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The composition of policy change: comparing Colorado's 1977 and 2006 smoking bans

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Abstract Understanding policy change is among the most enduring pursuits of public policy studies. Despite the wealth of policy change literature, a central challenge in the study of policy change remains measuring and assessing change. A useful starting point in measuring and assessing policy change is a thorough analysis of policy composition. The textual composition of policy change is analyzed by drawing on the Institutional Analysis and Development framework for conceptual definitions and data collection methods. Lessons from the policy implementation, design, and tools' literatures guide comparative data analysis and evaluation. The approach is illustrated through a study of smoking ban change in Colorado, USA. The conclusion discusses the methodological contribution offered in this paper and its potential for facilitating theoretical development.

Keywords Policy change · Policy design · Institutions · Institutional grammar

Policy scholars have given a great deal of attention to developing theories for explaining policy change. As a result of this attention, they have found that policy change is often incremental (Lindblom 1959) but also marked occasionally by punctuations of major policy change (Jones and Baumgartner 2012). Among the major explanations of policy change are learning (Heikkila and Gerlak 2013), policy entrepreneurs (Mintrom and Norman 2009), diffusion and transfer of ideas (Berry and Berry 2014), and major events and the strategic behavior of coalitions (Jenkins-Smith et al. 2014).

Compared to the attention devoted to developing explanatory theories of policy change, less attention has been given to conceptualizing, measuring, and assessing policy change. Although common measures exist for some forms of policy change, such as budget change (Baumgartner et al. 2014), common measures for gauging other forms of policy change,

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from constitutional to regulatory changes, are lacking. Existing descriptions of policy change include identifying differing levels, or degrees, of incremental change (Hall 1993), describing change as occurring in core or secondary aspects of a policy (Jenkins-Smith et al. 2014), and developing typologies for understanding change based on the means and aims of policies (Cashore and Howlett 2007). Although these efforts allow for the comparison of different cases of policy change, they remain limited in their ability to identify systematically the textual policy adjustments that collectively amount to the composition of policy change, or to appraise the merit of a given instance of policy change. Without commonly agreed upon approaches for the systematic and detailed description of policy change, theoretical advances remain limited because the lessons learned from any single application are ultimately attributable to either contextual or methodological idiosyncrasies. The goal of this paper is to describe one method that could be used for in-depth description and evaluation of many different types of policy change.

This effort begins with the premise that a useful starting point in documenting and assessing policy change is a thorough analysis of policy composition. Public policies are often composed of textual statements that comprise written policy documents. These textual compositions can include dozens to hundreds of words and statements that assign policy-relevant positions, describe the procedures for entering and exiting those positions, grant and restrict authority, structure information flows, formulate the rules of decision making, establish goals, and provide incentives and sanctions for changing behavior. Studying policy compositions requires a shift in perspective from one of studying public policy as a single unit of observation to one of studying the many compositional units that comprise a public policy.

In this paper, such a shift is accomplished by adopting the concepts and methods from the Institutional Analysis and Development (IAD) framework (Ostrom 2005). The IAD framework offers a coding scheme for analyzing the composition of a public policy and then for comparing compositional policy changes by grammatically dissecting a public policy document, classifying the dissected components into different types of rules, clustering and linking rule types into target action situations, and identifying rules that permit adaptation (Kiser and Ostrom 1982; Ostrom 1986, 2005; Crawford and Ostrom 1995, 2005; Basurto et al. 2010; Siddiki et al. 2011; McGinnis 2011).

A challenge encountered in analyzing public policy texts and comparing textual changes across public policies is the need to simplify and make sense of their dozens to thousands of words and statements. To address this challenge, five questions guide this compositional analysis of policy change, drawn from existing research on policy designs, tools, and implementation (Pressman and Wildavsky 1973; Mazmanian and Sabatier 1983a; Linder and Peters 1984; Schneider and Ingram 1993; May 2002; Salamon 2002; Howlett 2011; Koontz and Thomas 2012): (1) What are the policy outputs and outcomes? (2) What is the causal theory? (3) How does the policy grant and restrict behavioral discretion? (4) What are the sanctions and inducements to encourage compliance? (5) How does the policy permit adaptation over time? In applying this set of five questions, we assume that the lessons learned from previous research offer a valid set of criteria for comparing and contrasting policies. We return to this assumption in the conclusion with suggestions for further refinement.

This paper offers neither a new explanation of policy change (Jenkins-Smith et al. 2014; Donnelly and Hogan 2012; Berry and Berry 2014) nor generalizable lessons from a single case. Instead, the contribution of this paper is methodological and substantive, with the purpose of advancing an approach for describing and evaluating compositional policy change. The method is illustrated through the analysis of a public smoking ban policy

change in the state of Colorado, USA. The case study was chosen for its relative simplicity, general reader familiarity, and the opportunity to compare a change in a policy between 1977 and 2006. Given that description must precede explanation (Gerring 2009), the paper concludes with a discussion of how descriptive insights gained from the offered methods provide a platform for advancing theoretical explanations of policy change.

Guiding questions for analyzing changes in the composition of public policies

This section elaborates on five questions used to describe and evaluate the composition of policy change.

Question 1: What are the policy outputs and outcomes?

Specifying the goals of a public policy is often a starting point in understanding policy formulation, design, and implementation (Ranney 1968; Howlett et al. 2009; Pressman and Wildavsky 1973; Mazmanian and Sabatier 1983a). "Goals," however, is a generic term that limits the reliability and validity in its measurement and interpretation. A refined conceptualization of goals is a focus on desired outputs and outcomes (Ranney 1968; Koontz and Thomas 2012).

The outcome of a policy is defined as the desired change or achievement in the condition of the world (Easton 1965). However, the link between policies and outcomes is often indirect, limited, or spurious (Koontz and Thomas 2012). For example, a policy may require public disclosure of chemicals by an industrial operation with the intended outcome of improving public trust with the industry. In reality, disclosure of chemicals is but one of many factors related to public trust in an industry, and the relationship between disclosure and public trust is indirect, limited, and possibly inconsequential.

Outputs are defined in two ways. First, outputs can take the form of measurable policy results that are assumed by the policy designers to result in, and often serve as a proxy indicator for, desired outcomes. Such outputs are labeled "proximate outputs." In the previous example, a proximate output is the disclosure of chemicals by an industrial operation toward the outcome of generating public trust in the industry. Second, outputs can take the form of intermediate or transformative links from one situation to the next, described in the public policy in sequence of actions and decisions, which eventually lead to the proximate output. These outputs are labeled "transformative outputs."

Identifying proximate and transformative outputs enables distinction between the outputs that link together a chain of action initiated by a public policy and the outputs that represent the end result of the policy. Such a distinction has been recognized in past studies of public policy and policy design (Ranney 1968; Mazmanian and Sabatier 1983b). Koontz and Thomas (2012), for example, illustrate the utility of the distinction through a regulatory logic model in which a sequence of different types of outputs leads to an end outcome. The intent of the distinction is to allow for the identification of outputs both within and at the end of a policy's intended sequence of action, thereby facilitating the evaluation of different components of the intended sequence.

