The Evolution of Interorganizational Networks in NGO Communities

Research proposal submitted to the National Science Foundation

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C. Project Summary

This project addressed the following research question: What are the theoretical mechanisms underlying the evolution of NGO communities over time through variation, selection, and retention of various network forms? Evolutionary and community ecology theories were used to generate hypotheses regarding the growth, stability, and decline of individual-level ego-network portfolios along with hypotheses regarding higher-level community networks. The set of networks that comprise the children's rights community over a thirty year period were obtained and coded from copies of the annual *Yearbook of International Organizations* (*YIA*). This community included children's rights nongovernmental organizations (NGOs), intergovernmental organizations (IGOs), as well as other NGOs and private sector organizations interested in children's rights. Additionally, Internet search technology provided by Google, Inc., and the Internet Archive Wayback Machine provided data which also captured the Internet network of the children's rights community. Data were collected on resource munificence for a subset of organizations in terms of yearly funding support they obtained and on organizational performance defined as extent of yearly press coverage. Exponential random graph models, sequencing, and hazard models were used to test the hypotheses. They revealed the theoretical variation, selection, and retention mechanisms that led to network evolution over time at both the ego-network level and the larger overall network. Further, these evolutionary processes were examined in relation to organizational performance.

Intellectual Merit. Three thriving areas of organizational theorizing are furthered by this research. First, it examines global organizing among populations in the NGO community, an important sector which has received less scholarly attention than for-profit industries. Second, the research incorporates two emerging fields in network theory: longitudinal *p** and sequencing techniques for network transformation and multilevel approaches for egocentric network patterns. Also, the research focuses on portfolios of relationships that may be favored for specific forms of organizing, an understudied aspect of networks. In combination, these network techniques can describe, explain and predict the transformation of networks. Third, the research extends theories of organizational evolution by systematic translation of concepts from ecological theory to the study of network evolution including portfolios of interorganizational relationships.

Broader Impact. Understanding NGOs is important because of the significant role these organizations play by acting in the interest of underrepresented societal groups. NGOs provide a variety of services to fill gaps in creating and sustaining collective societal goods that otherwise might be provided only by formal governmental organizations (Chatfield, 1997) or not at all. The children's rights community includes not only NGOS but also IGOs, other non-profit organizations and for-profit businesses that have a stake in children's rights. The findings are expected to improve understanding of resource dynamics among NGOs and neighboring organizational populations. The proposed research uses ego networks as the primary level of analysis, facilitating direct application of results to individual NGOs. The systematic application of the evolutionary perspective to NGO networks offers information on which types of egocentric tie portfolios are associated with successful and sustainable NGOs. The research will provide recommendations about how NGOs can formulate partnering strategies that generate resources and increase their likelihood of success. Based on this research, NGO strategists can learn to match their external linking strategies with internal change efforts, adjust their egocentric relational mixture according to environmental events, and seek beneficial outcomes at the collective network level that are essential for achieving societal impact in the complex global landscape. These results will be widely shared with NGO practitioners through a variety of venues such as the International Society for Third-Sector Research. Study results will be extensively disseminated within the academic community through journal articles and conference presentations. The data will be provided to other scientists through the NSF-sponsored social networks cyberinfrastructure at the SONIC lab at the University of Illinois and the Network WorkBench at Indiana University. The project offers undergraduates and Master's students training through participation in the research; the data will be available to them for further analyses and projects, including their own honors and MA theses. Several PhD dissertations will result from the research.

D. Program Description

1. Introduction.

This proposal seeks NSF support to answer the following research question: What are the specific theoretical mechanisms underlying the evolution of NGO communities over time through variation, selection, and retention of various network forms? It is a revision of Proposal 0721017 submitted jointly to DRMS and IOC in January 2007. The recommendation from DRMS was "should fund," but the recommendation from IOC was to "decline to fund." Reviewers from both divisions made a number of excellent suggestions for strengthening the proposal, all of which have been undertaken in this revision. We also shared the proposal with other networks scholars and received the benefit of their recommendations. Here is a summary of the changes we have made in revising this proposal.

- Added a clear general research question to the beginning of the proposal which serves as a broad statement of our research goals that are encapsulated in representative research hypotheses.
- Broadened the theoretical perspective to include other relevant theories such as the advocacy coalition framework.
- Incorporated research on network portfolio sequencing (Stark & Vedres, 2006) in the theoretical and methodological sections.
- Revised the wording of the hypotheses to make them clearer and more specific.
- Mapped the hypotheses more specifically onto the analytic techniques so that it is clearer how we will analyze the data and what knowledge will be generated.
- Extended the project to two years for approximately the same amount of money to address the concern that our work plan was overly ambitious.
- Added a statistical consultant, Dr. Garry Robins, to assist with several of the technical issues surrounding the analysis of evolutionary ego network data with exponential random graph models computed via XPNet/LPNet. See Supplementary Documents for letter of commitment.
- Added a Gantt Chart to the Management Plan to map out all research activities.
- Made arrangements to provide the NGO networks data to the scientific community via the NSF Social Network Analysis Cyberinfrastructure located at the Science of Networks in Communities (SONIC) in the National Center for Supercomputing Applications (NCSA) and the NSF-funded Network Bench at Indiana University. See Supplementary Documents for letters of support.
- Provided a letter from the Dean of the Annenberg School for Communication, USC, to verify provision of five additional years of data collection at no cost to NSF as requested in the addendum of the DRMS Panel Summary. See Supplementary Documents.

Evolutionary theory and community ecology are well-established approaches to the study of interorganizational processes in for-profit industries (Astley, 1985; Carroll & Hannan, 2000; Dimmick, 2003). This body of research has examined a wide array of evolutionary processes such as how firms acquire and utilize resources from their organizational environments (Carroll, Dobrev, & Swaminathan, 2002; Podolny, Stuart, & Hannan, 1996; Swaminathan, 1995) and the emergence, proliferation, and diversity of corporate forms (Ruef, 2000). While private-sector ecology has become a vibrant field of scholarly inquiry, communities of nongovernmental organizations (NGOs) and other nonprofits have not yet been examined systematically from an ecological perspective (for a recent exception, see Shumate, Fulk, & Monge, 2005). NGOs are "private, voluntary, nonprofit groups whose primary aim is to influence publicly some form of social change" (Khagram, Riker, & Sikkink, 2002, p. 6) or to provide services not otherwise available through government (Shumate et al., 2005). Particularly since 1990, the NGO sector has grown globally (Anheier, Carlson, & Kendall, 2001; Anheier, Kalder, & Glasius, 2005) and increased in transnational influence (Scholte, 2000). The diversity of nongovernmental forms of organizing has also increased (Kendall & Anheier, 2001).

Recent scholarship has explored the relations between organizational populations as a vital aspect of community evolution (DiMaggio, 1986; Hawley, 1950) by supplementing the community

ecology framework with network methods (Bryant & Monge, in press; Podolny et al., 1996; Powell, White, Koput, & Owen-Smith, 2005; Shumate et al., 2005; Venkatraman & Lee, 2004). Such efforts are promising for studying the evolution of the increasingly complex networking structures of NGOs (Kendall & Anheier, 2001), as they employ confirmatory network analysis techniques (Contractor, Wasserman, & Faust, 2006) on multiple theoretical levels (Brass, Galaskiewicz, Greve, & Tsai, 2004; Monge & Contractor, 2003).

