception of the stream by the non-strategic agents are the lowest: this makes sure that these values never reach the threshold.
- A strategic agent chooses the stream, which average values related to the perception of the stream by the non-strategic agents are the highest: this increases the amount of average values above the threshold (if any are above the threshold at all), increasing the amount of targets that have to be legitimized.

After identifying a target, the strategic agent has to select which type of strategic behavior he is going to exert. This is where the algorithm is applied, ensuring that the entire behavior space is explored. However, there are several choices to be made. When the aim is to legitimize a problem, the only available option serving the goal is communication. Transactions could only aim to delegitimize the problem. When the aim is to delegitimize a problem, the choice has to be made between communication and transaction.

The choice between executing a transaction or communication will be made based on authority. Transactions require a certain level of authority to have the power to make the transactions happen. Transactions are only available to strategic agents, who have this power. The variable authority will be a Boolean-type variable.

Availability of information is another variable that influences the decision for a type of strategic behavior. Some strategic actors might only have information on the policy, or only information on facts or personal values. This highly influences the options at its disposal. Availability of information will be a string-type variable indicating no limitations, or a specific limitation on available information, such as "personal" or "values".

The used variables so far have been about restrictions, what was possible or not possible in a certain situation. There are also probabilities playing a role in the choice for the type of action. Every possible form of strategic behavior will have a corresponding perceived opportunity and perceived risk (all integer-type variables between 0-10) and statements will also have a truth indicator (Boolean-type variable).

The choice between a true or a false statement will be made based on the moral compass of the strategic agent. This moral compass will be a integer-type variable with a value between 0-10. The higher the moral compass, the lower the chance the strategic agent makes a false statement.

When the strategic agent has decided whether a true or a false statement is going to be made, the choice has to be made which specific statement. This choice is made using the perceived opportunity and risk of these statements. Strategic agents evaluate the perceived opportunity of the statements at its disposal and choose the three statement with the highest opportunity. Then the corresponding perceived risks are evaluated. The evaluation of the perceived risks is influenced by the willingness to take risks, an integer-type variable of strategic agents between 0-10. The higher the willingness to take risks, the higher the risk the agent is willing to take.

The opportunity and risk of the statements will be determined by their content. Every element of a statement will have a corresponding opportunity and risk. A statement will have a smaller risk than a transaction, but a transaction will have a higher opportunity. Making a statement unfoundedly will have a higher risk, than an anticipating statement. A true statement and a false statement will have similar utilities, but a false statement entails a much higher risk. Statements on values will have a higher opportunity and risk than a factual statement. A statement with personal facts will have a higher opportunity, but also a higher risk than a statement with impersonal facts. Behavior aimed at a conflictual actor will have a higher risk but a lower opportunity, compared to behavior aimed at a cooperative actor. Delegitimizing as a goal will have a higher risk and similar opportunity compared to legitimizing. The opportunity and risk that the objects entail will be random, due to the fact that this depends on the object.

The opportunity and risk can be calculated via the following formula:

$R_{total} = R_B + R_{BM} + R_{Boolean} + R_S + R_{SM} + R_{AM} + R_G + R_O$

$O_{total} = O_B + O_{BM} + O_{Boolean} + O_S + O_{SM} + O_{AM} + O_G + O_O$

With:

- R_B / O_B = Risk or opportunity corresponding with the type of behavior
- R_{BM} / O_{BM} = Risk or opportunity corresponding with the behavior modifier
- $R_{Boolean} / O_{Boolean}$ = Risk or opportunity corresponding with a true or false statement
- R_S / O_S = Risk or opportunity corresponding with a type of statement
- R_{SM} / O_{SM} = Risk or opportunity corresponding with a statement modifier
- R_{AM} / O_{AM} = Risk or opportunity corresponding with an actor modifier
- R_G / O_G = Risk or opportunity corresponding with a goal (legitimize or delegitimize)
- R_O / O_O = Risk or opportunity corresponding with an object (problem, policy or actor)

This formula takes direct influence into account and neglects interaction effects. This is caused by the limited insights in the interaction effects. Future work should be aimed at improving these formulas and the estimation of risk and opportunity of the forms of strategic behavior.

A variable that influences the willingness to take risks is the personal credibility of the strategic agent, an integer-type variable between 0-10. The higher the credibility of the agent, the lower the chance that the risk will have negative impact. This negative impact will decrease the personal credibility of the agent, which decreases the impact of the strategic behavior. The choice for a form of strategic behavior will be a trade-off between opportunity and risk. How the strategic actors make this choice will be influenced by their willingness to take risks.

The impact of the statements lies in the processing of these statements by the non-strategic actors. They will have three options in processing these statements according to Das, Gollapudi, & Munagala (2014), namely stubborn processing, compromising and conforming (see paragraph 4.2 for a more comprehensive description of these processes). The higher the

credibility, the higher the chance that conforming occurs. The lower the credibility, the higher the chance stubborn processing takes place.

Stubborn processing does not influence the perception of the non-strategic actors. They perceive the statement, but do not act on it. Compromising does influence their perception: the average of their perception and the value 9 will be the new perception of the targeted value of the tuple (the strategic actors could target facts, causal relations or values). When conforming takes place, the value of the tuples is increased to 9, above the threshold of reaching the agenda.

The environment does not play any role in this model. There is no ordering of the agents in the environment that influences the outcome, nor does the environment itself have any influence on the model outcomes.

