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A Systematic Approach to Institutional Analysis: Applying Crawford and Ostrom's Grammar

Xavier Basurto[1], Gordon Kingsley[2], Kelly McQueen[3], Mshadoni Smith[4], and Christopher M. Weible[5]

Abstract

In 1995, Crawford and Ostrom proposed a grammatical syntax for examining institutional statements (i.e., rules, norms, and strategies) as part of the institutional analysis and development framework. This article constitutes the first attempt at applying the grammatical syntax to code institutional statements using two pieces of U.S. legislation. The authors illustrate how the grammatical syntax can serve as a basis for collecting, presenting, and analyzing data in a way that is reliable and conveys valid and substantive meaning for the researcher. The article concludes by describing some implementation challenges and ideas for future theoretical and field research.

Keywords

grammar of institutions, institutional statements, rules, norms, institutional analysis and development framework, IAD

Introduction

One of the challenges with applying institutional theories to policy environments is translating key concepts into reliable strategies for observation. The institutional analysis and development (IAD) framework provides a definition of institutions as "shared concepts used by humans in repetitive situations organized by rules, norms, and strategies" (Ostrom 2007, 23). This improves on the multiple, opaque, and sometimes conflicting definitions of institutions that exist in the literature (for discussion, see Table 1 in Crawford and Ostrom 1995, 589). However, Ostrom's definition is challenging to observe since the concept occurs across multiple scales, operates interdependently in configurations, and exists in form or in use (Ostrom 2007, 23–25).

Crawford and Ostrom (1995) have developed one promising approach to observing institutions by focusing on how they are expressed linguistically through "institutional statements." As defined by Crawford and Ostrom (1995, 583), "Institutional statement refers to the shared linguistic constraint or opportunity that prescribes, permits, or advises actions or outcomes for actors (both individual and corporate). Institutional statements are spoken, written, or tacitly understood in a form intelligible to actors in an empirical setting."

Institutions and institutional statements share many of the same conceptual descriptions. Both must be shared by the relevant actors, can be in form or in use, occur across all scales as holons from a part of a system to a whole system,[1] operate interdependently in configurations, and include concepts of strategies, norms, and rules. However, institutional statements differ from institutions in two conceptually important ways. The first difference is that Crawford and Ostrom (1995, 2005) provide a grammatical syntax with concrete directions for coding institutional statements as strategies, norms, and rules.[2] The second difference is that institutional statements are "linguistic" statements, meaning that they are actually spoken

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or written (Crawford and Ostrom 1995, 583). The concept of institutions, in contrast, does not involve a linguistic component, which suggests a more conceptual or abstract definition. Obviously, IAD researchers have been observing institutions in various linguistic forms for nearly two decades, but they have not yet applied the concept of institutional statements to describe their units of observation or to help operationalize their variables.

This article contributes to IAD research in three ways. First, this article provides one approach for using Crawford and Ostrom's grammatical syntax to code institutional statements as strategies, norms, and rules. In the past, IAD field research focused mostly on rules (either rules-in-use or rules-in-form) to help understand the constraints and opportunities of individuals in a particular action arena and not on the difference between strategies, norms, and rules. Furthermore, most of the work conducted with Crawford and Ostrom's grammatical syntax has focused on concept and theory development. We know of only two other efforts—none of them empirical studies—toward operationalizing Crawford and Ostrom's grammar (Schluter and Theesfeld 2008; Smajgl, Izquierdo, and Huigen 2008). However, other institutional scholars outside of the IAD tradition have recognized the value of the grammar to identify between rules, norms, and strategies (Vatn 2005, 68).

Second, this article provides guidelines for identifying institutional statements in legislation. To date, IAD researchers have focused broadly on an action arena using evaluative criteria to assess interactions among actors and on the institutional incentives guiding their interactions that result in observable outcomes. The data going into such research come from the aggregation of observations collected through interviews, focus groups, analysis of texts, and observations of behavior. We take a more fine-grained approach by treating institutional statements as single units of observation in two different legislative policies.

Third, this article uses an explicit approach to nesting institutional statements and treats institutional statements as holons, that is, operating simultaneously both as a whole system and as part of a larger system (Ostrom 2005, 11). The IAD framework is very clear that institutions are often nested within other institutions. In this article, we do not consider how these institutional statements could be analyzed in the context of a larger legal system. Instead, we analyze institutional statements as single units of observations, and we discuss an approach for analyzing units of observation either as stand-alone statements or as aggregated units of observation configured into more complex statements, which then serve as the unit of analysis. One of the advantages of focusing on legislation is that these documents are often designed to mediate the different levels of institutions linking constitutional principles to shape organizational and individual behavior.