One novel area in the study of network evolution is the structural manifestations of variation, selection, and retention (V-S-R) as they occur in an organization's local network neighborhood or "ego network" (Wasserman & Faust, 1994, p. 41). V-S-R processes are at the heart of an evolutionary framework, but research focusing on the evolution of interorganizational networks rarely operates at the level of egocentric network analysis. Research typically concentrates on the formation, maintenance, and dissolution of dyadic linkages and alliances (Gulati, 1995) as enabled and constrained by the structural properties of the network as a whole (Kenis & Knoke, 2002). This strategy consistently neglects the mediating role of meso-level ego networks. Literature on structural embeddedness (as defined by Zukin & DiMaggio, 1990; Mizruchi, Stearns, & Marquis, 2006; Uzzi, 1996), however, suggests that over time V-S-R mechanisms may lead to distinct linking patterns emerging in an organization's local network cluster that cannot be detected by examining individual, decontextualized links. This means that NGO populations can be expected to evolve unique egocentric tie combinations or *portfolios* that correspond to their specific resource niches in their communities (Audia, Freeman, & Reynolds, 2006; Stark & Vedres, 2006). The term *niche* refers to the conditions and resources in environments that sustain organizational populations (Aldrich, 1999). For example, NGOs that mainly depend on government grants may sustain themselves with small numbers of ties to governmental agencies, whereas NGOs with diverse resource bases may seek to establish ties with a large and heterogeneous group of alliance partners. Thus, these egocentric tie portfolios constitute the structural manifestation of the ecological niches that NGO populations occupy within their organizational environments.

In summary, the proposed research will contribute to the study of nongovernmental organizational fields by improving our understanding of linking propensities operating in interorganizational networks at both the community and ego network levels. By using evolutionary theory to empirically investigate the manner in which NGOs are constrained and enabled by their networks, this research will provide far-reaching practical implications for NGO strategy development. Its results will illuminate the characteristics of successful tie portfolios, providing NGOs with guidance in strategically assembling productive collaborative relationships based on the resource environments in which they operate.

The theoretical contributions of this research arise from a variety of unique hypotheses about the evolution of the organizational community concerned with children's rights. The most influential "key moment" in the emergence of the children's rights movement was the United Nations Convention on the Rights of the Child (UNCRC) in 1989 (Alaimo, 2002, p. 1). This convention is not only credited with articulating the rights of children in their entirety, but it also provided a set of guiding principles that fundamentally shaped the way in which NGO networks operated (Convention on the Rights of the Child, n.d.). An empirical evolutionary analysis of the children's rights NGO network from 1977 to 2007 will demonstrate how different kinds of voluntary organizations came to populate distinct niches within a larger organizational community comprised of NGOs, intergovernmental organizations (IGOs), national governments, and corporations. Longitudinal network analysis techniques are used to test theory-driven hypotheses about the linking patterns associated with the occupancy of these emergent niches.

The following section (2) develops a community ecology framework and explicates several evolutionary concepts that are important for studying NGOs. These include V-S-R mechanisms and multilevel coevolution among populations of organizations in communities. The subsequent section (3) reviews the literature on NGOs and their networks, with a special emphasis on the contributions made by social movement theorists. The fourth section (4) translates concepts from organizational evolution and network theory into a set of hypotheses about change in nongovernmental organizational communities. The fifth section (5) details the study design and analytical methods in

the context of the children's rights NGO networks. The final section provides an overview of the potential intellectual merits and broader impacts of this research.

2. An Evolutionary Approach to Organizational Communities

Evolutionary theory has become an important explanatory framework in a variety of social sciences (Freese, Li, & Wade, 2003). In the organizational arena, some examples include Aldrich's work (1979, 1999) on organizational evolution and boundaries, Weick's (1979) early formulation of an evolutionary model of organizing, and Hannan and Freeman's (1977, 1984) development of population ecology theory. Built fundamentally on evolutionary ideas originally formulated by Darwin (1859), Mendel (1865), Lamarck (1904/1984), and others, community ecology (Astley, 1985) is at its core a theory of social change (Campbell, 1965). Community ecology examines the dynamic processes by which populations adapt to their environments and relate to one another in order to acquire the set of resources that enable them to thrive, or, at minimum, survive. It develops population ecology with an explicit awareness that evolutionary processes occur on various levels, ranging from intraorganizational routines (Nelson & Winter, 1982) to interactions between organizational communities and their institutional environments (Ruef & Scott, 1988). This focus on multilevel interactions shifts our attention away from single, static organizations toward populations of organizations and their dynamic relations with other organizational populations (Aldrich, 1999).

A community-level conceptualization of transnational NGO networks recognizes that NGOs operate in the context of their relationships with other NGOs, governmental agencies, and corporations. Thus, the local network structures and strategies exhibited by individual NGOs are best understood when viewed within a larger transnational network of organizations. Evolutionary theory provides a generalized, dynamic theory of change (Baum & Rao, 2004), and it is especially well-suited to explaining the dynamics of large numbers of interrelated organizations. It specifies change in terms of birth, growth, transformation, decline, and demise through the processes of variation, selection, and retention (Poole & Van de Ven, 2004). The following sections describe the community ecology perspective in more detail and explicate how V-S-R processes can be conceptualized in terms of NGO networks.

Benefits of a Community Ecology Perspective

Organizational communities are defined as "set[s] of coevolving organizational populations joined by ties of commensalism and symbiosis through their orientation to a common technology" (Hunt & Aldrich, 1998, p. 272). Commensalist linkages can range from competitive to cooperative relations among members of the same population, while symbiotic linkages are mutually beneficial relations between members of different populations (Aldrich, 1999; Barnett, 1994; Hawley, 1986). Just like biological species in an ecosystem, organizational populations can be differentiated based on the niches they occupy. Populations differ in their reliance on environmental resources, which is associated with specific patterns of embeddedness in interorganizational networks (McLaughlin & Khawaja, 2000).

Community ecology emphasizes that resource availability is moderated through community relationships because communities operate as "functionally integrated systems of interacting populations" (Astley, 1985, p. 232). Community members can utilize the linkages within and among populations to obtain resources from each other rather than from their niches. This makes them less dependent on the environmental niches in which they are located and enables them to attain various levels of "closure" to the outside (Astley, 1985, p. 234; Astley & Fombrun, 1987). In other words, symbiotic links between populations may serve as buffers from adverse environmental effects, thus improving the likelihood of the survival of populations (Baum & Oliver, 1991; Miner, Amburgey, & Stearns, 1990). Linkages between organizations as well as between populations also may be sources of competition (Hannan & Carroll, 1992). Finally, community ecology assumes the mutual influence of evolutionary processes on multiple levels, suggesting that the longitudinal development of populations is subject to both upward, i.e. organization-level, and downward, i.e. community-level, evolutionary pressures that should be modeled and accounted for.

Processes of Variation, Selection, and Retention

As noted by Campbell, "for an evolutionary process to take place there need to be variations (as by mutations, trials, etc.), stable aspects of the environment differentially selecting among such variations and a retention-propagation system rigidly holding on to the selected variations" (1965, p. 306). Thus, community ecology "consists of three sub-processes: variation embodied in new populations and forms, selection shaped by symbiotic and commensalistic relations between constituent populations, and retention of established populations" (Rao, 2002, p. 543).

