

An Integrative Framework for Laboratory Experiments in Social Organization

Anonymized for Review

January 13, 2015

ABSTRACT

Interest in laboratory experiments on social organization has grown in the past decade driven by high-profile successes, a growing capacity to perform large scale experiments, and an increased training in experimental methods. This new interest has the potential to reverse a perennial lag in the use of laboratory experiments in the social sciences and offer new insight into the basic social processes. However, the field is dispersed and fragmented. Long-standing traditions in social psychology, experimental economics, and organizational behavior have long remained within their disciplinary boundaries. New approaches to experimenting with markets, networks, and groups are coming from heterodox fields like computer and network science. In this paper, we propose a three dimensional framework with which to connect these various lines of research into a single endeavor. The first dimension is the specific organization form being induced or simulated in the lab and include markets, networks, and teams. The second dimension is the kind of tasks participants are asked to perform, such as decision-making, puzzle-solving, or resource allocation. These two dimensions are chosen because research consistently shows that altering the task or the structure of the organization fundamentally changes the collective dynamics that emerge. These collective dynamics, including processes like path dependency and equilibrium, represent the third dimension. We argue this framework provides a map of the field, its areas of strength and weakness, and can act as a foundation for an experimental research agenda.

INTRODUCTION

There has been a recent surge in high profile experiments in networks and groups brought about by the increasing capacities of online laboratories and a renewed interest in experiments in disciplines outside of psychology (Centola, 2010; Mason and Watts, 2012; Salganik et al., 2006; Woolley et al., 2010). These experiments have demonstrated the significant amount of promise experiments in organizations has for advancing social scientific research (Lazer et al., 2009; Watts, 2007). In addition, large amounts of resources are being dedicated to expand the infrastructure to support and expand the capabilities of this research. However, the questions, traditions, and perspectives being used to formulate these experiments come from disparate disciplines and areas of interest, making the findings from each difficult to compare and synthesize.

We put forward a three-dimensional framework with which to connect experiments in social organization into a coherent subfield. The first dimension focuses on the form of social organization studied and derives from categorical differences purported by organizational theories. The second dimension focuses on the tasks social organizations are asked to perform and is drawn from McGrath's typology of tasks in group research (1984). Finally, a third dimension arises from the processes and mechanisms studied at the intersection of these two dimensions. This framework is bounded by the broad concept of social organization and focuses on the types of organization and their underlying behavior. Based on this framework, we argue that certain kinds of organization and certain mechanisms have been more thoroughly researched than others and point to gaps in the literature where further research is needed. We conclude by offering several key questions which we believe researchers in the field must address conceptually as a part of advancing the science of experimental research in social organization.

BACKGROUND

A series of highly successful experiments involving group performance in networks and markets evinces the growing interest in laboratory experiments in social organization. This research demonstrates the presence of under-theorized relationships between group structure and individual behavior and their effect on collective action and the outcomes that result. However, there has been little attempt to integrate these approaches into a coherent framework with which to understand the field's history, prioritize questions, identify gaps in knowledge, and broadly frame its contributions.

One of the most recent and influential areas of new laboratory experimentation is in network science. Damon Centola's experiments on an online health community have provided tests of several perennial hypotheses in networks including distinguishing homophily and contagion (Centola, 2011; Shalizi and Thomas, 2011; Lazer, 2001; Lazer et al., 2010) and the process of complex diffusion through repetition and reinforcement (Centola and Macy, 2007; Centola, 2010). Numerous experiments have examined how humans perform tasks while embedded in experimentally defined social networks (Mason and Watts, 2012; Suri and Watts, 2011; Kearns, 2012; McCubbins et al., 2009; Enemark et al., 2014). Their results demonstrate the high degree of variability between the task individuals are asked to accomplish and the performance of networks as a whole. The broad conclusion from their research has been that our theories of the relationship between individual behavior and network performance is naive and a vast amount of work is needed to close the gaps.

Another trend in social organizational experiments has been work on markets outside of economic exchange. Experiments using group processes and market structures has been done in economics since the 1930s (see Roth (1993) for an overview of these early experiments). Recent experiments outside economics have examined a wider array of behaviors and market types beyond price setting, negotiation, and market design. Matthew

Salganik's work with Duncan Watts (2006; 2008) used an online experiment to examine the trajectories of music ratings. Their results indicated that ratings were arbitrary, raising a series of provocative questions over the nature of quality and valuation in cultural markets. A second example is the explosion of work on prediction markets which use transactions as mechanisms for aggregating beliefs into predictions about the future (Tziralis and Tatsiopoulos, 2007). The earliest of these markets predicted the outcomes of political elections in the U.S. (Forsythe et al., 1992; Hanson, 1990). Research on the accuracy of prediction markets shows that this social structure performs better than most other predictive practices including expert judgment and political polling (Wolfers and Zitzewitz, 2006). These experiments in the extra-economic properties of markets continue to expand the scope of behavior in social organization and our understanding of it.

Finally, the increasing capacity to perform research with online subjects has led to rapid changes in the capacity for experiments in social organization. A body of research is developing around performing experiments with online samples (Kohavi et al., 2009, 2010; Bakshy et al., 2014; Reips, 2002a,b; Rand, 2012). This includes a number of studies testing the reliability of online research (Mason and Suri, 2011; Mason et al., 2009; Berinsky et al., 2012; Crump et al., 2013; Horton et al., 2011). The promise of online research lies not only in its relative efficiency in terms of time and money, but also in its capacity to facilitate new kinds of experiments and at larger scales. To take full advantage of this opportunity, we must conceptualize what has been and remains to be studied, what can be studied with new, larger experiments, and what light they can shed on existing knowledge. In other words, we need a framework which connects these new lines of research and capabilities with existing paradigms, questions, and theories.