The overarching goal of this article is to move Crawford and Ostrom's grammatical syntax from theory development to application. More specifically, the objectives are to provide a set of guidelines for (1) identifying institutional statements; (2) coding the institutional statements as strategies, norms, and rules; and (3) conducting a nested analysis of the coded institutional statements.

This article is divided into two parts. The first describes the guidelines for applying the theory developed in Crawford and Ostrom (1995, 2005). This first part begins with a brief overview of the grammatical syntax within the IAD framework. It then introduces a set of guidelines for identifying the institutional statements, applying and coding Crawford and Ostrom's syntax, and then in conducting a nested analysis. This first part is briefly illustrated with an example from the U.S. Transportation Policy. The second part applies the approach to two case studies, one from the U.S. Transportation Policy and the other from abortion policy in the State of Georgia. The article concludes by describing some of the struggles in applying the grammatical syntax and additional theoretical and applied uses of Crawford and Ostrom's work. We also consider issues of translating the lessons of this research out to the field.

Background on the IAD and Its Grammatical Syntax

The IAD focuses attention on the resulting patterns of interaction and outcomes of an action arena in which decision making takes place as well as the evaluation of these outcomes. There are three types of institutional statements that we might observe in action arenas: rules, norms, and strategies (Crawford and Ostrom, 1995, 2005). To these three types, Crawford and Ostrom provide an "ADICO" grammatical syntax. The ADICO syntax is an acronym that stands for five subcomponents of an institutional statement: *attribute* (A), *deontic* (D), *aim* (I), *condition* (C), and *or else* (O). The three types of institutional statements are created from different combinations of the ADICO syntax: Strategies include only the attribute, aim, and a condition (AIC); norms include the attribute, deontic, aim, and condition (ADIC); and rules consist of the entire syntax, an attribute, deontic, aim, condition, and or else (ADICO).

The *attribute* is the individual or organization to which the institutional statement applies. The portion of an institutional statement that belongs with the attribute includes the subject and the descriptions of the subject. If the subject is individuals, then the attribute might include descriptions, such as age, sex, or position (Crawford and Ostrom 2005, 141). For organizations, the attribute might include organizational descriptions, such as organizational size

(Crawford and Ostrom 2005, 141). In building our framework, we assume that the attribute can be implicit or explicit in any given institutional statement. Thus, one institutional statement might be in reference to an attribute in another institutional statement, or an implicit attribute might be in reference to all subjects in an action arena. One helpful approach for identifying the attribute is to identify the actor or organization to which the deontic or aim applies (Crawford and Ostrom 2005, 139).

The *deontic* is the prescriptive operator of an institutional statement that describes what ideally is permitted, obliged, or forbidden (Crawford and Ostrom 2005, 141-49). The deontic need not always be literally written as the words *permitted*, *obliged*, or *forbidden* but may also come in other forms, such as *may*, *must*, *should*, *must not*, and *should not* (Crawford and Ostrom 2005, 141-49). In our coding framework, the deontic is usually explicitly stated, but we also assume that it can be implicit. Deontics are allowed to be implicit because some statements prescribe a command without using the words *may*, *must*, or *must not*, especially when an explicit deontic is in a preceding institutional statement. By allowing implicit institutional statements, this article differs from Crawford and Ostrom (2005, 144), which states that deontics must be explicit. We deviate from Crawford and Ostrom because the implicit deontics are fairly common in the type of units coded in this analysis. We also discuss limitations of such an assumption in the conclusion. The deontic operators can vary by prescriptive force; for example, *must* represents more force than *should* (Crawford and Ostrom 2005, 142-49). In our coding framework, we assume that various operational forms of the operators take on the same force; for example, *should* and *must* represent an equal amount of prescriptive force.

The *aim* describes the goal or action of the statement to which the deontic refers (Crawford and Ostrom 2005, 140). The aim portion of an institutional statement includes all descriptions about the process and goals of the action, such as what action is conducted and how the action is conducted.[3] The aim does not include descriptions of when and where the action is conducted.

The *condition* represents the operators *when* and *where* for which the aim is allowed, required, or forbidden (Crawford and Ostrom 2005, 149). The *when* might be temporal or in relation to a process, and the *where* might be geographical or jurisdictional. Although Crawford and Ostrom restrict the condition only to *when* and *where* operators, we also include *if* and *unless* operators, for example, when the aim is allowed to occur if certain events happen. While the *when*, *where*, *if*, and *unless* are used as operational guidelines, in general, conditions set the prerequisites or restrictions on the aim. We assume the conditions can be explicit or implicit, meaning that the conditions are implied from a different institutional statement. When an institutional statement does not specify an explicit condition nor refer to one implicitly elsewhere, the default value is *at all times* (Crawford and Ostrom 2005, 149).