Variation focuses on alternative possibilities, specifically those available in the environment and those generated by human choice. For example, Delacroix and Carroll (1983) show that the episodic occurrence of social upheavals over a period of one hundred years in Argentina and Ireland lead to the emergence of alternative newspapers originally concentrating on those issues. *Selection* is the process of accepting one or more alternative variations and rejecting the others. Miner and Raghavan (1999) show how mimetic processes often lead organizations to select the routines and practices of others they deem successful, thereby rejecting a host of alternatives. In the case of strategic alliances, this may mean choosing a partner that other successful firms have already chosen. *Retention* is the process of institutionalizing a selected variation, establishing it as an ongoing characteristic of the organization, and maintaining it over time. Nelson and Winter (1982) examined the role of routines as a retention mechanism for institutionalizing organizational procedures. March, Schulz, and Zhou (2000) examined the academic rules set that had been selected and retained, and in some cases, modified and then retained, by Stanford University from 1891 to 1987. The retention of routines and rules provides continuity to organizational communities and populations.

An innovative and promising application of V-S-R principles is to theorize about them in the context of organizational community networks. Variation not only pertains to different kinds of organizational linkages (e.g., cooperative versus competitive) and different organizational types (e.g., NGOs versus IGOs), but also to the diversity and prevalence of tie portfolios exhibited by organizational populations. A tie portfolio is a particular combination of characteristics which describes an ego network. These parameters, such as the number of ties, their redundancy, and the types of linking partners, can be analyzed as combinations. The prevalence of particular combinations as well as the sequences by which organizations change from one combination to another (Stark & Vedres, 2006) can be assessed and compared with each other. An NGO population may exhibit variation in terms of its tie portfolios, with some organizations acting as coordinating bodies linking to a large number of organizations in a wide range of other populations including governments and corporations. Other NGOs might have a smaller and more homogeneous portfolio, linking only to a few similarly oriented NGOs. Selection pressures occur if populations are found to gravitate towards recognizable and distinct local linking patterns. If such divergent trends become established, and typical linking patterns, or portfolios, come to be associated with specific populations, retention processes are in operation. An investigation of these linking patterns thus allows researchers to understand how populations evolve.

Population Niches and Egocentric NGO Networks

It is necessary to conceptually differentiate various NGO populations from their neighboring populations in order to analyze the evolutionary pressures operating within NGO communities. Organizations that are members of the same population depend on the same environmental resources and occupy the same niche, thus adhering to the same organizational form. Prominent formulations of organizational form differentiate them based on organizational attributes such as their identity (Carroll & Hannan, 2000, Hsu & Hannan, 2005), which is an approach exemplified well by research distinguishing microbreweries and brewpubs from mass beer producers (Swaminathan, 1998; Swaminathan & Wade, 2001). Carroll and Hannan (2000) note that "the processes that create and reproduce the boundaries – social network ties, closed flows of personnel among a set of organizations, technological discontinuities, social movements articulating the interests of a set of organizations – are the key to understanding forms" (p. 63). DiMaggio's (1986) claim that organizational forms entail "expectations about the behavior of sets of organizations, rather than of

single organizations, and about relations among sets of organizations" (p. 341) suggests that the networking behaviors of organizational populations are also recognizable features noted and acted upon by other social actors. Thus, organizational forms can be distinguished by examining the ways in which organizations differentiate themselves from others in terms of their egocentric networking patterns (Audia et al., 2006; Stark & Vedres, 2006). Members of the same population, by contrast, exhibit similar ego networks and are structurally equivalent with each other (DiMaggio, 1986).

As Grabher and Stark (1997) note, there is a relationship between the niches realized by populations adhering to the same form and the structure of the organizational networks. In other words, niche emergence and population segmentation as specified in community ecology is directly visible in the simultaneous emergence of discernable linking patterns associated with populations in a community. Thus, just as we expect resource space segmentation to produce pronounced differences between populations and homogenizing pressures within, we expect to see that tie portfolios between members of the same population will start to look increasingly alike, and at the same time distinct from other populations' tie portfolios. The determinants for the emergence of such distinct patterns for different NGO forms are, as specified by community ecology, to be found on multiple levels of analysis. They may come in the form of movement strategies emerging from within NGOs and individual activists, be influenced by competition between organizations fighting for support from the same constituencies, or be shaped by institutional forces such as political environments, which affect whole social movement industries.

3. NGOs as a Unique Form in Evolutionary Research.

The number of NGOs has grown considerably throughout the world (Anheier et al., 2005), and researchers increasingly recognize them as politically significant agents of global civil society (DeMars, 2005). These organizations also have demonstrated unique methods of organization, characterized by their extensive interorganizational linkage patterns across both local and global scales (Fisher, 1997; Garrido & Halavais, 2003). These novel networked forms of global organization challenge our fundamental principles about how to organize, manage, and pursue collective goals and activities (Fulk, 2001). This section offers a definition of NGOs and an overview of how networking provides solutions to the unique challenges facing NGOs.

Definition of NGOs

NGO is an umbrella term for a variety of not-for-profit organizations including national NGOs, international NGOs (INGOs), social movement organizations (SMOs), and transnational social movement organizations (TSMOs; Kriesberg, 1997). INGOs can be coalitions of national NGOs, federations with national sections, or horizontally structured virtual organizations (Nelson, 2002). NGOs conduct a variety of service activities, such as promoting member interests, coordinating member activities, providing education and propaganda to the public, conducting research and collecting information, and conducting humanitarian activities (Chatfield, 1997). Many NGOs work within the political status quo to provide service and to advocate for their members. By contrast, "social change" NGOs challenge the status quo to promote change, either nationally or transnationally (Sikkink & Smith, 2002, p. 25). For the purposes of this research on networks, we use the term "NGO" in its broadest sense to include both types of organizations. Transnational NGOs have been of particular interest to researchers as the issues they are concerned with cross national boundaries, which is also reflected in their networks (Buechler, 2000).

Unique Organizational Concerns of NGOs

Although many parallels exist between for-profit organizations and NGOs, several differences exist. First, NGOs are private organizations claiming to further public welfare, but their reliance on support from multiple stakeholders requires them to balance differential and often conflicting agendas (DeMars, 2005). Thus, NGO strategies are more variegated than those of most corporations, which typically focus on maximizing profit. Rather than being based on strong market competition, NGO success may depend strongly on the political environment in which NGOs conduct their activities, as NGOs rely more heavily on non-tangible resources such as legitimation

by constituencies (Galaskiewicz & Bielefeld, 1998; 2006). Comparing them to for-profit organizations, Galaskiewicz and Bielefeld (1998) conclude that "resource procurement is the key factor driving organizational change, yet this impulse is tempered by the needs to be legitimate and to control costs" (p. 21). Another characteristic is their ubiquitous use of coalition-building (Smith, 2004) and a wide variety of additional networking strategies for the procurement of both tangible and non-tangible resources (Fisher, 1997). NGOs "form networks based on information exchange, project collaboration, participation in meetings and forums, or joint membership in advocacy coalitions" (Anheier & Katz, 2006, p. 240).

