

Incentives for Collaboration in Networks:

An Experimental Analysis of the Role of Performance Information

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In recent years, there has been huge growth in both theory and application associated with managing public service delivery through network structures. Much of this research has tried to address issues surrounding organizational incentives for collaboration. One of the less studied mechanisms for promoting collaboration is the use of performance information.

This paper reports on a unique experiment that uses student teams to analyze the role of performance information as a catalyst for collaboration. The paper begins with an overview of collaboration incentive issues. Second, the paper provides a theoretical rationale, in part based on public values theory, as to why individual organizations might be motivated to collaborate if they see overall system wide improvement in services, even if such improvements come at some cost to the individual organization.

Next, the paper explains how we test this hypothesis using an innovative small group experiment. In the experiment, student teams, representing social service delivery organizations, work within network structures to make resource allocation decisions. As these repeated resource allocation decisions are made, network members are given information about how those allocations affected both organizational and system performance. By systematically varying the structure of the network and the composition of groups, the experiment tests how performance information affects team willingness to collaborate with others.

Last, the paper analyzes the preliminary results of this novel experiment, with the goal of explaining when performance information does and does not serve as an incentive for collaboration. Our goal is to contribute to the theory and literature concerning incentives for collaboration.

Why do public managers and public organizations collaborate?¹

Most scholars of interorganizational collaboration agree that organizations prefer autonomy to dependence (e.g. Rogers and Whetten 1982; Hudson 1999; Roberts 2001; Bryson *et al.* 2006). Although several different theories have been proposed to explain why organizations choose to collaborate, there is no consensus on which incentives are most prevalent, and under what conditions some may be more salient than others. The most common incentives for collaboration discussed in the literature are resource dependency and exchange, common purpose, shared beliefs, political interests, catalytic actors, and public value.

Resource dependency is the most well developed theory of interorganizational partnership. The basic assumption is that individual organizations do not have all the resources they need to achieve their goals, and thus rely on inputs from the environment, which consists of a collection of interacting organizations, groups, and persons (Van de Ven *et al.* 1975, 19). Consequently, exchange relationships develop. Levine and White (1961, 588) defined organizational exchange as “any voluntary activity between two or more organizations which has consequences, actual or anticipated, for the realization of their respective goals or objectives.” More than just a way to acquire needed resources, interactions based on exchange are “a stabilizing force in the life space of organizations” (Alter and Hage 1993, 45). Exchange relationships stabilize interorganizational linkages by reducing uncertainty about the future provision of resources (e.g., Galaskiewicz 1985) and by maintaining consistent interaction patterns (Kickert *et al.* 1997).

¹ Part of this literature review is adapted from Rachel Fleishman, “To Participate or Not to Participate? Incentives and Obstacles for Collaboration.” Chapter 3 in Rosemary O’Leary and Lisa Blomgren Bingham, eds. *The Collaborative Public Manager*. Washington D.C.: Georgetown University Press (2009). Used with permission of the author.

Although resource exchange theory is based on the notion of dependency, even relatively independent organizations may participate in networks to take advantage of available resources (Graddy and Chen 2006; Gray 1989; Gray and Wood 1991; Pfeffer and Salancik 1978; Ansell and Gash 2007; Berry, Krutz, Langner and Budetti 2008). Organizations may actively seek out funds within existing network structures, or seek to initiate collaboration in order to tap into funding sources (Agranoff and McGuire 2003; Alter and Hage 1993).

A second incentive for collaboration found in the literature is *common purpose*. Organizations form network linkages in order to achieve similar, compatible, or congruous goals (e.g. Gray 1989; Rogers and Whetten 1982). Increasingly many groups or organizations have some partial responsibility to address public challenges (Crosby and Bryson 2005). Issues that were previously thought of as single agency issues are now understood to have broad linkages and to be interconnected with other issues (Bryson *et al.* 2006).

Tied in with this is the notion of *shared beliefs*. A similarity in values and attitudes make the formation of interorganizational linkages more probable (Aldrich 1979; Alter and Hage 1993) and make these linkages more stable over time (Van de Ven *et al.* 1975). A common ‘belief system’, including norms, values, perceptions, and common worldview, “[provides] the principal ‘glue’” to hold together networks of actors” (Sabatier 1993, 27). In a study of estuary partnerships, Fleishman (2009) asked, why do organizations participate in networks? Fleishman found that the importance of shared goals and advocacy motivations appeared again and again, indicating that partnerships provide a unique platform from which the organizations could leverage resources to achieve common goals.