Time does play a role in this model. Every tick the strategic actors have the opportunity to influence the perception of the non-strategic actors on their problems. Furthermore, time also influences the perception of the non-strategic actors. When a problem has been around for some time, but has not reached agenda status yet, the attention for the problem will diminish as stated by the issue-attention model of Downs (1972). The effect in the model will be that every 5 ticks every value of the 3-tuple of perception will decrease with 1. The total duration of the model will be 50 ticks.

The objects in this model and their relations are visualized in a UML class diagram in figure 34 (Rumbaugh, Jacobson, & Booch, 2004). This gives a visual representation of the different objects and their attributes, which improves the understanding of the model. In this UML class diagram there are three different relations: association, generalization and aggregation. Association are relations, which are described with words and no arrowheads. Generalization is a relation that indicates that one class is an example of another class. This relation is indicated with an empty arrowhead and the class on the side of this arrowhead is the super class. In this figure the agent is a super class and non-strategic agent a sub-class. The aggregation relation describes a relation between a part and a whole, where the whole can also exist without any of the parts. This relation is indicated with a black diamond-shaped arrow, with the whole at the end of the arrow. In this example there is an agenda (whole) that consists of problems (parts).

The dynamics of the model are summarized in figure 35. The variables related to the strategic actor influence the choice for the type of strategic behavior and the choice itself is a trade-off between the opportunity of the behavior and the corresponding risk. The action will cause impact, which influences the perception and therefore the agenda status. Time decreases the perception of problems that have not reached agenda status yet.

This model can be used in order to answer the following research question:

Does strategic behavior distort the agenda and under which conditions does this occur?

The distortion of the agenda can be measured by calculating the difference between the values of the 3-tuples of necessity (facts, causal relations and values related to problem), expediency

Figure 34: UML class diagram of the proposed agent-based model

(facts, causal relations and values related to policy) and credibility/moral duty (facts, causal relations and values related to interest group) at the beginning and at the end of the simulation in percentages.

It should be noted that the setup of the actual model influences the results greatly. This has to be kept in mind when analyzing the results. However, it can be a first step in understanding the dynamics of agenda setting and the impact of strategic behavior on the agenda setting process.
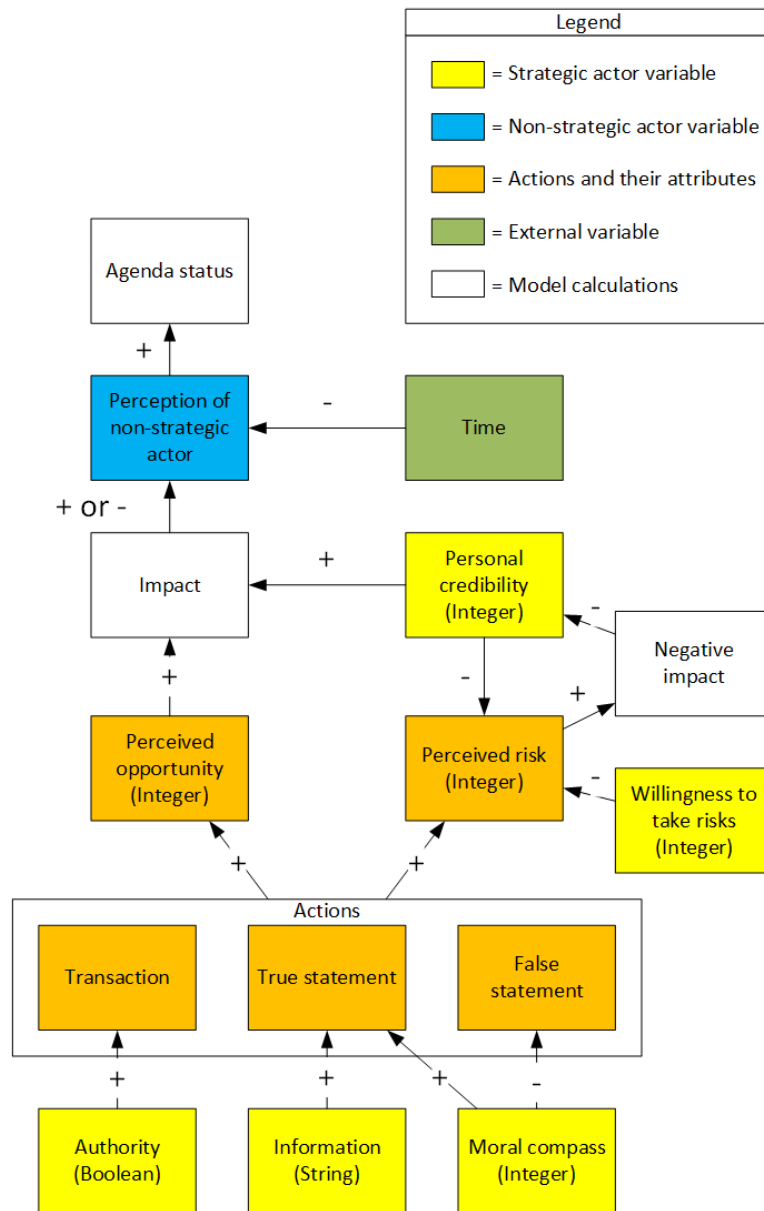
Figure 35: Schematic overview of the dynamics in the proposed agent-based model