The *or else* operator is the punitive action if the rule is not adhered. For the purposes of this article, we relax some of the guidelines for coding *or else* operators. For example, we do not require the *or else* operator to be backed by another institutional statement for enforcement or the incentives of the monitors (Crawford and Ostrom 2005, 150). We limit our definition because one of our objectives is to code each statement as an individual unit of observation. We require *or else* statements to be explicit to be coded, whether it is in the same institutional statement or not.

An example of the application of this syntax is "You must stop your car at a red light or the police officer will give you a traffic ticket." Attribute = "you"; deontic = "must"; aim = "stop your car"; condition = "at a red light"; or else = "the police officer will give you a traffic ticket."

Understanding these grammatical differences is important because, for instance, it can allow analysts crafting institutions to be sure that the institutional statements that they design are indeed rules and not norms or strategies. Crawford and Ostrom (2005, 139) also state that the grammar of institutions "is a useful tool for summarizing and analyzing the content of institutional statements, distinguishing between types of institutional statements, and studying the formation and evolution of institutional statements."

Identifying Institutional Statements and Applying the Grammatical Syntax

The following section describes how the legislation was systematically partitioned into institutional statements and then coded using the ADICO grammatical syntax. In this article, we provide guidance for finding and coding institutional statements in legislation at the smallest units of observation.[4] We discuss an approach to nesting analysis, that is, strategies for analyzing units of observation as either stand-alone statements or for aggregating the units of observation into more complex statements, which then serve as the unit of analysis.

Institutional statements are embedded in legislation, making it difficult to demarcate one unit of observation from another unit. For instance, one sentence may span multiple sections (see Table 1, units of observation 3, 4, and 5, for example) with multiple units of observation. A section or subsection may alternatively have more than one sentence (see Table 1, units of observation 1 and 2, for example) or not be a sentence at all. Furthermore, one

Table 1. Finding Units of Observations in the U.S. Transportation Policy Case

Section Level	Sample Text From MPO Section 134 TEA-21	Units of Observation
Subsection	(a) (4) PROCESS OF DEVELOPMENT.—The process for developing the plans and programs shall provide for consideration of all modes of transportation and	1
	shall be continuing, cooperative, and comprehensive to the degree appropriate, based on the complexity of the transportation problems to be addressed.	2
Section	(b) DESIGNATION OF METROPOLITAN PLANNING ORGANIZATIONS.—	3
Sub-subsection	(1) IN GENERAL.—To carry out the transportation planning process required by this section, a metropolitan planning organization shall be designated for each urbanized area with a population of more than 50,000 individuals—	4
Sub-sub-subsection	(A) by agreement between the Governor and units of general purpose local government that together represent at least 75 percent of the affected population (including the central city or cities as defined by the Bureau of the Census); or	5
Sub-sub-subsection	(B) in accordance with procedures established by applicable State or local law.	6
Sub-subsection	(2) STRUCTURE.—Each policy board of a metropolitan planning organization that serves an area designated as a transportation management area, when designated or redesignated under this subsection, shall consist of—	7

Note: MPO = Metropolitan Planning Organization.

sentence in a single section of a bill may have two or more units of observation. We assume that the smallest unit of observation is a single institutional statement, in the form of a strategy (AIC), norm (ADIC), or rule (ADICO). In looking at legislation, we discarded definitions, titles, preambles, and headings because they do not constitute institutional statements.

We have developed the following guidelines to identify the units of observation and to code them using the ADICO syntax. Depending on the specific circumstances of the case under analysis, the analyst might find it useful to apply these guidelines iteratively. We refer to Table 1 and Table 2 to illustrate the guidelines.

Guidelines for Applying the ADICO Syntax to Legislation

1. *Identify all definitions, titles, preambles, and headings and disregard them for coding purposes*. Titles and headings are discarded first because they are fairly easy to locate and rarely constitute an institutional statement of theoretical interest.
2. *Identify sections and subsections of the bill as initial units of observation*. We call headers of sections and subsections "outline indicators." Outline indicators are titles, subheadings, a capital letter or lowercase letters, colons, semicolons, or Roman numerals used to separate sections from subsections and subsections from sub-subsections, and so on. For example, in Table 1, the first sub-subsection is identified by "(a) (4)."

These initial units of observation are temporary and may be divided into additional units when there is more than one norm, rule, or strategy within them.

3. *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.
4. *Code the units of observation following the ADICO syntax*. The text in each unit is coded with respect to the attribute, deontic, aim, condition, and or else.
5. *Code all units of observation as rules, norms, or strategies*. Following the ADICO syntax, a rule has all ADICO components, a norm has ADIC components, and a strategy has the AIC components. For example, Table 2 has been coded with the syntax.
6. *Subdivide all sentence-based units of observation that have more than one rule, norm, or strategy into separate units and recode, following the ADICO syntax as rules, norms, or strategies*. For example, the very first section in Table 1 was subdivided into two units in Table 2 because there were two norms in the same sentence.