Research on NGOs in general has been heavily influenced by theoretical developments in the study of social movements (see Davis, McAdam, Scott, & Zald, 2005). The organizational study of social movement industries was originally formulated in the resource mobilization framework (McCarthy & Zald, 1977), which emphasizes the resource dependence of SMOs. Newer scholarship has infused the politically oriented resource mobilization framework with a more explicit acknowledgement of the importance of symbolic interaction in the form of framing (Buechler, 2000). Current research often highlights that both the reliance on legitimacy and the procurement of resources through networking are typical for nonprofit advocacy, and frequently identifies three processes that are necessary for NGO success (McAdam, McCarthy & Zald, 1996). These processes include mobilization, seizure and/or creation of political opportunity, and strategic framing.

First, SMOs face the typical public goods problem of convincing people to bear the costs of working toward collective goals (McCarthy & Zald, 1977). SMOs are successful to the extent that they can effectively aggregate resources and mobilize them toward goal accomplishment. Mobilizing structures are the "fundamental infrastructures that support and condition" mobilization, and include informal and formal networks and organizations (Smith, Pagnucco & Chatfield, 1997, p. 61). Second, a political opportunity structure refers to the "formal and informal political conditions that encourage, discourage, channel, or otherwise affect movement activity" (Campbell, 2005, p. 44). Thus, opportunities are created for SMOs when some facet of the political system changes in their favor (McAdam et al.,1996), which can be thought of as an environmentally conditioned increase in resource availability. In this way, the political opportunity determines the environment in which SMOs, and NGOs more generally, work to gain both legitimacy through framing and resources through mobilization. Third, framing processes are an essential part of SMOs' and NGOs' legitimation strategies (McAdam et al.,1996, p. 6) as they provide researchers with information about the cultural and ideological diversity of collective action (Buechler, 1993).

The advocacy coalition framework (ACF) from European policy research (Sabatier, 1988, 1998; Sabatier & Jenkins-Smith, 1993, 1999) provides additional insights for studying interorganizational advocacy dynamics. Research conducted from an ACF perspective spans prolonged observation periods of at least ten years, recognizes that policy processes are inherently multi-level and involve NGOs as well as governmental agencies, and focuses on "policy subsystem[s]" rather than on individual organizational actors (Sabatier, 1998, p. 99).

The Central Role of Networks for NGO Populations

There are several reasons why it is essential to consider networks when studying NGO communities. Networks formed among NGOs often serve as the basis for their ability to gain legitimacy and ultimately achieve their goals. This has been demonstrated by the success of partnerships among organizations in the environmental movement (Ronfeldt, 2005). In addition, an organization's relationships provide access to a broad range of resources necessary for sustainability (Lister, 2000), including finance, human capital, political opportunity and institutional legitimacy (Anheier & Katz, 2006).

Much research has recognized this propensity toward networking among NGOs by incorporating the network concept at the individual, organizational, and community levels. The social movement literature emphasizes the role of networking at the individual level, highlighting the embeddedness of prominent social movement entrepreneurs in activist networks (Diani, 2003). Among the main areas of interest informed by this focus has been the diffusion of movement ideas and tactics through interpersonal networks (McAdam & Rucht, 1993), volunteer recruitment and

sustained movement participation (Kitts, 2000; Tindall, 2004), and identity formation and network socialization (McAdam & Paulsen, 1993; Passy, 2003).

Research at the organizational level has consisted mainly of case studies. Networks of NGOs that advocate for HIV/AIDS medication dissemination (Sell and Prakash, 2004), expose industrial poisoning in Thailand (Forsyth, 1999) and work toward the eradication of sweatshop labor (Armbruster-Sandoval, 2005) are all examples of such case studies. Anheier and Katz's recent research (2006) represents one of only a few studies which focus on NGO networks at the macro-level. Garrido and Halavais (2003) also conducted a broad network study incorporating web links among NGOs involved in the Zapatista movement against the Mexican government's attempts to privatize the communal lands of its indigenous people. They found that this movement is still highly central in the global NGO website network.

Although the above studies represent important first steps in our understanding of NGO networking, they do not systematically analyze NGO network behavior both on a broad scale and over the course of time. Shumate et al.'s study (2005), which examined the evolution of the HIV/AIDS INGO population from its inception in the 1980s, is the only one that has accomplished both objectives. Shumate et al. found that geographic proximity, mutual ties with IGOs, and prior alliance relationships with an organization predicted the likelihood of future partnerships.

The Evolution of the Children's Rights NGO Community

The proposed research will examine the evolution of the networks that comprise the children's rights NGO community, which emerged to advocate for the ratification of the UN Convention on the Rights of the Child in 1989. As organizational actors have collectively articulated the area of children's rights within the last four decades, their efforts exemplify the emergence and maturation of a global organizational community revolving around a specific human rights issue. Thus, the study of its network evolution illuminates the transition of a "*nascent* [policy] subsystem (i.e., in the process of forming)" into "a *mature* one (i.e., that has existed for a decade or more)" (Sabatier, 1998, p. 111).

Children's rights gained momentum in the years following World War II with the establishment of the United Nations Children's Fund (UNICEF) in 1946 and the release by the UN of the Declaration of the Rights of the Child in 1959. Organizations such as Save the Children in Great Britain and The Child Welfare League in the U.S. were founded in the early 1920s (Edmonds & Fernekes, 1996). However, increased transnational children's rights advocacy only became noticeable in the early 1970s and attained global visibility in 1979, which was designated by the United Nations as the International Year of the Child (IYC; Cohen, 2002; Freeman, 1983). The IYC was intended to 1) raise awareness about the importance of the world's children, 2) increase understanding of what is required for a child to reach his or her full potential, 3) increase sympathy for unmet needs, and 4) instigate a commitment to change for children around the world (Burgess, 1979). The eventual outcome of the IYC was the UN Convention on the Rights of the Child (UNCRC), which was completed in 1989 and ratified in 1990 (Cohen, 2002).

The UNCRC represents a landmark document in the human rights sector as it obtained the necessary number of ratifications to be put into force faster than any previous human rights treaty and by 1997 had achieved almost universal ratification (Cohen, 2002). This document contains 54 articles, which have been divided into three main types of rights including provision rights (e.g. access to care and education), protection rights (e.g. safety), and participation rights (e.g. rights to civil participation; Lansdown, 1994; Smith, 2000).

There are several reasons why the children's rights NGO community represents an ideal locale in which to study NGO network evolution. First, since the issue of children's rights has emerged relatively recently, the evolution of the community can be captured from the early stages of its development though its progression to maturity as represented by the drafting of the UNCRC. Our study will track organizations from 1977 through 2007, as this ensures that we encompass the primary range of community development, which began in earnest with the drafting of the UNCRC in 1979. Second, commencing with the drafting of the UNCRC, NGO networks played a crucial role in the development of today's conception of children's rights. They also set the standards for compliance with the UNCRC (Edmonds & Fernekes, 1996) by forming an ad hoc NGO working

group to consult with the authors (Cohen, 2002). Finally, the children's rights community is highly interdisciplinary and thus provides linkages to organizations from many different NGOs, IGOs, and corporate populations, including those in the fields of health, education, and labor.

