Mapping political discourse: An application of network visualization to textual records of legislative deliberations

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Abstract—In political science, one strand of research on agenda setting concerns the politics of choosing and defining problems for policy action. While theory deals with both strategies for agenda control at the individual level and the dynamic of agenda change at the aggregate level, existing quantitative analysis remains confined to the latter. This deficiency prevents scholars from testing empirical observations about the micro-macro link between behaviors and outcomes. With a view to closing this analytical gap, this paper describes our application of network visualization as a first step to realizing the aggregate structure of local interactions between participants of in the legislative process. It concludes with some preliminary outputs generated from a dataset of published chamber deliberations in the French national legislature .

I. INTRODUCTION

Agenda setting research in political science deals with the politics of choosing and defining problems for policy action. At one level, since more issues emerge than there is time to address them all, deciding which of the few issues out of a practically infinite set should receive attention is a chief source of conflict [?] (Walker 1977; Kingdon 1984; Baumgartner and Jones 1993; Jones 2001). While some actors want an issue to be put forward for discussion so that they can contest and alter existing policies, others may wish to keep that issue away from the agenda so as to protect the status quo from the sceptics (Schattschneider 1960; Pralle 2006). At the other level, how the issues are portrayed is just as important as what issues are being brought up for discussion (Chong and Druckman 2007a; Baumgartner and Jones 2009).

In pluralistic communities, competing interests use different ideas and values to construct their own policy narrative (Chong and Druckman 2007b; Dery 2000). The ability to marginalize narratives different from their own enables advocates to sustain a policy regime most compatible with their interests (Rochefort and Cobb 1993).

To tease out the mechanisms of agenda setting, much of the research falls on the strategies and calculations of actors who engage in the contest (Cobb and Elder 1972; Rochefort and Cobb 1994), the cognitive and informational basis of agenda change (Jones 2001), the general institutional environment regulating agenda formation and revision (Kingdon 1984; Jones and Baumgartner 1993; Workman, Jones, and Jochim 2009), and the broad patterns of agenda change (Downs 1972; Baumgartner and Jones 2003). However, existing research has vet to take a systematic look at the micro-macro link between the disparate actions pursued by individual actors and the macro-level trends of agenda change (e.g. Princen and Rhinard 2006). Though often supported by supplemental case studies, most quantitative analyses of agenda setting are confined to broad descriptions of the aggregate dynamic of agenda change (Kingdon 1984; Sabatier 1997; Baumgartner and Jones 2009 ; Jones, Sulkin, and Larsen 2003).

Although theorists seek to make sense of agenda setting with reference to activities occurring across entire political systems (Berger 2001; Soroka 2002; Jones and Baumgartner 2004), legislative activities have often provided the key indicator for agenda outcomes in the literature (John 2006b). We follow this practice and attempt to unpack the micro-macro link in agenda setting processes by focusing on the legislature as the nexus of the agenda setting processes (Brninger and Debus 2009). In other words, we are interested in the agenda setting process as it unfolds in legislative deliberations. These deliberations, in sum, form a body of discourse from which we can learn about the interconnections between policy topics and how individual actors interact with others in setting the agenda. Given such a dataset, the challenge is to organize the relationships in a way that allows scholars to reconsider agenda dynamics in terms of the microfoundations in general and formulate new hypotheses about the emergent properties of policy agendas in particular.

Following the example of the growing scholarship on political communication (e.g. McKelvey et al. 2012; Vespignani 2011; Conover et al. 2011) and network analysis of political data (e.g. Fowler 2006), this paper describes our attempt to represent legislative discourse as networks. The network

¹The current visualization outputs are produced in a very short time frame and much of the information about the nodes is yet to be incorporated into the graphs. With a clear strategy for further analysis, we can expect substantial improvements at the time of presentation. In addition, we will expand the dataset to cover the tenth, eleventh, and twelfth legislative cycles (1995-2007) and use network statistics to substantiate the interpretation of the visual outputs.

paradigm affords a new way to conceive the link between micromotives and macrobehavior in complex social systems (Schelling 2006; Mitchell 2006). It is our intention to capture the overall clustering pattern of actors involved in agenda setting in the legislative process so that we can develop an effective way to systematically review untested intuitions and hypotheses about policy agendas using the network terminology. We have three forms of interaction in political discourse: one between the individuals taking part in the discourse, one between the individuals and the discourse events that they choose to take part in, and one between the discourse events. Each gives different insights on the social dynamics and contexts of agenda setting. We explain below how each of these forms of interaction can be inspected through network visualization.