The first three steps in the guidelines above instruct the researcher toward identifying the institutional statements

Table 2. Syntax Coding of the Institutional Statements in the U.S. Transportation Policy Case

Unit	Section	Syntax Code	Description of the Institutional Statements
1	(a) (4) PROCESS OF DEVELOPMENT	A	MPO [implicit]
		D	Shall = must
		I	Provide for consideration all modes of transportation
		C	[at all times and in all places; implicit]
		Type	Norm
2		A	MPO [implicit]
		D	Shall = must
		I	Be continuing, cooperative, and comprehensive to the degree appropriate based on the complexity of the transportation problems to be addressed
		C	[at all times and in all places; implicit]
		Type	Norm
3	(b) DESIGNATION OF METROPOLITAN PLANNING ORGANIZATIONS	Discard	Title only
4	(b) (1) IN GENERAL	A	MPO
		D	Shall = must
		I	Be designated to carry out the transportation planning process required by this section
		C	For each urbanized area with a population of more than 50,000 individuals
		Type	Norm
5	(b) (1) (A)	A	MPO [implicit]
		D	Shall = must [implicit]
		I	Be designated to carry out the transportation planning process required by this section [implicit]
		C	Agreement between governor and Govt entities that represent 75% of population,
		Type	Norm
6	(b) (1) (B)	A	MPO [implicit]
		D	Shall = must [implicit]
		I	Be designated to carry out the transportation planning process required by this section [implicit]
		C	In accordance with procedures established by applicable State or local law.
		Type	Norm
7	(b) (2) STRUCTURE	A	Each policy board of a metropolitan planning organization that serves an area designated as a transportation management area
		D	Shall = must
		I	Consist of [implicit in subsections that follow]
		C	When designated or redesignated under this subsection
		Type	Norm

Note: MPO = Metropolitan Planning Organization.

as units of observation. Steps 4 through 6 apply the ADICO to code each unit. The following is a basic example: "If a project is located within the boundaries of more than one metropolitan planning organization, the metropolitan planning organizations shall coordinate plans regarding the project." Attribute = "metropolitan planning organizations"; deontic = "shall"; aim = "coordinate plans regarding the project"; condition = "if a project is located within the boundaries of more than one metropolitan planning organization"; type = norm.

Table 1 gives an example in which we found seven units of observation from the U.S. Transportation Policy case study. For the most part, the units are separated by an outline indicator (e.g., a letter or a number). The units of observation also require some coding of the ADICO syntax because a single sentence may have two or more institutional statements. For example, the first two units in Table 1 were split apart in Table 2 because both include institutional statements in the form of a strategy, norm, or rule.

The ADICO syntax applied to the sample legislation in Table 1 is presented in Table 2. The third unit is not coded because it is a title. The remaining six institutional statements are all coded as norms because they do not have the *or else* statement.

Conducting a Nested Analysis

The results from Table 2 could be analyzed with the current units of observation treated as units of analysis. The researcher could then, for example, draw conclusions about the range of attributes in a legislation, the types of aims associated with a particular attribute, or even the types of aims directly connected to an *or else* operator, all of which are just a few examples of how analysts could simplify and analyze institutional diversity.

Drawing conclusions only from Table 2, however, would be incomplete and possibly misleading, because sometimes institutional statements are better viewed as nested or independently linked than as single units of observation. Indeed, there is an artificiality of the coded units that must be recognized. For example, the number of units of observation might represent not only the description of aims and conditions charged to an attribute but also the manner in which they were presented in a bill.

Consider the following example of an institutional statement: "By the end of the year, the Department of Human Resources (DHR) must conduct tasks entailing description 1, description 2, description 3, and description 4." In this first scenario, the four task descriptions for the DHR fall under the same aims for the deontic ("must"), are encapsulated in one sentence by a series of commas, and are all restricted by the same condition ("by the end of the year"). This first scenario would be coded as one unit because the descriptions were listed in one continuous sentence without any outline indicators (e.g., indented letters *a* through *d*, emphasizing the four descriptions).

Consider a second scenario with the same words formatted differently: "By the end of the year, the DHR must conduct tasks entailing: (a) Description 1; (b) Description 2; (c) Description 3; (d) Description 4."

In this second scenario, the same four descriptions remain in one sentence, but the sentence is now subdivided by outline indicators, that is, by the letters and brackets (a), (b), (c), and (d) for the four respective descriptions. In this second scenario, the four descriptions would be coded as four units, one for each of the outline indicators with implicit conditions (by the end of the year), implicit attribute (DHR), implicit deontic (must), and an implicit aim (conduct tasks). The opening institutional statement ("By the end of the year, the DHR must conduct tasks entailing:") would also be coded as a separate unit, more specifically, as a norm because it has an attribute ("DHR"), a deontic ("must"), an aim ("conduct tasks"), and a condition ("by the end of the year"). Absent from this opening institutional statement would be the four descriptions describing how the task were conducted. Notwithstanding, this opening institutional statement would remain a norm because it still identifies an action (e.g., conduct tasks), albeit an action that is not well described. In all, the second scenario would encompass five units.