4. Representative Hypotheses

Previous research supported by NSF (IIS-9980109; "Co-evolution of Knowledge Networks and 21st Century Organizational Forms: Computational Modeling and Empirical Testing") examined the evolution of interorganizational networks in three organizational communities: the children's television industry as it evolved in relation to other populations in its community over its entire 50 year history (Bryant, 2003; Bryant & Monge, in press), feature film co-financing via networks of partnerships during the period of 1995-2003 (Gardini, 2004; Gardini, Fulk & Sismeiro, 2007), and the HIV/AIDS INGO community from its inception in the 1980s continuing to the present (Shumate, 2003; Shumate et al., 2005). All three communities evolved their partnering strategies significantly in response to changes in their resource bases over time. The present proposal expands upon these studies in three important ways. First, this research focuses specifically on the role of V-S-R processes as they are manifest in network structures. Second, it adds the mesolevel egocentric network to the multilevel analysis. This approach thus leads to evolutionary hypotheses at multiple levels: the evolution of distinct forms of egocentric tie portfolios, the growth and decline of interorganizational ties, and resulting changes in the global properties of community networks. Third, at all of these levels, the effects of external events are also important to consider (Bryant & Monge, in press; Madhavan, Koka, & Prescott, 1998). The following section suggests representative hypotheses for each of these three categories.

Ego network level hypotheses: Variability and stability in structures. Community ecology analysis makes inferences about the underlying processes of variation, selection and retention by which the network evolves. Such an evolutionary logic suggests that successful system change may take many forms. For example, when a particular resource becomes scarce in an environmental niche, the organizational population that occupies that niche might restructure its network in a variety of ways. First, it might seek to secure that resource by initiating links with a new set of organizations that possess that resource. Second, it might seek to compensate for the loss of this resource via more intense linking with existing partners to garner their support. Third, it might reduce the number of links it carries to conserve the now scarce resource. Fourth, it may employ some combination of these strategies. Since the effectiveness of these strategies is largely determined by environmental conditions, it is difficult to predict which particular strategies will be successful prior to their implementation. However, as organizational populations uncover successful linking strategies to cope with environmental variations and shocks, the variety of ego network link portfolio types will tend to stabilize within the niche. Thus, longitudinal community ecology analysis provides an opportunity to observe the V-S-R of linking trends and confirm their stability over time.

At the ego network level, only a limited number of potential tie portfolios will likely be suitable for extracting the unique resources of a particular niche. For instance, activist NGOs may gain access to legitimacy by linking to IGOs, and non-activist NGOs may be most successful when located in central network positions. However, the manifestation of suitable portfolios by specific NGO's will likely take time to emerge. In the early stages of network development, NGOs may not know which portfolios are best suited to their environments. They may also lack the resources or other capabilities necessary to transform their current portfolios to those that are more appropriate for their niches. During this period of variation, the population will exhibit a diverse set of portfolios, many of which will not be optimal for the organizations that employ them. Over time, selection pressures will alter a population's composition. Some organizations with unsuitable portfolios will fail, others will imitate more successful NGOs. Successful NGOs themselves will seek to fine-tune their networks for optimal performance as they learn from their success. These changes will not be uniform, however. Differences between NGOs will lead to different "sequences" of network transformation (Stark & Vedres, 2006). For example, NGOs that find it difficult to make and maintain ties may reconfigure their networks by jettisoning most or all partners and then carefully selecting

new alliances, while those that form ties easily may seek to increase the number or diversity of their ties first and then pare their networks down to optimal size and configuration. Hypotheses can thus be made about how the population of ego networks will change over time as well as about specific longitudinal paths that organizations will take as part of that change.

Operating in newly created or recently shocked communities, NGOs have limited experiences in identifying which linking patterns suit their niches best, and thus may experiment with a variety of adaptations. Early stages of network formation may contain rough approximations of optimal portfolios as well as unsuitable portfolios which will eventually be selected out. NGOs that approximate the same ideal type can be grouped together or treated as a *cluster* (Stark & Vedres, 2006). As time passes and isomorphic selection pressures operate, it is expected that dominant types of portfolios will homogenize as NGOs sharing the same niches emulate each other and unsuitable variations disappear, decreasing the variation within clusters of similar portfolios and increasing variation between clusters of different portfolios. Thus, the first hypothesis tests the variation mechanism and suggests that:

H1: Over time, egocentric tie portfolios will become more homogenous within clusters and more distinct between clusters.

These more homogenized tie portfolios can almost be conceived as "species" of ego networks. These species, which have emerged as successful over time, can serve as indicators of environmental fluctuations. This idea has many implications. First, as a selection mechanism, more successful tie portfolios should become the dominant ones. Therefore, the following hypothesis is suggested:

H2: NGOs which adopt an egocentric tie portfolio that deviates less from the cluster average will be associated with higher performance.

Second, observing the ego network of other organizations provides valuable information about how to succeed in the organizational environment. An organization can observe the dominant and successful forms and then imitate them without having to experiment. Imitation has been found to be a powerful mechanism behind the selection process of interorganizational networking behavior, as suggested by the findings on "follow-the-trend" in the biotechnology industry (Powell et al., 2005). This study suggests that a similar mechanism will operate at the ego network level. Thus:

H3: New entrants in the NGO community will be more likely to adopt the predominant tie portfolio present upon their entry than any other portfolio.

Third, as Stark and Vedres (2006) demonstrate, it is not only an organization's current network position, but also the sequence of ego network portfolios it has employed in the past that determine its performance. For example, the sequence of portfolio types adopted by an organization can indicate its flexibility, the ability to form new alliances or to learn from its own experimentation. Thus:

H4a: The sequence by which an NGO has evolved will be a significant predictor of its performance.

H4b: The sequence by which an NGO has evolved will be a significant predictor of its performance within each type of ego network portfolio.

The retention of egocentric tie portfolios is also worth consideration. Retention dynamics, indicated by rates, trends, and stability, will be analyzed over time and therefore, it is important to clarify the passage of time. As evolutionary theories put emphasis on the interaction between communities and environments, theorists (Tushman & Romanelli, 1985; Gould, 2002) have argued that the passage of time can be bracketed by external events, or shocks that serve as triggers for evolutionary processes. These events can have positive or negative effects on a population and its network dynamics. Thus, the appropriate way to analyze the evolution of a network is over several important punctuating events. The children's rights network offers a particular advantage in this regard as the network was affected by at least two key events, the ratification of the UNCRC in 1989 and the Millennium Development Goals (MDGs) in 2000, thus providing three distinct epochs. These events will serve to punctuate the periods of homogenization that are hypothesized to dominate the intra-event periods:

H5: Following a major event, egocentric tie portfolios will become less homogenous within clusters and less distinct between clusters.

Interorganizational level hypotheses: Growth and decline of ties. Analysis of network evolution often looks at the increasing presence or absence of particular types of ties (Barabási, 2002; Dorogovtsev, Mendes & Samukhin, 2000; Garlaschelli & Loffredo, 2004; Jezewski, 2002; Powell et al., 2005). Research indicates that organizations use interorganizational ties to buffer against exogenous shocks and declines in resource munificence (Koka, Madhavan, & Prescott, 2006; Miner et al., 1990). At the same time, others have argued that maintaining linkages costs organizations more resources (Zajac & Olson, 1993). These findings are not contradictory, but they do suggest that there is a complex relationship between the costs and benefits of linking. On the one hand, it is possible that links serve as a form of organizational "resource savings," where resources in good times are invested to form links that are useful in bad times. If ties serve mainly as support in rough times, then ties should be added when resources are munificent but not when they are scarce. Thus:

H6: Tie additions will vary directly with changes in the level of resource munificence.

