5-2010

Cooperative Institutions in Cultural Commons

Gregg P. Macey

RESPONSE

COOPERATIVE INSTITUTIONS IN CULTURAL COMMONS

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This Response critically evaluates Elinor Ostrom's Institutional Analysis and Development framework and points to some of the challenges of adapting it to study patent pools, open source software groups, and other "cultural" as opposed to natural commons. Few have done more than Ostrom to advance the study of institutions, and no approach offers more insight into the structure of a common-pool resource or its management. But beyond Ostrom's considerable descriptive endeavor and rebuke of "thin" rational choice arguments such as the tragedy of the commons lies a difficult and as yet unfinished enterprise: the study of institutional change. The hazards of applying her framework to cultural commons, which include avoiding functionalist explanations, attending to the dynamic nature of commons creation, and acknowledging the role of narrative in shaping knowledge production and use, suggest the need to embrace and update Ostrom's concern for institutional change. I offer a few modest suggestions for how to accomplish this task. These include adopting a broader definition of "institution," incorporating a holistic approach to human agency, giving attention to the recursive interactions between a commons and its institutional environment, and focusing on how technologies are shaped by their interpretive and institutional context. Each proposal recalls efforts to bridge enduring divides between "old" and "new" institutionalism in economics as well as sociology.

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INTRODUCTION

Many years ago, I visited the Museum of Modern Art in New York City and happened upon what became my favorite painting. I often wonder what drew me to this particular work: the watercolors, the birdlike figures, the contraption on which they were perched. The painting also had an uneasy feel to it, as if Paul Klee were shielding something from the viewer. The machine-like quality of the birds was lost on me, as was their placement on a wire by some unseen force, where they hovered over a void. My fondness for *Twittering Machine*[1] tells me that even at an early age, I was developing a fascination with the seemingly tidy frameworks that rise above the vast expanse of human behavior. *Constructing Commons in the Cultural Environment*[2] offers intellectual property scholars one such framework. The Institutional Analysis and Development (IAD) framework, carefully crafted by Elinor Ostrom and her colleagues at the Workshop in Political Theory and Policy Analysis at Indiana University,[3] is the most oft-cited approach in the relatively young field of public policy studies.[4] There is much to recommend the framework and efforts of Professors Madison, Frischmann, and Strandburg to conform it to cultural as opposed to natural commons dilemmas. In their article, they remind us of the role of law in studying new forms of human organization[5] (a tradition dating back to Karl Llewellyn[6]), offer a refreshing call for cumulative research projects that are all too scarce in legal scholarship,[7] and introduce a means of capturing the diverse arrangements that drive our information economy.[8] They reproduce the latter, the IAD framework, in Figure 1 of their article.[9] This framework repre-

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1 The Museum of Modern Art, The Collection, Paul Klee, Twittering Machine (Die Zwitscher-Maschine) (1922), *available at* http://www.moma.org/collection/object.php?object_id=37347 (last visited Mar. 11, 2010).

2 Michael J. Madison, Brett M. Frischmann & Katherine J. Strandburg, *Constructing Commons in the Cultural Environment*, 95 CORNELL L. REV. 657 (2010).

3 *See* Elinor Ostrom, *Institutional Rational Choice: An Assessment of the Institutional Analysis and Development Framework*, *in* THEORIES OF THE POLICY PROCESS 35, 41–49 (Paul A. Sabatier ed., 2007) (explaining the IAD framework).

4 Paul A. Sabatier, *Introduction: The Need for Better Theories*, *in* THEORIES OF THE POLICY PROCESS, *supra* note 3, at 8–9 ("[Institutional rational choice, which includes the IAD framework,] is clearly the most developed of all the frameworks in this volume and is arguably the most utilized in the United States . . . .").

5 *See* Madison et al., *supra* note 2, at 659–63.

6 *See* Karl N. Llewellyn, *What Price Contract?—An Essay in Perspective*, 40 YALE L.J. 704, 704–36 (1931).

7 For a discussion of the challenges and ambiguities of cumulative research in law and the social sciences, see Edward L. Rubin, *Law and the Methodology of Law*, 1997 WIS. L. REV. 521, 555–56.

8 *See* Madison et al., *supra* note 2, at 664–65 ("[A] systematic, comprehensive, and theoretically informed research framework offers significant potential for learning within and across these commons phenomena.").

9 *See id.* at 680 fig.1.

sents the world of a common-pool resource[10] in all of its biophysical, institutional, social, and cognitive complexity with the elegant flow of a small number of arrows across Ostrom's conceptual map.

It is easy to understand why Madison, Frischmann, and Strandburg chose the IAD framework, and I will reiterate some of its strengths. We should also note that a framework—which as Ostrom points out, can accommodate multiple theories and models[11] and merely begins to organize our inquiry—already has certain parts fused together and mechanisms set in motion. Contrasting them with theories and models, Ostrom emphasizes that frameworks "organize diagnostic and prescriptive inquiry," "provide a metatheoretical language that can be used to compare theories,"[12] and "attempt to identify the universal elements that any theory relevant to the same kind of phenomena would need to include."[13] Frameworks, in other words, are not clean slates. They represent a good deal of work in imposing a level of order on a social system. An effort to hoist one such approach to human interaction above others should raise questions.

Madison et al. intuit these questions as they try to escape the IAD framework's functionalist underpinnings.[14] In ostensibly presenting simple graphical adjustments and a broader expressive turn, the authors hint at longstanding struggles over agency and structure, the dynamics of institutional change, and what Pierre Bourdieu decries as the "rock-bottom antinomy upon which all the divisions of the social scientific field are ultimately founded, namely, the opposition between objectivism and subjectivism."[15] We have witnessed these struggles before in the writings of institutionalist scholars crudely labeled

10 Ostrom defined a common-pool resource ("CPR") as a good "for which subtractability in units appropriated from and restricting access to the resource or facility is a nontrivial institutional problem." Elinor Ostrom & James Walker, *Neither Markets nor States: Linking Transformation Processes in Collective Action Arenas*, *in* PERSPECTIVES ON PUBLIC CHOICE: A HANDBOOK 35, 40 (Dennis C. Mueller ed., 1997).

11 *See* Elinor Ostrom & Vincent Ostrom, *The Quest for Meaning in Public Choice*, 63 AM. J. ECON. & SOC. 105, 112–14 (2004).

12 Ostrom, *supra* note 3, at 35, 39–40.

13 Ostrom & Ostrom, *supra* note 11, at 113 (emphasis omitted).

14 A functionalist framework embodies two claims: that an institutional form or social practice leads to a certain effect, and that it exists to encourage that effect. *See* HAROLD KINCAID, PHILOSOPHICAL FOUNDATIONS OF THE SOCIAL SCIENCES: ANALYZING CONTROVERSIES IN SOCIAL RESEARCH 105 (1996).

15 Pierre Bourdieu, *Vive la Crise!: For Heterodoxy in Social Science*, 17 THEORY & SOC'Y 773, 780 (1988) (emphasis omitted).

"new" and "old,"[16] be they Commons and Williamson[17] or Selznick and Meyer.[18] Sadly, these oppositions will endure beyond our efforts to understand cultural commons, haunting us "like theoretic ghosts."[19] But they generate a number of bridging innovations that can assist us as we try to improve upon the IAD framework.

I introduce a few of these innovations in the form of methodological moves, which the authors' proposed changes to Ostrom's framework inspire. Each treats the construction of a cultural commons as an institutionalization process, where institutions embed in a given context and serve as templates for action.[20] Institutions are the "web of values, norms, rules, beliefs, and taken-for-granted assumptions" in which organizations and their members operate.[21] They are the blueprints that govern the inner workings of an organization, "specifying the forms and procedures an organization of a particular type should adopt."[22] The authors describe a number of institutions in their cultural-commons research, including "membership rules," "resource contribution or extraction standards," and "social structures that describe the roles and interests of individual actors."[23] But in order to meet their goal of "developing institutions and practices"[24] to cooperatively manage the knowledge production efforts that dot our landscape, we have to know how these institutions emerge, persist, and change.

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16 "Old" institutional economics, for example, does not reduce the individual to an independent entity—it views a transaction as incorporating the social order in which it occurs. By contrast, in "new" institutional economics, "[m]ethodological individualism makes the individual with given preferences the fundamental building block of the theory." John Groenewegen, Frans Kerstholt & Ad Nagelkerke, *On Integrating New and Old Institutionalism: Douglass North Building Bridges*, 29 J. ECON. ISSUES 467, 468–70 (1995).

17 *See generally* JOHN R. COMMONS, THE ECONOMICS OF COLLECTIVE ACTION 14–29, 110–12, 288–90 (Kenneth H. Parsons ed., 1950); OLIVER E. WILLIAMSON, MARKETS AND HIERARCHIES: ANALYSIS AND ANTITRUST IMPLICATIONS 1–49 (1975) (contending that transactional considerations determine which institutional mode of organization will obtain in what circumstances).

18 *See generally* PHILIP SELZNICK, LEADERSHIP IN ADMINISTRATION: A SOCIOLOGICAL INTERPRETATION 1–9 (1957) (exploring the nature of critical decisions as they relate to institutional leadership); John W. Meyer & Brian Rowan, *Institutionalized Organizations: Formal Structure as Myth and Ceremony*, 83 AM. J. SOC. 340, 340–63 (1977) (arguing that formal structure of many organizations in postindustrial society "reflect the myths of their institutional environments").

19 *See* Bourdieu, *supra* note 15, at 780.

20 *See* Ronald L. Jepperson, *Institutions, Institutional Effects, and Institutionalism*, *in* THE NEW INSTITUTIONALISM IN ORGANIZATIONAL ANALYSIS 143, 149 (Walter W. Powell & Paul J. DiMaggio eds., 1991) (discussing the characteristics of institutions and institutionalization).

21 Stephen R. Barley & Pamela S. Tolbert, *Institutionalization and Structuration: Studying the Links Between Action and Institution*, 18 ORG. STUD. 93, 93 (1997).

22 *Id.* at 93–94.

23 *See* Madison et al., *supra* note 2, at *139.

24 Michael J. Madison, Brett M. Frischmann & Katherine J. Strandburg, *The University as Constructed Cultural Commons*, 30 WASH. U. J.L. & POL'Y 365, 402 (2009).

Even when applying a framework as refined as Ostrom's, we should be attentive to the full range of institutions and patterns of institutional change that shape cultural commons. To ensure such development, the framework must discourage methodological individualism, accommodate the recursive interaction of structure and agency, and consider the social construction of technology. If we address the above challenges, we will more fully appreciate the dynamics that sustain these unique forms of collective action.