Given that the grammar of the policy partly determines the number of units coded, the next challenge is how to aggregate and analyze nested units in a way that conveys meaning and removes the artificiality from the coding scheme. The method of nesting might reflect a number of priorities, such as the research question(s) or the scale at which the researchers wish to draw conclusions. Once the institutional statements are nested and combined into a collection of institutional statements, those configurations are then analyzed and become the new units for analysis.

There are many ways to nest institutional statements. One approach would be to nest institutional statements by shared components of the grammatical syntax. For instance, a researcher could nest all institutional statements by those that share the same attribute. This would then enable that researcher to examine the strategies, norms, and rules that provide constraints and opportunities for that one attribute type (be it an organization, a group of people, or everyone). Similarly, a researcher could nest institutional statements based on a specifically shared aim or topic of the aims. Finally, a researcher could analyze institutional statements based on the relation in the substantive structure of the policy or legislation; for example, institutional statements could be combined into common sections and subsections that share the same broad aim. The point is that the linking mechanism for nesting or combining institutional statements needs to be clear and justified by the researcher.

Two Illustrative Case Studies

Three criteria were used in selecting cases for this study. First, we privileged the selection of legislation that was likely to have a range of institutional statements under the ADICO grammar. Thus, we preferred complex legislation that contained strategies, norms, and rules. Second, we selected cases that are familiar to at least one of the authors. A third criterion was to select contrasting cases with regard to the attributes of the target of the legislation. Thus, in one case, the legislation is aimed at determining the behavior of organizations regulated under the legislation. In the second case, the legislation is aimed at regulating the behavior of individuals, both professionals providing health-related services and patients seeking those services.

U.S. Transportation Policy

The U.S. Transportation Policy can be a vast and encompassing action arena. At the federal level, the U.S. Department of Transportation (USDOT) manages various modes of transportation, including water, air, and land. Even within surface transportation, federal transportation policy involves regulation, authorization, and funding, which in turn covers roads, bridges, transit, and freight. To simplify, for this research, we consider only a surface transportation bill authorized after the building of the Interstate System, TEA 21 (98). A transportation bill is the ultimate guide and regulation for surface transportation. The bill is developed by Congress as legislative amendments to the Code of Federal Regulations, specifically, Title 23, which is reauthorized on a five-year cycle. It is then interpreted into guidance by the USDOT and ultimately implemented by state transportation departments and local agencies.

The full content of a transportation bill is beyond the scope of this research; therefore, the application effort has been narrowed to the Metropolitan Planning Organization (MPO) section of the bill, or section 134 from the 2002 amendments. MPOs are regional government organizations in charge of federally and nonfederally funded transportation projects and programs. The focus of section 134 is broad with subsections and sub-subsections describing the designation of MPOs, the boundaries of MPOs, the coordination of MPOs across state areas, the processes for considering projects, the development of long-range transportation programs, and the designation of transportation management areas.

The MPO section is a good case study for this application because the objectives, designations, boundaries, scope, and planning requirements of MPOs are delineated in the bill. Implicitly, these requirements are financially binding, and explicitly, they are law, meaning that nonadherence can induce federal funding lapses. However, for the purposes of this article and in an effort to reduce the complexity of the institutional analysis, we coded only explicit *or else* statements. We revisit the issue of implicit and explicit *or else* statements in the Conclusions.

Georgia Abortion Legislation

Abortion is one of the most divisive issues in modern politics and is the topic of legislation in both federal and state legislatures. With the legalization of abortion in *Roe v. Wade* in 1972, prolife opponents have shifted a great deal of their strategies toward restrictions on the procedure. A good example of such restrictions is the 2005 House Bill 197 in the State of Georgia, which amends and revises provisions of the Official Code of Georgia Annotated relating to abortions (Georgia General Assembly 2005).

Specifically, the House Bill 197 affects Titles 15, 16, and 31 by requiring that a parent or guardian of a minor present identification and be notified about an abortion prior to its performance. Previously, a minor could utilize an adult standing in loco parentis (in place of her parent) to be granted an abortion. This bill outlines court proceedings for a waiver of parental notification provisions as well as the physician's reporting requirements. In addition, this bill requires that abortions be performed in certain medical facilities by doctors licensed in Georgia, who must submit reports and forms to the DHR or be fined for failure to provide such reports. Previously, reporting was done by the facility where the abortion was performed; this bill requires the performing physician to report. Prior to the passage of this bill, there was limited reporting on the details surrounding abortions in Georgia and no consequence for failure to report. Finally, this bill enacts the Woman's Right to Know Act. This act requires that a female give her informed consent prior to an abortion after viewing newly mandated state materials about the procedure. Previously, the female would need only to consult with her physician. The Woman's Right to Know Act requires that a written acknowledgment of receipt of such information be kept by the performing physicians. There are provisions made for procedures in a medical emergency.