Next, organizations sometimes pursue their *political interests* through networks (Sabatier 1993; Hecllo 1978; Kickert *et al.* 1997). Through participation in a policy network, organizations

may promote the views or desires of their members or constituency; gain access to political officials or decision processes and cultivate political alliances; gain political legitimacy or authority; and promote organizational policies or programs.

Catalytic actors, or leadership both within the organization and by network leaders or coordinators, can provide other important incentives for the formation of network linkages (Agranoff and McGuire 2001; Kickert and Koppenjan 1997; Bardach 1998). Thus, individuals may provide incentives to collaborate. Sometimes this takes the form of an individual whose sense of what it means to be a highly professional actor includes the imperative to collaborate, as for example in McGuire's (2009) study of emergency management professionals. Other times, the catalytic actor may be an individual who naturally engages in networking throughout his or her career -- a truly collaborative public manager (Hicklin, O'Toole, Meier, and Robinson 2009).

Public value as incentive for collaboration

One final, understudied, incentive for collaboration is *public value*. While Moore (1995) is credited with developing the idea of public value, Bardach (2001) first brought the idea to the collaboration literature when he studied creative opportunity as a driver of collaboration. "An opportunity exists to create new public value . . ." Bardach wrote, "through some sort of interagency collaboration" (e.g., improving service to clients). Moore equated managerial success in the public sector with initiating and reshaping public sector enterprises in ways that increase their value to the public in both the short and the long term. Moore offered a strategic triangle to assist managers in envisioning value in particular circumstances: (1) substantive judgments of what would be valuable and effective; (2) a diagnosis of political expectations; and (3) calculations of what is operationally feasible. This triangle focuses managerial attention

“upward to the political level who authorize and fund programmes, outward to the desired impact and values to be created for society, and downward to address internal management issues” (Try and Radnor 2007, 659). Moore (2000) concluded that public managers should seek to produce public value with the resources they are endowed in particular circumstances.

Bozeman took the public value discussion one step further in his work which sought to “address the imbalance of theoretical bases between . . . market-based and public values approaches to policy and management” (2007, 18). He argued that one may find public values “nearly everywhere” (2007, 141), and that they are just as legitimate – perhaps more legitimate – incentives for public action as are economic incentives. Examples of public values provided by Bozeman include the common good, the public interest, human dignity, sustainability, democracy, protection of minorities, protection of individual rights, transparency, accountability, honesty, equity, and fairness. Bozeman’s (2007, 13) definition of public value guides our research; public values are:

. . .those providing normative consensus about (a) the rights, benefits, and prerogatives to which citizens should (and should not) be entitled; (b) the obligations of citizens to society, the state, and one another; and (c) the principles on which governments and policies should be based.

Thus, one of the underlying tenets of our research is that public managers and public organizations will be motivated by public value to collaborate if they see overall system-wide improvement of services, even if such improvements might come at some cost to the individual organization. This literature inspired the following theory and hypotheses which guide our research. It should be noted that the prior discussion of *common purpose* and *shared beliefs* as a motivation for collaboration are consistent with the notion of public values.

The Central Hypothesis

Recent literature in policy analysis, and particularly environmental policy, has developed the idea of information incentives for action (Hamilton 2005). This, along with the growing interest in transparency as a tool for increased accountability in a variety of settings, is part of a general view that access to information has direct impact on behavior and decision-making. Most of this recent literature is predicated on the view that people will act in their own self-interest if they become aware of the appropriate information. For example, citizens aware of environmental risks associated toxic releases to the environment will bring political pressure to bear on polluters. Our perspective builds on these time honored views to include action predicated on things other than self interest. For example, recent experimental studies in economics have identified that individuals will make decisions that do not attempt to optimize personal self-interest if those decisions result in egregious problems of perceived fairness (Thaler 1988).

In this paper, we contend that performance information can be a motivator for the sharing or reallocation of resources among organizations in a service delivery network. More specifically, we believe that all things equal, teams of individuals acting as organizations in a service delivery network will collaborate by sharing resources when given performance information showing that other groups are better at using those resources. Such behavior clearly makes sense when viewed in light of having a common purpose and/or a set of shared beliefs. Indeed, much of the literature suggests that organizations form network linkages and are more likely to collaborate when their goals or values are similar.

Such behavior also aligns with the notion of public values, which suggests that the creation of public value is the ultimate goal of public sector programs and activities, and that this

proposition that should guide public organizations (Moore 1995, 2000). Public value can be thought of generally as the contribution the public sector makes to the economic, social, environmental health of a nation or political community (Try and Radnor 2007). Embedded in the public value literature is the presumption that the public is willing to make sacrifices (e.g., money, freedoms, liberties, etc.) in order to achieve these outcomes (Kelly et al. 2002). We extend this rationale to organizations, and contend that— organizations within a network may be willing to sacrifice resources in order to produce a better overall outcome for the network. Thus, a foundational issue of this study is that public managers and public organizations motivated by public value will collaborate if they see overall system-wide improvement of services, even if such improvements might come at some cost to the individual organization.