I
FOUNDATIONS

Herbert Simon, one of many influences behind Ostrom's research on common-pool resources,[25] argued that "[n]othing is more fundamental in setting our research agenda and informing our research methods than our view of the nature of . . . human beings."[26] It is therefore surprising that *Constructing Commons* neglects to mention that the IAD framework is a product of institutional rational choice, which moves away from the neoclassical approach to human behavior but preserves some of its assumptions. The IAD framework is a choice-theoretic approach—part of Ostrom's efforts to "expand the range of rational choice models we use."[27] It is constructed around a situation where individuals either support or try to change existing rules by assessing benefits and costs.[28] Her analysis proceeds from a conception of rational action that includes internal variables (expected benefits and costs, discount rates, and norms) and adds "situational variables" that affect perceived benefits and costs.[29] The variables feed into judgments about the benefits and costs of transforming rules as Ostrom describes in her classic text, *Governing the Commons*.[30]

Twenty years later, the framework remains an effort to place before a researcher "the major types of structural variables present to some extent in all institutional arrangements" and an "action arena" in which interactions lead to outcomes of interest.[31] If we define the action arena, we "isolate the immediate structure" that contributes to

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25 *See, e.g.*, ELINOR OSTROM, ROY GARDNER & JAMES WALKER, RULES, GAMES, AND COMMON-POOL RESOURCES 195–220 (1994) (noting the consistency of their results with bounded rationality).

26 Herbert A. Simon, *Human Nature in Politics: The Dialogue of Psychology with Political Science*, 79 AM. POL. SCI. REV. 293, 303 (1985).

27 Elinor Ostrom, *A Behavioral Approach to the Rational Choice Theory of Collective Action*, 92 AM. POL. SCI. REV. 1, 2 (1998).

28 ELINOR OSTROM, GOVERNING THE COMMONS: THE EVOLUTION OF INSTITUTIONS FOR COLLECTIVE ACTION 193, 195–205 (1990).

29 *Id.* at 193.

30 *See id.* at 197 fig.6.2, 199 fig.6.3.

31 Ostrom & Ostrom, *supra* note 11, at 114 (emphasis omitted).

interactions and outcomes through an aggregate of, *inter alia*, participants, "potential outcomes that are linked to individual sequences of actions," and "costs and benefits . . . assigned to actions and outcomes."[32] Such variables are Ostrom's "givens."[33] Ostrom notes that her framework is compatible with "[e]conomic theory, game theory, transaction cost theory, social choice theory, covenantal theory, and theories of public goods and common-pool resources,"[34] a list that is instructive in both the order of its presentation and also what it excludes.

Ostrom criticizes and improves upon what she refers to as the "thin model" of rational choice.[35] Early writings about social dilemmas, which arise when individuals make discrete choices in what turn out to be interdependent situations, were motivated by this simpler version of rational choice theory that came to dominate Ostrom's discipline of political science.[36] With the benefit of hindsight, it is easy to see why the multiparty prisoner's dilemma of Garrett Hardin's "tragedy of the commons"[37] or the free riders that figure prominently in Olson's logic of collective action[38]—both examples of a thin model of rational choice in action—would lead to unnecessarily dire predictions: when self-interested individuals with stable, clear, and fixed preferences try to maximize utility along a narrow time horizon (often a one-shot interaction) without external influences, resources are not adequately cared for and public goods are underprovided. Ostrom's contributions include her work to bring rational choice in line with the limits of human cognition and to show that, despite our constraints (such as Simon's notion of bounded rationality), we can, through the design of institutions, advance social welfare.[39] She also demonstrates that we are not limited to the generic categories of institutional arrangements (markets with individual property rights and

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32 *Id.* at 117; *see also* Mark Lubell, *Collaborative Institutions, Belief-Systems, and Perceived Policy Effectiveness*, 56 POL. RES. Q. 309, 309 (2003) ("Research in the institutional rational choice (IRC) tradition at least implicitly assumes perceived effectiveness is a function of explicit cost/benefit calculations based on objective information about the characteristics of the action arena in which collective action takes place." (emphasis omitted) (citation omitted)); Edella Schlager & William Blomquist, *A Comparison of Three Emerging Theories of the Policy Process*, 49 POL. RES. Q. 651, 653 (1996) ("Actors' strategy choices are guided by their perceptions of expected benefits and costs, conditioned by the decision situation.").

33 Ostrom & Ostrom, *supra* note 11, at 117.

34 Ostrom, *supra* note 3, at 40.

35 Ostrom, *supra* note 27, at 9.

36 Elinor Ostrom, *The Danger of Self-Evident Truths*, 33 POL. SCI. & POL. 33, 37–38 (2000).

37 Garrett Hardin, *The Tragedy of the Commons*, 162 SCIENCE 1243, 1244–48 (1968).

38 MANCUR OLSON, THE LOGIC OF COLLECTIVE ACTION: PUBLIC GOODS AND THE THEORY OF GROUPS 33–52 (1965) (discussing the free-rider problem in a variety of contexts).

39 OSTROM ET AL., *supra* note 25, *passim* (using empirical data to study the institutional theory of common-pool resource dilemmas).

bureaucracies). Ostrom and her colleagues identify a broad array of alternatives through inductive review of case studies and deductive modeling of resource-appropriation regimes.[40]

Yet even with adjustments such as the bounded rationality of individuals and institutional scaffolds to encourage cooperation, the unit of analysis in institutional rational choice often remains the individual.[41] The question of when self-interested individuals will have sufficient incentive to cooperate, which in the IAD framework is driven by a focus on rules,[42] does not take us as far as we might have hoped had rational choice not been our point of departure. At base, it is still a theory of agency that mirrors new institutional economics, which Ostrom notes shares a number of key elements with the IAD framework.[43] Both focus on making opportunistic behavior costly through institutional arrangements, particularly rules and norms.[44]

In the field of new institutional economics (NIE), Oliver Williamson extended Chester Barnard's insight that organizations could "compensate for the cognitive limitations of individuals."[45] Williamson investigated when, in the absence of complete contracting (which is impossible due to bounded rationality and opportunistic behavior),

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40 *See, e.g., id.*; Ostrom, *supra* note 27, at 8 (noting that field and experimental research suggest that "individuals temporarily caught in a social-dilemma structure are likely to invest resources to innovate and change the structure itself in order to improve joint outcomes" through a "continuous trial-and-error process until a rule system is evolved that participants consider yields substantial net benefits").

41 *See, e.g.*, Pranab Bardhan & Isha Ray, *Methodological Approaches to the Question of the Commons*, 54 ECON. DEV. & CULTURAL CHANGE 655, 660–61 (2006) (linking methodological individualism to the commons research of Ostrom and others, which asks "under what rules and incentives a group of self-regarding individuals would cooperate to govern the commons and whether or not specific asymmetries would prevent cooperation from emerging" (citations omitted)); Bonnie J. McCay & Svein Jentoft, *Market or Community Failure? Critical Perspectives on Common Property Research*, 57 HUM. ORG. 21, 23 (1998) (describing the methodological individualism of Ostrom's "communitarian approach, which examines endogenous and exogenous factors that distinguish between successes and failures at community-based common resource management"); Peter J. Robertson & Shui-Yan Tang, *The Role of Commitment in Collective Action: Comparing the Organizational Behavior and Rational Choice Perspectives*, 55 PUB. ADMIN. REV. 67, 69–70 (1995); Nikolaos Zahariadis, *Comparing Three Lenses of Policy Choice*, 26 POL'Y STUD. J. 434, 437, 440 (1998).

42 OSTROM, *supra* note 28, at 50–55; ELINOR OSTROM, UNDERSTANDING INSTITUTIONAL DIVERSITY 16–22 (2005).

43 Ostrom, *supra* note 3, at 35–36 ("The elements involved in the framework are closely related to concepts that play an important role in related theories, such as those represented in the work of Douglass C. North, Oliver Williamson, and others in the 'new institutional economics' tradition.").

44 *Compare* OSTROM, *supra* note 28, at 197 fig.6.2, 199 fig.6.3, *with* Sumantra Ghoshal & Peter Moran, *Bad for Practice: A Critique of the Transaction Cost Theory*, 21 ACAD. MGMT. REV. 13, 19 fig.1 (1996).

45 W. Richard Scott, *Symbols and Organizations: From Barnard to the Institutionalists*, *in* ORGANIZATION THEORY: FROM CHESTER BARNARD TO THE PRESENT AND BEYOND 38, 38 (Oliver E. Williamson ed., 1990).

transactions should be organized within a hierarchy or firm.[46] As with Ostrom's common-pool regimes, which rely on rules, monitoring, and escalating enforcement to ensure resource protection, NIE concerns the need to avert opportunistic behavior with clever institutional innovations, such as long-run contracts firms use to economize on transaction costs and render malfeasance costly. This approach can lead to an undersocialized view of human behavior.[47] In economic-institutional frameworks generally, institutions do not so much produce elements that are necessary to rise above a social dilemma (such as trust) as provide functional substitutes for them in the form of rules.

To varying degrees, Ostrom and Williamson depart from neoclassical theory. In the IAD framework's effort to move past the thin view of rational choice, it acknowledges that decision making is not entirely independent—for example, individuals may be members of a community of shared norms that alters their calculus of benefits and costs. But neither effort emerges entirely unscathed, as Madison et al.'s struggles with a characteristic other than the framework's comfort with methodological individualism shows.[48] The authors compare the "functionalist approach that Ostrom and her colleagues take" to the functionalist view of intellectual property: "'[I]n the absence of [some institutional solution], there would be a significant underinvestment in (some types of) [intellectual resources] because of the risk that competitors would appropriate the value of the [resources].'"[49] This habit of referring to functions as "ends which determine the course of events"[50] is a common criticism of institutionalists new and old, in economics as well as sociology.

In NIE, for example, institutional innovations arise out of "global, cost-minimizing behaviour" as part of a competitive evolutionary process.[51] Akin to the functionalism of early theories of private property, where inefficient institutions are selected out of the population,[52] NIE

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46 *See, e.g.*, Oliver E. Williamson, *The Economics of Organization: The Transaction Cost Approach*, 87 AM. J. SOC. 548 *passim* (1981).

47 Mark Granovetter, *Economic Action and Social Structure: The Problem of Embeddedness*, *in* THE SOCIOLOGY OF ECONOMIC LIFE 53, 59 (Mark Granovetter & Richard Swedberg eds., 1992).

48 *See* Madison et al., *supra* note 2, at 671 ("The functionalist aspect of our proposed framework mirrors the functionalist approach that Ostrom and her colleagues take with respect to regimes governing the sharing and exploitation of natural resources.").

49 *Id.* at 666, 671 (quoting Brett M. Frischmann, *The Pull of Patents*, 77 FORDHAM L. REV. 2143, 2156 (2009)).

50 Steven R. Brown, *Structural and Functional Information*, 35 POL'Y SCI. 285, 286 (2002).

51 Geoffrey M. Hodgson, *Institutional Economic Theory: The Old Versus the New*, 1 REV. POL. ECON. 249, 254 (1989); Malcolm Rutherford, *What Is Wrong with the New Institutional Economics (and What Is Still Wrong with the Old)?*, 1 REV. POL. ECON. 299, 306 (1989).