A BRIEF SURVEY OF EXPERIMENTATION IN SOCIAL ORGANIZATION

What unites studies of social organization is their interest in the relationship between the characteristics and behaviors of collectives. This contrasts with methodologically in-

dividualist work in economics which examines individual decision-making and emergent allocation dynamics as well as much of the experimental tradition in psychology and social psychology which examine the neurobiological, perceptual, interpersonal, or cultural basis for individual behavior. Despite the relative paucity of experiments in social organization compared to non-experimental work, there is still a long and healthy tradition on which to base the framework.

Research on social organization has been a hallmark of the social sciences since its foundation. And, the use of experiments to study social organization extends back as far as the history of experimentation in the social sciences (Allport, 1920; Triplett, 1898). However, the prevalence and prominence of experimentation has not kept up with other methods of research (Green and Gerber, 2003; Jackson and Cox, 2013; McDermott, 2002; Scandura and Williams, 2000). Despite its relative underuse, these experiments have long-standing roots in social psychology and experimental economics. In addition, various threads of inquiry have emerged in political science, sociology, and newer fields of communication, management, and network science. In order for a framework to be complete, it must begin by incorporating these diverse threads.

Research in social and organizational psychology is by far the oldest and most mature field contributing to the experimental study of social organization (see McGrath and Kravitz (1982) for a historical overview and review). Early experiments in social psychology, examined the effects of groups on the individual (Triplett, 1898; Allport, 1920; Asch, 1956; Bandura et al., 1961; Milgram, 1974; Haney et al., 1973). These classic experiments in social influence corresponded to a less-well known (outside of psychology) body of research on group processes. The arc of its history has been an ever-finer-grained (and larger) body of work on processes like group decision-making, conflict, identification, inter-group relationships, large groups, and specialist groups (McGrath and Kravitz, 1982). The result, like the study of organizations more generally, has been a fragmentation of the subfield into many more subfields (Levine and Moreland, 1990; Kerr and Tindale,

2004). And, this subfield continues to receive little attention from its cognate disciplines (Agarwal and Hoetker, 2007). One hope for this framework is to draw attention to this field and to make it accessible for use in other areas.

The other strongly-rooted tradition of experimentation in social organization comes from experiments with coordination problems and markets in economics. The former originate in early tests of game theory, notably in the prisoner's dilemma (Flood, 1958; Thrall et al., 1954) and the tragedy of the commons (Hardin, 1968). The latter tests relationships between individual decision-making in collectives and market behavior (Chamberlin, 1948; Siegel and Fouraker, 1960). The legacy of the former is a rich field of experiments in game theory, some of which directly contribute to our knowledge of collective problems and outcomes (Ostrom et al., 1999). The latter has led to robust work not only on the dynamics of individual preferences, but also the importance of institutions and information as well as the emergence of collective phenomena like bubbles (Smith, 1994).

These two long-standing traditions in research on collective behavior in laboratories remain theoretically disconnected, empirically distinct, and ontologically incommensurate. For example, work on the use of information for collective decision-making in both traditions has shown that less information can sometimes lead to better collective outcomes and more can lead to worse outcomes (Camerer et al., 1989; Stasser and Titus, 1985). In both cases, more or less information can lead to asymmetry which has vastly different implications in the two traditions' paradigms. For economists, unequal information in exchange leads to imbalanced gains or losses. For social psychologists, groups may discount information that has not been shared with all members of the group when pooling information together. In both cases the dynamics and effects of information in collective action are moderated by the structure of the participants and their prospective task (pooling vs bargaining) and rewards (for the group's decision or individual pay-off).

Outside of social psychology and economics, experimental research on social organization and performance emerged across disciplines sporadically after World War II

with network experiments and special group research. Most experimental work in sociology and political science developed from field experiments on social policy (Oakley, 1998; Green and Gerber, 2003; Riecken and Boruch, 1978). In political science, McDermott (2002) counted six political science articles which published the results of experiments before 1970. Since then, laboratory experiments in political science have been dominated by empirical work incorporating coordination problems from game theory to study committee bargaining, electoral competition, and voting (Palfrey, 2009). In addition, independent lines of experimentation have examined special group decision-making, such as legislative committees (Baron and Ferejohn, 1989), legislative voting (Frechette et al., 2003; Diermeier and Gailmard, 2006), and jury decision making (Feddersen and Pesendorfer, 1998; Guarnaschelli et al., 2000; Palfrey, 2009).¹

Sociology on the other hand, has two experimental traditions related to social organization. First, work in expectation states theory examines how status differences are induced and how they influence individual behavior and group performance (Berger, 2007). The second is social exchange theory which examines the dynamic adaptation of structure and power as it evolves through exchange relationships defined broadly (Cook and Rice, 2006). While these two traditions have led to the development of numerous theories of interpersonal dynamics and emergent social structures, these remain tied to specific experiments, concepts, and theoretical assumptions which divide them even within the field (Turner, 2006).

