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Role analysis using the ego-ERGM: A look at environmental interest group coalitions

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ABSTRACT

Interest groups coordinate to achieve political goals. However, these groups are heterogeneous, and the division of labor within these coalitions varies. We explore the presence of distinct roles in coalitions of environmental interest groups, and analyse which factors predict if an organization takes on a particular role. To model these latent dynamics, we introduce the ego-ERGM. We find that a group's budget, member size, staff size, and degree centrality are influential in distinguishing between three role assignments. These results provide insight into the roles adopted in carrying out coalition tasks. This approach shows promise for understanding a host of networks.

> "Typically there is a group that takes a lead . . . We have a coalition of what we call the Green Groups, which is predominately environmental organizations based in Washington, D.C., which focus on federal and environmental policy. And so, that's what binds us together: we are all environmental groups; we are all based in D.C.; and we all work on federal environmental policy" (Correspondence, 2016).

Interest group coalitions are ubiquitous in American politics, and analyzing the social roles in interest group coalitions sheds light into the fundamental question of politics: who gets what, when, and how? In this paper we argue that interest groups take on varying roles that are critical to the overall structure of the coalition. Our general queries are similar to the ones that intrigued Faust and Skvoretz (2002) and Box-Steffensmeier and Christenson (2014), which are to determine the driving factors of particular network structures and the roles of individual players within them. To tease out different roles, we compare egocentric networks, that is, the immediate network of any specific group, across a wide range of similar interest groups within the environmental politics space. Comparing these ego-networks with respect to their similarities and differences gets us closer to answering whether networks are structured differently within a specific policy domain. More generally, we make advances about why networks may be structured differently, what the structure means for the roles adopted within the coalition, and what the policy and effectiveness implications may be for the coalition.

Given the collective goals of interest groups, we develop a novel theory of interest group roles which posits that actors join coalitions seeking partners that can make up for their weaknesses, while searching for partners whose weaknesses they can make up for. Our analyses utilizes novel network data on all interest groups that coauthored amicus curiae briefs for 2000–2009 Supreme Court cases on natural resources and environmental protection. This novel dataset where interest groups are tied to one another through coauthoring the same brief captures a purposive and coordinated network of interest groups lobbying collectively on environmental policy issues. Once the network is assembled, our first step is to focus on the roles of actors within a network. We do so using a novel methodological innovation that extracts the ego-networks for each group, such as the network for the Sierra Club or National Wildlife Federation, from the larger environmental advocacy coalition. This allows us to characterize the ego-networks and find which are similar. These groups are then sorted by whether they play similar roles within the larger environmental interest group coalition network. We use a novel and flexible methodological framework developed by Salter-Townshend and Murphy (2015) based on a mixture of Exponential-family Random Graph Models to cluster the nodes into

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like roles. This methodological advancement is referred to as the ego-ERGM.[1]

The ego-ERGM allows analysts to examine the structural roles that exist within a given network, and the structural dependencies and covariates that may inform the prevalence of certain social roles. Conventional qualitative approaches do not offer the opportunity to rigorously measure these endogenous and exogenous processes for large groups. Alternatively, conventional network approaches like stochastic block modeling or community detection do not allow for the specification of specific processes that the analyst may think informs role assignment. The ego-ERGM resolves both of these shortcomings by allowing the analyst to highlight similar structural roles within a network conditioned on a specified model.

In the particular case of the environmental interest group coalitions, we specify a generative model for structural roles that includes 6 ERGM terms, including two structural features, Edges, Concurrent Ties, and 4 nodal covariates, Group Budget, Members, Staff, and Degree Centrality. We find that an ego-ERGM specified with these ERGM terms produces three distinct role assignments. We refer to these roles as Teammates, Coordinators, and Peripheral Specialists. Within a coalition of industry interest groups, we find similarity across the network gives rise to one role, Teammates, which reflects a network process of equality and shared obligation for lobbying. Within the coalition of pro-environment lobbying groups, we detect roles associated with a dominant core-periphery structure where core nodes, Coordinators, appear to be coordinating the coalition through its material resources and relative influence. On the periphery of the coalition, we see the emergence of Peripheral Specialists which may offer specialized knowledge and research over particular topics that Coordinators may otherwise be missing.