52 *See* Harold Demsetz, *Toward a Theory of Property Rights*, 57 AM. ECON. REV. 347, 350 (1967).

predicts that governance structures will become more prevalent to the extent they minimize transaction costs.[53] A similar tautological reasoning can occur in commons research, where successful collective action appears individually rational[54] and adaptive efficiency is assumed for enduring common-pool resource regimes.[55] The IAD framework and NIE also share a foundation in game theory, which can model the spontaneous emergence of institutions such as norms through their repetition across infinite (or at least indefinite) time horizons.[56] By contrast, old institutional economics proceeds from a more holistic rationality. It relies on historical analysis and considers individuals in terms of their position within various entities, with their position determining "the values, ideas, knowledge, preferences, purposes and constraints they face."[57]

Similar bouts with functionalism exist in sociology. For example, Talcott Parsons's work linking organizational change to adaptive efforts is arrayed against new institutionalist accounts of formal organizational structures that persist despite their inefficiency.[58] In neither field do pendulum swings of this sort lead to necessarily more complete approaches to institutional change. For example, new institutionalist sociology pays too much attention to structure (as opposed to NIE's focus on the behavior of agents) and ironically adopts its own functionalist explanation for why organizations adopt similar practices

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53 *See* Mark Setterfield, *A Model of Institutional Hysteresis*, 27 J. ECON. ISSUES 755, 758 (1993) ("The central contention of the NIE is that institutions arise spontaneously in the course of market activity."); Oliver E. Williamson, *Organizational Innovation: The Transaction-Cost Approach*, *in* ENTREPRENEURSHIP 101, 125 (Joshua Ronen ed., 1983) ("[E]fficiency is the main and only systematic factor responsible for the organizational changes that have occurred.").

54 Bryan E. Burke, *Hardin Revisited: A Critical Look at Perception and the Logic of the Commons*, 29 HUM. ECOLOGY 449, 457 (2001) (summarizing Ostrom's argument that "it may be rational for common resource users to forego individual benefits and cooperate toward collective goals").

55 For examples of how common-pool resource regimes may endure for reasons other than economic efficiency, see Bonnie J. McCay, *Emergence of Institutions for the Commons: Contexts, Situations, and Events*, *in* THE DRAMA OF THE COMMONS 361, 361–402 (Elinor Ostrom et al. eds., 2002), and David Mosse, *Collective Action, Common Property, and Social Capital in South India: An Anthropological Commentary*, 54 ECON. DEV. & CULTURAL CHANGE 695 (2006).

56 *See* OSTROM ET AL., *supra* note 25, at 23–50.

57 Fernando Toboso, *Institutional Individualism and Institutional Change: The Search for a* Middle Way *Mode of Explanation*, 25 CAMBRIDGE J. ECON. 765, 767 (2001); *see also* Setterfield, *supra* note 53, at 757.

58 *See* Paul Colomy, *Neofunctionalism and Neoinstitutionalism: Human Agency and Interest in Institutional Change*, 13 SOC. F. 265, 267–69 (1998); Paul J. DiMaggio & Walter W. Powell, *Introduction* to THE NEW INSTITUTIONALISM IN ORGANIZATIONAL ANALYSIS 1, 11–19 (Walter W. Powell & Paul J. DiMaggio eds., 1991); Paul M. Hirsch & Michael Lounsbury, *Ending the Family Quarrel: Toward a Reconciliation of "Old" and "New" Institutionalisms*, 40 AM. BEHAV. SCIENTIST 406, 409–10 (1997).

over time.[59] But these intellectual shifts can inform the present debate over common-pool resource management and its extension to cultural commons. They offer suggestions for how to properly balance individualism and holism, structure and agency, and objective and subjective elements in a way that is useful for sustained inquiry. They can help us resolve not only how to systematize and inventory studies of commons dilemmas, where the IAD framework has proven its worth, but also identify the kinds of studies that we should carry out.

It is important that we undertake this exercise to question whether the IAD framework—with echoes of opportunism among self-interested individuals (prominent in Williamson's transaction cost economics approach), Axelrod's tit-for-tat strategy and the emergence of norms (that appears in Ostrom's framework in the form of monitoring and escalating enforcement), and other remnants of a choice-theoretic approach—can properly assess whether institutions hinder or help resolve the collective action problems that exist in cultural commons. Although the IAD framework is open to contributions from a broad range of disciplines, a choice-theoretic framework will, when a legal academy that shares political science's infatuation with rational choice adopts it,[60] fit more easily with certain explanations of cultural commons including NIE. Such approaches give less attention to historical and anthropological accounts, institutionalist alternatives to NIE, and research that focuses on the embeddedness of actors and network effects, which are of particular importance to cultural commons, including open source software.

Without such accounts, we will be less able to critically evaluate the norms that sustain cooperative behavior, or view the institutions of today as expressions of path dependence or the micropolitics of a place or network. We will ask questions in order to figure out how the commons solved the first-order problem of credible commitment and second- and third-order concerns of monitoring and enforcement, but we will not be as attentive to how institutional structures arise, shape preferences, or act beyond the realm of purposive behavior. And we will lack the means of sifting through complex forms of governance to locate essential mechanisms that may be of interest to policymakers.

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59 *See, e.g.*, Mark C. Suchman, *Managing Legitimacy: Strategic and Institutional Approaches*, 20 ACAD. MGMT. REV. 571 (1995).

60 *See generally* Russell B. Korobkin & Thomas S. Ulen, *Law and Behavioral Science: Removing the Rationality Assumption from Law and Economics*, 88 CAL. L. REV. 1051 (2000) (explaining how legal scholarship makes use of the rational choice assumption and how behavioral science improves rational choice theory).

In important ways, Madison et al. begin such a calibration exercise. The authors point out that community production of intellectual property is not a one-size-fits-all activity. They note the complexity of efforts to overcome blocking patents, protect open source information through new licensing schemes, and the like. They adopt the best of Ostrom's commons framework—its nested levels that can explain institutional change and its rich findings on the process of self-governance. And they show, often implicitly in their study of the research university,[61] that the creation and maintenance of cultural commons is at base an institutionalization process, shaped by "the expectations of a field, a department, a lab, and so forth"[62] and by norms and rituals that diffuse into the "smallest nooks and crannies"[63] of the academy.

While Madison et al. are faithful to the "clusters of questions"[64] they find important and add several prominent innovations[65] that, they admit, "complicate the project of specifying and describing commons,"[66] the broader challenges of studying institutional change remain. Indeed, Madison et al.'s analysis of the university overwhelms the reader with data on everything from the nesting of archive-within-library-within-school to the norms of a workshop presentation. How do we truly understand what they refer to as the "cycle of commons construction"?[67] What mechanisms drive this institutionalization process? Answering such fundamental questions as how a university interacts with its institutional environment, how individuals within the academy—who are in large part shaped by this environment—are also able to question and change various roles and practices, and how some practices can become taken for granted and shape the commons beyond the realm of rational choice, will get us closer to the mechanisms of commons construction that the authors seek to understand. Their proposed modifications to the IAD framework hint at ways in which we can organize our research.

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61 Madison et al., *supra* note 24.

62 *Id.* at 390–91.

63 *Id.* at 390.

64 *Id.* at 374.

65 For example, they point to the need to bring the IAD framework in line with intellectual property's unique characteristics (e.g., boundaries are hard to define for nonexcludable, nonrivalrous goods; resources must at some point be created before they are shared). *See* Madison et al., *supra* note 2, at 666.

66 Madison et al., *supra* note 24, at 377.

67 *Id.* at 388.

II
METHODOLOGICAL CONCERNS

A. Functionalism and the Many-Variables Problem

The social sciences do not often encourage productive relations between different theoretical "imageries."[68] The IAD framework is a welcome departure in its efforts to blend two such imageries: institutionalist arguments about sets of enforceable rules provide initial conditions for the framework's largely actor-centric hub, allowing the two to exist in a kind of modular complementarity. Still, Madison et al. recognize that this accommodation arises within what remains a functionalist approach. Understanding that creative and information-intensive activities involve a good deal more than public-goods production, the authors do not want to adopt Ostrom's approach to common-pool resources whole cloth. They propose three key departures. First, they suggest that we expand the number of variables in the framework.[69] They want to discourage researchers from looking just to mechanisms of exclusion or appropriation, for example, which might mask other forces at work within a commons.

Researchers who use the IAD framework to study commons dilemmas have identified far more variables than they could ever analyze with the appropriate level of precision. One noted IAD scholar admits that, after many years of research, the framework has yet to provide a theoretically consistent account of collective-goods provision.[70] Arun Agrawal reviewed the work of three scholars, including Ostrom, and found that they alone identified thirty-six conditions "that seem relevant to the successful management of common-pool resources," a list he narrowed to twenty-four factors.[71] He added that:

> At present, we do not have any reliable way to assess the degree of correlation among these factors. . . . As soon as we concede the possibility that somewhere between 30 and 40 variables affect the management of common-pool resources, and that some of these variables may have important interactional effects, we confront tremendous analytical problems.[72]

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68 *See* PAUL PIERSON, POLITICS IN TIME: HISTORY, INSTITUTIONS, AND SOCIAL ANALYSIS 8 (2004); *see also* ARTHUR L. STINCHCOMBE, CONSTRUCTING SOCIAL THEORIES 57–129 (1968) (describing the "causal imagery" of demographic, functional, and historicist theories).

69 *See* Madison et al., *supra* note 2, at 672 (explaining that certain features of cultural resources "add to the range of variables that must be considered when studying commons institutions"); *see also id.* at 671 (representing modifications to Ostrom's framework in the form of "baskets of questions" that will be needed to "interrogate constructed cultural commons").

70 *See* Arun Agrawal, *Common Resources and Institutional Sustainability*, *in* THE DRAMA OF THE COMMONS, *supra* note 55, at 41, 45–46.

71 Arun Agrawal, *Sustainable Governance of Common-Pool Resources: Context, Methods, and Politics*, 32 ANN. REV. ANTHROPOLOGY 243, 254 (2003).

72 *Id.*

Facing this and related problems such as endogeneity and omitted variable bias, we can appreciate why Ostrom was careful not to set forth her framework until she could review a large number of case studies,[73] and why she and her colleagues link their inductive review of case studies with deductive theory building.[74]

The studies of patent pools, jambands, and other cultural commons that Madison et al. identify[75] pale in comparison to the dozens of empirical studies that served as the raw material for Ostrom's *Governing the Commons.* Obviously, a single article does not give the authors sufficient space in which to analyze these studies and inductively suggest revisions to the IAD framework. Nor is there discussion of how Ostrom's efforts to inform case selection and hypothesis generation with modeling and game theory should apply, if at all, to the study of cultural commons. These are questions at the foundation of the kind of cumulative research project that Madison et al. propose.[76] But one could argue that mirroring Ostrom's approach may not be well advised, given how far the framework has to go in generating and testing causal mechanisms to connect important variables. Perhaps it is better to recall that metaphors such as the prisoner's dilemma are useful not because they are accurate across a broad range of human interaction but because they capture a key feature of human behavior that warrants greater scrutiny. It is also my guess that many of the variables that we might identify through the study of cultural commons are not those that we should address as a matter of policy. Frameworks with a narrower scope than the IAD framework (or Madison et al.'s version) could arguably be more useful in identifying a small number of mechanisms that are of special relevance to effective legal and policy intervention.

With the above methodological concerns in mind, there is some, in my opinion, mistaken appeal to simply extending NIE to cultural commons such as open source software. As mentioned, NIE shares a number of assumptions with the IAD framework, and similarly looks to the benefits and costs of participation in certain governance struc-

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73 *See generally* OSTROM, *supra* note 28, *passim* (developing a wide range of case studies before exposing a framework for understanding self-governing common-pool resources).