Despite long histories, there is little cross-disciplinary coherence in our contemporary approach to understanding social organizations in the laboratory. Each tradition has approached the topic with different interests and assumptions and therefore developed fairly independent theories of social organizational process. Social and organizational psychology has developed a panoply of models of group decision making based on information aggregation whether weighting (Davis, 1996), sequencing (Stasser and Davis,

¹Laboratory experiments have also become increasingly common in political science following Gerber and Green's work (2000; 2012)

1981), or pooling (Ariely et al., 2000). In economics and economically inspired work in political science, models of social organization based on coordination and market participation have given rise to a variety of theoretical mediators like institutions and information, individual strategies and roles, and (dis)equilibria (Smith, 1994). Finally, in sociology, experimentation in social organization has examined the mediation of socio-cultural constructs in the allocation of resources, power, and esteem and their generalization to macro-level structures (Ridgeway, 2006).

A FRAMEWORK FOR LABORATORY EXPERIMENTATION IN SOCIAL ORGANIZATION

The renewed interest in experiments with social organization offers the opportunity to build bridges between classic paradigms, emerging interests, and new capabilities. To build these bridges, a common understanding of the state of the field, what differentiates it and what holds it together, is necessary. Here, we provide a three dimensional view of experiments with social organization which, we believe captures the main forms of variation and similarity across fields. The first is organizational form or how members are related to one another, whether as groups, teams, markets, networks, or institutions. The second dimension is the task or activity which participants are expected to accomplish such as decision-making, exchange, creating ideas, or performing collective acts. Finally, the third dimension is the pattern of activity or emergent phenomenon studied which is most often performance on the given activity but also may be processes like path dependency, strategy formation, and information pooling. The examples given for each dimension exemplify the main types of forms, activities, and behaviors used across fields, but are not exhaustive classifications.

Dimension 1: Organizational Structure

The first dimension which holds this literature together while differentiating it is the type of relationship participants are to have with one another and the structure of the organization as a whole. The primary examples of this dimension are given in Table 1. Groups and teams, crowds, markets, networks, hierarchies, institutions, and other organizational forms are analytically separable types of social organization. Understanding the boundaries between these forms enables us to differentiate the effect of form on behavior and create experiments which more clearly differentiate their dynamics.

Table 1 here.

Groups and Teams. Most common to social and organizational psychology, groups and teams are collectivities (both simulated and real) in which everyone is aware of one another and must take one another into account when behaving. One of the key differences between groups or teams and their nearest conceptual neighbor, networks, is that the action among individuals in groups cannot be completely privatized into the set of dyadic relationships to which network conceptions apply. In other words, if there is no substantive difference whether individuals interact with other individuals or whether they interact with multiple individuals or the whole set of individuals, then the organization is a group, rather than a network. In addition, networks can also include collectivities which are not aware of one another, whether through the size of the collectivity or through the fact that some members are hidden from others. There is room to debate whether teams and groups should be lumped together or split into different types of organization.

Crowds. Crowds are collectivities in which everyone can interact with any other members of the crowd, but it is infeasible for anyone to interact with or directly influence everyone or the collective outcome. Crowds exist in an uneasy middle between groups,

networks, and markets because the conceptual distinctions between them are often relatively unimportant in observational contexts. Crowds can be represented with networks and markets, by definition allow for the all-to-all possibilities of a crowd. One characteristic that distinguishes crowds from groups is the inability for consensus or collective decision-making in the way groups are capable of owing to the ability for everyone to account for everyone else individually. In this case, phenomena like stigmergy and local leadership emerge as key sources of systematization (Doyle and Marsh, 2013; Shaw and Hill, 2014).

Markets. Markets are structurally ambiguous in that the potential relationships between all individuals in the collective is unspecified. Some experiments in markets use a series of dyadic exchanges while others use computer-mediated financial exchanges. What defines markets as a distinct form is that the all interaction takes place for the purpose of allocating resources through exchange. The prior two categories, crowds and groups, are defined by the limits on the relationships between individuals. We argue that markets are defined by the mode of those relationships. When everyone with whom a person interacts is always and only a partner for resource exchange, the pattern of interaction, collective action, and emergent behavior should be fundamentally different from when this interaction is unbounded. We believe it is worth debating whether markets, like the rest of these categories, are a unique form of social organization. A number of sociologists would agree with assert that they are institutions (Friedland and Alford, 1991; Scott, 2008). And, this particular discussion is one positive outcome made possible by attempting to define the differences and similarities between game theoretic, group process, and legislative decision-making experiments.

Networks. Networks are collectives which can be reduced to the set of relationships between individuals through control over who can interact with whom. From the earliest network experiments, we know that simply limiting interaction between individuals has substantial effects on everything from individual participation and satisfaction with

participation to vastly different behaviors and collective outcomes (Bavelas, 1950; Cook et al., 1983). These profound effects demonstrate the different behaviors that occur and patterns that emerge when members of one group can talk freely among themselves and those of another can only talk to certain others.

Hierarchies. Hierarchies are defined by the division of power within a collective. Groups, markets, and networks sometimes allocate power unequally as a product of the structure they impose or assets they provide to participants. Hierarchies allocate power as a way of defining the conditions from which collective action is to emerge. This is often accomplished by defining leaders or assigning special roles to participants providing them with a locus of control within the collective. Another form of hierarchy can be a mutli-level or multi-stage hierarchy wherein selected leaders must report to yet other leaders. The important point is that when power or roles are allocated, individuals behave differently and different patterns emerged.