The number of ties an organization has is found to be an important predictor of success or survival (Baum & Oliver, 1991). Yet, the relationship may be moderated by the types of ties, which is closely related to tie redundancy as often suggested in the context of brokerage and structural holes (Burt, 1992). The degree to which tie additions contribute to success is determined by tie functions and types in accordance with environmental conditions. A community ecology analysis might suggest that community members seek to support those organizations that fulfill important roles in the network, as suggested by Levine and Kurzban's (2006) model of networks as a public good. In other words, organizations that are prominent and central in the network should be a favorable linking partner when resources are scarce, since tie additions are intended to increase resources. On the other hand, when environmental resources are munificent, organizations may seek diversity and new opportunities, which makes them less reliant on a few nodes. Thus, the following hypotheses are suggested:

H7a: Under resource scarcity, organizations will be more likely to create ties to prominent partners, increasing redundancy in the network.

H7b: Under resource munificence, organizations will be more likely to create ties to diverse partners, decreasing redundancy in the network.

From an evolutionary perspective, however, such analyses fail to capture the differential effects of addition and deletion of ties, which is related to Koka et al.'s (2006) idea of tie "churning." Specifically, it is one thing to say that NGOs increased their linkages with IGOs, but quite another to say that they did so by dropping their former alliances and forming new ones as opposed to expanding on their existing networks. Tie deletions are critical to understanding how the community evolves, as deletions indicate the most clear-cut example of selection processes at work. Organizational ecology refers to the concept of the *liability of newness* to describe the heightened rate of death associated with low organization age (Freeman, Carroll, & Hannan, 1983; Stinchcombe, 1965). Recent research on link decay applies this concept to networks, suggesting that younger or newer nodes and links will have higher rates of tie deletions than older nodes and links (Burt, 2000, 2002). In the context of interorganizational networks, nodal age refers to an organization's network tenure, the duration of its presence in the network. Burt (2002) has also examined the decay rate of bridges, which are ties that connect individuals and/or organizations belonging to dissimilar groups, and found that intergroup ties are more susceptible to decay than those formed within groups of similar nodes. Accordingly, in organizational communities, ties between organizations of the same population should be more durable than the ones forged between members of different populations. …

H8: Younger interorganizational ties decay at a faster rate than older ones.

H9: Interorganizational linkages of organizations with shorter tenure in the community network decay at a faster rate than those of organizations with longer tenure.

H10: Interpopulation ties die at a faster rate than intrapopulation ties.

Community level hypotheses: Evolution of global community networks. At the community level, an important question is whether the network as a whole is undergoing variation, selection, and retention or whether these processes are occurring only locally within niches. Niches can be considered sub-components of the larger network. Theory suggests that early in a community's formation, niches evolve in concert with one another. However, as the network matures, individual areas of the network will move toward closure (Hawley, 1986). This implies that they stabilize their own structures, thus buffering themselves from shocks in the rest of the network (Baum & Singh, 1994). Thus:

H11: Over time, the degree to which change in the network structures of one population affects change in other populations or the community as a whole will decrease.

Other hypotheses will be developed and tested along with these representative hypotheses.

5. Method and Management Plan

Data

The proposed research will study the emerging children's rights NGO community. This permits tracking the evolution of the community from early in its formation. The research will include network data from several sources. First, current and past linkages between NGOs are available from the Yearbook of International Organizations (*YIO*), published by the Union of International Associations (UIA). The *YIO* provides the most extensive coverage of nonprofit organizations by any source, public or private (Keck & Sikkink, 1998; Smith, 1996, 1997) and has been used in previous research (Shumate et al., 2005; Smith, 2005). The *YIO* provides information on interorganizational links both at the dyadic and group membership level. The *YIO* also provides various organizational attribute data including year of founding and information on organizational missions and aims. An analysis of mission statements and activities will be conducted to identify and categorize the core children's rights population and its neighboring populations. The data will be collected yearly from 1977 to 2007 for a total of 30 time points. We are requesting funding from NSF to code and analyze a comprehensive children's rights NGO database which will include 25 years of UIA data; the remaining five years will be made available through separate resources, as described below.

Second, we will further collect hyperlink data as a secondary measure of entry and exit into the NGO children's rights community, and to further support our analysis of the evolution of the community at various stages. As part of the preliminary work for this proposal, Google Inc. has provided support and access to their online database of hyperlinks between websites (see Supplementary Documents). Additionally, with computing support from the Annenberg School for Communication and programming assistance from the USC Viterbi School of Engineering, we have pretested scripts for collecting hyperlinks based on a method of keyword search that queries the search engine and collects sites that meet a set of filtering criteria (Hindman, Tsioutsiouliklis, & Johnson, 2003). Using this technique, we will collect repeated snapshots of the hyperlink structure that exists between NGOs. In order to maintain a manageable dataset we will restrict the online analysis to a subset of NGO sectors. Historical data on interorganizational linkages will be obtained from a second subset of data generated through the Internet Archive Project's Wayback Machine, which is a publicly accessible historical data archive (http://www.archive.org/index.php). This subset will be limited in size by the fact that the Wayback Machine only archives a sampling of websites.

Third, supplementary information on both organizations and overall factors in their environments, including important events that serve as shocks will be obtained from secondary sources, such as organizational websites, annual reports and written histories. Resource munificence will be captured via organizational funding information contained in the U.S. federal tax form 990, which most U.S. organizations are required to file. Analyses requiring this information will be performed only on the subset of organizations where such information is available. Data also will be collected in a parallel research program: "Global Communication: Struggles and Sustainability" funded by the Annenberg School for Communication (see "Current and Pending Support"). In addition, as mentioned in H2, we plan to measure the level of performance of a selected subset of

NGOs. Performance, in this instance, will be operationalized as the ability of an organization to communicate its intended message to a public audience. Using the PR Newswire database, we will track press releases by organizations dating back to 1977. To control for organization size, we will measure performance as the ratio of press releases to media coverage of a given organization. As a measure of coverage, we will sample the resulting coverage from a given press release as the number of articles appearing in the top 50 global newspapers compiled by the article database LexisNexis. Thus, working with a defined subset of organizations, we will create a dataset of press coverage ratios (press releases/newspaper articles) to track performance.

Analysis

Overview. NGO networks are most appropriately analyzed using techniques developed within the field of social network analysis (Wasserman & Faust, 1994). Social network analysts have developed a series of metrics that capture network properties of individual actors (e.g., in-degree and out-degree, betweenness, and centrality), dyads (e.g., reciprocity, similarity of attributes between dyads), and triads (e.g., transitivity, cyclicality) as well as the global characteristics of the overall network (e.g., density, centralization, and heterogeneity). Analysis for this research will proceed with three general techniques. First, the variation and homogenization of egocentric tie portfolios will be analyzed using hierarchical clustering (Ward, 1963), sequential analysis (Stark & Vedres, 2006) and entropy statistics (Frenken and Nuvolari, 2004). Second, network growth and decline will be captured using event history analysis. Third, changes in underlying network properties, i.e., changes in the structure of the overall network beyond merely its growth and decline, will be captured using *p** techniques (Wasserman & Pattison, 1996; Robins, Pattison & Wang, 2007). Visualization techniques will be employed to show the dynamics of network evolution.