74 *See* OSTROM ET AL., *supra* note 25, at 75–97 (using descriptions of rules that fishing communities employ as an empirical basis to develop a common theoretical language of rules); Koen P. Overmars, Wouter T. de Groot & Marco G.A. Huigen, *Comparing Inductive and Deductive Modeling of Land Use Decisions: Principles, a Model and an Illustration from the Philippines*, 35 HUM. ECOLOGY 439, 450–51 (2007) (arguing that using a deductive approach in interaction with inductive work will enhance progress in land use science).

75 *See* Madison et al., *supra* note 2, at 660–63.

76 *Id.* at 707 ("[W]e offer the framework described in this Part as a template for ongoing case study investigations of constructed cultural commons across a broad variety of domains.").

tures.[77] Yochai Benkler, whose article is cited by Madison et al., shares their interest in "[c]ommons-based peer production."[78] But he argues that Ostrom's approach "do[es] not give a complete answer to the sustainability of motivation and organization for the truly open, large-scale nonproprietary peer production projects."[79] Benkler's reluctance to extend the IAD framework to open source suggests his discomfort with Ostrom's "design principles"—a small list of variables culled from case studies that, over time, might suggest the necessary building blocks for the cooperative management of a common-pool resource.[80] The design principles are well adapted to small-scale resource situations that encourage face-to-face interaction, clearly defined boundaries, and broad participation in the modification of rules,[81] but do not seem to coincide with the distributed nature of many cultural commons.

Building on Williamson's approach, Benkler proposes a framework using relative social cost to identify when peer production would be more efficient than market- or firm-based production. He argues that "it is relatively easy to adapt the transaction-costs theory of the firm and the comparative institutional cost theory of property to include [peer production]."[82] If we place a boundedly rational actor with preferences for monetary, intrinsic (hedonic), and social-psychological rewards in a network that pools a sufficiently large number of contributions, direct monetary incentives for participation need only be trivial.[83] Once we solve the motivation to take part in an open source project, modular project components and low-cost integration

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77 *See* Yochai Benkler, *Coase's Penguin, or, Linux and* The Nature of the Firm, 112 YALE L.J. 369 (2002) (discussing the IAD framework and NIE's shared goal of averting opportunistic behavior by making it costly through institutional innovations, adoption of a functionalist, ends-oriented approach to institutions, and foundation in game theory).

78 *Id.* at 375; *see also* Benoît Demil & Xavier Lecocq, *Neither Market nor Hierarchy nor Network: The Emergence of Bazaar Governance*, 27 ORG. STUD. 1447, 1457–58 (2006) (applying "transaction cost economics" to open source and arguing that the success of such projects depends in large part on their "sweeping economies of both transaction and production costs").

79 Benkler, *supra* note 77, at 378.

80 Ostrom posited that at some point, "it will be possible to identify a set of necessary design principles and that such a set will contain the core of what has been identified here." OSTROM, *supra* note 28, at 91. Elsewhere, she emphasizes that "there is no blueprint that can be used to create effective local institutions" and that the design principles should not alone be considered sufficient for encouraging effective common-pool resource management. Elinor Ostrom, *Designing Complexity to Govern Complexity*, *in* PROPERTY RIGHTS AND THE ENVIRONMENT: SOCIAL AND ECOLOGICAL ISSUES 33, 43 (Susan Hanna & Mohan Munasinghe eds., 1995).

81 *See* Agrawal, *supra* note 71, at 248 (discussing commons scholars' view that "members of small local groups can design institutional arrangements to help manage resources sustainably . . . [by implementing] a small set of conditions that are positively related to local self management of resources.").

82 Benkler, *supra* note 77, at 403.

83 *See id.* at 407 n.78, 434–35.

of contributions into a final product help drive successful collaboration.[84] Others, including Josh Lerner and Jean Tirole,[85] have adapted the standard framework of labor economics to open source development, using an approach that also focuses on individuals' perceived benefits and costs.[86]

What is the justification for moving beyond these efforts to understand cultural commons? Madison et al. explain that if we rely exclusively on functionalist accounts of intellectual property creation, such as one based on transaction costs, we will analyze only a narrow set of variables.[87] What do we gain by substituting a more complex IAD framework for, say, an extension of NIE to cultural commons?[88] First, if we were only to extend NIE, we would risk retaining its methodological individualism.[89] We would focus on institutions as a means of facilitating transactions while minimizing vulnerability to opportunistic behavior.[90] Our theoretical work would locate cultural commons as hybrids along a market-hierarchy continuum, even though as network

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84 *See id.* at 426–39.

85 *See, e.g.*, Josh Lerner & Jean Tirole, *Some Simple Economics of Open Source*, 50 J. INDUS. ECON. 197, 212–15 (2002) ("A programmer working on an open source software development project incurs a variety of benefits and costs [including opportunity cost, improved performance on paid employment tasks, hedonic gain, and career advancement and ego gratification]."). If the individual programmer perceives a net benefit from engaging in the open source project (equal to immediate payoff plus delayed payoff), she will be motivated to participate. *See id.* at 212–13.

86 There is considerable overlap between Lerner and Tirole's findings, which follow NIE's view of governance as a trade-off between incentives and controls, and variables of interest to innovation theorists, who also focus on the motivations of individual users and contributors. *See, e.g.*, Eric von Hippel & Georg von Krogh, *Open Source Software and the "Private-Collective" Innovation Model: Issues for Organization Science*, 14 ORG. SCI. 209, 217 (2003) ("Programmers contribute freely to the provision of a public good because they garner private benefits from doing so."). Von Hippel and von Krogh's model shares much with economic-institutional approaches to cultural commons. It explains the solution to a collective action problem such as open source software by showing that the benefits of contributing are greater than those free riders obtain. Similarly, the benefits of the free revealing of innovations, if properly specified, also outweigh its costs. *See id.* at 213–17; *see also* Lars Bo Jeppesen & Lars Frederiksen, *Why Do Users Contribute to Firm-Hosted User Communities? The Case of Computer-Controlled Music Instruments*, 17 ORG. SCI. 45, 45 (2006) (discussing the benefit online information sharing confers to innovators); Georg von Krogh, Sebastian Spaeth & Karim R. Lakhani, *Community, Joining, and Specialization in Open Source Software Innovation: A Case Study*, 32 RES. POL'Y 1217, 1234 (2003) (discussing the educational benefit of the open source environment to rising developers).

87 *See* Madison et al., *supra* note 2, at 671–72.

88 Benkler suggests the following division of labor: NIE would isolate important mechanisms for further analysis within "the domains of social psychology and anthropology, or, if done formally, through artificial life-type modeling" to better understand actions and motivations that are beyond the purview of economic functions. Benkler, *supra* note 77, at 424.

89 *See* Fernando Toboso, *Explaining the Process of Change Taking Place in Legal Rules and Social Norms: The Cases of Institutional Economics and New Institutional Economics*, 2 EUR. J.L. ECON. 63 (1995).

90 *See id.* (explaining the centrality of transaction costs to new institutionalist theory).

forms of organization, we should set cultural commons apart from this continuum.[91] Walter Powell, who studied network forms when they arose in the late 1980s, cautioned against analyzing them according to their transaction costs: "[M]any of the [network] arrangements . . . actually increase transaction costs, but in return they provide concrete benefits or intangible assets that are far more valuable. The reduction of uncertainty, fast access to information, reliability, and responsiveness are among the paramount concerns that motivate the participants . . . ."[92] He viewed a transaction cost analysis of these new governance arrangements with suspicion.

While Ostrom notes that her framework is compatible with NIE, the rich literature her study of natural resource management encouraged demonstrates that a transaction cost-based approach is of limited use to cultural commons researchers. The pervasive emergence of cooperation in common-pool resource regimes, often under conditions that are not favorable to such behavior, suggests that something beyond opportunism and its institutional control is at work.[93] In addition, the IAD framework's many-variables problem calls for a treatment of rationality that is at odds with NIE. So far, "[t]he connection between situation and outcome" under the IAD framework is "quite loose," and it is unlikely that Ostrom has "completely missed some determinative circumstance that alone or in combination with other features of the situation turns cooperation on and off."[94] Failing this, an outcome "can only be explained by reference to the history of a (perhaps changing) bundle of local conditions."[95] Thus we need to consider grounding our research in a theory of agency where individuals define themselves and articulate their goals and strategies in reference to their social setting.[96] This conclusion recalls efforts

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91 *See* Walter W. Powell, *Neither Market nor Hierarchy: Network Forms of Organization*, 12 RES. ORGANIZATIONAL BEHAV. 295, 298 (1990) ("[A]lthough I was earlier of the view that nonmarket, nonhierarchical forms represented hybrid modes, I now find that this mixed mode or intermediate notion is not particularly helpful. It is historically inaccurate, overly static, and it detracts from our ability to explain many forms of collaboration that are viable means of exchange." (citation omitted)).

92 *Id.* at 323.

93 *See* Charles F. Sabel, *Constitutional Ordering in Historical Context*, *in* GAMES IN HIERARCHIES AND NETWORKS: ANALYTICAL AND EMPIRICAL APPROACHES TO THE STUDY OF GOVERNANCE INSTITUTIONS 65, 83–84 (Fritz W. Scharpf ed., 1993). This is in part because a transaction cost approach alone cannot account for high levels of cooperation. *See* Ghoshal & Moran, *supra* note 44, at 25.

94 Sabel, *supra* note 93, at 85.

95 *Id.*

96 See *id.* at 86–90 for how the concepts of reflexivity and sociability can substitute for NIE's focus on autonomous utility maximizers. *See also* Granovetter, *supra* note 47, at 65–68 (showing how the embeddedness of, for example, subcontractors within "a community of construction personnel, generate[s] standards of expected behavior that not only obviate the need for but are superior to pure authority relations in discouraging malfeasance"); Charles Perrow, *Economic Theories of Organization*, 15 THEORY & SOC'Y 11, 16–18

within old institutional economics to discard rational actor assumptions "in favor of [an approach] that places economic behavior in its cultural context."[97] Cultural commons researchers will have to decide how to accomplish this task.

The struggles between followers of old and new institutional economics advise that the first step toward moving past functionalism is not to expand the set of variables considered a priori. Rather, we must be clear at the outset in adopting an alternative to methodological individualism. Proponents of more historical and anthropological studies of commons dilemmas suggest this change. For example, Bonnie McCay argues that Ostrom's framework can obscure "the role of contextual and external factors" that shape behavior in a common-pool resource:[98]

> A common-pool resource scholar [concerned with overgrazing on arid lands] might quickly jump to a study of the regulatory institutions of local tribal pastoralists, expecting from the middle-range theory that has developed to find that relatively small, homogeneous groups with a long history in the region have developed rules and other institutions that help prevent overgrazing of common lands. However, this "jumps the gun.". . . It may turn out that the patterns are heavily influenced by informal or formal rules and other institutions, in which cases those institutions are candidates for further study. But it may turn out that those changes in grazing activity that warrant the term "overgrazing" have little to do with local institutions, in comparison with changes in market demand, conflicts among pastoralist groups, expanded investment in livestock on the part of urban elites, or invasion of the grasslands by an exotic species.[99]

When an IAD lens is not carefully applied to a new collective action setting, longstanding institutions can be mistaken for the "successful" management of individual incentives. As David Mosse writes, this is true despite the fact that institutions often persist due to power imbalances and other dynamics:

> From an institutional economic perspective, the answer was clear: the difference between the two types of village was that self-interested farmers were rationally constrained to follow public rules in one ecology and not in the other. But, from my perspective, an equally significant observation was that, in one set of villages, power and authority tended to be articulated through public institutions—

(1986) (suggesting conditions within organizations that favor "self-regarding" as opposed to cooperative and "other-regarding" behavior).