Institutions. Institutions are the combination of structures and the specific meanings attached to them which people understand as a taken-for-granted part of the social world (DiMaggio and Powell, 1991; Thornton et al., 2012). Existing research involving institutions typically falls under the "special groups" label in experiments on social organization and includes juries, committees, legislatures, therapy groups, and families. What separates institutions from groups, networks, and other forms is that the combination of structures and meanings must be induced based on participants' preconceived idea of how these institutions work and how to participate in them. In other words, juries are not groups because groups are categorically defined (member, non-member) while institutions are task or role-defined (prisoner/guard, juror, member of congress). While scholars have criticized a range of research based on subjects pretending to be something they're not, it is important to understand how these expectations affect behavior and outcomes in ways that are different from purely structural or utilitarian considerations (Scott, 2008).

Other Forms. The proliferation of organizational forms in the private sector offers a smorgasbord of other forms of social organization with which to perform research (Davis and Marquis, 2005). These include project-based teams which form, dissolve, and reform over time; value chains of progressive work on a given task or object; and networks of teams with which networks link groups rather than individuals. While these increasingly dispersed and complex forms may have been difficult to simulate in laboratory settings, online methods of experimentation are decreasing the costs to recruit and manage large numbers of subjects and enabling a new range of mechanisms with which to induce organizational form as an experimental control.

Dimension 2: Collective Activities and Tasks

The activity dimension refers to what the participants are asked to do collectively. Each research tradition has different, but overlapping types of activities it asks individuals and collectives to engage in. And, these traditions have their own theoretical classification schemes which highlight the key similarities and differences between activities. For example, experimental economics has a sophisticated and highly elaborate repertoire of games with a series of key discriminatory characteristics like the presence of one or multiple rounds, the summation of results, and type of information sharing allowed. In addition, McGrath (1984) formulated a typology of tasks for social psychology based on two axes: conflict/cooperation and conceptual/behavioral. However, these tend to prioritize the relationship among individuals without systematic concern for collective outcomes. For example, individuals may be asked to cooperate individually, but compete against the group. As such, they are inadequate for a classification of social organization activities broadly defined. Here, we present a task-based approach to characterizing the activities collectives are asked to carry out (Table 2). Again, we do not believe our list is complete and believe a more analytically rigorous approach to categorizing activities may provide the sense of boundaries we can not. In addition, these categories very often

overlap in individual experiments and should not be taken as a classification schema for experiments in social organization.

Table 2 here

Appraisal or Evaluative Tasks. When collectives are asked to estimate a value, provide a cumulative opinion of, or rank things; they are performing an appraisal task. We distinguish appraisal from exchange (treated below in resource allocation tasks) and some may assert that exchange is a form of appraisal. We think this is an informative misconception. While exchange in markets has the effect of generating a price and indicating the underlying value people have for things, the action individuals are undertaking is fundamentally different. "What can I get for what I have" is a different task than "what is this thing worth." The mode of appraisal can vary widely as well. Whether quantitative or qualitative appraisal, giving stars or numbers or number of votes; we treat these as the same task of providing comparable values to things.

Knowledge Production. When collectives are asked to estimate the truth value or probability of something being or becoming true, they are engaging in knowledge production. Knowledge Production is a surprisingly distinct task given the predictive power of aggregate knowledge. Again, prediction markets make for an instructive example in our delineation of tasks. While the underlying action in prediction markets is typically the exchange of futures, the purpose of exchanging futures is to placing bets on future events coming true. Thus, the purpose of the action plays a role in defining the task and differentiates how individuals and collectives engage in the task. Finally, experiments with juries or committees are often based on estimating the truth value of claims. However, the purpose for these is to come to a decision (a task treated later).

Puzzle-Solving. Another class of tasks involve finding the answer to solvable problems. Many of the recent wave of experiments has examined how human's solve puzzles devel-

oped in other disciplines, especially computer science (MacGregor and Chu, 2011; Kearns et al., 2006). One advantage to these types of activities is that they have clear solutions that are often difficult to achieve. This allows collectives to play a larger role in outcomes which often have high variability. In addition, puzzle-solving tasks require collectives to process information that is true or false and better or worse by standards outside the experimental conditions, and are thus more realistic than attempts to simulate strong or weak information through hypothetical problems.

Resource Allocation. Resource allocation tasks encompass most experiments in the game theory tradition, both in and outside of economics. In these tasks, individuals or groups are asked to identify the conditions by which they would allocate resources to given ends, typically in exchange for some payoff for the investment or receipt. What ties resource allocation games together is the focus on who controls what resources, the terms of allocation and the processes by which these terms are settled upon, and the return given for different allocation decisions. In some cases, the terms of allocation are set (market taking) while in others, they are negotiated (market making) or unilaterally set (ultimatum). Another key dimension of variation is the set of tasks, that is, how often they are repeated, with whom, and under what conditions.

Collective Action. Most any experiment in social organization involves some form of collective action. What defines an experiment as about collective action is when the task involves acting in concert, whether simultaneously or asynchronously. Collectives may need to plan, allocate resources, or evaluate options; but all of these activities are subordinate the accurate or optimal performance of some collective act. Examples of collective action tasks include collective writing tasks or board games.