Egocentric tie portfolios: Clustering, entropy, and sequencing. At the ego network level, a variety of methods must be combined. The assignment of NGO ego networks to specific portfolio clusters will be performed using the methodology established by Stark and colleagues (Stark, Vedres & Bruszt, 2006; Vedres, Bruszt & Stark, 2005; Bach & Stark, 2004; Stark & Vedres, 2006). Portfolios are identified by selecting a set of network properties, such as degree centrality, tie redundancy, and types of linking partners for each organization's ego network. Using the measures of these properties, ego networks can then be grouped into clusters of similar networks using Ward's hierarchical clustering routine (Ward, 1963). For example, NGOs with high degree centrality and high redundancy of ties would be in one cluster, and the average score on these parameters for the members of that cluster would constitute an ideal type. NGOs with high degree centrality but low redundancy would form another cluster.

Each organization's ego network at each point in time is thus assigned to a specific cluster. This way, organizational ego networks can be compared with ego networks of other organizations within their cluster, with those of other organizations in the community as a whole, or with the same organization's ego network from previous periods. The relative homogeneity of the clusters can be measured by calculating the entropy in the community in regard to its clustering, i.e., the degree to which cluster assignment is a predictor of the correlation between parameter scores (Frenken & Nuvolari, 2004). The more homogenous the distribution within types, the more important common cluster membership is as a predictor and thus the lower the community's entropy score. Sequencing the development of each organization in terms of these types over time creates a concrete view of which strategies are selected and retained at the community level, and which ones are selected against due to environmental pressures. Sequences of ego networks can be compiled for each organization using optimal matching techniques (Stark & Vedres, 2006). The effect of ego network type and ego network sequence on organizational performance will be determined using logistic regression analysis. Logistic regression captures the degree to which the newness of an organization or its preceding path influences its adoption of dominant portfolios (Powell et al., 2005).

Network evolutionary growth and decline: Event history analysis. Hypotheses about longitudinal evolution of networks, particularly the probability of new tie additions at the dyadic level as suggested in H7a and H7b, can be tested through a logistic regression model (Powell et al., 2005). The hazard model predicts the likelihood of a new link forming between two nodes with a

specific set of attributes given the possible risk set for links of this type. This procedure allows a comparison of linking behavior across networks as it creates coefficients that are adjusted for network size and composition. Hypotheses about the rate of tie decay can also be tested through a hazard model (Burt, 2000). This hazard model predicts the likelihood of a tie disappearing between two nodes with attributes including tie age, organizational tenure, and type of link (interpopulation or intrapopulation).

Changing network properties: Exponential random graph (ERG; p) models*. Confirmatory network analysis for modeling the network configurations will be calculated using the PNet software package (Robins et al., 2007), which employs *p** analysis methods (Wasserman & Pattison, 1996). The program employs ERG modeling to analyze networks based upon a vector of graph statistics in order to determine the probability of various network characteristics, such as k-star and k-triangle parameters and other higher-order network parameters, applying the most recent specifications for these models (Snijders, Pattison, Robins, & Handcock, 2006). Further, this social network analysis method isolates statistically significant parameters essential to the structure of the network and distinguishes them from those that are merely incidental properties. The algorithm uses Monte Carlo Markov Chain Maximum Likelihood Estimations (MCMCMLE) to model the network and to produce a set of structural characteristics representative of the network (Robins et al., 2007). These parameter estimates can be used to simulate "similar" networks, thus creating a sampling distribution against which hypotheses about community-level measures can be tested. Node-level attributes can also readily be included so that hypotheses about the characteristics of NGOs can be examined while controlling for structural effects. The parameters will be used to measure the probability that traits, including transitivity, homogeneity and preferential attachment, occur in the network.

Within the PNet program suite, XPNet models multiple networks simultaneously and LPNet models network evolution over time. A prototype program, not yet publicly available, LXPNet, combines these two models and thereby estimates parameters for the coevolution of multiple networks across time (Pattison, Robins, Wang, Koskinen & Snijders, 2006). This program is the only software currently available that can estimate multiple network coevolution *p** models. These models will be used to test our longitudinal hypotheses by examining the simultaneous evolution of the resource and collaboration networks together with relevant NGO attributes. We will draw inferences about the relationship between resource availability and tie creation suggested in H6. We expect that the presence of k-star parameters will increase as the resource munificence of an organization increases. Likewise, to examine the creation of interorganizational ties by new entrants, as suggested in H7, the probability of edge creation over time will be modeled against the age of the node. Exponential random graph modeling provides quantitative statistics that, when combined with the previously described methods, establish probabilistic patterns in support of our hypotheses. Network visualization is often critical for grasping network change. Pajek (Batagelj & Mrvar, 2003) will be used to provide a visual representation of a series of discrete-time images of the evolution of the network of NGO relationships over time. Additionally, the JUNG code package will be used to create time-series animations that illustrate the evolution of ego network linkage patterns (Adar, 2006).

Dr. Garry Robins (University of Melbourne) has agreed to serve as a statistical consultant. Dr. Robins has helped to develop much of the statistical theory for ERG models and has played a leading role in the development of the PNet suite of programs. (See Supplementary Documents.)