Evaluative assessments can be made with regard to the transformative and proximate outputs and desired outcomes in relation to policy change. We posit that improvements have been made through changes to a policy composition if (1) clarifications and

distinctions have been made in the meanings and measurements of outputs and outcomes, (2) the proximate output is a closer measure of the outcome, and (3) the outputs and outcomes are more consistent in intent.

Question 2: What is the causal theory?

Policy documents describe the means by which the goals of a public policy are to be achieved. They are devices or instruments that create or alter situations of collective action. A given policy might target a single situation resulting in a single proximate output, whereas another policy might target a sequence of situations linked through transformative outputs, eventually leading to one or more proximate outputs.

A policy depiction as a sequence of situations operating toward an outcome matches what Ranney (1968) describes as a "course of events," what Mazmanian and Sabatier (1983a) describe as "causal theory," and what Koontz and Thomas (2012) depict in their regulatory policy logic model. Pressman and Wildavsky (1973, p. xv) state it most clearly: "Polices imply theories. Whether stated explicitly or not, polices point to a chain of causation between initial conditions and future consequences." The aim of specifying the causal theory in question 2 is to understand the chain of causation inherent in a policy document.

We posit that improvements have been made in changes to a policy composition if (1) the causal theory is made more explicit in describing the chain of events linking to the proximate outputs and outcomes, and (2) the causal theory represents a more reasonable approach for achieving the proximate outputs and outcomes.

Question 3: How does the policy grant and restrict the behavioral discretion of target populations?

A major theoretical concept—and sometimes the single theoretical concept—used for comparing and describing public policy is degree of coercion (Schneider and Ingram 1993; Salamon 2002; Howlett 2011). As defined by Salamon (2002), coercion "measures the extent to which a tool [policy] restricts individual or group behavior as opposed to merely encouraging or discouraging it." The reason for emphasizing coercion is simple: Public policies usually target populations for behavioral change, and the mechanism for achieving the anticipated change is often coercion. However, emphasis on coercion incidentally narrows the theoretical and empirical lens of scholars interested in policy. When assessing the coerciveness of policies, we recommend the analysis of two concepts structuring behavioral discretion within the policy document: restrictive and granting rules.

Restrictive rules are those that limit the choice potential of target populations. Granting rules are those that expand the choice potential of target populations. A city charter, for example, might grant a mayor line item veto authority over budgets passed by a city council but also limit authority by requiring that a mayor receive city council approval for all executive appointments. For nongovernmental actors, restrictive rules might limit the locations where a person can smoke tobacco, and granting rules might give employees the right to request a nonsmoking location at their place of employment.

The emphasis on granting and restricting directives may be an important yet overlooked distinction for scholars who emphasize coercion but it is a common distinction in other literatures. For example, Ostrom (1990) lists desirable principles of constitutional design that both give and limit governmental authority. Schneider and Ingram (1993) describe how policies have the potential to constrain or grant liberties on target populations.

McCubbins (1985) and Huber and Shipan (2002) explore the manners in which the scope and procedures of statutes grant interpretive discretion to administrative bodies.

In this paper, we posit that improvements will have been made in changes to the policy composition if (1) the restricting or granting rules of the target populations are made clearer and are more consistent in their effect on behavior discretion, and (2) the restricting and granting rules directed at target populations provide more specific conditions under which the rules apply.

Question 4: What are the sanctions and inducements to encourage compliance?

This question involves the analysis of the rules that seek to encourage compliance with restricting and granting rules through sanctions and inducements. Issues of sanctions and inducements are well established across literatures with emphasis on "carrots" and "sticks" and various forms of incentive systems (Clark and Wilson 1961; Howlett et al. 2009; Teske 2004; Wilson 1980). Ostrom (1990, 2005) has shown in the study of common pool resources, for example, that robust arrangements for overcoming the tragedy of the commons require some degree of monitoring and enforcement through graduated sanctions.

This paper suggests that sanctions and inducements need to be assessed in relation to their clarity of application and to whether they apply to both the policy monitors and enforcers and the target populations. If one considers the development and enactment of policy to be a chain of principle–agent relationships, each step along the chain is vulnerable to goal slippage and official shirking, referred to as the "classic bureaucratic problem" (Miller 1992; Teske 2004). External influences such as interest groups, contextual factors, and the actions of other agencies can derail or alter policies as they are enacted and administered, as can internal factors such as the personal interests of administrators and government officials, program and governmental budgets, and the goals of implementing and program agencies (Kerwin and Furlong 2011; Pressman and Wildavsky 1973; Wilson 1980). Structuring the appropriate incentives in a policy document is an important mechanism, therefore, for promoting compliance with policy directives (Ostrom 2005).

We posit that improvements have been made through changes to a policy composition if (1) the conditions of noncompliance are clearer as they relate to the application of the sanctions and inducements, and (2) the sanctions and inducements are applicable to both the monitors/enforcers and the target population.

Question 5: How does the policy permit adaptation over time?

A principal lesson from public policy literature, and especially implementation literature, is the evolutionary and adaptive characteristic of policy processes (Pressman and Wildavsky 1984; John 1998). Policies are not simply designed and implemented at a single point in time, but rather respond to and adjust according to local contexts and changing conditions. This paper analyzes the adaptive capacity of policy documents by assessing the extent to which regulatory directives permit policy adaptation in response to specific contexts or to changing conditions.

We posit that improvements have been made in changes to a policy composition if the policy document enables or permits policy adaptation in response to specific contexts or to changing conditions.

Steps in the compositional analysis of public policy

To answer the five questions, this section describes the steps to analyze the composition of public policy by drawing on the concepts and methods from the IAD framework (Ostrom 2005; Basurto et al. 2010; Siddiki et al. 2011, 2012). See Appendix 1 for further elaboration on the steps.

Step 1: Dissecting the policy document

The first step begins by dividing the document into single-rule statements, which require, forbid, or permit action by one or more individuals under specified conditions. Most of these rule statements will be a single sentence.

Each statement is then coded into five components.[1] The first is the "attribute" which represents the actor category. The attribute is assumed to have agency for taking action (or not taking action) and can be an individual or a collection of individuals, like an organization or social group. The second is the "deontic" which provides the prescriptive force of the statement often in the form of "must," "may," or "must not" phrases. The third is the "aim," which is the statement verb and thus denotes the action assigned to the attribute. The fourth is the "condition," which provides the spatial, temporal, and procedural circumstances under which the statement applies. The fifth and final category is the "or else," which is the sanction or inducement for complying with the directive.

For example, a statement might be written: "All people must not smoke tobacco within 15 feet of an entrance of a public building or pay a $200 fine." In this sample statement, "all people" is the attribute, meaning the policy applies to all people within the jurisdiction of the law. "Must not" is the deontic, which forbids a type of action. The aim or action that is forbidden is "smoke." The condition under which all people must not smoke is "tobacco within 15 feet of an entrance of a public building." Finally, "a $200 fine" is the sanction for not complying with this statement.

Step 2: Classifying the rules

This second step uses the grammatical components from the first step to code the statements into one of five functional rule categories (Ostrom 2005).