97 Malcolm Rutherford, *The Old and the New Institutionalism: Can Bridges Be Built?*, 29 J. ECON. ISSUES 443, 443 (1995).

98 McCay, *supra* note 55, at 388.

99 *Id.* at 390 (citation omitted).

> for example, irrigation systems, temples, and service roles that recollected Maravar warrior rule—while, in another set, power operated less publicly through diffuse private networks of patronage, alliance, and personal obligation . . . . Now, the institutional economic account requires no further explanation. The answer to the question of why self-interested farmers cooperate is built into the cost-benefit model. But the answer to the question of why caste power does or does not articulate through public institutions of water control . . . is more complicated.[100]

The views of human agency expressed above resemble the holistic approach to rationality of the old institutionalists, which can expose "variables that are neglected by economic interpretations of organizational behavior."[101] These variables include the position of individuals within a broader matrix of institutions, and the habits and power influences that emerge because of those positions.[102] How should we consider such variables in studying cultural commons?

Madison et al. address the need for a more holistic rationality. They are attentive to the fact that a commons is embedded within a variety of "social, political, economic, and institutional arrangements."[103] Applying their framework to the university, they consider the history of the commons and catalogue a rich institutional setting in which individual actors, such as professors, administrators, and students operate.[104] This backdrop for human behavior emerges over time through what the authors refer to as the "[n]esting of commons institutions within the university."[105] Thus, a researcher applying Madison et al.'s proposed questions to, say, a nanotechnology laboratory will collect plenty of data on the historically grounded expectations, norms, and physical structures that are embedded within the lab and form the context in which scientists, students, industry representatives, auditors, and administrators interact. They may also begin to identify a number of "nesting" processes, which in the case of universities include the diffusion of certain models from elite universities to colleges elsewhere and the transmission of practices from one area of a university to another (such as a broader library system that influences an archiving system).[106] But a holistic rationality should also point to the mechanisms by which individuals and organizations are affected by and influence the broader institutions in which they find

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100 Mosse, *supra* note 55, at 704.

101 Perrow, *supra* note 96, at 39.

102 *See* Charles K. Wilber & Robert S. Harrison, *The Methodological Basis of Institutional Economics: Pattern Model, Storytelling, and Holism*, 12 J. ECON. ISSUES 61, 79–80 (1978) (discussing the "holist conception of reality").

103 Madison et al., *supra* note 2, at 677.

104 *See* Madison et al., *supra* note 24, at 378–402.

105 *Id.* at 385 (internal quotation marks omitted).

106 *See id.* at 386.

themselves. Madison et al.'s second adjustment to the IAD framework moves us closer to the process of institutional creation and change.

B. Capturing Complexity

Expanding the number of variables under consideration will not resolve the IAD framework's methodological shortcomings. Nor will retreating, when faced with the complexity of a social system, to a transaction cost-based account.[107] Such a move risks preserving some of the problems that underlie a rational choice framework. But simply embracing the complexity of a cultural commons poses similar risks. Let us consider Madison et al.'s second proposal: make dynamic effects more central to the analysis.[108] This suggestion is reminiscent of C.S. Holling's writings on the uncertain and indeterminate nature of natural commons and the need for common-pool resource management to move beyond static models of carrying capacity or sustainable yield.[109]

Madison et al. make two broad adjustments to the IAD framework to reflect the complex relationships that we find in cultural as opposed to natural commons.[110] They add an arrow leading from the action arena back to exogenous variables such as "resource characteristics."[111] They also eliminate "outcomes" as a separate object of analysis, equating them with patterns of interaction.[112] These changes reflect the dynamic nature of the commons. In open source projects, for instance, "the identity of the dynamic thing called the open source software program" is continuously feeding into and reflective of the interactions of participants with "rules, resources, and each other."[113] These interactions obviate the need for a distinct focus on outcomes: what is at stake is not simply a product to be manufactured but a governance solution for "loosely aligned contributors, distributed broadly in space and time."[114]

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107 NIE does offer a variety of useful insights. For example, it provides a framework for analyzing how firms choose to structure their transactions given the intellectual property rights at stake. *See* Robert P. Merges, *Intellectual Property Rights and the New Institutional Economics*, 53 VAND. L. REV. 1857, 1863–67 (2000) (observing that firms tend to resort to hierarchical forms of integration when faced with the high transaction costs of arm's-length contracting).

108 *See* Madison et al., *supra* note 2, at 672–73; *see also id.* at 685 (describing how their modified framework "integrates a more dynamic and contextual understanding of intellectual resources").

109 *See* ADAPTIVE ENVIRONMENTAL ASSESSMENT AND MANAGEMENT 7–9, 334–35 (C.S. Holling ed., 1978).

110 *See* Madison et al., *supra* note 2, at 682 & fig.2.

111 *Id.* at fig.2.

112 *Id.*

113 *Id.* at 672.

114 *Id.* at 705–06.

How should we operationalize these proposed changes? Both adjustments heighten the importance of the action arena, which generates patterns of interaction and cycles back to influence exogenous variables. For scholars using the IAD framework, the action arena has proven difficult to define. One approach that would explicitly capture the dynamic processes of a cultural commons would be to view the action arena as a complex adaptive system. Robert Axelrod, who developed one application of this idea, has garnered acclaim for upgrading the prisoner's dilemma to show that cooperation can emerge in repeated games.[115] His work represents, in Ostrom's words, "one of the most exciting areas in the social sciences."[116] Borrowing from complexity theory, it organizes the study of how variation, interaction, and selection occur in the context of diverse, mutually adapting players operating under conditions of uncertainty.[117]

Open source software, when analyzed as a complex adaptive system, relies on many of the same mechanisms that allowed for the evolution of multicellular organisms.[118] Consider the Linux operating system: a small group of managers are responsible for maintaining a "standard" version of Linux, excluding most users and software writers from its reproduction just as the majority of cells in an organism are excluded from reproductive functions.[119] Control over reproduction allows for considerable variation in code without the threat of chaotic inconsistency.[120] Linux also overcomes the risks associated with a complex, interdependent system by isolating software components in modules called "kernels."[121] Each module encourages experimentation according to a unique set of constraints (such as the need to optimize speed in one module or improve crash resistance in another).[122] Variations can be tested quickly, locally, and with reliable feedback.[123] The Unix operating system also presents problems that span incredibly long time horizons, a condition that favors explora-

115 *See generally* ROBERT AXELROD, THE COMPLEXITY OF COOPERATION: AGENT-BASED MODELS OF COMPETITION AND COLLABORATION 11–13 (1997) [hereinafter AXELROD, COMPLEXITY OF COOPERATION] (arguing that in a prisoner's dilemma context, successful strategies employ reciprocity-based cooperation during multiple iterations of the game); ROBERT AXELROD, THE EVOLUTION OF COOPERATION 28–30 (1984) [hereinafter AXELROD, EVOLUTION OF COOPERATION] (remarking that to strategize effectively in a prisoner's dilemma situation, actors must take into account previous iterations of the game).

116 *See* OSTROM, *supra* note 28, at 7.

117 *See* ROBERT AXELROD & MICHAEL D. COHEN, HARNESSING COMPLEXITY: ORGANIZATIONAL IMPLICATIONS OF A SCIENTIFIC FRONTIER 50–52 (1999) (setting forth factors to consider when determining the benefits of encouraging variation in uncertain situations).

118 *Id.* at 55.

119 *Id.*

120 *Id.*

121 *Id.* at 57.

122 *Id.*

123 *Id.* at 56–57.

tion and increased variation in available solutions.[124] All told, Axelrod's framework would apply a dozen concepts from complexity theory to a cultural commons. It builds a number of dynamic concepts into the approach, including feedback and path dependence.[125] And it addresses the fact that large groups of actors and their interaction patterns, such as those brought together by modern information technology, cannot be analyzed using deductive models alone, such as those that inform Ostrom's IAD framework.[126] Instead, Axelrod advocates supplementing case studies with an inductive review of data generated by computer simulations.[127]

The framework introduces its own methodological challenges. Simulations figure prominently, and elements of complexity theory (such as variation and its influence over open source software development) do not always apply to cases in a systematic way. In addition, Axelrod's approach (with a nod to evolutionary biology) risks replacing one brand of functionalism with another. Indeed, Axelrod's earlier work on repeated games did not depart from the presumption of opportunism that dominates choice-theoretic approaches—it held it in check by introducing the "shadow of the future" to exchange situations,[128] which leads to a reevaluation of benefits and costs (a function served by norms in many IAD accounts of common-pool resources).

Despite these challenges, Axelrod's framework demonstrates that much ground can be covered by placing patterns of interaction at the center of our analysis. Studies of complex adaptive systems show that they have distinct interaction patterns involving both actors and artifacts.[129] Madison et al. are right to focus on them when accounting for the dynamic nature of a commons. But how do we study patterns of interaction in a way that allows for a more holistic rationality and avoids functionalism? A second debate among institutionalists, this time in sociology, provides some guidance.

New institutionalist sociology (NIS) offers a departure from NIE's focus on the strategic behavior of boundedly rational individuals. It is in part a rejoinder to Parsons, who wrote about broad economic shifts such as the replacement of multifunctional organizations with specialized units in order to improve efficiency.[130] Parsons's depiction of trends in industrialized nations toward higher levels of efficiency mimics the functionalist narrative of NIE, where transaction cost re-

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124 *Id.* at 56.

125 *See id.* at 40–41.

126 *See* AXELROD, COMPLEXITY OF COOPERATION, *supra* note 115, at 55–56 (describing the effects of social forces on group interactions as the size of the group increases).

127 *See id.* at 64–65.

128 *See* AXELROD, EVOLUTION OF COOPERATION, *supra* note 115, at 126–32.

129 *See* AXELROD, COMPLEXITY OF COOPERATION, *supra* note 115, at 63.

130 *See* TALCOTT PARSONS, THE STRUCTURE OF SOCIAL ACTION 727–75 (1937).

duction guides the evolution of organizational forms.[131] In response, NIS scholars initially marginalized the role of human agency and tried to explain too much using structural variables. They defined institutions as routine-reproduced systems[132] that, in contrast to the kinds of institutions that figure prominently in institutional rational choice (e.g., rules, norms), operate largely beyond the purview of individual cost-benefit calculation.

NIS moves from individual rational choice to a higher unit of analysis that focuses on the institutional environment of an organization. An institutional environment, or "organizational field," includes groups of organizations offering similar products or services as well as the agencies, funding sources, suppliers, customers, and competitors that influence the organizations' performance.[133] An organizational field supplies templates, such as standard operating procedures and new ways of classifying behavior, which are adopted by firms and stabilize how they arrange and govern themselves. Firms gravitate toward similar procedures and structures, such as when an accounting firm becomes a professional partnership not for reasons of efficiency but because its institutional environment views this as a legitimate practice.[134] This process, referred to as isomorphism, can occur in a number of ways.[135] But generally, the form that an organization takes, its capacity for innovation, and its potential for change are linked to the characteristics of its institutional context, including whether its organizational field is well developed, tightly coupled, or open to the influence of other fields.[136]

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131 *See supra* text accompanying notes 51–57.