Decision-Making. Another category of task with several long traditions, experiments involving decision-making tasks focus on the ability of a collective to facilitate choice. Again, choice is not synonymous with valuation. And, the choice(s) involved may be a synthetic one made by the collective or the set of choices by individuals or subgroups

within the collective. Groups can sometimes help individuals make better decisions than the decision the group as a whole would make (Feddersen and Pesendorfer, 1998).

The list of types of tasks arguably includes others such as creating ideas, destruction or conflict, problem-solving, planning, and information search. To reiterate, while the task dimension helps define the key similarities and differences between experiments on social organization; the particular types here is not complete and probably not the most conceptually efficient. And, many experiments in social organization study multiple tasks. What is important about clarifying this dimension is, first, differentiating these tasks from one another in a way that relates to differences in individual and collective behavior and outcomes. We must be clear about what is a failure of knowledge production and what is a failure of decision-making. This task framework also maps more directly to real-world collective action than those conceptualized in other models. Finally, the framework is cross-disciplinary.

Dimension 3: Emergent Pattern of Behavior

The final dimension of experiments on social organization are the particular patterns of behavior that have emerged as interesting and which are typically the explanans of these experiments. Two experiments involving the same kind of organization performing the same kind of task can still differ significantly in terms of the phenomenon being studied. Table 3 lists several important types of phenomena which are of interest across fields and traditions. These patterns can be broken down into whether they occur during the collective process or as a result of collective process. They can also be broken down into interest in patterns for the group as a whole or for individuals in the group.

Table 3 here

Collective Outcomes. Collective outcomes are assessments or descriptions of the quality of final output of collective action. Perhaps the most popular and well known is whether or not an outcome is an equilibrium, but others include optimality, performance, and reliability. The fit among traditions between theory, experiment, and outcome means that there are strong associations between the kinds of tasks and the associated outcome of interest. This is not necessarily the case however. One interesting line of research on markets in the laboratory examines the emergence of price bubbles even among traders who know the underlying value of the commodity (Smith et al., 1988). In this case, the question is how do markets generate differences between their price and the underlying, “true” value.

Collective Processes. Collective processes are those patterns which regularly emerge during and affect collective action. Perennial examples include path dependency, polarization, and the maintenance of equity or justice. Process-focused research is concerned with discovering how to reliably elicit these phenomena and measure their effect on collective outcomes.

Individual Outcomes. Interest in the effects on these experiments on the individual typical marks an experiment as beyond the scope of social organization. However, there are some individual outcomes which constitute evidence crucial to understanding processes of social organization. One set of outcomes identified in sociology and economics is how individuals’ perceive themselves and one another at the end of an experiment as well as their perception of the results of the experiment. For both of these outcomes, individuals’ willingness to continue participating and the sense of value they ascribe indicates the sustainability of the collective activity and its capacity to reinforce or undermine broader status categories.

Individual Processes Interest in individual processes are also typically beyond the scope of social organization. However, strategy-formation, selection or change is one important individual process which represents, at least in repeated games, how the collective is

perceived by the individual. For example, in Philip Zimbardo's review of the Milgram experiments, he noted that participants' willingness to shock a confederate was a sign that "We must critically reexamine the ethics and tactics of our revered social institutions, which lay the foundation for our mindless obedience to rules, to expectations, and to people playing at being authorities." (Zimbardo, 1974, p. 566)

CONCLUSION: WHY "LABORATORY" EXPERIMENTS

This three dimensional framework is meant to guide experimentalists across fields to the work of others and the paradigms, problems, and findings they share. The hope is that by bringing these disparate traditions into a shared understanding of what kinds of collectives there are, things they can be studied doing, and the interesting things that happen when you combine these in a lab; a cross-disciplinary conversation can begin about what gaps exist to be filled and what overlaps might lead to new integrative theory.

However, until now, we've focused on laboratory experiments with little mention of the vast literatures on field experiments or observational research. The reason for the focus on laboratory experiments instead of experimentation more generally is twofold. First, we are responding to new trends in experimentation and, as such, our primary goal is to build bridge between these new lines of experimentation with more traditional work.

Secondly, the cross-disciplinary conceptual clarity is more important for laboratory experimentation than field research, whether experimental or observational. In order to generalize beyond the laboratory, we have to be clear about what the conditions in the laboratory do and do not represent. One advantage of the laboratory setting is that you can induce a fairly pure case of a group, for example, with less interference from environmental factors like pre-existing relationships among participants. This is the strength and weakness of laboratory experiments. And, as soon as you step out into the world, the controlled model becomes more effected by the complex milieu of social conditions and so casts doubt on the internal validity of your results. As such, it can be difficult to

compare the results of field experiments with groups with those in the laboratory because both the samples and experimental conditions are systematically different.

The need for theoretical clarity then is most relevant in the laboratory where the control necessary to generate these theoretically-defined constructs is possible. The unique strength of experimentation is not external validity, but their ability to achieve fidelity to precise theory. Thus, it's more important to relate experiments according to a pre-specified, theoretical framework. Two laboratory experiments are more comparable only if the theoretical constructs and mechanisms are clearly defined and operationalized. In essence, it is theoretical clarity which gives experiments their cumulative, explanatory power.

Table 1:**Dimension 1: Structures studied in Social Organization Experiments**

Structure	Description
Group/Team	Small group with actors interacting with everyone and acting together simultaneously.
Crowd	Group with autonomous actors acting independently.
Market	Interaction takes place for the sole purpose of exchange
Network	Group of actors linked to specific other actors for communication or action.
Hierarchy	Group of actors assigned to super-ordinate, subordinate, and middle positions vis-a-vis one another.
Institution	Group of actors assigned to perform the tasks of a particular institution (police, doctors, government, etc.).