1. *Rules that establish boundaries of a position in a situation* "Boundary rules" establish the conditions by which an actor can fill a certain position in a situation described within the policy document. A boundary rule might specify, for example, prerequisites for a person to become eligible for welfare payments or for a business to be eligible to permit smoking. Boundary rules do not grant or restrict behavior but rather determine the exit and entry rules into a particular situation.

2. *Rules that establish outputs and outcomes* "Scope rules" are statements that identify and characterize outputs or outcomes for a particular position or positions. They are useful for identifying transformative outputs, proximate outputs, or outcomes, although outcomes are often stated in the introductory statement of many policy documents.

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[1] Most of the statements from this analysis follow a regulatory syntax with the five identified components. Some statements follow a different syntax referred to as "constitutive" (D'Andrade 1984; Searle 1969). See Appendix 1 for more detail regarding regulatory and constitutive statements.

3. *Rules that grant or restrict behavior* There are four types of rules that grant and restrict behavior in a policy document. The first rule type is "position rules," which are the rule statements that establish positions to be occupied in a situation. Position rules may define or create a position, for example, for an industrial operation, a welfare recipient, or a smoker and nonsmoker. Position rules automatically enable or restrict behavior simply by establishing the available positions in a given situation. The second rule type is "choice rules," which are rules that restrict or enable authority or discretion of an actor and the conditions under which such rules apply. The third rule type is "information rules," which are rules that specify channels of communication. Unlike choice rules, information rules necessarily involve more than one actor, as they require a giver and receiver of information. The fourth type is "aggregation rules," which are rules that indicate how groups of actors make decisions. Unlike choice and information rules, aggregation rules require some degree of collective decision making either by actors occupying the same position or different positions.

4. *Rules that sanction and induce behavioral discretion* There is one type of rule that provides incentives for behavior or decisions either through sanctions or incentives. These rules are "payoff rules." Payoff rules involve either a carrot or a stick in the or else category of the grammatical coding. All payoff rules involve an actor category that imposes the incentive and an actor category that receives the incentive.

5. *Rules that permit adaptation of the policy document* Public policies evolve in the implementation and administration processes. In conceptualizing adaptive mechanisms as part of a policy's composition, we draw from the IAD framework's distinction between operational and collective-choice rules. Operational rules relate to the "day-to-day" decisions and actions of individuals and are determined by decisions made at the collective-choice level. Collective-choice rules outline when, how, and by whom operational-level rules may be determined or altered. Components of policy composition that allow for policy adaptation take the form of collective-choice rules. Collective-choice rules make up distinctive rule category because they can include any of the four categories of rules listed immediately above. In other words, there can be boundary rules, rules that specify outputs and outcomes, rules that restrict and grant discretion and authority, and rules that sanction and induce behavior at the collective-choice level.

Step 3: Portraying the causal theory with target action situations

Although much of the literature on policy design, tools, and implementation refer to the causal theory in which the outputs and outcomes are achieved, none offer a procedure for portraying the causal theory. This paper depicts a causal theory as consisting of one or more target action situations linked by transformative outputs and resulting in one or more proximate outputs.

Target action situations are the settings through which the policy document seeks to alter targeted behavior. In policy documents, target action situations may be clearly specified or unclearly specified in terms of time, location, and actors. In some situations, the target action situations may refer to existing "real-world" situations, and in others, a target action situation may generate an entirely new "real-world" situation. In yet other situations, the target action situations may refer to a situation that exists in writing but may not come to exist in reality.

To identify and construct a target action situation from a policy document, a researcher clusters rules (Step 2) into configurations around common outputs. The underlying assumption is that the rules in policy documents do not operate independently but rather operate in interdependent arrangements. For example, in a policy document, some rules may restrict and grant discretion in a particular setting, other rules may require information to be exchanged in the same setting, and yet another rule may specify a sanction if the rules are not followed. The interdependence of these rules is demonstrated by the relative importance of restricting and granting rules given the presence or absence of a sanction. In this example, all of these rules operate in the same target action situation and are directed toward a particular output. The purpose of this step was to arrange the rules from Step 2 into one target action situation with one or more associated proximate output(s) or into more than one target action situations that are then linked by transformative outputs toward one or more proximate outputs.

A useful strategy for constructing target action situations is to first identify the desired outcome(s) of the policy document. The analyst then backtraces to identify the intended proxy outputs. Policy documents that include clusters of rules that apply to situations indirectly related to the proximate output may indicate the presence of one or more transformative outputs and an associated sequence of target action situations. Once the transformative and proximate outputs have been identified, the rule statements directed at realizing the intended outputs are isolated and clustered into the respective target action situations. The result is a visual map of the causal theory with one or more target action situations, intended outputs, and desired outcomes.

Case study background

The methodological approach for the in-depth description and evaluation of policy change offered in this paper is illustrated through an analysis of Colorado smoking ban policy change between 1977 and 2006. This section provides background context and a description of the case under study by reviewing the emergence of smoking ban policies in the USA and the state of Colorado.

Smoking policies emerged nationally and internationally in response to scientific evidence of the harmful health effects of smoking and secondhand smoke on nonsmokers. While compelling evidence of the detrimental effects of smoking on human health emerged as early as the 1950s and 1960s, a link between exposure to secondhand smoke and adverse health effects lagged in the scientific literature of the time. In 1981, the first evidence of a relationship between secondhand smoke and health issues was published, identifying a correlation between secondhand smoke and lung cancer, followed by later studies arguing a relationship between exposure to secondhand smoke and coronary heart disease (USDHHS 1993).[2]

Despite the lack of substantial scientific evidence linking exposure to secondhand smoke and adverse health effects, states and local jurisdictions in the USA began enacting limited smoking bans throughout the 1970s. Such bans typically targeted one of three venue categories: restaurants, bars, or workplaces. As of 1975, 30 states had some sort of state policy aimed at protecting nonsmokers from involuntary exposure to secondhand smoke, the most comprehensive of which was passed in Minnesota (Montago and Sciolino 1975). The Minnesota Indoor Clean Air Act prohibited smoking in most indoor public

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[2] Prior to 1981, a number of Surgeon General Reports drew a correlation between secondhand smoke exposure and respiratory issues in infants and children, but not in adults (USDHHS 1993).

places and required restaurants to provide smoke-free areas. In the late 1970s, local governments began enacting smoking ordinances at a steady rate, targeting restaurants and workplaces, with restaurant smoking bans representing the majority of local smoking ordinances (USDHHS 1993).

In 1986, credible evidence of a relationship between secondhand smoke and disease came with the publication of the Surgeon General's report on the consequences of "involuntary smoking" (USDHHS 1986). The report argued that secondhand smoke causes a variety of diseases, such as lung cancer, in nonsmokers; that the children of smokers display higher rates of respiratory infections and decreased lung function compared to the children of nonsmokers; and that the separation of smokers and nonsmokers within the same spaces reduces, but does not eliminate, exposure to secondhand smoke.