Some of the research in experimental economics provides support for this notion as well. For example, Henrich (2000) found that patterns of responses and offer characteristics among subjects for standard Ultimatum Games in less developed societies (such as the Machiguenga of the Peruvian Amazon) were different than those among subjects in developed Western societies (such as residents of Los Angeles, California). Interestingly, notions of fairness were more likely to dominate the offers and acceptances by subjects drawn from the developed world. Norms and behaviors here likely manifest values, and clearly fairness, the dominant results from Ultimatum games experiments, is a form of public value.

Formally, then, our hypothesis is:

Groups of individuals within a network of groups, all working to achieve the same goal, are likely to give resources to those better able to make use of them once the information is provided, all other things equal (Main Hypothesis).

Once this main hypothesis is tested, we will also consider a number of additional hypotheses. For example, it is well known that network structure mediates communications and

information flows. Denser networks are known to speed up innovations through communications, whereas sparser networks retard such changes. In the context of this study though, denser networks will result in more information, which increases processing needs, thus, also increases the costs of search and analysis. These transaction costs could impede the ability of teams to see which other teams are better and worse at utilizing resources. Learning provides one mechanism for dealing with these high transaction costs. Thus, while overall we expect denser networks to result in higher levels of reallocation of resources and collaboration, we also expect it to take longer for such reallocations to occur. The increases in the process will be manifest at two distinctive levels: first, the number of times or repeat plays for a final equilibrium to emerge will take longer, while at the same time, the average duration, at least of initial decisions by each team, will also be longer.

Our first supplemental hypothesis about system structure and collaboration is:

In denser networks, the overall level of reallocating resources will be greater, with more shifting of resources occurring from less effective to more effective groups, all other things equal (Supplemental Hypothesis 1).

Our second hypothesis is about system structure suggests that the number of steps or iterations before a stable equilibrium emerges is greater when the network is denser:

The denser the network structure, the longer it will take (e.g. more repeated decisions) for the process of re-allocating resources to stabilize (Supplemental Hypothesis 2).

Our final hypothesis about structure focuses on the time it take a team to make a decision:

The denser the network structure the more information each team will be presented with so that processing time for decisions will be longer at the start of the process (Supplemental Hypothesis 3).

Experimental Design

The experiment is a simple repeat play resource allocation game. Various teams were

formed, with each team representing an organization within a social service delivery network. Each team was given a predetermined amount of one generic resource (e.g. labor hours), and was asked to allocate the resource, either to their own organization, or to a number of other organizations as determined by the network structure. Initially, we employed two different network structures, although in future iterations of the experiment we are likely to use several other network structures. The first network had a dense structure, where all teams were linked to all other teams. In the dense network, a group could keep the resources for itself or allocate the resources to any other group within the network. The second network had a sparser structure, where teams were limited in the connections they had to other teams. In the sparse network, a team could keep the resources for itself, or allocate the resources to the other teams with whom they were linked. In short, the allocation possibilities included all teams in the dense network structure, but were more constrained in the sparse network structure.

Once all teams entered their allocations into a web-based computer program, the program determined how each resource was converted to some social output (e.g. drug treatments or counseling sessions) based on a fixed multiplier unknown to each team. After all of the allocations were made, each team saw the output results in terms of the inputs provided by themselves and by the other teams to whom they were linked, along with the amount of social output produced. The process then repeated, with each team again getting a set of fixed resources to allocate followed by a production process and information presentation.

Customized web-enabled software was developed to implement the experiment. The system has two modules: an administrative module used to define and initialize a game and a team module used by each team. A game is set up by having the administrator enter the number of teams (i.e., nodes in the network), the number of rounds or decision iterations, the amount of

resources allocated by each team on each round, the production multiplier for each team on each round, and the formal structure of the network. This last parameter is provided by entering an adjacency matrix with rows and columns equal to the number of network nodes (i.e., teams) with zeros indicating no connection, and ones indicating a connection. This process allows for many different network structures and designs. Once a game is defined, the system generates logon IDs and passwords for each team. The data for each game is saved electronically so that it can be linked to data from individual team decision recorded during the game. Teams may then log on simultaneously through the team module, which will support up to 15 teams.