Table 2:**Dimension 2: Tasks Studied in Social Organization Experiments**

Task	Description
Evaluation/Appraisal	Individual or group must offer an opinion of a target.
Knowledge Production	Individual or group must provide or offer an assessment of factual information.
Puzzle Solving	Individual or group is given a problem to solve (i.e TSP).
Resource Allocation	Individuals or groups allocate resources in exchange for some expected return.
Collective Action	Individuals or group must act together (simultaneously or asynchronously).
Decision-Making	Individuals or group must make a choice.

Table 3:**Dimension 3: Patterns of Behavior Studied in Social Organization Experiments**

Type	Pattern	Description
Collective Outcomes	Equilibria	Do states or characteristics emerge and sustain themselves indefinitely?
	Optimality	How close is the outcome to some optimum (optimal strategy, correct answer, etc.)?
	Reflection	Does the outcome reflect some external standard (truth, expert rating, known behavior outside the lab)?
	Reliability	Does the same outcome or same type of outcome occur repeatedly?
Collective Processes	Path Dependency	How do early solutions relate to later solutions? How do solutions or behavior carry over from round to round?
	Polarization	Does the collective converge on one or more states during discussion?
	Equity/Justice	How are (in)equalities maintained, enforced, accumulated, or forgotten?
	Structuration	To what extent are relationships created, altered, or removed?
Individual Outcomes	Satisfaction	Would the individual continue to participate and would they perform differently?
	Status	Does the individual esteems or disesteems others in the group or the group as a whole?
Individual Process	Strategy Adaptation	How do individuals determine, identify, or select their behavior in the group?

REFERENCES

- Agarwal, R. and Hoetker, G. 2007. A Faustian bargain? the growth of management and its relationship with related disciplines. *Academy of Management Journal*, 50(6): 1304–1322.
- Allport, F. H. 1920. The influence of the group upon association and thought. *Journal of Experimental Psychology*, 3(3): 159.
- Ariely, D., Tung Au, W., Bender, R. H., Budescu, D. V., Dietz, C. B., Gu, H., Wallsten, T. S., and Zauberman, G. 2000. The effects of averaging subjective probability estimates between and within judges. *Journal of Experimental Psychology: Applied*, 6(2): 130–147.
- Asch, S. E. 1956. Studies of independence and conformity: A minority of one against a unanimous majority. *Psychological Monographs: General and Applied*, 70(9): 1–70.
- Bakshy, E., Eckles, D., and Bernstein, M. S. 2014. Designing and deploying online field experiments. In *Proceedings of the 23rd International Conference on World Wide Web*, WWW '14, 283–292, Republic and Canton of Geneva, Switzerland. International World Wide Web Conferences Steering Committee.
- Bandura, A., Ross, D., and Ross, S. A. 1961. Transmission of aggression through imitation of aggressive models. *The Journal of Abnormal and Social Psychology*, 63(3): 575.
- Baron, D. P. and Ferejohn, J. A. 1989. Bargaining in legislatures. *The American Political Science Review*, 83(4): 1181–1206.
- Bavelas, A. 1950. Communication patterns in task-oriented groups. *The Journal of the Acoustical Society of America*, 22(6): 725–730.
- Berger, J. 2007. The standardized experimental situation in expectation states research:

-
- Notes on history, uses, and special features. In Webster, M. and Sell, J.(Eds.), *Laboratory Experiments in the Social Sciences*, 353–78. Amsterdam: Academic Press.
- Berinsky, A. J., Huber, G. A., and Lenz, G. S. 2012. Evaluating online labor markets for experimental research: Amazon.com’s mechanical turk. *Political Analysis*, 20(3): 351–368.
- Camerer, C., Loewenstein, G., and Weber, M. 1989. The curse of knowledge in economic settings: An experimental analysis. *The Journal of Political Economy*, 1232–1254.
- Centola, D. 2010. The spread of behavior in an online social network experiment. *Science*, 329(5996): 1194–1197.
- Centola, D. 2011. An experimental study of homophily in the adoption of health behavior. *Science*, 334(6060): 1269–1272.
- Centola, D. and Macy, M. 2007. Complex contagions and the weakness of long ties. *American Journal of Sociology*, 113(3): 702–734.
- Chamberlin, E. H. 1948. An experimental imperfect market. *The Journal of Political Economy*, 56(2): 95–108.
- Cook, K. and Rice, E. 2006. Social exchange theory. In Delamater, J.(Ed.), *Handbook of Social Psychology*, Handbooks of Sociology and Social Research, 53–76. Springer US.
- Cook, K. S., Emerson, R. M., Gillmore, M. R., and Yamagishi, T. 1983. The distribution of power in exchange networks: Theory and experimental results. *American Journal of Sociology*, 275–305.
- Crump, M. J. C., McDonnell, J. V., and Gureckis, T. M. 2013. Evaluating amazon’s mechanical turk as a tool for experimental behavioral research. *PLoS ONE*, 8(3): e57410.