The findings of the Surgeon General's report, in combination with following reports such as a National Academy of Sciences (NAS 1986) study, led to increased efforts to protect nonsmokers through public policies, at first primarily at the local level (Pertschuk and Shopland 1989; USDHHS 1986). By 1992, 543 cities and counties across the USA had enacted smoking ordinances (USDHHS 1993). In 1998, California became the first US state to ban smoking in all restaurants and bars (Koh et al. 2007); however, it was not until 2002 that a US state—Delaware—banned smoking in workplaces, restaurants, and bars (CDC 2011).

Several states shortly thereafter followed Delaware's lead. By the end of 2006, nine US states had enacted comprehensive smoking bans (bans that include restaurants, bars, and workplaces). By the end of 2010, 26 states had implemented comprehensive smoke-free laws, resulting in approximately half of US residents living in an area covered by comprehensive state or local smoke-free laws (CDC 2011).

The history of smoking bans in the state of Colorado reflects overall national trends. Prior to the 1970s, little-to-no effort was made to address secondhand smoke at the state level. In the mid-1970s, several bills were introduced at the state legislature, and in 1977, the first state-level smoking ban was passed (Kopel 2003). The bill (SB 137) prohibited smoking in identified public locations, encouraged smoke-free areas in restaurants, and allowed hospitals to ban smoking in part or all of the facility. The following three decades saw no state-level smoking ban change, while local jurisdiction smoking ordinances continued to proliferate. In 2006, with support from restaurant industry groups seeking a "level playing field" (Couch 2005) the state legislature passed the Colorado Clean Indoor Air Act—a comprehensive smoking ban in most indoor public venues.

Public policy and political science scholars have studied tobacco policy and smoking bans from multiple perspectives. Scholars have analyzed tobacco politics, patterns of smoking ban adoption over time, learning, or the formation and collapse of the interest groups and coalitions supporting the tobacco industry, and the role of social movements as the source for policy change (Baumgartner and Jones 1992; Cairney et al. 2012; Cairney 2009; Derthick 2011; Givel 2006; Nathanson 1999; Wood 2006). To date, however, scholars have not analyzed, with the detail found in this paper, compositional changes in smoking bans over time. For example, Cairney (2009) analyzed the transfer of policies via policy instruments (e.g., education, restrictions, taxes) but not the textual composition of those instruments, which is the focus of this study.

Results

The results from the data coding are organized by the set of five questions to help analyze and compare changes in the policy. For a general understanding of the coded data, a summary is presented in Fig. 1 with comparative charts detailing the composition of the rule types in the 1977 and 2006 smoking bans. The numbers within chart sections indicate the percent of statement types out of all statements coded per policy.

The 1977 smoking ban is comprised of 38 coded statements. A large majority (74 %) of the statements either grants or restricts target population or location choice, such as that of an employer or hospital. The remaining statements refer to physical or material conditions, for example definitions and descriptions of hospitals or other locations where smoking is prohibited or permitted. An equally small percent of statements structure information flows, mostly in the form of smoking and nonsmoking location sign postings.

The 2006 smoking ban is comprised of 62 coded statements. The overall distribution of statements shows more diversity in 2006 compared with the 1977 ban. Nearly half of the statements are grant/restrict (47 %), and 39 % refer to the physical/material state of the world. Unlike the 1977 policy, the 2006 policy document includes statements that refer to the creation of positions and sanctions/inducements.

What are the outputs and outcomes of the policy?

Table 1 compares the transformative and proximate outputs and the outcomes of the 1977 and 2006 policy documents. The transformative outputs are the same for both policies, indicating the decision of an owner, manager, or director of a facility to designate part or all of a location as smoke-free. This is identified as a transformative output as it shifts the identity, or position, of a designated location such that new smoking rules apply.
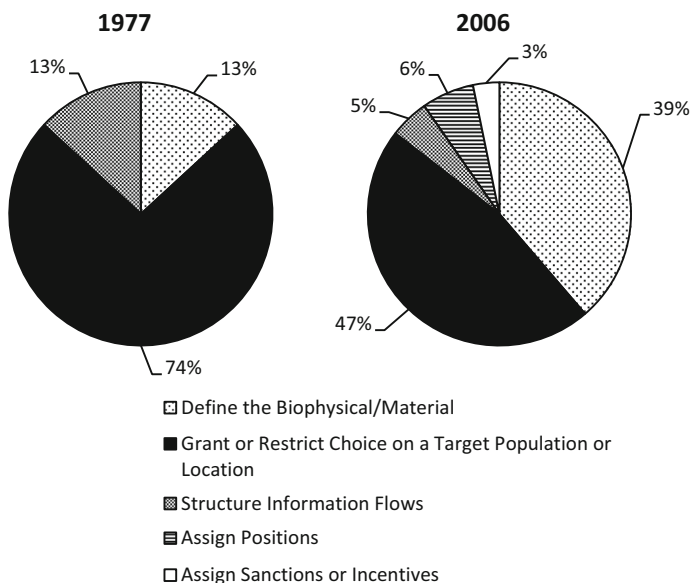

Fig. 1 Distribution of rule types in the 1977 and 2006 smoking bans in Colorado, USA

Table 1 Comparing outputs and outcomes across the 1977 and 2006 Colorado smoking bans

	1977	2006
Transmission outputs	Designation in-part or in-whole a facility as "smoke-free"	Designation in-part or in-whole of a facility as "smoke-free"
Proximate outputs	Individuals smoke Individuals do not smoke	Noncompliance, involuntary exposure to smoke, and sanction Compliance and protection from exposure to secondhand smoke Voluntary exposure to secondhand smoke
Outcomes	Protect citizen health, safety, and welfare	Preserve and improve citizen health, comfort, and environment Minimize government intrusion on individual decision to consume tobacco products

Sources: 1977 Senate Bill entitled "control of smoking" and the 2006 House Bill 06-1175 entitled "Colorado Clean Indoor Air Act"

The proximate outputs for the 1977 and 2006 bans are different. In 1977, the policy document establishes two basic outputs related to smoking or nonsmoking, and reference to involuntary exposure to smoke is not mentioned. In 2006, the outputs became more specific, with references to involuntary exposure or voluntary exposure to secondhand smoke. The shift in emphasis from smoking/nonsmoking to voluntary versus involuntary exposure to secondhand smoke suggests a shift in the focus of the 2006 ban from the 1977 ban, as well as a better understanding of the negative externality of smoking on nonsmokers.

From 1977 to 2006, the desired outcomes became more specific, yet also contradictory. In 1977, the outcome was better protection of citizen health, safety, and welfare. In 2006, the outcomes were diversified. Similar to 1977, a desired outcome in 2006 was to protect citizen health, comfort, and the environment. However, the outcome of protecting the rights of citizens to consume tobacco products was also explicitly listed in 2006.