Compared with the transportation bill, Georgia's abortion bill provides a complementary analysis because it is state legislation instead of federal legislation, it focuses on a relatively narrow topic, and it involves a politically contentious issue with specific target populations (e.g., women seeking abortion).

Results

The results are presented in three parts. The first presents and discusses the intercoder reliability. While intercoder reliability is often discussed in the Methods section or demoted to a footnote, it is highlighted here because of the novelty of applying Crawford and Ostrom's syntax and because of our goal of generating reliable data. As will be seen, when the intercoder reliability standard is set at 80% agreement, the reliability results are mixed. There is a similar tendency among both bills to show the lowest scores when identifying conditions and the highest when identifying the *or else* statements, but there is also near-perfect reliability for results in identifying strategies, norms, and rules from both bills. The second part presents the data on the basis of the coded units of observation, which is an expository exercise to identify the basic emphasis of the legislation under study. The third part summarizes the data through a nested analysis, in which we focus on one attribute from each bill. In the abortion

bill, the DHR is the focal attribute. In the transportation bill, the focal attribute is the MPO. We nest the analysis by common attributes because we expect that the attribute is probably one of the more common rationales for combining institutional statements and, thus, will serve as a useful unit of analysis to illustrate our approach.

Part 1: Intercoder Reliability and General Findings

Table 3 presents a summary of the intercoder reliability results for both bills as percentage agreement between coders for identifying the same units of observation, the same ADICO components (from the same attribute to the same *or else* statement), and the same strategies, norms, and rules. The goal is agreement greater than 80% among coders. Two coders did not code the entire bill but instead coded sample sections. Two rounds of coding were conducted on two different sample sections. After the first round, the guidelines were clarified and modified before conducting another round of coding on the second section. Only the percentage agreements on the second section are shown in Table 3.[5]

The goal of 80% agreement was reached for the abortion bill but not always for the transportation bill, which fell short for identifying the units of observation, attributes, and conditions (see Table 3). There are several reasons for the differences between coders in each bill and for the differences in reliability between the two bills.

The biggest difference between the bills is complexity. Put simply, the transportation legislation is more complex than the abortion legislation. The transportation bill is federal legislation directing the activities of all MPOs under the context of the USDOT. The transportation bill must deal with governance issues at the federal level, at the state level, and across states. In contrast, the abortion bill focuses on procedures restrictions for women seeking abortion in Georgia, a task that is non-trivial but is relatively straightforward.

The units of observation were harder to code for the transportation bill compared with the abortion bill (see Table 3). In the transportation bill, the structure is heavily nested, meaning there are many subsections and sub-subsections. It also reflects the manner in which it was developed, by congressional committee amendments over time. Furthermore, whereas the abortion bill is a new bill, the MPO section of the transportation bill is 14 years old and continuously builds on previous versions, which complicates its structure.[6]

Table 3 shows that the coders agreed less on the attributes in the transportation bill than in the abortion bill. We identified several challenges to coding attributes in both bills. First, attributes were difficult to code when they

Table 3. A Summary of the Intercoder Reliability Results (in percentages)

Unit of Observation	Abortion Legislation	Transportation Legislation
Agreement between coders	90	71
Attributes	94	70
Deontics	94	85
Aims	94	90
Conditions	88	45
Or else	100	100
Strategies	100	100
Norms	100	100
Rules	100	100

were implicit, phrased passively, or inanimate objects, all of which was more often the case in the transportation bill. For example, compared to the abortion bill, we found the transportation bill had more passively phrased sentences with implicit attributes. Thus, coders often disagreed about which specific organization a unit referred to or whether the unit should be coded as its default, implicit *all*. Second, attributes were difficult to code when there was a wide range of possible attributes with blurred boundaries and unclear roles. For example, the attributes in the abortion bill were relatively few actors with clear boundaries and roles, such as minors seeking abortion and physicians. In the transportation bill, the attributes included organizations with overlapping and unclear roles, such as state governments, the Secretary of the Department of Transportation, the MPOs, and Congress. Third, attributes were difficult to code, especially in the transportation bill, when the statement referred to a subgroup of the organization. For example, in the transportation bill, the coders disagreed as to whether an institutional statement applied to one entire organization, such as a MPO, or to a subgroup of the organization, such as a policy board within a MPO.