II. NETWORK VISUALIZATION

We propose to examine the theoretical expectations outlined above using network visualization in the following three approaches.

A. Actor-to-event network

Contentious issues are expected to draw a relatively diverse set of actors, as participation diversity is indicative of agenda setting activities. Skeptics of the policy regime attempt to discredit the current arrangement while its supporters counter these criticisms by reiterating their narrative (Pralle 2006; Rochefort 1993). On the other hand, issues that are less contentious are relegated to the margin of agenda, where only a few advocates may claim ownership and feel interested to allocate attention to the subject matter. In addition, since actors choose issues to differentiate themselves from others on political spectrum (Slothuus and de Vreese 2010), different issues are expected to draw unique sets of actors. However, some overlapping is expected as some issues affect the interests of the same social and political groups, with some scholars arguing that partisanship is only relevant to some issues (Baumgartner et al. 2009).

To explore these expectations in the network paradigm, we represent discourse events and the actors who participate in these events as two types of nodes. Nodes that represent discourse events, such as legislative hearings, are connected to nodes that represent actors who participated in the events. The first proposition that issue contentiousness predicts the diversity of participation can be reflected by the variation of promiscuity of the nodes representing different events, such that a handful of nodes should be connected with actors belonging to a wide range of political affiliations while others have relatively homogeneous actors as neighbors in the network. The second proposition that issues have non-overlapping constituencies can be reflected by the extent that the clustering pattern is indicative of the behavioral tendency to selectively participate in discourse events based on issues.

B. Actor-to-actor network

Theories of policy ownership and policy advocacy (Sabatier and Jenkins-Smith 1993) lead us to the expectation that the network aggregated from actors will align with political memberships. Since political actors claim ownership over specific policy issues to differentiate themselves from rivals, legislative debates about these 'owned' issues will draw attention from the same 'owners' over time. If this behavioral specification in political discourse is correct, actors will find themselves interacting with the same set of actors over the same set of issues. However, counter-arguments have been raised in the literature. It is also possible, at least for some issues, to draw attention from a much wider range of actors. In the extreme, there is no particular clustering pattern, as actors do not confine themselves to any particular issue. These two possibilities mirror the theoretical debate over the partisan neutrality thesis in policy agendas studies (Baumgartner, Brouard, Grossman 2009).

With the edges between the nodes representing coparticipation in discourse events, the actor-to-actor network derived from actor-event interaction is expected to have high modularity. The community will be dominated by a few larger components comprising of actors who participate in meetings that concern controversial issues. There should also be small components, each containing small communities of actors interested in marginal issues. Like the actor-to-event network, the actor-to-actor network will reveal a social structure based on shared issue interests: actors are located in the same component because they participated in chamber deliberations in the same meetings or in meetings that draw on similar participants. Actors who are located in different components participate in an non-overlapping set of discourse events. The modularity of the

C. Event-to-event

In the context of policy agendas, discourse events are occasions where actors come together to elaborate on issues and policy topics. Since these events are topic-specific, actors participating in the deliberations are required to share their views on the same issue. Yet, the multidimensionality of issue frames often means that such a strict separation between issues can only be an artificial division which hardly reflects the interconnectedness of issues due to shared values, contexts, and interests (Jones 2010). Knowing whether a discourse event is close to another facilitate the investigation on how the multiple dimensions of different issues may structure the whole body of discourse by supplying similar symbols and values to the construction of frames across events dedicated to different topics.

The theory of issue framing as a rhetorical exercise considers the social and political context as the source of values and ideas with which the frames are constructed (Rochefort and Cobb 1994). Some structural particularities can be expected based on the debate over the nature of policy issues as multidimensional, social constructs. Event-to-event edges are indicative of shared attention; the more closely two events are connected, the more likely the events are discussed in similar terms and contexts. By contrast, events that occupy very different locations in the network invite dissimilar sets of actors. This structural pattern may help us reveal the latent dimensions of issue frames by combining appropriate analysis of the speeches delivered in both the proximate and distant discourse events.