To assess the policy change in 2006 compared to 1977, we answer three assessment sub-questions discussed earlier. First, *have clarifications and distinctions been made in the*
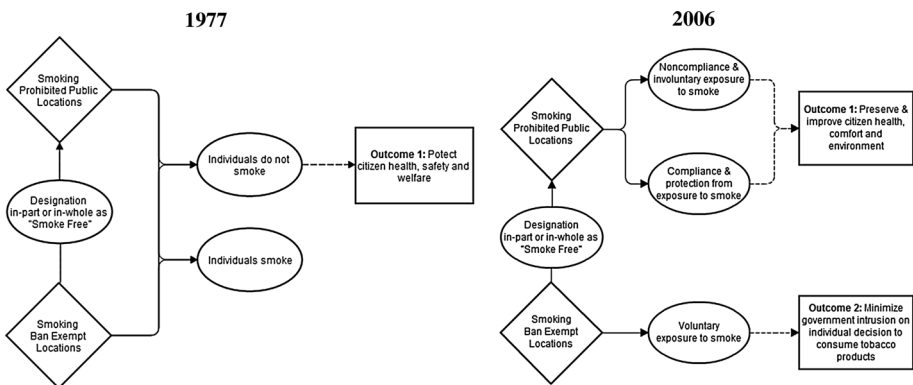

Fig. 2 Comparing causal theory across the 1977 and the 2006 Colorado smoking bans. *Diamonds* target action situations, *ovals* intended outputs, *squares* desired outcomes

meanings and measurements of the outputs and outcomes? Yes, from 1977 to 2006, the outputs have been clarified by focusing more on secondhand smoke and involuntary exposure. Second, *is the proximate output closer to the outcome?* Moderately so, the proximate outputs in 2006 are a better match for the outcomes; however, the 1977 proximate outputs may have been adequate. Third, *are the outputs and outcomes more consistent?* No, the inclusion of the outcome to protect the rights of the smoker provides a potentially inconsistent outcome when considered in relation to the desired outcome of protecting public health, comfort, and the environment.

What is the causal theory?

The causal theories for the 1977 and 2006 smoking ban are presented in Fig. 2. The diamonds represent target action situations, that is, scenarios where collective action is

Table 2 Comparing restricting and granting rules by target populations and locations in the 1977 and 2006 smoking bans

	Populations and locations	1977		2006	
		Restrict	Grant	Restrict	Grant
Population and locations targeted in 1977 law with restrict and grant statements	Owner of smoking-banned location	2	2	0	0
	Public place where food is sold	1	0	0	0
	Hospitals	4	2	0	0
	Offices and commercial establishments	2	1	0	0
	State legislative buildings	4	1	0	0
	Senate and house of representatives	0	1	0	0
Population and locations targeted in 1977 and 2006 laws with restrict and grant statements	All people in public locations	2	0	2	0
	Local authority	0	3	1	6
	Employer of exempt location	1	2	5	2
Population and locations targeted in 2006 laws with restrict and grant statements	Private homes, residences, and vehicles	0	0	1	1
	Employer who violates act	0	0	1	0
	Smoker who violates act	0	0	2	0
	Local district attorney	0	0	2	0
	Judges, clerks, and officials	0	0	5	0
	State Treasurer	0	0	2	0
	Employee of exempt location	0	0	0	1
	Total restrict and grant statements	16	12	21	9
	Total statements in the laws	38		62	
	Percent of restrict and grant statements of all statements per each law	42	32	34	15

Numbers indicate statements in the laws that grant or restrict

imagined to happen. The ovals represent target action situation outputs. The squares represent desired outcomes. The transformative outputs link target action situations, while the proximate outputs are connected by dotted line to the associated outcome. Note that the dotted lines from the proximate outputs to the outcomes are meant to symbolize indirect relationships. One could imagine, for example, a location exempt from the smoking ban resulting into two relevant outputs: either designating the location in-part or in-whole as smoke-free or exposing voluntarily patrons to smoke.

The target action situations for the 1977 and 2006 bans are very similar. Both have target action situations where smoking is permitted ("smoking ban exempt locations"), and both have target action situations where smoking is prohibited. Finally, both have a transformative output that allows a location where smoking is not permitted to transition to a location where smoking is prohibited. For example, an owner of a restaurant may decide to ban smoking in the building. Such a ban by the owner (transformative output) has the force of law and shifts the banned location from the lower left diamond to the upper left diamond in the 1977 and 2006 causal theories. The two figures differ in their proximate outputs and outcomes, as previously discussed.

To assess the change in the 1977 and 2006 causal theories, the first question to ask is: *Has the causal theory been made more explicit in describing the chain of events linking the proxy outputs and outcomes?* The causal theory in both the 1977 and the 2006 smoking bans is fairly explicit and portrays a similar chain of events linking to the proximate outputs and desired outcomes. The major difference is in the content of the proxy outputs and outcomes as discussed previously. Second, *does the causal theory in the new policy provide a more reasonable approach for achieving the proximate outputs and outcomes?* Similarly, the causal theory is about the same in both. There is no change in the causal theory outside of clarifying the proxy outputs and outcomes.

How does the policy grant and restrict behavioral discretion of target populations?

The first two questions relate to the outputs and outcomes as well as the general causal theory for achieving those outputs and outcomes. This question is specifically related to the actual rule statements and how those statements restrict or grant the behavioral discretion of target populations or locations. The question relates more to understanding the meaning underlying the black portion of the pie charts in Fig. 1.

Tables 2 lists the number of grant and restrict statements in the 1977 smoking ban compared to the 2006 smoking ban. The statements are divided with regard to the statements that refer only to 1977 populations and locations in the top portion, the statements that refer to the same populations or locations in 1977 and 2006 in the middle portion, and statements that refer only to 2006 populations and locations in the bottom portion.

The overall percent of grant and restrict statements in the 2006 ban compared to the 1977 ban has decreased (see bottom row in Table 2). This is not surprising given the finding from Fig. 1 that shows that the number of actual grant and restrict statements has decreased as a proportion of the total from 1977 to 2006. Instead, the 2006 policy document has a large number of statements that describe physical/material conditions. As will be addressed, a lesson from Table 2 is that referencing the number of grant and restrict statements is not enough to claim that one policy is more or less coercive.

From Table 2, most populations and locations that are granted some discretion are also restricted in discretion. For example, cigar-tobacco bars are an exempted location in 2006, but also are restricted from expanding the size of their facility. Local authorities are

granted authority to adopt their own smoking bans (grants) but also restricted by the requirement that such bans be more (and not less) stringent than the state law. A lesson from Table 2 is that Colorado smoking ban exhibits instances of coercion (often addressed in the literature), as well as granting authority (which is arguably studied less).