In both bills, the lowest percentage agreement between coders was for identifying conditions (88% for the abortion bill and 45% for the transportation bill). Conditions modify or restrict an aim and were operationally found by looking for the *when*, *where*, *if*, and *unless* operators. The coders tended to agree when the conditions referred to a moment in time or a span of time or made reference to a specific place. The coders tended to disagree when the conditions restricted actions that needed to take place sequentially in a process or that acted as prerequisites for other actions to take place at a later step. In such situations, one coder might identify a descriptor as a condition, while the other coder might identify the same descriptor as an aim. For example, the coders would agree in coding

the following hypothetical statement: "MPOs must develop transportation plans by the end of the current year." In this statement, there is a clear attribute ("MPOs"), deontic ("must"), aim ("develop transportation plans"), and condition ("by the end of the current year"). The coders would more likely disagree in coding the following hypothetical statement: "MPOs must coordinate plans that cross two MPO regions." In this statement, there is a clear attribute ("MPOs") and deontic ("must"); the aim and the condition, however, are unclear. One coder might identify the aim as "coordinate plans" and the condition as "that cross two MPO regions," while the other coder might identify the aim as "coordinate plans that cross two MPO regions" and the condition as the default value, *at all times*. The difference in coding is that the former coder interpreted "that cross MPO regions" equivalent to an *if* statement that is a prerequisite for the MPO to take a certain action. The latter coder interpreted "that cross two MPO regions" as a description of the action and, therefore, the aim.

Despite the differences in coding between the bills, the researchers agreed (often agreed to disagree) on finalizing the coding for the analyses in the next two sections.

Part 2: Summarizing the Data as Units of Observation

This section presents the data as the coded units of observation. Table 4 shows that the vast majority of coded institutional statements were norms for both bills, with very few strategies and rules. One of the primary reasons for this result is that the two documents included many *must*s and *shall*s. Surprisingly, however, there were very few rules, as identified by sanctions. We found only four rules in the abortion bill and zero rules in the transportation bill. In the abortion bill, the rules included the following:

(i) Physician or a physician's qualified agent will be subject to a fine of $500 by the Department of Human Resources for submitting late a report as described in section 16-12-141.1(c–i) in the bill [e.g., involving the number of abortions];

(ii) The Courts are permitted to order a physician or a physician's qualified agent to submit the form in section 5 or be subject to further sanctions or contempt;

(iii) A licensed physician or a physician's qualified agent will be subject to a fine of $500 by the Department of Human Resources for submitting late a report as described in section 31-9A-3 in the bill [e.g., involving the frequency of presented information to females seeking abortion]; and

Table 4. Summarizing Institutional Statements as Number of Units of Observation

Unit of Observation	Abortion Legislation	Transportation Legislation
Number of strategies	3	0
Number of norms	110	128
Number of rules	4	0
Total number of units of observation	117	128

(iv) The Courts are permitted to order a physician or a physician's qualified agent to submit the form as described in section 31-9A-3 in the bill or be subject to sanctions or contempt.

Table 5 presents the summary of the attribute frequencies in the two bills. There are 117 units coded in the abortion bill and 128 in the transportation bill (see Table 4). In the abortion bill, the number of different attributes is 8, with the DHR receiving the majority (52). Interestingly, one of the target populations of the bill, females seeking an abortion, was the object of relatively few units (3 for minors and 1 for all females). Instead, the bill directs its norms, rules, and strategies toward the DHR, the physician or the physician's qualified agent, and the Courts.

Out of the 128 different units, MPOs received the vast majority, 77. The number of units that referenced the MPO as the attribute would increase if the count included references to MPOs and/or state governments (3 units), the MPO policy board (4 units), the Lake Tahoe MPO (4 units), and the MPO, public transit agency, and state (2 units). The distribution of units for the different attributes does reflect the focus of the bill. For example, the Lake Tahoe MPO is a specific MPO spanning California and Washington that is not a major focus of the subsection. Other than MPOs, showing a moderate number of attributes, 26, is the Secretary of the Department of Transportation. These units describe a role for the secretary that often involved oversight of MPOs. Congress tends to be the attribute in reference to designating MPOs (10 units).

Part 3: A Nested Analysis by Attributes

The previous part of the results summarized the data by units of observation, that is, by the actual units coded. Given that there are instances that a policy analyst might be interested in nesting different units of observation to analyze the data, in this section, we illustrate one of many ways in which an analyst might be able to do so. For the purposes of illustration, our nested analysis groups and combines different units of observation first by the same

Table 5. Frequencies of Units of Observation by Attributes for the Abortion and Transportation Bills

Attribute Type	Frequency
Abortion Bill	
Department of Human Resources	52
Physician or physician's qualified agent	28
All	20
Court (or juvenile court)	11
Minor (or minor seeking abortion)	3
Parent or guardian	1
State of Georgia	1
Female (seeking abortion)	1
Total units of observation	117
Transportation Bill	
MPO	77
Secretary	26
Congress	10
MPO and/or state	3
MPO policy board	4
Lake Tahoe MPO	4
All	1
MPO, public transit agency, and state	1
State(s)	2
Total units of observation	128

Note: MPO = Metropolitan Planning Organization.

attribute; then we continue creating groups and subgroups of other elements of the ADICO syntax in a systematic fashion in order to facilitate further analysis.