In conclusion, network visualization will guide the development of some testable hypotheses about policy agendas and issue framing in the terminology of network analysis. At the current stage, we have generated a dataset

III. DATA AND PRELIMINARY RESULTS

The dataset is extracted from the corpus of parliamentary debates compiled from the published chamber remarks of the thirteenth legislative cycle of the National Assembly of France. Our dataset runs from 26 July 2007 to 30 June 2011, and contains a total of 969 sessions. Each document of the corpus contains verbatim chamber remarks delivered by the MPs, ministers representing the administration, and other policy stakeholders from outside the government who chose to take part in the deliberations. A session may cover a single or multiple topics; sometimes the entire session is dedicated to one issue, while at other times a medley of topics is dealt with in a single session. The documentation procedure follows this structure by listing chamber remarks in order of delivery and then break the whole session into sublists by the topic on which the speeches were made. This presentation structure allows us to determine the information for (1) grouping chamber remarks based on the time of delivery and (2) tagging each speech with the political and biographical information of the speaker and (3) associating the meetings with specific participants based on participation.

With this information, a bipartite edgelist with 1,051 unique participants and 7,767 unique discourse events is developed. Apart from network information, we are also in the process of extracting biographical and political data of the participants in the chamber deliberations, such as party affiliation, gender, age, and constituency composition (in the case of the MPs), as well as the contents of the parliamentary sessions from official publications. We propose the following network representations of the political discourse with reference to the theoretical and methodological issues cited above.

While the literature on policy agendas is dominated by the studies of the U.S., there is a growing interest in overseas cases (John 2006b). In France, several research projects have shown the comparability of the agenda dynamics under constitutional arrangements much different from those in the U.S., yet the system exhibits the same agenda dynamics observed in the U.S. (Baumgartner, Foucault, and Franois 2006). Studying parliamentary discourse of the French National Assembly is consistent with the current effort by policy agendas scholars to examine French politics as a comparison to the U.S. system.

This visual representation of the actor-to-actor network,fig1, shows some expected properties of the legislative discourse in the French parliament. The many actors involved in legislative deliberations are highly unequal in terms of the frequency, i.e. how often an actor speaks in the chamber, and the importance of the discourse events they participate, i.e. how many of the



Fig. 1. Actor-to-actor network

other participants in the discourse pay attention to each of the discourse events an actor is involved in. Located centrally in the network are actors whose participation in legislative deliberations is regular and frequent. The discourse events they take part in are also important - their centrality is an indication that those events drawn attention from a large portion of the network community. These region of the network is occupied by important lawmakers who are senior members and hold strategic positions in the legislative institutions, such as a membership on the finance committee. In terms of policy agendas, the network centrality of these actors may have a positive impact on their ability to control the policy agenda and manipulate policy frames.

In between the core region and the margins of the network are those actors whose participation is less frequent and regular. The discourse events they take part in are less relevant for the majority of the network community, perhaps events that deal with issues of low political salience. These actors include more junior members of parliament and government officials whose participation is relatively infrequent. Young lawmakers may choose to focus on their constituency while officials do not get involved in parliamentary operations unless invited to answer questions and explain legislative proposals. Generally speaking, the ability for them to control the policy agenda and manipulate issue frames is undermined by the peripheral location, but at the same time the distance from the network core may enable them to embrace alternative views of issues. Lastly, there are many actors who are located in the peripheral region of the network. These actors take part only a few times in the legislative discourse. Their sporadic involvement means that they can only have minimal impact



Fig. 2. Actor-to-actor network in committee

on the agenda processes inside the legislature. Yet, it would be interesting to see whether they involvement coincide with major shifts in issue frames or policy agendas as they may only take part in the deliberations strategically given the scarcity of participation opportunities.

This graph, fig2, shows how the actors, color-coded based on committee membership, are linked to each other. We plan to use the same method for other political variables, such as partisanship, length of tenure, and location of constituency. If a variable determines how actors choose to take part in the discourse, we expect the distribution of nodes to follow the clustering pattern of the network. Here, for example, members of the finance committee - a very central body in French politics - occupies central locations on the graph.

Pending analyses

These initial outputs only show us the basic clustering patterns of interactions. They can only be fully understood, however, with information about the actors and the events. To build on these initial outputs, we need to ascertain whether the network representations of the legislative discourse interact with major political, institutional, and contextual variables that are known to influence policy agendas. Below is a brief outline of how this can be achieved.