Although Table 2 shows instances of granting and restricting, it does not provide specific details that enable direct comparison of the 1977 to the 2006 policy documents. Table 3 lists comparatively the specific locations where smoking was banned or permitted in the two bans. There were five general locations where smoking was banned in 1977 and 2006 (elevators, museums/galleries, libraries, indoor smoking arenas, and auditoria/theaters). More common are locations and populations where smoking was permitted with conditions in 1977, permitted in 1977, or not mentioned in 1977 and then simply banned in

Table 3 List of locations specific to the 1977 and 2006 Colorado smoking bans

	Location
Locations where smoking was banned in 1977 and in 2006	Elevators Museums, galleries Libraries Indoor sporting arenas Auditoria, theaters
Locations where smoking was permitted with conditions in 1977 but banned in 2006	Hospitals Government buildings Public transportation
Locations were smoking was permitted in 1977 but banned in 2006	Food service establishments and bars
Locations not mentioned in 1977 and where smoking was banned in 2006	The common areas of nursing homes Bowling alleys and billiard or pool halls Public meeting places Grocery stores Gymnasiums Facilities with limited gaming facilities, in which any gaming or gambling activity is conducted, or in which games of chance are conducted Restrooms, lobbies, hallways, and other common areas in public and private buildings, condominiums multiple-unit residential facilities, and in hotels and motels 75 % of the sleeping quarters within a hotel/motel The common areas of retirement facilities The common areas of publicly owned housing Public and nonpublic schools Other educational and vocational institutions The entryways of all buildings and facilities listed in above
Locations permitted with conditions in 2006	The retail floor plan of a casino A business with <3 employees and not open to the public Cigar bars or retail tobacco business Private homes, residences, and automobiles Limousines under private hire Airport smoking concession The outdoor area of any business Private, nonresidential building on a farm or ranch Retail floor plan of a casino

Sources: 1977 Senate Bill entitled "Control of Smoking" and the 2006 House Bill 06-1175 entitled "Colorado Clean Indoor Air Act"

2006. While Table 2 suggests that both policy documents grant and restrict, Table 3 indicates that 2006 was much more specific and extensive in establishing the locations subject to the smoking ban. Many of these locations were described in physical/material condition statements (but were actually banned in the content of the policy with a restriction statement).

In comparing the 1977 and 2006 bans, our first sub-question asked: *Are the restricting or granting rules of the target populations made clearer and are more consistent in their effect on behavioral discretion?* Overall, the 2006 ban is more extensive in location identification, and hence, clearer in its banning of locations. Second, *to what extent are the restricting and granting rules of the target populations providing more specific conditions under which the rules apply?* These results are mixed. The 1977 ban did not ban smoking in many locations, but instead provided detailed conditions that described when and how a location can permit or prohibit smoking. In 2006, there were fewer conditions, but the regulation banned smoking in more general locations. Hence, it is not the detail of the conditions pertaining to the various target action situations of a policy that necessarily make a policy more or less coercive. Since the 2006 policy document simply banned smoking in many locations, there was not the need for conditions. However, detailed conditions in the 2006 policy document are found in the listings of locations (Table 3) where smoking is banned, something largely absent in the 1977 policy document.

What are the sanctions and inducements to ensure compliance?

The top portion of Table 4 lists the enforcements and sanctions in the 2006 ban compared to the 1977 ban. There were no rules for enforcement or sanctions in the 1977 ban, whereas the 2006 ban established penalties and fines for noncompliance. Additionally, the 2006 policy identified the local authorities as the enforcers of the policy.

For assessment, we first ask *Are the conditions of noncompliance clearer with regards to the application of the sanctions and inducements?* Yes, prior to 2006, sanctions for noncompliance were nonexistent. Second, *are the sanctions and inducements applicable to both the monitors/enforcers and the target population?* The policy is an improvement from no sanctions, and does assign a policy enforcer, but it does not offer direct sanctions for the monitors and enforcers. Indirect inducements for monitors and enforcers are found in the

Table 4 Comparing rules for enforcement, sanctions, and adaptability in the 1977 and 2006 Colorado smoking bans

	1977	2006
Enforcement	None	Municipal courts or their equivalent in any city, city and county, or town shall have jurisdiction over violations of this law
Sanction	None	A person who smokes in an area where smoking is prohibited is guilty of a class 2 petty offense
		Upon conviction, a person may be subject to a fine not exceeding $200 for the first offense, $300 for the second offense, and $500 for the third and additional violations in a calendar year
Adaptability	Local authorities may adopt smoking regulations.	Local authorities may adopt smoking ban policy more stringent than the state-level policy

division of the "spoils" of the ban. The ban stipulates that the local authority receives 75 percent of the fines collected as a result of noncompliance, while the remaining 25 percent are transmitted to the state.

Table 5 Summary table

Question	Assessment sub-questions	Assessment	Comments
What are the outputs and outcomes of at the policy?	Have there been clarifications and distinctions in the meanings and measurements of the outputs and outcomes?	Better	The 2006 law is more precise in articulating its goals of protecting involuntary exposure to secondhand smoke
	To what extent is the proximate output closer to the outcome?	Better	The 2006 law provides a more direct link between proxy outputs and outcomes
	Are the outputs and outcomes are more consistent?	Worse	The 2006 law balances the right of the smoker with citizen health
What is the causal theory?	Is the causal theory more explicit in describing the linking to the outputs and outcomes?	Same	Both causal theories are equally explicit
	Is the causal theory a more reasonable approach for achieving the outputs and outcomes?	Same	Both causal theories provide about the same reasonable approach for achieving the outputs and outcomes
How does the policy grant and restrict discretion of target populations?	Are the restricting or granting rules of the target populations made clearer and more consistent?	Better	Yes, the locations and populations are better and more extensively specified
	Do the restricting and granting rules of the target populations provide more specific conditions under which the rules apply?	Better	The locations are more specific and extensive for banning smoking in 2006 than in 1977. The conditions have decreased but clarity have increased
What are the sanctions and inducements to ensure compliance?	Are the conditions of noncompliance clearer for the application of the sanctions and inducements?	Significantly better	Unlike the 1977 policy, the 2006 policy establishes sanctions for noncompliance
	Are the sanctions and inducements applicable to both monitors/enforcers and the target population?	Moderately better	The 2006 policy does not provide incentives to monitors and enforcers but does assign the responsibility. The topic is not addressed in 1977
How does the policy permit adaptation over time?	Does the policy permit adaptation to specific conditions or to changing conditions?	Same	The 1977 policy allows local governments to adopt smoking regulations, and the 2006 policy empowers local communities to adopt more stringent smoking bans

How does the policy permit adaptation over time?

The final question to ask in comparing policy documents is the specification of rule statements that enable or allow adaptation. This material is summarized in the bottom portion of Table 4. The 1977 policy document allowed local jurisdictions to adopt their own smoking regulations as did the 2006 policy. The 2006 policy document, however, included the requirement that adopted regulations by local governments must be more stringent than the state-level policy. This condition arguably strengthens the policy's link to intended outputs and desired outcomes.

To assess, we ask *Does the policy permit adaptation to specific conditions or to changing conditions?* Both policies do. The 2006 ban arguably offers a clearer link to desired outputs and outcomes.

Comparisons and discussion of the results

Table 5 summarizes the responses to the five questions, sub-questions, comparisons, and comments. Overall, 2006 established better intended outputs and desired outcomes but also inconsistency in desired outcomes. The bans are the same in their causal theories by describing situations permitting and prohibiting smoking, by permitting adaptation by local communities, and by providing proximate outputs that are nearer to the outcomes. The 2006 sanction and enforcement rules were not included in the 1977 policy document, as is the 2006 ban's adaptability provision.

This case study provides a constructive illumination of the 2006 Colorado smoking ban relative to the prior 1977 ban. Furthermore, the approach highlights different components of the two policy documents and identifies strengths and weaknesses of both. The approach also offers moderate assistance in understanding implementation challenges. More than 6 years have passed since the 2006 smoking ban was enacted in Colorado, and we can informally evaluate the usefulness of the approach to inform an assessment of policy implementation and performance.