-
- Davis, G. F. and Marquis, C. 2005. Prospects for organization theory in the early twenty-first century: Institutional fields and mechanisms. *Organization Science*, 16(4): 332–343.
- Davis, J. H. 1996. Group decision making and quantitative judgments: A consensus model. In Witte, E. and Davis, J. H.(Eds.), *Understanding Group Behavior: Consensual Action by Small Groups*, 35–59. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.
- Diermeier, D. and Gailmard, S. 2006. Self-interest, inequality, and entitlement in majoritarian decision-making. *Quarterly Journal of Political Science*, 1(4): 327–350.
- DiMaggio, P. J. and Powell, W. W. 1991. *The New Institutionalism in Organizational Analysis*. Chicago: University of Chicago Press.
- Doyle, M. J. and Marsh, L. 2013. Stigmergy 3.0: From ants to economies. *Cognitive Systems Research*, 21: 1–6.
- Enemark, D., McCubbins, M. D., and Weller, N. 2014. Knowledge and networks: An experimental test of how network knowledge affects coordination. *Social Networks*, 36: 122–133.
- Feddersen, T. and Pesendorfer, W. 1998. Convicting the innocent: The inferiority of unanimous jury verdicts under strategic voting. *American Political Science Review*, 23–35.
- Flood, M. M. 1958. Some experimental games. *Management Science*, 5(1): 5–26.
- Forsythe, R., Nelson, F., Neumann, G. R., and Wright, J. 1992. Anatomy of an experimental political stock market. *The American Economic Review*, 82(5): 1142–1161.
- Frechette, G. R., Kagel, J. H., and Lehrer, S. F. 2003. Bargaining in legislatures: An experimental investigation of open versus closed amendment rules. *American Political Science Review*, 97(02): 221–232.

-
- Friedland, R. and Alford, R. R. 1991. Bringing society back in: Symbols, practices and institutional contradictions. In Powell, W. W. and DiMaggio, P. J.(Eds.), *The New Institutionalism in Organizational Analysis*, 232–263. University Of Chicago Press.
- Gerber, A. S. and Green, D. P. 2000. The effects of canvassing, telephone calls, and direct mail on voter turnout: A field experiment. *American Political Science Review*, 653–663.
- Gerber, A. S. and Green, D. P. 2012. *Field Experiments: Design, Analysis, and Interpretation*. New York: WW Norton.
- Green, D. P. and Gerber, A. S. 2003. The underprovision of experiments in political science. *The Annals of the American Academy of Political and Social Science*, 589(1): 94–112.
- Guarnaschelli, S., McKelvey, R. D., and Palfrey, T. R. 2000. An experimental study of jury decision rules. *The American Political Science Review*, 94(2): 407–423.
- Haney, C., Banks, C., and Zimbardo, P. 1973. Interpersonal dynamics in a simulated prison. *International Journal of Criminology and Penology*, 69–97.
- Hanson, R. 1990. Market-based foresight-a proposal. *Foresight Update*, 10(1): 3.
- Hardin, G. 1968. The tragedy of the commons. *Science*, 162(3859): 1243–1248.
- Horton, J. J., Rand, D. G., and Zeckhauser, R. J. 2011. The online laboratory: conducting experiments in a real labor market. *Experimental Economics*, 14(3): 399–425.
- Jackson, M. and Cox, D. 2013. The principles of experimental design and their application in sociology. *Annual Review of Sociology*, 39(1): 27–49.
- Kearns, M. 2012. Experiments in social computation. *Communications of the ACM*, 55(10): 56–67.
- Kearns, M., Suri, S., and Montfort, N. 2006. An experimental study of the coloring problem on human subject networks. *Science*, 313(5788): 824–827.

-
- Kerr, N. L. and Tindale, R. S. 2004. Group performance and decision making. *Annual Review of Psychology*, 55(1): 623–655.
- Kohavi, R., Longbotham, R., Sommerfield, D., and Henne, R. M. 2009. Controlled experiments on the web: survey and practical guide. *Data Mining and Knowledge Discovery*, 18(1): 140–181.
- Kohavi, R., Longbotham, R., and Walker, T. 2010. Online experiments: Practical lessons. *Computer*, 43(9): 82–85.
- Lazer, D. 2001. The co-evolution of individual and network. *Journal of Mathematical Sociology*, 25(1): 69–108.
- Lazer, D., Pentland, A. S., Adamic, L., Aral, S., Barabasi, A. L., Brewer, D., Christakis, N., Contractor, N., Fowler, J., Gutmann, M., and others 2009. Life in the network: the coming age of computational social science. *Science*, 323(5915): 721.
- Lazer, D., Rubineau, B., Chetkovich, C., Katz, N., and Neblo, M. 2010. The coevolution of networks and political attitudes. *Political Communication*, 27(3): 248–274.
- Levine, J. M. and Moreland, R. L. 1990. Progress in small group research. *Annual Review of Psychology*, 41: 585–634.
- MacGregor, J. N. and Chu, Y. 2011. Human performance on the traveling salesman and related problems: A review. *The Journal of Problem Solving*, 3(2): 1–29.
- Mason, W., Street, W., and Watts, D. J. 2009. Financial incentives and the performance of crowds. In *KDD-HCOMP 09*, volume 11, 100–108.
- Mason, W. and Suri, S. 2011. Conducting behavioral research on amazons mechanical turk. *Behavior Research Methods*, 44(1): 1–23.
- Mason, W. and Watts, D. J. 2012. Collaborative learning in networks. *Proceedings of the National Academy of Sciences*, 109(3): 764–769.