At the start of a new game, the computer screen shows to each team its initial allocation amount and a list of other teams to which they are connected. An example of this screen is depicted in Figure 1. In the first round, each team was instructed to make a decision to allocate their initial resources among themselves and the other teams by entering the amount next to each team. Once done, they pressed a button to process the decision, at which point they were directed to a pending status screen until all other teams process their decision. A team cannot continue until all the teams have completed their decision for the current round. The system records time duration from the moment a team's resource allocation screen becomes available until they process their decision to allocate those resources. The length of time a team waits for other teams to process their decisions is not included.

The system only allows a group to move to the next round after the last team within a network has processed their decision. Prior to the start of each successive round, teams were provided with results from the completed round that appear on-screen as illustrated in Figure 2. This screen summarized the number of resources each team gave to themselves and the number of resources given to them by others, along with the amount of social output produced by their

total number of resources. Once the team decided to move to the next round, a new allocation screen was provided which includes the results from the previous round as illustrated in Figure 3. The process continued until all teams completed all rounds of the game. All decisions and time durations were written to a file for future use.

Two initial game designs were used to test our hypotheses. The first used a five node network with all nodes connected to each other, a dense network. Each team made allocation decisions over 5 teams. The game was defined to have 20 rounds and in each round each team received 10 resources to allocate. Finally, each team had a production multiplier that remained constant over the whole game. Two teams had a multiplier of 2, two teams had a multiplier of 5, and one team had a multiplier of 9. This set of multiplier created one superior team and reasonable variation across the other teams. The second design was identical to the first except for the structure of the network. In the second design, the network was a ring in which each team was connected to only two other teams in the network, thus having a resource allocation decision to make over three teams. The order of teams in the ring was set up so that each team was flanked by two other teams with different production multipliers. This situation is depicted in Figure 4.

Implementation of the Experiment

In this small group experimental design, we used MPA and Executive MPA students as subjects. The process began with a general call for volunteers made through student listservs. Subjects were told that the experiment was about group behavior in networks, would take approximately 2 hours and that \$20 would be paid to those who completed the process. Volunteers were then asked to meet with a graduate research student for a briefing and to sign

consent forms if they wished to proceed. In the briefing, subjects were told they would take a short online anonymous survey. For those subjects who completed the survey, the volunteers were organized randomly into teams of three and asked to participate in a computer simulation game in a few days time, where they would interact with three to six other teams through a web-based application. It was explained that each group would be asked to make some decisions and then have an opportunity to see the results of those decisions as they affected their team and others.

Analysis of Experimental Data and tests of Hypotheses

Discussion

Conclusion and Future Directions

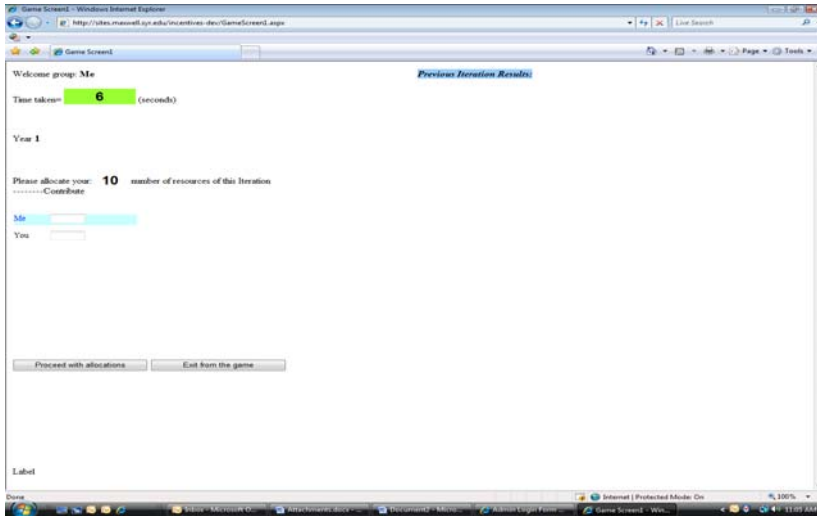


Figure 1: Allocation Decision Screen for a Group (Initial Round Only). At the start of a new game, a group sees the number of resources they have to allocate among themselves and any other group listed on the screen. The groups listed on the screen are only those groups to which this decision group has a connection as defined by the administrator.