Supporting our positive assessment of the 2006 policy in this paper, other assessments of the ban have been supportive (Human 2008; Littlefield 2008; Doyle et al. 2011; Urbina 2011). Additionally, we anticipated a couple challenges in the implementation of Colorado's 2006 smoking ban that arguably proved true, including a lack of legal protection for employees requesting smoke-free sites in exempt employment locations and issues of local enforcement. For the former, some local governments have adapted more stringent policies that protect the rights of employees.[3] For the latter, newspaper articles reported that some businesses refused to comply with the ban in the early years of implementation (Finley 2006; Simpson and Nicholson 2007) and that some local authorities clarified enforcement responsibilities (see footnote 3). However, our analysis did not identify other implementation challenges, including a major loophole permitting smoking in casinos that was later corrected with another law (CO HB 1269) and another loophole in the definition of cigar bars that enabled some bars and taverns to classify themselves as cigar bars to allow smoking by patrons (Draper 2006). Obviously, predicting the future is impossible but we find the approach helps in comparing policies and offers some insight into the challenges of implementation.

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[3] See list of city ordinances strengthening the Colorado Clean Indoor Air Act at http://www.gaspforair.org/gasp/ordinance/ordinance_index.php. Accessed April 4, 2013.

Conclusions

Possibly the most central topic of interest in policy studies is policy change. Although theoretical approaches for answering why policies change abound, methodological approaches for guiding research in answering what changed and evaluating such change are relatively sparse. This paper presents a compositional analysis of policy change based on the concepts and methods of IAD framework and organized by questions guided by the policy implementation, design, and tool literatures. The approach was illustrated by comparing Colorado's 1977 and 2006 smoking ban policies. This conclusion highlights some of the approach's methodological contributions and limitations, and the opportunities for theoretical development that it offers.

Describing policy change is a complicated endeavor, and any approach that attempts to understand it therefore necessitates a detailed vocabulary and methodology. The approach offered in this article draws from the IAD framework and its established language of institutions to understand the composition of policy change. Whether the investment in learning the IAD framework and applying the approach offered here is worth the gains in knowledge about policy change depends on a scholar's interests and objectives. Certainly, the approach is one way to describe policy change, and it is most useful if the objectives require a detailed textual description of policy change. This approach also has real potential for facilitating nontrivial advances in describing, comparing, and eventually helping to explain policy change. Examples of this potential are helping distinguish major policy change from minor policy change, link politics and power to the composition of policy change, and identify the specific components of policy change that might influence long-term path dependency and impacts (Jenkins-Smith et al. 2014; Mettler and SoRelle 2014; Hall 1993). Finally, the approach can also provide a more detailed account of policy transfer and policy mutation (Peck and Theodore 2010). For example, instead of analyzing policy transfer dichotomously as adopted or not by a government unit, these methods can be applied to document overlap and changes made to policies as they are adopted across space and time.

This is the first paper to utilize a replicable coding approach based on the IAD framework to measure and document policy change. In this regard, it bridges the relatively narrow policy-relevant literature within IAD framework studies and the broader literature on policy change. As a result, this paper also offers a new research trajectory within the IAD framework. Past applications of the IAD framework, for example, have often focused on the rules-in-use governing collective action situations, particularly those involving common pool resources (Ostrom 1990, 2005). This paper continues recent efforts to apply the IAD framework to studying rules-in-form, that is, the textual composition of public policy (Basurto et al. 2010; Siddiki et al. 2011; Carter et al. 2015), taking a step further by illustrating how the framework can be used to measure and assess policy change. The approach, thus, opens the door for a new research applying the IAD framework to understanding the interaction of policy processes and the evolution of rules-in-form.

While the data collection method was based on the IAD framework, the organization of the data analysis was guided by five questions drawn from the policy implementation, design, and tool literatures. A single case study is not sufficient to assess the merits of any approach. Nonetheless, the illustration of the five questions through a comparison of Colorado smoking bans supports their merit. The five questions, for example, helped organize the data analysis that reflected lessons learned from the existing literature and identified some of the actual challenges in implementing the 2006 policy. Additional

applications of the five questions are encouraged in different contexts to further gauge their usefulness. It is quite possible, for example, that the five questions are most applicable to a certain type of public policy, such as those that seek to regulate behavior, and less applicable to other types of policies or policy instruments. There are also, undoubtedly, different evaluation criteria that could be applied to assess the compositional change in public policy, such as a measurement of the graduated sanctions that target behavioral change (Ostrom 1990, 2005). One of the next steps in studying compositional public policy change is developing a more inclusive set of evaluation criteria for assessing policy change and guidelines for when to apply them.

Understanding changes in public policies and the impacts of policy change requires the ability to conceptualize and measure this change. This effort does not pose new explanations of policy change nor offer generalizable lessons from this single case application. The approach instead contributes to past efforts investigating policy change (e.g., Cashore and Howlett 2007; Hall 1993; Howlett and Cashore 2009) by offering a method for documenting, describing, and evaluating policy change. Based on the premise that a better understanding of policy composition can facilitate the investigation of policy change, our hope is to further the methodological investigation of policy change and offer a promising avenue toward the continued development of policy change theory.

Appendix 1: Coding guidelines

The procedures are inspired by the IAD framework (Crawford and Ostrom 1995, 2005; Basurto et al. 2010; Siddiki et al. 2011, 2012; Kiser and Ostrom 1982; Ostrom 1986, 2005).

1. Identify institutional statements

    (a) *Identify all definitions, titles, preambles, and headings* Titles and headings are first identified because they are fairly easy to locate and rarely constitute an institutional statement of theoretical or practical interest. Headers of sections and subsections may be retained as a manner or classifying and categorizing the statements in a given legislation or rule.

    (b) *Identify sections and subsections of the policy as initial units of observation* We call headers of sections and subsections "outline indicators." Outline indicators are titles, subheadings, a capital or lowercase letters, colons, semicolons, or Roman numerals, used to separate sections from subsections and subsections from sub-subsections, etc. These initial units of observation are temporary and may be divided into additional units when there is more than one institutional statement within them.

    (c) *Subdivide all initial section or subsection units from step 2 that have multiple sentences into sentence-based units of observation* If a section or subsection does not have a complete sentence ending in a period, code the entire section or subsection as one unit of observation. If there are multiple sentences in the section or subsection, code each sentence as units of observation. In some instances, a single norm, rule, or strategy may span outline indicators. For example, a statement may include a colon with a list of objects separated by semicolons. In such examples, the coder will decide, based on the existence of syntactic components, whether a statement is bound by the outline indicators, or spans them.

2. *Dissect the statements into syntactic components* Institutional statements can be coded in one of two basic syntaxes: regulatory or constitutive. Regulatory statements generally refer to an identifiable action, while constitutive statements generally have no action, and instead define, label, or describe a position or part of the physical world.

    (a) *Regulatory syntax* Regulatory statements will contain all or most of the following components and should be coded according to the regulatory ADICO syntax: attribute, deontic, aIm, condition, and or else. Definitions and examples can be found in Table 6. Generally, regulatory statements will take one of three syntactic forms: ADICO, ADIC, or AIC.