-
- McCubbins, M. D., Paturi, R., and Weller, N. 2009. Connected coordination network structure and group coordination. *American Politics Research*, 37(5): 899–920.
- McDermott, R. 2002. Experimental methods in political science. *Annual Review of Political Science*, 5(1): 31–61.
- McGrath, J. E. 1984. *Groups: Interaction and Performance*. Englewood Cliffs, NJ: Prentice-Hall.
- McGrath, J. E. and Kravitz, D. A. 1982. Group research. *Annual Review of Psychology*, 33(1): 195–230.
- Milgram, S. 1974. *Obedience to Authority: An Experimental View*. New York: Harper & Row.
- Oakley, A. 1998. Experimentation and social interventions: a forgotten but important history. *BMJ: British Medical Journal*, 317(7167): 1239.
- Ostrom, E., Burger, J., Field, C. B., Norgaard, R. B., and Policansky, D. 1999. Revisiting the commons: local lessons, global challenges. *Science*, 284(5412): 278–282.
- Palfrey, T. R. 2009. Laboratory experiments in political economy. *Annual Review of Political Science*, 12(1): 379–388.
- Rand, D. G. 2012. The promise of mechanical turk: How online labor markets can help theorists run behavioral experiments. *Journal of Theoretical Biology*, 299: 172–179.
- Reips, U.-D. 2002a. Internet-based psychological experimenting five dos and five donts. *Social Science Computer Review*, 20(3): 241–249.
- Reips, U.-D. 2002b. Standards for internet-based experimenting. *Experimental Psychology*, 49(4): 243–256.

-
- Ridgeway, C. L. 2006. Status construction theory. In Burke, P. J.(Ed.), *Contemporary Social Psychological Theories*, 301–323. Stanford, CA: Stanford University Press.
- Riecken, H. W. and Boruch, R. F. 1978. Social experiments. *Annual Review of Sociology*, 4: 511–532.
- Roth, A. E. 1993. The early history of experimental economics. *Journal of the History of Economic Thought*, 15(02): 184–209.
- Salganik, M. J., Dodds, P. S., and Watts, D. J. 2006. Experimental study of inequality and unpredictability in an artificial cultural market. *Science*, 311(5762): 854–856.
- Salganik, M. J. and Watts, D. J. 2008. Leading the herd astray: An experimental study of self-fulfilling prophecies in an artificial cultural market. *Social Psychology Quarterly*, 71(4): 338–355.
- Scandura, T. A. and Williams, E. A. 2000. Research methodology in management: Current practices, trends, and implications for future research. *Academy of Management Journal*, 43(6): 1248–1264.
- Scott, W. R. 2008. Approaching adulthood: the maturing of institutional theory. *Theory and Society*, 37(5): 427–442.
- Shalizi, C. R. and Thomas, A. C. 2011. Homophily and contagion are generically confounded in observational social network studies. *Sociological Methods & Research*, 40(2): 211–239.
- Shaw, A. and Hill, B. M. 2014. Laboratories of oligarchy? how the iron law extends to peer production. *Journal of Communication*, 64(2): 215–238.
- Siegel, S. and Fouraker, L. E. 1960. *Bargaining and Group Decision Making: Experiments in Bilateral Monopoly*. New York: McGraw-Hill.

-
- Smith, V. L. 1994. Economics in the laboratory. *The Journal of Economic Perspectives*, 8(1): 113–131.
- Smith, V. L., Suchanek, G. L., and Williams, A. W. 1988. Bubbles, crashes, and endogenous expectations in experimental spot asset markets. *Econometrica*, 56(5): 1119.
- Stasser, G. and Davis, J. H. 1981. Group decision making and social influence: A social interaction sequence model. *Psychological Review*, 88(6): 523–551.
- Stasser, G. and Titus, W. 1985. Pooling of unshared information in group decision making: Biased information sampling during discussion. *Journal of Personality and Social Psychology*, 48(6): 1467.
- Suri, S. and Watts, D. J. 2011. Cooperation and contagion in web-based, networked public goods experiments. *PLoS One*, 6(3): e16836.
- Thornton, P. H., Ocasio, W., and Lounsbury, M. 2012. *The Institutional Logics Perspective: A New Approach to Culture, Structure, and Process*. Oxford University Press.
- Thrall, R. M., Coombs, C. H., and Davis, R. L. 1954. *Decision Processes*. New York: Wiley.
- Triplet, N. 1898. The dynamogenic factors in pacemaking and competition. *The American Journal of Psychology*, 9(4): 507–533.
- Turner, J. H. 2006. The state of theorizing in sociological social psychology: A grand theorist's view. In Burke, P. J.(Ed.), *Contemporary Social Psychological Theories*, 353–374. Stanford, CA: Stanford University Press.
- Tziralis, G. and Tatsiopoulos, I. 2007. Prediction markets: An extended literature review. *The Journal of Prediction Markets*, 1(1): 75–91.
- Watts, D. J. 2007. A twenty-first century science. *Nature*, 445(7127): 489–489.

Wolfers, J. and Zitzewitz, E. 2006. Prediction markets in theory and practice. Technical report, national bureau of economic research.

Woolley, A. W., Chabris, C. F., Pentland, A., Hashmi, N., and Malone, T. W. 2010. Evidence for a collective intelligence factor in the performance of human groups. *Science*, 330(6004): 686–688.

Zimbardo, P. G. 1974. On "obedience to authority.". *American Psychologist*, 29(7): 566–567.