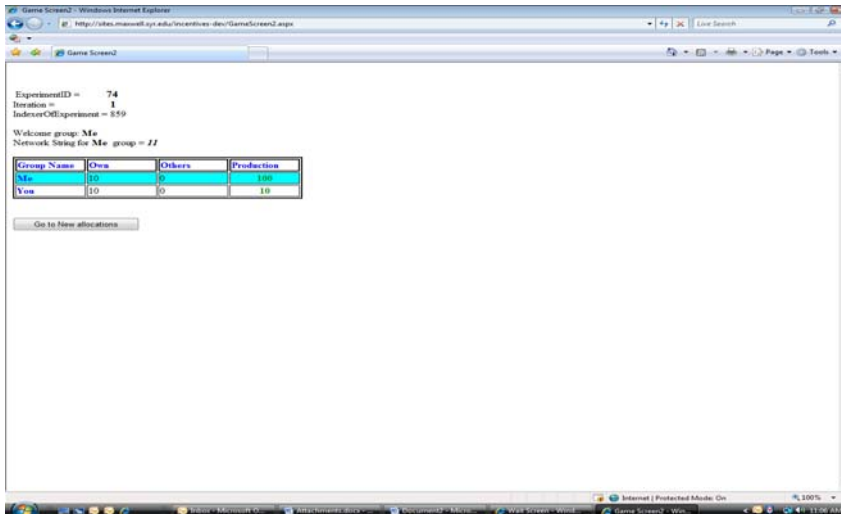


Figure 2: Results Screen for a Team. At the completion of each round, the allocation decision made and production output obtained by each group is displayed. The production output is determined by a fixed number determined by the administrator that is multiplied to the total resources allocated to the group.

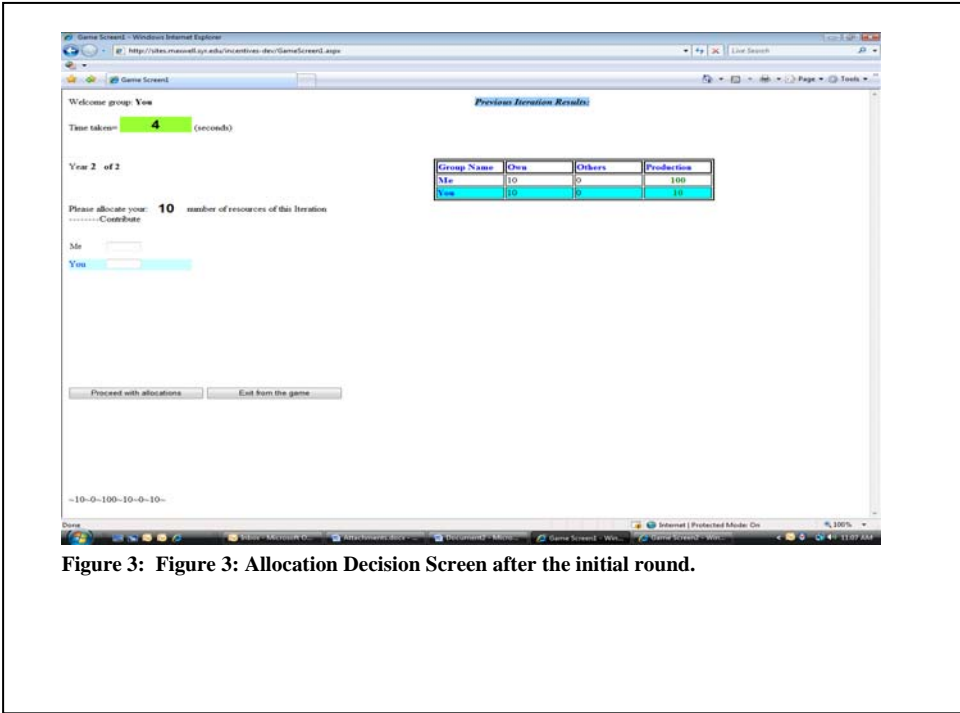


Figure 3: Allocation Decision Screen after the initial round.

Figure 4a: Game One

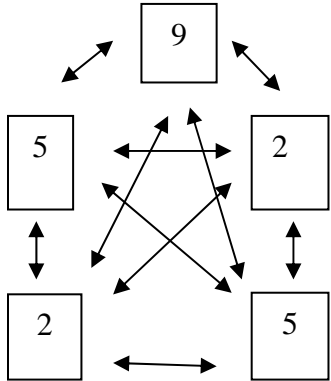
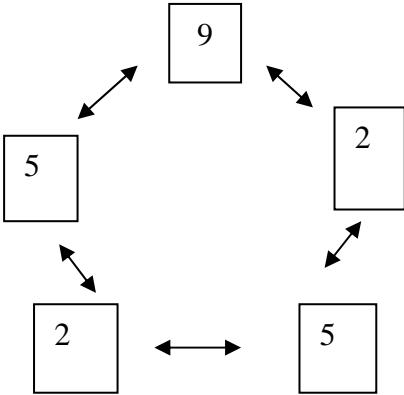


Figure 4b: Game 2



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