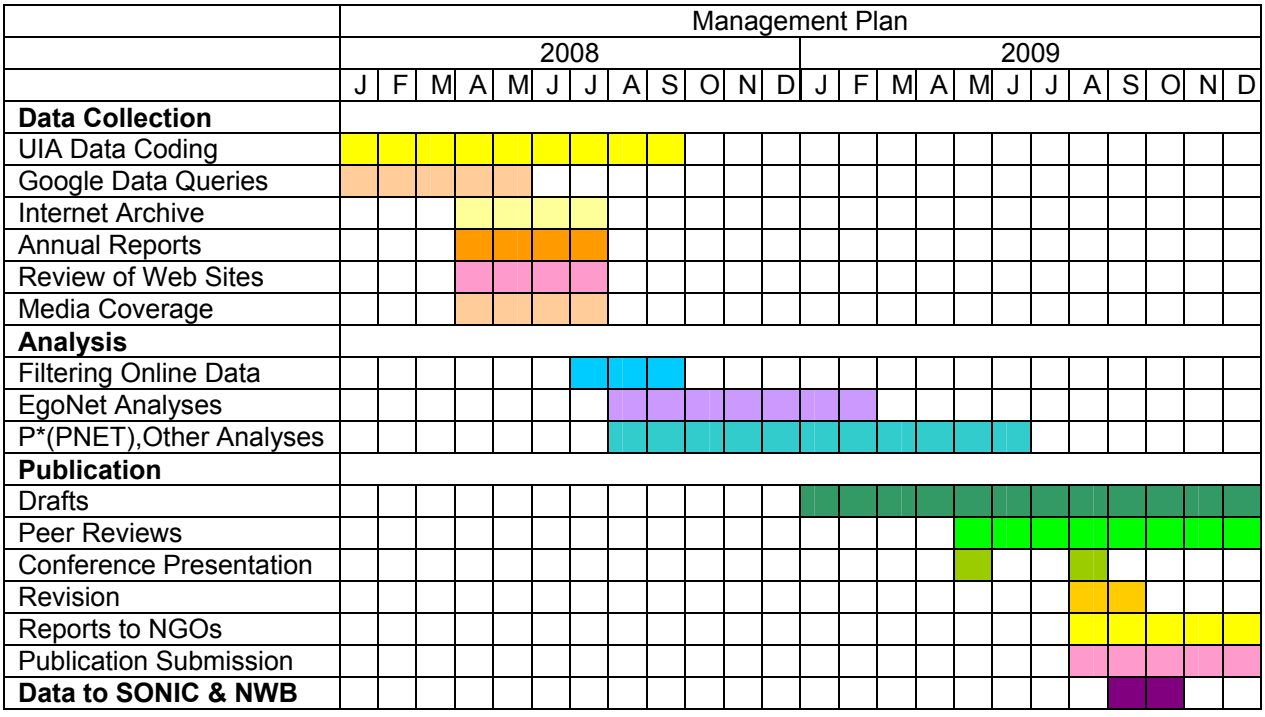
Management Plan

In the summer of 2006, the current edition of the *YIO* was purchased in electronic CD format. This CD has been used to estimate the ultimate size of the children's rights community, which contains approximately 800 unique organizations. Conversation with the UIA resulted in the discovery that the UIA has no past *YIO* editions electronically available. Thus, in fall 2006 the coding of the children's rights network data from the printed *YIO* editions commenced. In addition, in fall 2006 we established a partnership with Google Inc., which provided us with access to the Google hyperlink database via their High Volume Web Search utility. (See Supplementary Documents.) This access allows us to create a second database to complement the UIA database. To do this, we will

collect current hyperlink data to capture a snapshot of the current online structure of the NGO community. Further, to collect historical hyperlink data we are working with Bruster Kale, the creator of the Internet Archive, to arrange access to the historical archive. Combining the Google data and the Internet Archive data enables us to create a complete picture of the hyperlink structure of the NGO community. Initial research has been conducted using a custom-built open source web crawler.

Preliminary work on this project, including initiation of relationships with the Internet Archive and Google and research on web crawlers has been supported by the Annenberg Networks Network (ANN). ANN was created in 2005 by Manuel Castells and Peter Monge with start-up funding from the Annenberg School for Communication. The research grant "Global Communication: Struggles and Sustainability", funded by the Annenberg School for Communication provided resources to establish the coding protocol for the UIA data. Co-PI Janet Fulk is also Co-PI on the Global Communication grant. Based on the work completed to date with the assistance of these sources of support, we have (1) estimated the numbers of nodes for which data will need to be collected in order to tap two steps out in each ego network for the 30-year period, (2) developed and tested the coding design and data structure based on a small sample of NGOs from the subject population, and (3) estimated the time and cost parameters associated with the various aspects of the research as detailed in the budget. Additionally, the Annenberg School will provide resources for coding five additional years of UIA data to supplement the coding funds requested in this proposal. (See letter of commitment from Annenberg School Dean Ernest Wilson in Supplementary Documents.)

The proposed research will be conducted between January 2008 and 2010 as described in the Management Plan provided below. Preliminary work undertaken to date and continuing during the fall of 2007 will enable us to commence the primary research effort as soon as we receive NSF funding. The project duration of 24 months includes preparation of results for dissemination to a variety of audiences. At the completion of the project the entire NGO network dataset will be made available to the scientific community via the NSF Social Network Analysis Cyberinfrastructure located at the Science of Networks in Communities (SONIC) in the National Center for Supercomputing Applications (NCSA) and the NSF funded Network Workbench at Indiana University. (See Supplementary Documents for letters of support.)



Intellectual Merit and Broader Impacts

Intellectual Merit. The research question motivating the proposed research is: What are the specific theoretical mechanisms underlying the evolution of NGO communities over time through variation, selection, and retention of various network forms? This focus extends three thriving areas of organizational theorizing. First, it examines global organizing among populations in the NGO community, an important sector which has received less scholarly attention than for-profit industries. Second, the research incorporates two emerging fields in network theory: longitudinal *p** and sequencing techniques for network transformation and multilevel approaches for egocentric network patterns. This is one of the first longitudinal studies of interorganizational communities to make use of these advances in network analysis (see also Powell, et al, 2005; Shumate et al., 2005). Also, the research focuses on portfolios of relationships that may be favored for specific forms of organizing, an understudied aspect of networks. In combination, these network methods can describe, explain and predict the transformation of networks. Third, the research extends theories of organizational evolution by systematic translation of concepts from evolutionary and ecological theory to the study of network evolution, focusing on the evolution of portfolios of interorganizational relationships.

Broader Impact. These intellectual efforts are situated in the context of NGOs. This pursuit extends recent streams of research in the field such as the effect of civic organizational networks on integrative civil society (Baldassarri & Diani, 2006; Taylor & Doerfel, 2003), network structure and strategies for NGOs in the global civil society network (Katz & Anheier, 2006; Stohl & Stohl, 2005), and network patterns of collective action in social movements (Diani, 2003). Understanding NGOs is important because of the significant role these organizations play in acting in the interest of underrepresented groups in society. NGOs conduct a variety of service activities to fill gaps in creating and sustaining collective societal goods that otherwise might be provided by formal governmental organizations (Chatfield, 1997) or not at all. Social movements arise to protect the interests of groups and/or issues that are relatively excluded from normal decision-making processes (McCarthy & Zald, 1977). The children's rights community to be studied in the proposed research includes not only NGOs but also IGOs, other non-profit organizations and for-profit businesses that have a stake in children's rights. Findings from the proposed research are expected to improve understanding of resource dynamics among NGOs and neighboring organizations.

The unique aspects of the proposed research promise to provide the growing NGO community in children's rights and the broader human rights sector with valuable insights for organizing. As Anheier & Themundo (2002) note, the complex global environment exerts tremendous pressure on NGOs to find both new organizational forms and new strategies. They also note that the global context favors the network form, despite its challenges to identity formation and maintenance. This sector can benefit tremendously from research that sheds light on how to build such effective network strategies. The proposed research uses organizational ego networks as the primary level of analysis, facilitating direct application of results to individual NGOs. The systematic application of the evolutionary perspective to NGO networks offers information on which types of egocentric tie portfolios are associated with successful and sustainable NGOs. The research will provide recommendations about how NGOs can formulate partnering strategies that generate resources and increase their likelihood of success. Based on this research, NGO strategists can learn to match their external linking strategies with internal change efforts, adjust their egocentric relational mixture according to environmental events, and seek beneficial outcomes at the collective network level that are essential for achieving societal impact in the complex global landscape.

These results will be shared widely within the academic community through journal articles and conference presentations. The data will be provided to other scientists through the SONIC lab at the University of Illinois and the Network WorkBench at Indiana University as part of the larger cyberinfrastructure project that is currently being supported by NSF. Results also will be shared with NGO practitioners through outlets such as the International Society for Third-Sector Research.

The project offers undergraduates and Master's students training through their participation in the research; the data will be available to them for further analysis and projects, including their own honors and MA theses. Several Ph.D. dissertations will result from the research.

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