1. We will incorporate political and biographical data of participants into the visualizations. Decisions to participate in a particular discourse event may be related to the actors political and personal parameters, such as seniority, constituency composition, voting margin (seat security), partisanship, committee membership, and age. If actors similar in any of these respects cluster together, we can develop some testable hypotheses that the variables in question can predict attention allocation to the issues (Bruninger and Debus 2009). The associated tests can help us understand the interaction between the private considerations (captured by the personal parameters such as age, education, and gender) and the political considerations (captured by political parameters such as partisanship, constituency composition, and committee membership) in shaping expressed issue preference. This also links up our project to the theory of source cues (identity of the issue framers) in issue frames (Hartman and Weber 2009).

2. We will categorize each discourse event based on a nomenclature of policy rubriques, or issue topics, supplied by the archival services of National Assembly. A report is published every year with summaries of all legislative activities, including a list of the meetings that have occurred. This can help the identification of the discourse structure with reference to the actual themes of the deliberations rather than looking at the discourse events alone without reference to the contents. With that information, we can estimate the distance between issues as a function of the way attention is allocated across these issues by individual lawmakers and participants taking part in chamber deliberations.

3. Seeing how the network structure evolves over time is important for evaluating claims about the dynamic of agenda setting. Agenda change theories make extensive references to how the contents of the policy agenda and issue frames are changed, and these changes cannot be dealt with unless our dataset covers a longer time frame than our present dataset. We plan to expand the dataset to cover the X, XI, and XII legislative cycles of National Assembly and realize the network structures of these legislatures for comparative analysis.

IV. FUTURE RESEARCH DIRECTIONS

This paper describes the initial stage of a project that attempts to answer some major questions about policy agendas. New theoretical knowledge can be developed by applying the method to international contexts, making use of the actual contents of the deliberations in the analysis, and looking into different indicators of the policy processes. Specifically:

1) Implement comparative analysis for other legislatures belonging to different regime types, and in the long run, with political discourse occurring in institutional and organizational contexts other than lawmaking. Crossnational analysis of agenda setting will serve as an effective response to the concern that the theory of agenda setting is dominated by studies of the U.S. (Baumgartner, Green-Pedersen, and Jones 2006). The methods presented in this paper will be applied to different legislatures, where factors such as party system (Walgrave et al. 2006; John 2006a; Breunig 2006), institutional structures (Baumgartner, Foucault, and Francois 2006), competitive contexts (Chong and Druckman 2007b), and the size of direct public involvement (Princen and Rhinard 2006) can be more systematically and collectively examined. This will also form the basis of an effective evaluation of the respective roles of human cognition and institution in shaping agenda dynamics (Jones 2001; Baumgartner, Brouard, and Grossman 2006).

- 2) Analyze the dynamic of discursive interactions between participants in conjunction with concomitant changes in policy agenda and issue frames where the discourse is realized as evolving networks. The temporality of policy agendas is crucial to the analysis of focusing events and post-event politics (Birkland 1998), group activities (Bachrach and Baratz 1962), media propagation (Edwards and Wood 1999), diction or choice of words (Belich 2007; Baker 2004; Bachmann 2011), and fluctuations of issue attention over time (Liu, Lindquist, and Vedlitz 2009). Since the current network is based partly on shared issue preference (i.e. choosing to speak on the same subject matter), not actual act of collaboration (e.g. co-sponsoring a bill, see Fowler 2006), information about word choice would be particularly interesting if brought into the analysis of the networks. It affords an opportunity to link the social dimension of agenda setting (collaboration through coalition formation) to the realms of ideas, attitudes, and frames (collaboration as the sharing frames in communication) (Kinder and Sanders 1996; Chong and Druckman 2007b). This will also contribute to the recent development of automated textual analysis in political science (Grimmer and King 2011).
- 3) While legislative debates are likely to produce the richest dataset for the analysis of political discourse, many other government activities can allow us to gauge the pattern of agenda change. Apart from records of legislative deliberations, digests of cabinet meetings, questions to ministers and written proposals for parliamentary debates (Green-Pedersen 2005), and parliamentary questions time (Penner, Blidook, and Soroka 2006), government budget (Buamgartner, Foucault, and Franois 2006), and other forms of elite communications (Chong and Druckman 2007b) are other indicators of policy agenda that have been used to estimate the pattern of policy agenda change. The fact that government policy agenda is the outcome of activities occurring across the entire political system - including stakeholders from outside the policy establishment - means that other institutions ought to be included for a better understanding of how issues come to be acted upon and defined by policymakers and the public (John, 2006b; Cohen, March, and Olsen 1972).

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