132 *See* Jepperson, *supra* note 20, at 145 ("[I]nstitutions are those social patterns that, when chronically reproduced, owe their survival to relatively self-activating social processes. . . . That is, institutions are not reproduced by 'action' . . . . Rather, routine reproductive procedures support and sustain the pattern . . . .").

133 W. Richard Scott & John W. Meyer, *The Organization of Societal Sectors: Propositions and Early Evidence*, *in* THE NEW INSTITUTIONALISM IN ORGANIZATIONAL ANALYSIS, *supra* note 20, at 108, 117–20 (defining a societal sector "as (1) a collection of organizations operating in the same domain, as identified by the similarity of their services, products or functions, (2) together with those organizations that critically influence the performance of the focal organizations: for example, major suppliers and customers, owners and regulators, funding sources and competitors").

134 *See* Christine Oliver, *Strategic Responses to Institutional Processes*, 16 ACAD. MGMT. REV. 145, 164–67 (1991).

135 Paul J. DiMaggio & Walter W. Powell, *The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields*, 48 AM. SOC. REV. 147, 150 (1983) (defining three mechanisms for isomorphic change: coercive, stemming from "the problem of legitimacy"; mimetic, "resulting from standard responses to uncertainty"; and normative, "associated with professionalization").

136 *See* Royston Greenwood & C.R. Hinings, *Understanding Radical Organizational Change: Bringing Together the Old and the New Institutionalism*, 21 ACAD. MGMT. REV. 1022 *passim* (1996).

Unfortunately, by emphasizing the routine nature of institutions and their relative inertia, NIS traded one mode of functionalism for another, namely the efforts of firms and other organizations to secure legitimacy.[137] Over time, however, NIS analyzed internal dynamics and the interaction between institutions and the organizations that ultimately adopt them. How, for example, do ideas, roles, or tasks develop in an organizational field and affect the actions that we take within a cultural commons? And what allows for change if those who operate within a commons internalize the prevailing templates for action? There are a variety of proposals for addressing these questions. Each accounts for dynamic change by focusing on the recursive interaction of structure and agency. The basic innovation underlying efforts to bridge old and new institutionalism in sociology is to address the following paradox: actors whose behavior is determined in large part by their institutional environment can also initiate change.

Although Madison et al. allude to NIS concepts in their study of cultural commons, they are too quick to label certain aspects of commons construction "intentional human activity."[138] They refer to the "expectations of a field" and the role of rituals in shaping some of the signature events in a university commons.[139] They also acknowledge isomorphism, which in their view occurs when certain templates regarding the operation of universities spread "more or less intact across time and culture."[140] And their version of the IAD framework, which allows for attributes of the community, resources, and rules-in-use to recursively shape patterns of interaction, can accommodate the structural dynamics of NIS as well as insights regarding human agency offered by old institutional sociologists such as Philip Selznick.[141]

More importantly, Madison et al.'s focus, along with Ostrom's, is on patterns of interaction. As institutions influence recurrent interactions and activities, they become second nature, or part of the stock of personal knowledge. They shape how problems are interpreted and work is carried out in ways that are increasingly removed from rational cost-benefit calculation. This process lies at the dynamic intersection of agency and structure. To address how institutions emerge, persist, and change within a cultural commons and in turn affect its govern-

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137 *See* Suchman, *supra* note 59, *passim* (discussing the vast and diverse literature on strategic and institutional approaches to organizational legitimacy, and examining strategies for gaining, maintaining, and repairing organizational legitimacy).

138 Madison et al., *supra* note 24, at 377.

139 *Id.* at 390–93.

140 *Id.* at 401.

141 Selznick was concerned with how various influences, coalitions, and competing values can divert the formal mission of an organization like the Tennessee Valley Authority (TVA), such as when the TVA became less able to promote environmental standards or the interests of key constituencies as it responded to external threats. *See* Philip Selznick, *Institutionalism "Old" and "New,"* 41 ADMIN. SCI. Q. 270 (1996).

ance, we need to study how interaction patterns become locked into place in settings such as a patent pool or university lab, where they assume a "relative permanence" that explains much of the behavior we find.[142] I briefly sketch several ideas for how this process could be researched.

The authors state that cultural commons are "often situated in nonhierarchical and distributed institutional settings," or networks.[143] Thinking about action arenas and their institutional setting as networks covers a lot of ground if we want to accommodate both agency and structure. Broadly speaking, a network-centric approach defines rationality as embedded within a social context, emphasizing the relations through which transactions occur.[144] The "embedded ties" of a network encourage trust and other elements that we would not predict in a mere hybrid of market and hierarchical forms.[145] The structure of networks and the position of individuals and organizations within them can generate insights into social capital, influence, and power dynamics—matters of human agency that were of interest to old institutionalist sociologists.[146] Identifying the scope of networks, such as long-term relationships among contractors and subcontractors, also encourages research into the historical development of cultural commons.[147] Furthermore, networks can help us isolate the spillover effects of addressing one issue within other areas of a social structure, a primary concern among intellectual property researchers.[148]

Treating a commons (and its institutional environment) as a network takes us beyond a simple account of agency and structure to the study of how they interact. Networks are the channels through which processes such as institutional adoption take place. Cultural commons have ties to government agencies, professions, competitors, and

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142 Everett C. Hughes, *The Ecological Aspects of Institutions*, 1 AM. SOC. REV. 180, 181 (1936).

143 *See* Madison et al., *supra* note 2, at 701; *see also* Katherine J. Strandburg, Gábor Csárdi, Jan Tobochnik, Péter Érdi & László Zalányi, *Law and the Science of Networks: An Overview and an Application to the "Patent Explosion,"* 21 BERKELEY TECH. L.J. 1293, 1294–1318 (2006) (describing the benefits and applications that "network science" can provide to legal scholarship).

144 *See* Granovetter, *supra* note 47, at 63–73.

145 Joel M. Podolny & Karen L. Page, *Network Forms of Organization*, 24 ANN. REV. SOC. 57, 61 (1998).

146 *See, e.g.*, Peter deLeon & Danielle M. Varda, *Toward a Theory of Collaborative Policy Networks: Identifying Structural Tendencies*, 37 POL'Y STUD. J. 59, 62 (2009).

147 *See id.* at 67–68.

148 *See, e.g.*, Brett M. Frischmann & Mark A. Lemley, *Spillovers*, 107 COLUM. L. REV. 257, 258–61 (2007) (pointing out the significance of spillovers in the context of innovation). Network theorists are moving from analysis of social structure alone (through indicators such as density and equivalence) to how the placement of actors in a network influences information brokerage, resource sharing, and other processes. *See* deLeon & Varda, *supra* note 146, at 67–68.

other sources of templates for behavior that their members might adopt or ignore. Madison et al. provide an example of the institutional environment of a commons:

> Members of a [patent] pool may be part of a network structure that extends to related collectives, firms, individuals, groups, and social structures, including disciplines and social norms. Research scientists may be organized formally into pools or commons structures within firms and other formal institutions, such as universities. Their functional network will include both members of their own technical art and related arts and other researchers in different arts who share a related but distinct set of social norms . . . . Networks in not-for-profit or educational research settings will overlap to a degree with related networks in commercial environments. Researchers in university science departments will be interested in sharing information resources with researchers in corporate research-and-development groups. Pools may bridge gaps created by the edges of formal institutional structures.[149]

An organization's place within such a network can help us predict whether it will adopt a new practice or innovation. For example, one could hypothesize that structural equivalence, which occurs when two firms are more closely related to a set of third parties than to each other, is a better predictor of the adoption of a quality assurance practice than cohesion between the two companies.[150]

At the level of either a commons or its institutional context, we can study the process of institutionalization in keeping with Ostrom's notion of "nested" analysis that Madison et al. emphasize.[151] For institutional context, we can research how standardized rules, roles, and structures develop and potentially spread. Commentators have criticized NIS for failing to account for these mechanisms.[152] NIS at first viewed organizations as embedded in networks of institutions, but did not investigate how those templates for action arose. Institutionalization originates with (a) new ideals set out through verbal and written arguments and definitions, (b) the specification of tasks, objects, roles, and relationships among them, and (c) efforts to systematically

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149 *See* Madison et al., *supra* note 2, at 701 (citations omitted).

150 *See* Isin Guler, Mauro F. Guillén & John Muir Macpherson, *Global Competition, Institutions, and the Diffusion of Organizational Practices: The International Spread of ISO 9000 Quality Certificates*, 47 ADMIN. SCI. Q. 207, 226 (2002) (finding that role equivalence, or the extent to which two firms share similar kinds of relationships with third parties, can help explain the adoption of ISO 9000 quality certification programs).

151 *See* Madison et al., *supra* note 2, at 673–75 (analyzing a particular commons phenomenon at multiple, interacting levels).

152 *See, e.g.*, Hans Hasselbladh & Jannis Kallinikos, *The Project of Rationalization: A Critique and Reappraisal of Neo-Institutionalism in Organization Studies*, 21 ORG. STUD. 697, 701 (2000) ("Neo-institutionalism offers no account of the means through which . . . rules of conduct, performance principles and devices of control are developed and forms of actorhood constituted.").

measure and evaluate each.[153] Together, these efforts create the domains and patterns of acceptable action that could potentially become part of a commons.[154] By defining the networks in which such institutions emerge, we can learn to what degree they have achieved closure or are still subject to change. To take patent pools as one example, a new form of contract might emerge within an institutional field and transform an ideal regarding how patents should be cross-licensed into a discourse involving unique roles and relations. This could occur within a network of only loosely assembled sources of technical control (e.g., monitoring, fee setting, recruitment). A new patent pool could still form in a variety of ways, leaving room for the law to intervene in a constructive manner.

To study the dynamic elements of a commons that are of interest to Madison et al., we should next look at how institutions, once they emerge in an organizational field, "interact with the internal characteristics of an organization."[155] Royston Greenwood and C.R. Hinings focus on this intersection of agency and structure.[156] They carefully link old institutionalist accounts of how group interests and power imbalances divert organizations from their formal objectives with more recent findings about the institutional context of a firm. Early NIS studies simply assumed that institutional environments were tightly coupled, meaning they exhibited "clearly legitimated organizational templates and highly articulated mechanisms (the state, professional associations, regulatory agencies, and leading organizations) for transmitting those templates to organizations."[157] It is now clear that organizational fields vary by how well they are defined, what kinds of (potentially inconsistent) pressures they are subjected to, the strength of any networks of regulatory bodies that operate on them, and how open they are to the influence of other fields.[158]

Greenwood and Hinings add elements of a commons' internal dynamics, such as interest dissatisfaction, value commitments, power dependencies, and capacity for action, to the above exogenous factors.[159] In order to appreciate "the mechanics of innovation contexts,"[160] we should build on their understanding of how cultural commons "adopt and discard templates for organizing" given the na-

153 *See id.* at 704–08 (adopting a threefold distinction between an institution's ideals, discourse, and techniques of control so as to analyze and deconstruct the process of institutionalization).