This method holds great promise beyond this immediate application. There exists a great deal of literature to suggest that roles emerge within a variety of group-based political dynamics, from fundamental theories of International Relations (Wendt, 1999) to Congressional representation (Alpert, 1979), from mid-level theories of foreign policy behavior (Cantir and Kaarbo, 2012; Chafetz et al., 1996; Holsti, 1970) to Supreme Court decision-making (James, 1968). The ego-ERGM brings opportunities to understand the interdependencies that exist between these roles and the larger network consequences that were left previously impossible to consider, and thus, providing the opportunity for a great deal of theoretical innovation and methodological tests to those interested in network dynamics.

In the following section, we present a discussion of how scholars have historically considered, measured, and empirically studied group-based roles. We then move towards our specific application of role analysis through considering the environmental interest groups coalition in Section 2. In particular, we discuss the history of environmental interest groups, the nature of their political objectives, and how these objectives influence the advocacy coalitions they form. In Section 3, we present our theory of environmental interest group role behavior. We argue that given the costs associated with joining a coalition, and the effort needed to extract the gains from collective lobbying, we expect that groups will join coalitions knowing the particular value that they can add, and the role that they would best serve. In Section 4, we present a detailed and approachable introduction of the ego-ERGM, as well as our research design including the data used for our study. This section serves as a primer for those interested in using it for their own research while attempting to balance accessibility with technical detail. Section 5 presents the results of our analysis. We include a discussion of the implications of our findings, and in particular, how applicable the ego-ERGM may be to scholars interested in understanding group-based social phenomena. We offer parting thoughts in Section 6.

1. Role analysis of coalition dynamics

Perhaps one of the best ways to understand environmental advocacy is to understand the particular tasks that actors adopt when undertaking large-scale collective lobbing efforts. Central to this dynamic, is role analysis. Role analysis has been a relatively recent phenomena in network science, but has its roots in a long tradition in the social and behavioral sciences. Role analysis, which initially was used by psychology, found itself permeating into other disciplines such as sociology and political science (Parsons, 2013; Rizzo et al., 1970; Gouldner, 1957).

Only recently with the development of community detection in the study of networks and techniques such as those applied in this paper, has an inferential approach to understanding social roles become possible. An inferential approach is particularly appealing. In this section, we discuss these two literatures, paying mind to how social role has been conceptualized with time and how recent network analytic methods offer an opportunity to revitalize a literature and technique that offers great promise in answering important social and behavioral scientific questions.

1.1. Conceptualizing social roles

Within social groups, actors can be said to adopt certain roles. Generally a role is defined with respect to social position and behavioral expectations associated with that position. Sociological and psychological approaches have employed certain theories to explain the importance of roles for outcomes. While a review of all of these theories is beyond the scope of this project, we briefly discuss two that frame our discussion of roles.[2] First, "Structural Role Theory" considers role as parts played by an actor in scripts that have been written by society. Within structural role theory, society is described as a system of functional substructures where actors learn roles through repeated interactions. Individuals generally interact in groups delineated by people with shared goals and who are therefore willing to cooperate. Despite shared goals, not everyone has the same role within a group. Second, "Organizational Role Theory" is concerned with the role of formal organizations and how individuals interact with these organizations. Roles are associated with social positions and come from normative expectations generated by the organization. The theory allows for consideration of several concepts such as role conflict and role strain.

Our approach to understanding roles is built primarily upon these two theories of social roles. Social role, as a concept, has been discussed over 100 years of literature and in broad ways that vary from discipline to discipline. When discussing social roles, we employ the definition of roles outlined by Gleave et al. (2009) who builds upon Callero (1994). Roles are defined with respect to social and structural positions within a network, emerge from structural features of a community, and reflect commonalities in behavior (2). In particular, social roles are defined as cultural objects that are accepted and understood within a community and are used to accomplish community-based tasks (Gleave et al., 2009, 1).

[1] It is worth noting immediately that the ego-ERGM utilized here is distinct from the `ergm.ego` function used in `statnet`. This model is distinct as it can be seen as a latent-clustering routine performed on a multitude of egocentric networks as opposed to a single ERGM performed on an egocentric network.

[2] For those interested in a broader reading, we suggest the following: Stryker (2001), Turner (2001), Collins (1994), Heiss (1990), Biddle (1986), Thomas and Biddle (1966) and Sarbin and Allen (1954).

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