        (1) Any sentence-based statement that contains two aims should be divided into the appropriate number of statements, relative to the other syntactic components. For example, the statement "The Mayor shall appoint department heads and the Council shall approve them." can be broken into two statements: "The Mayor shall appoint department heads." and "The Council shall approve department heads appointed by the Mayor."

    (b) *Constitutive syntax* Constitutive statements will generally, but not always, contain an attribute, a description, or label for the attribute (or an inanimate object) and possibly will have conditions under which the description or label applies. Examples can be found in Table 7. Constitutive statements will take one of three syntactic forms: "There shall be X," "X is Y," and "X is Y under [specified conditions]."

3. *Categorize the statements according to the rules typology* The institutional statements can be classified as one of seven types, according to the functional purpose of the rule: position, boundary, payoff, aggregation, information, scope, and choice.

    (a) The first step is to compare the statement's aim with the basic aim verbs listed in Table 1 and in the codebook in Appendix 2 (Ostrom 2005, p. 190). Determine which basic aim verb best approximates the specifically stated aim in question, and code the statement according to the corresponding type of institution.

    (b) Sometimes, the aim of the statement is ambiguous (especially in the case of constitutive statements) or reflective of more than one basic aim verb, requiring a second coding step. For example, both information and payoff rules may have an aim that falls under the "receive" basic aim verb. In instances where the aim is ambiguous, or reflective of more than one basic aim verbs, it is necessary to determine the regulated component of the target action situation that the aim is linked to. This may be accomplished by looking to the object and the condition of the statement and comparing these with the regulated component categories in Table 1 on the following page, and in the codebook in Appendix 2.

    (c) The third step is to compare the statement with additional indicators, specific to institution type, which can be found in the codebook in Appendix 2.

    (d) Finally, some statements cannot be coded simply as one institution type and may fall under two or more categories. For example: "The applicant must pay an entry fee to the organizer." The statement is reflective of a payoff institution, as it assigns a cost to the applicant, and a benefit to the organizer. The statement is also reflective of a boundary institution, as it identifies a necessary action for the applicant to enter a position. In such instances, the coder should code the statement in question according to the following order: position, boundary,

Table 6 Examples of regulatory statement syntactic components

Attribute The animate actor charged with performing an action	"A **local authority** may adopt a more stringent smoking ban"
Deontic The prescriptive operator who describes whether the action is required, allowed, or forbidden	"The operators of public locations where smoking is banned **shall not** allow smoking within their building"
Aim Describes the action of the statement	"Employers of exempt locations shall **provide** requesting employees with a smoke-free work area"
Condition Specifies the spatial, temporal, and procedural circumstances under which the action is executed	"Employers of exempt locations that decide to prohibit smoking shall post a sign **stating that the location is smoke-free in a conspicuous location**"
Or else The punitive sanction resulting from noncompliance with the institution	"No one shall smoke in an indoor public location **or face a $200 fine**"

Table 7 Examples of constitutive statement syntax

There is X	"There shall be statewide smoking regulations"
X is Y	"A 'cigar-tobacco bar' is a bar that generates at least five percent of its sales from that on-site sale of tobacco products"
X is Y under (specified conditions)	"A location in a cigar-tobacco bar shall be a smoking prohibited location [if designated as such by signage]"

aggregation, payoff, information. This means, for example, that if a statement can be coded as both a boundary and an information institution, the coder will code it as a boundary institution.

(e)   Code all remaining institutional statements as either choice or scope rules. Choice and scope rules are default "all other" rules for statements that cannot accurately be classified as position, boundary, aggregation, information, or payoff rules (Ostrom 2005, p. 209). Choice rules refer to directives regarding what specific actions must, must not, or may be taken by an actor. The aim of a choice institution is an action. Scope rules outline or affect the outcome variable of action. The aim of a scope institution refers to an outcome (Ostrom 2005, p. 209). Additionally, one can distinguish scope rules from choice rules by determining whether the statement prescribed specific actions to be used in obtaining an outcome—if the statement refers to specific actions, or action sets, it is a choice institution.

4. *Code the statements that allow for rule change* Some statements have rules that target day-to-day behavior. Other statements allow for changes to the rules; these statements should be coded as "collective-choice." Statements that meet the following criteria are collective choice: (1) statements that identify the positions or bodies that can change the rules, (2) the criteria by which the rules should be changed, and (3) the conditions under which the rules can be changed.

5. *Multiple coders for intercoder reliability* Multiple coders should code shared documents to ensure that the data collected through the coding process are reliable.

Coding methods should be revised based on the coding experiences of the coders until an agreed upon percentage of coding similarity is reached. Communication between the coders regarding coding methods is key, as each new document may present new and distinct coding challenges (Tables 6, 7).

Appendix 2

See Table 8.

Table 8 Rule typology codebook

Institution type	Definition	Basic aim verb	Regulated component	Additional indicators
Position	Identify roles to be filled by individuals. Position institutions also identify the absolute, minimum, or maximum number of individuals that can occupy a given position (Ostrom 2005, p. 193)	Be	Positions	Statements related to the number of individuals that can occupy positions
Boundary	Identify the prerequisites (characteristics, skills, possessions) of individuals eligible to occupy a position (Ostrom 2005, p. 194)	Enter or leave	Participants	Statements delineating requirements for entry to a position, such as fees for permits
Aggregation	Aggregation institutions relate to actions or decisions that require two or more individuals (Ostrom 2005, p. 202)	Jointly affect	Actions	Statements that address what process multiple actors can make specific decisions
Information	Statements that indicate which is the permitted, obliged, or prohibited channel of communication, how the information is to flow, to whom, and when. They also may indicate the form that the information is to take (Ostrom 2005, p. 206)	Send or receive	Information	Statements that combine a form of information and communication. The combination may be who the information is to be communicated to, from whom, when, or how
Payoff	Assign external rewards or sanctions to specific actors relative to distinct actions (Ostrom 2005, p. 206)	Pay or receive	Costs/ benefits	Statements that contain all ABDICO components Statements that allocate benefits or costs
Choice	Specify specific actions—what an actor must, must not, or may do. Often, such situations will also indicate the conditions that affect what an actor must, must not, or may do (Ostrom 2005, p. 200)	Do	Control	Statement cannot be confidently classified as a position, boundary, aggregation, information, or payoff institution, but identify specific actions or action sets (May also identify outcomes if coded as choice/scope institutions)

Table 8 continued

Institution type	Definition	Basic aim verb	Regulated component	Additional indicators
Scope	Identify required, desired, or prohibited outcomes. They may identify the parameters, or range, of outcome variables that can be affected, or identify limits or parameters to a required, desired, or prohibited outcome (Ostrom 2005, p. 208)	Occur	Outcomes	Statement cannot be confidently classified as a position, boundary, aggregation, information, or payoff institution, and that refer to outcomes, goals, or results
				Statements that do *not* identify defined action sets or limit the processes that lead to an outcome
				(May also identify specific actions or action sets if coded as choice/scope institutions)

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