154 *See id.* at 706–08.

155 *See* Greenwood & Hinings, *supra* note 136, at 1032 (emphasis omitted).

156 *See id.* at 1031.

157 *Id.* at 1029.

158 *See id.* at 1029–30.

159 *See id.* at 1032–33 (contending that these "endogenous dynamics" contribute to an understanding of how institutionalized practices change over time).

160 Madison et al., *supra* note 24, at 365.

ture of their institutional environment.[161] Specifically, Greenwood and Hinings hypothesize when institutional context will facilitate or disrupt collective action within an organization. For example, network position plays a role in this dynamic:

> [O]rganizations that are centrally located within an institutional context may be less likely to develop the specialties and competencies of an alternative archetype. Peripheral organizations, in contrast, may develop these competencies because they are less fully socialized by the context. In this sense, the institutional context can act to limit the development of capacities for action in some but not all organizations. However, the context itself might fundamentally shift and articulate a new template . . . . In this scenario, the institutional context serves to articulate the need for new competencies and promotes the development of capacities for action.[162]

Networks can help us capture the mechanisms through which institutions enter and become embedded in a cultural commons.[163] To see how, we can think about the contradictions that arise as this process takes place. There are several sources of tension when an institution lodges within a university or patent pool and subsequently guides the behavior of its members and agents.[164] For example, rules and roles, which are categorical, are adopted in ways that conflict with technical demands that call for a more continuous array of solutions. Thus, adopting certain practices in order to gain legitimacy in the eyes of an institutional environment can undermine efficiency.[165] Second, as a commons imports institutions, they encourage individuals to process information in ways that they will not want to give up later. Shared expectations become resistant to change. Even though isomorphism might begin as an adaptive effort within a cultural com-

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161 *See* Greenwood & Hinings, *supra* note 136, at 1041 (proposing that the study of these processes helps to "bridge [the] gap" between old and new institutionalism).

162 *Id.*

163 DiMaggio and Powell describe this process, which in social theory is referred to as "structuration," as involving four parts: "an increase in the extent of interaction among organizations in the field; the emergence of sharply defined interorganizational structures of domination and patterns of coalition; an increase in the information load with which organizations in a field must contend; and the development of a mutual awareness among participants in a set of organizations that they are involved in a common enterprise." DiMaggio & Powell, *supra* note 135, at 148.

164 *See* Myeong-Gu Seo & W.E. Douglas Creed, *Institutional Contradictions, Praxis, and Institutional Change: A Dialectical Perspective*, 27 ACAD. MGMT. REV. 222, 222–26 (2002) (defining a set of internal institutional contradictions that "drives, enables, and constrains further institutional change"); *see also* Christine Oliver, *The Antecedents of Deinstitutionalization*, 13 ORG. STUD. 563, 566–79 (1992) (adopting a "deinstitutionalization" perspective to explore the political, economic, and social factors that explain changes in an organization's institutional structure).

165 *See* Seo & Creed, *supra* note 164, at 226–27 (noting that conformity to institutional arrangements may conflict with "technical activities and efficiency demands").

mons, it can reduce adaptability in the long run.[166] Third, conformity to a new institution leads to incompatibilities with practices that are already established within a commons.[167] Finally, adopting institutions such as a new university budget category leads to conflicts among divergent interests.[168]

These sources of contradiction suggest that the adoption of institutions is a matter of degree, and that network effects can influence this process. To find out whether an institution is prone to persistence or change within a cultural commons, it would help to learn about the position of actors within the commons and the kinds and degrees of connections these actors share with others.[169] Network indicators can tell us about the strength of ties, levels of structural autonomy, interconnectedness, and other indicators of the durability of institutions and opportunities for "entrepreneurs" to mobilize against them.[170] Myeong-Gu Seo and W.E. Douglas Creed offer their own propositions for how the above contradictions, alone or in combination, can encourage collective action for institutional change.[171] Their hypotheses deserve consideration when crafting historical, ethnographic, sociometric, or other accounts of cultural commons.

C. Constructing the Cultural Commons

To the recursive interaction of human agency and structure, we can add an innovation that mirrors Madison et al.'s final corrective to the IAD framework. We can look to, in their words, "the construction and evolution of meaning in the system, as reflected in symbol and narrative."[172] Through this adjustment, we see hints of the struggle between objectivist and subjectivist accounts that appeared in institutionalist scholarship for decades. Bourdieu argues that social theory

166 *See id.* at 227–28 (explaining how following the initial process of institutionalization, institutions become "locked in" and isolated from changes in their external environments).

167 *See id.* at 228–29 ("[C]onformity to certain institutional arrangements . . . may cause conflicts or inconsistencies with the institutional arrangements of different levels or sectors.").

168 *See id.* at 229; *see also* Steven Brint & Jerome Karabel, *Institutional Origins and Transformations: The Case of American Community Colleges*, *in* THE NEW INSTITUTIONALISM IN ORGANIZATIONAL ANALYSIS, *supra* note 20, at 337, 345–52 (analyzing the role of institutional power structures and elite administrators in transforming the focus of American community colleges from liberal arts to vocational training); Mark A. Covaleski & Mark W. Dirsmith, *An Institutional Perspective on the Rise, Social Transformation, and Fall of a University Budget Category*, 33 ADMIN. SCI. Q. 562, 576–83 (1988) (studying the organizational and external interests that influence a public university's adoption of budgetary policies).

169 *See* Hirsch & Lounsbury, *supra* note 58, at 416 (suggesting actors' positions within a commons and the connections they share as one of three possible solutions to determine "threshold points where institutions take hold or break down").

170 Seo & Creed, *supra* note 164, at 236–37.

171 *See id.* at 231–39.

172 *See* Madison et al., *supra* note 2, at 673.

must find a way to combine "into a single model the analysis of the experience of social agents and the analysis of the objective structures that make this experience possible."[173] This is the dialectical relationship to which Madison et al. allude.

Bourdieu and NIS scholars share an interest in the systems of meaning that form the "mediating link in the structure/agency relationship," where "an individual's position in a structure" influences their "interpretive practices, meaning, and action at the local level."[174] This underscores a key comparison between the IAD framework and other institutionalist approaches: each views different kinds of institutions as central to its analysis. I have discussed how Ostrom's original framework and NIE emphasize regulative concerns, such as rules, monitoring, and sanctioning.[175] While it is not always clear how regulative institutions such as *rules* develop in the first place, rational choice provides a robust account of how they affect the cost-benefit assessments of individual actors. Ostrom and some NIE scholars such as Douglass C. North also rely on normative institutions.[176] Norms, once established, encourage the creation of new *roles*, or the kinds of actions that are considered appropriate in a given setting.[177] NIS scholars expand the list to include a third category: cognitive institutions.[178] Here is where, in the words of Peter L. Berger and Thomas Luckmann, institutions are "brought to life" as meanings attach to various actions and situations.[179] One mechanism by which this occurs involves the use of *categories*.[180] As we interact, we take our subjective experiences and "subsume [them] under general orders of meaning"[181] by creating categories for the various ideas, objects, events, and actors involved.[182] With the help of categories we are able to take meaningful action in a particular setting.

Together, cognitive and normative institutions are crucial to the social construction of a commons, including the actors involved and technologies they employ. They shape the roles of actors, categories of behavior, and meanings that actors attach to themselves and their

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173 Bourdieu, *supra* note 15, at 782.

174 Diane Vaughan, *Rational Choice, Situated Action, and the Social Control of Organizations*, 32 LAW & SOC'Y REV. 23, 31 (1998).

175 *See supra* Part I.

176 *See, e.g.*, DOUGLASS C. NORTH, INSTITUTIONS, INSTITUTIONAL CHANGE AND ECONOMIC PERFORMANCE 3, 27, 57 (1990).

177 *See* W. RICHARD SCOTT, INSTITUTIONS AND ORGANIZATIONS: IDEAS AND INTERESTS 54–56 (3d ed. 2008).

178 *See id.* at 56–58.

179 *See* PETER L. BERGER & THOMAS LUCKMANN, THE SOCIAL CONSTRUCTION OF REALITY: A TREATISE IN THE SOCIOLOGY OF KNOWLEDGE 75 (1966).

180 SCOTT, *supra* note 177, at 64–65.

181 BERGER & LUCKMANN, *supra* note 179, at 39.

182 *See* SCOTT, *supra* note 177, at 41–42.

interactions with others. And they suggest that choice is dictated by more than internal motivations or cost-benefit assessments. Madison et al.'s depiction of social construction hints at but does not sufficiently embrace the role of cognitive institutions.[183] The authors describe cultural commons as having certain essential qualities, such as "the way in which [they] allocate[ ] resources as they are produced dynamically" and their unique "combination[s] of legal rules and other 'openness' constructions propose[d] to solve [collective action and other problems]."[184] This language reflects a focus on purposeful design as opposed to what are often the unintended consequences of cognitive institutions. The authors continue: "Understanding the construction of cultural commons . . . requires understanding the mechanisms by which resources are provisioned to the commons, whether via legal entitlements or otherwise, and the nature of entitlements to use and consume those resources while they are part of that commons."[185] Their suggestion that we look to the "creation narrative" of a commons is helpful in that it directs attention to contextual variables that are missing from institutional rational choice.[186] However, their creation narratives seem to focus on the influence of overt struggles within a resource pool ("the influence of power, politics, and personalities"[187]) that were at the heart of old institutionalist works. A broader array of institutions generates the shared meanings that guide daily interactions and decision making within cultural commons.

Broadening the kinds of institutions that we study will help us capture and critically evaluate the evolution of meaning within a commons. But we should also adopt a constructivist approach that reflects the unique importance of technology in cultural commons. The first two methodological shifts that I propose, viewing agency as embedded within a social structure and treating the interaction of structure and agency as a recursive process, suggest how we can document the social construction of cultural commons.

There is a rich tradition of research regarding how technology is not just invented and produced, but shaped through interaction. An earlier focus concerned how interactions stabilize the meaning of a technology or inscribe it with various interests that are expressed through later use.[188] Other scholars criticized these studies for their

183 *See* Madison et al., *supra* note 2, at 679–81 (asking to what extent certain attributes of a commons are "inscribed in social norms or other social or cultural structures").

184 *Id.* at 700, 706.

185 *Id.* at 700.

186 *Id.* at 698–99.

187 *Id.* at 699.

188 *See, e.g.*, Trevor J. Pinch & Wiebe E. Bijker, *The Social Construction of Facts and Artifacts: Or How the Sociology of Science and the Sociology of Technology Might Benefit Each Other, in*

determinism and for assuming that technology develops only until it reaches a certain endpoint. More recently, Wanda Orlikowski developed a way to analyze the social construction of technology that not only builds on the recursive interaction of agency and structure, but accounts for both normative and cognitive influences.[189] She explains how the standard definition of technology-as-artifact ("the bundle of material and symbol properties packaged in some socially recognizable form") is distinguishable from "technology-in-practice":

> While a technology can be seen to have been constructed with particular materials and inscribed with developers' assumptions and knowledge about the world at a point in time, it is only when this technology is used in recurrent social practices that it can be said to structure users' actions. That is, it is only when repeatedly drawn on in use that technological properties become constituted by users as particular rules and resources that shape their action.[190]

This shift from having technology simply embody or move inexorably toward a social structure to a more interactive approach suggests the prescience of Ostrom's concern for patterns of interaction and their usefulness in depicting cultural commons. Orlikowski's work is part of a trend in organization theory that focuses on the process of continually evolving organizational forms as opposed to forms that we merely assume to persist.[191] According to her technology-in-practice lens, enactment proceeds in the following way:

> [U]se of the technology involves a repeatedly experienced, personally ordered and edited version of the technological artifact . . . .
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> . . . When people use a technology, they draw on the properties comprising the technological artifact—those provided by its constituent materiality, those inscribed by the designers, and those added on by users through previous interactions (e.g., specific data content, customized features, or expanded software/hardware accesso-

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THE SOCIAL CONSTRUCTION OF TECHNOLOGICAL SYSTEMS: NEW DIRECTIONS IN THE SOCIOLOGY AND HISTORY OF TECHNOLOGY 17, 40–44 (Wiebe E. Bijker, Thomas P. Hughes & Trevor J. Pinch eds., 1987) (describing the development of the modern bicycle to demonstrate how social construction leads to the "stabilization" of different interpretations of technological advancements).

189 Wanda J. Orlikowski, *Using Technology and Constituting Structures: A Practice Lens for Studying Technology in Organizations*, 11 ORG. SCI. 404, 407–21 (2000).

190 *Id.* at 408 (citation and footnote omitted).

191 *See, e.g.*, KARL E. WEICK, THE SOCIAL PSYCHOLOGY OF ORGANIZING 1 (1969) ("Organizations and their environments change so rapidly that it is unrealistic to show what they are like now . . . ."); Stephen R. Barley, *Technology as an Occasion for Structuring: Evidence from Observations of CT Scanners and the Social Order of Radiology Departments*, 31 ADMIN. SCI. Q. 78, 100 (1986) (describing the evolution of role structures in a community hospital); Stephen R. Barley, *Technology, Power, and the Social Organization of Work: Towards a Pragmatic Theory of Skilling and Deskilling*, 6 RES. SOC. ORG. 33, 44 (1988) (giving examples of the effects of the introduction of new technologies into an organization).

> ries). People also draw on their skills, power, knowledge, assumptions, and expectations about the technology and its use, influenced typically by training, communication, and previous experiences. These include the meanings and attachments—emotional and intellectual—that users associate with particular technologies and their uses, shaped by their experiences with various technologies and their participation in a range of social and political communities.[192]

Orlikowski equates technologies-in-practice with structure and the ongoing use of technology with agency.[193] The recursive interaction between the two is mediated by interpretive schemes (e.g., a prevailing view on how the technology can speed up existing tasks), norms (e.g., a norm that dictates that "tools are best designed collaboratively"), and facilities (e.g., database customization, discussion databases).[194] In one study, she follows several companies' use of Lotus Notes to show that this class of groupware can, when mediated by different arrangements of facilities, norms, and interpretive schemes, lead to a range of very different technologies-in-practice.[195] Enacted versions of Notes included "collaborative," "collective problem-solving," "limited use," "individual productivity," "process support," and "improvisation" forms.[196]

Adopting Orlikowski's approach would lead to a better understanding of the kinds of technology enactment that take place in cultural commons and how "specific properties of technologies in specific interpretive and institutional contexts" can lead to more cooperative development of intellectual property.[197] For example, the original technology-in-practice version of Lotus Notes (as developed by a firm financed by Lotus Development Corporation) focused on collaboration and distributed control.[198] Yet for one group of users, a different set of interpretive schemes and the use of certain facilities (e.g., e-mail and discussion databases) but not others (e.g., text entry and edit, database customization) led to a technology-in-practice that furthered only individual productivity goals.[199]

Orlikowski's framework provides one way to capture the patterns of interaction that socially construct technology and other innovations within a cultural commons. Brian Pentland and Martha Feldman provide another, which follows some of the principles of actor-network

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192 Orlikowski, *supra* note 189, at 408, 410 (citation omitted).

193 *Id.* at 410 fig.2.

194 *Id.* at 414–21 & fig.3.

195 *See id.* at 413–21.

196 *Id.*

197 *Id.* at 423.

198 *See id.* at 413.

199 *See id.* at 417–18.

theory.[200] Of particular use for the study of cultural commons, proponents of actor-network theory argue that networks are not limited to the characteristics of social relations such as the density or strength of ties.[201] From a social-constructivist perspective, networks represent interactions among individuals and material, including technological artifacts.[202] Actor-network theory provides a constructivist approach to how agents and artifacts interact, taking neither as determinative of the other.[203] Each is a social construction resulting from interactions between social and material elements:

> If human beings form a social network, it is not because they interact with other human beings. It is because they interact with human beings *and* endless other materials too. And, just as human beings have their preferences—they prefer to interact in certain ways rather than in others—so too do the other materials that make up the heterogeneous networks of the social. Machines, architectures, clothes, texts—all contribute to the patterning of the social. And . . . if these materials were to disappear then so too would what we sometimes call the social order. . . .
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> . . . .
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> This, then, is the core of the actor-network approach: a concern with how actors and organizations mobilize, juxtapose, and hold together the bits and pieces out of which they are composed . . . .[204]

Madison et al. describe a number of arrangements within cultural commons that we could study as actor-networks, such as the archives, libraries, and schools nested within a university.[205] As we investigate the influence of institutions in a cultural commons, we should account for the heterogeneous nature of the networks through which commons are constructed, which include human beings as well as the technologies and architectures with which they interact. Pentland and Feldman's work provides one approach to carrying this out.

Pentland and Feldman respond to a concern in actor-network theory over how to integrate social and material aspects of a network without falling victim to determinism in either direction. They do so by adopting a tool that Madison et al. identify as important to setting

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200 Brian T. Pentland & Martha S. Feldman, *Narrative Networks: Patterns of Technology and Organization*, 18 ORG. SCI. 781, 786 (2007).

201 *See infra* note 204 and accompanying text.

202 Nathalie A. Steins & Victoria M. Edwards, *Collective Action in Common-Pool Resource Management: The Contribution of a Social Constructivist Perspective to Existing Theory*, 12 SOC'Y & NAT. RESOURCES 539, 544 (1999).

203 John Law, *Notes on the Theory of the Actor-Network: Ordering, Strategy, and Heterogeneity*, 5 SYS. PRAC. 379, 383 (1992).

204 *Id.* at 382, 386.

205 Madison et al., *supra* note 24, at 391–93.

forth the history of a cultural commons: the narrative.[206] Specifically, Pentland and Feldman construct "narrative networks" from: the actors, which are both human and material and referred to collectively as "actants" in actor-network theory; narrative fragments, consisting of "at least two actants and some kind of action that occurs with them or between them"; and sequences of fragments that unity of action or purpose hold together.[207] As opposed to a purely social network where nodes represent individuals, narrative fragments represent nodes in Pentland and Feldman's approach.[208] These nodes and the sequential ties that connect them are represented graphically, as in the authors' representation of a network for purchasing an airline ticket on the Internet.[209]

Narrative networks offer a means of analyzing ethnographic, archival, and other data about cultural commons. As with Orlikowski's technology-in-practice approach, narrative networks can help us explain why certain arrangements of social and technical actors stabilize over time (e.g., through the isolation of certain nodes from others) or are prone to change (e.g., through the substitution of one narrative fragment for another).[210] Each approach understands social construction to involve the interaction of multiple and divergent actors, goals, and materials that can yield unexpected results. As with the treatments of agency and structure that I introduced in the previous subpart,[211] each approach accounts for the micropolitics of change, path dependence, and other dynamics that would be missing from more functionalist approaches to cultural commons. Furthermore, they allow the researcher to hold objectivist and subjectivist accounts in dialectical relation and to focus on how meanings attach to technologies as they interact with other elements of a network. When we study how technologies that are developed in patent pools, open source projects, and other initiatives can stabilize or change over time and facilitate a range of collaborative and individualized forms of problem solving, we will add another level of granularity to the study of cultural commons.

CONCLUSION

The IAD framework followed Ostrom's efforts to show that self-governing institutions can exist in settings where collective action problems, such as credible commitment and mutual monitoring,

206 *See* Madison et al., *supra* note 24, at 374; Pentland & Feldman, *supra* note 200, at 787–90.

207 Pentland & Feldman, *supra* note 200, at 787–90.

208 *Id.* at 788 tbl.1.

209 *Id.* at 789 fig.1.

210 *See id.* at 792.

211 *See supra* Part II.B.

would appear to stand in their way. Few have done more to advance the study and in particular the field research of institutions, which Ostrom defined as "working rules" in recognition of the old institutionalists.[212] No approach offers more insight into the structure of a common-pool resource or its management. Madison et al. display good instincts in turning to the framework and refining it with the goal of teasing out the attributes of "successful and sustainable cultural-commons regimes."[213] But beyond Ostrom's considerable descriptive endeavor and rebuke of "thin" rational choice arguments such as the tragedy of the commons lies a more difficult and as yet unfinished enterprise: the study of institutional change.[214]

This Response points out some of the hazards of adapting Ostrom's approach to the study of cultural commons. I suggest that the challenges that Madison et al. identify—avoiding functionalist explanations, attending to the dynamic nature of commons creation, and acknowledging the role of narrative in shaping knowledge creation and use—can be met by embracing and updating Ostrom's concern for institutional change. I offer a few modest suggestions for how to accomplish this task. Each views the creation of a cultural commons as an institutionalization process and defines "institution" to include regulative, normative, and cognitive elements. Each adopts a holistic approach to human agency (of importance to early economic institutionalists) that situates an individual or commons within a broader network of influences or institutional environment. And each defines change as the recursive interaction of agency and structure (borrowing from attempts to bridge old and new institutionalist sociology), highlighting key elements of Ostrom's framework: attention to change on multiple levels and focus on patterns of interaction. We can detect the level of influence of institutions and the contradictions that they introduce at multiple levels of a cultural commons. And it is through patterns of interaction that institutions are adopted, reproduced, internalized, questioned, and discarded or replaced.

Building on these assumptions, we can ask some of the more difficult questions of cultural commons. How do cultural commons adopt and discard a broad range of templates for organizing? How do the characteristics of an organizational field influence a commons' capacity for innovation? What contradictions emerge when an institution is lodged within a commons and begins to guide the behavior of its members? How do those contradictions, alone or in combination, encourage collective action for change? How do actors initiate change when their institutional environment determines their behavior?

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212 *See* OSTROM, *supra* note 28, at 51.

213 Madison et al., *supra* note 2, at 689.

214 *See* OSTROM, *supra* note 28, at 2–3.

How does one's position within a commons influence interpretive practices, meaning, and action at the local level? How do arrangements of social and technical actors change or stabilize over time? And how does interpretive and institutional context encourage cooperative technologies-in-practice? Asking such questions of cultural commons will help bridge the enduring chasms that lie between the old and new institutionalisms. How well each effort fits within Ostrom's broader framework is a conversation that we should have and that I am excited to join.