It took us five steps to nest the data shown in Tables 6 and 7. The first step involved grouping all units of observation by the same attribute. This reduced the units as listed in Tables 4 and 5 from 117 to 52 for the DHR of the abortion bill and from 128 to 77 for the MPOs of the transportation bill. Next, those units of observation within the same attribute were further subgrouped by common or very broad aims. For the abortion bill, we found three very broad aims describing three actions assigned to the DHR spanning all 52 coded units; herein we call the broad aims "topics" to avoid confusion. For the transportation bill, we found nine topics charged to the MPOs for the 77 units, but because of space constraints, we present just one topic for the MPO, encompassing 17 of the 77 units, and briefly list the remaining topics and units in a note.[7] Third, all units sharing the same topic were sub-subgrouped by the same deontic. For instance, for the abortion bill's first topic, reporting forms for physicians, on Table 6, the deontic *must* was the same in 16 out of 18 units, which in turn showed seven distinct aims, while the deontic *may* involved one unit and one aim. Fourth, given the same deontic and topic, we grouped the aims together if they shared the same condition. For example,

Table 6 shows how the sixth and seventh aims under the *must* deontic shared the same default condition, *at all times*. Finally, we summarized the text describing the aims and conditions from both bills in Tables 6 and 7.

While we tried to present the text from the bill in Table 6 and 7 verbatim, to save space, the text was frequently abbreviated. Thus, the amount of text in each topic in Tables 6 and 7 is not proportional to the total number of units and is somewhat an artifact of how the data were summarized in the tables. For example, publishing information about abortion (topic 2 in Table 6) takes up nineteen units and included two deontics, a *must* and a *must not*. The *must* deontic involves eighteen of the nineteen units but is summarized with about the same amount of text in Table 6 as the *must not* deontic, which involved just one unit. The eighteen *must* units were abbreviated for presentation purposes.

We include the units of observation as a last column on the right in Tables 6 and 7 to underscore the relative proportion of the topics and subsequent subgroupings under the topics in relation to the total number of units in the bills (see Tables 4 and 5 for description of total units). For example, topic 1 in Table 6 includes 18 of the 52 units involving the DHR as the attribute or 18 of the 117 total units in the abortion bill.

Table 6 presents an attribute nested analysis for the DHR from the abortion bill. We find that the DHR was charged with the following topics: (1) providing and publishing reporting forms (e.g., number of abortions performed), (2) publishing information about abortion (e.g., unborn child characteristics during pregnancy), and (3) preparing and publishing reporting forms in reference to providing information to women seeking abortion from topic 2 above. For each topic, the units of observation devoted to aims with the same condition are listed on the right. Table 7 shows just one task covering seventeen units for the MPO: the descriptions of specific actions for developing transportation improvement plans.

By nesting our data, the analyst is able to easily identify that the most common deontic operator affecting attributes DHR and the MPO is *must*, and the set of actions that the attributes are obliged to perform are readily identifiable to the analyst in Tables 6 and 7. The use of the *may* deontic operator is less common in both bills, while the deontic operator that denotes a forbidden action, *must not*, is rarely used. For instance, Table 6 shows that the DHR is obliged to action by *must* in forty-seven units of observation, while it has discretionary action power by *may* in only three units, and the DHR attribute is forbidden to act by *must not* in only one unit. This institutional statement forbids the DHR from collecting information about the people visiting the state abortion Web site. Table 7 obliges the MPO to act by

Table 6. Attribute Analysis for the Department of Human Resources, the Abortion Bill

Units of Observation for Each Particular Syntactic Configuration	Number of Units
Topic 1: Reporting Forms for Physicians / Reference: 16.12.141.1(c–i)	18
Deontic: Must (shall)	6
Aim: Prepare a reporting form for physicians [e.g., including the number of females who went on to obtain an abortion, etc.]	
Condition: Within 90 days [of the current year]	
Aim: Ensure that copies of the reporting forms are provided to health facilities licensed as an abortion facility and to all physicians licensed to practice medicine in the state [3 units]	3
Condition: Within 120 days [of the current year]	
Aim: Ensure that copies of the reporting forms are provided to health licensed abortion facilities	1
Condition: By December 1 of every year [other than the current]	
Aim: Subject physicians	1
Condition: When reports [on the number of abortions] are more than 30 days late	
Or else: Fine of $500	
Aim: Issue a public report from the previous year compiled from all the reports.	4
Condition: By June 30 of every year [other than the current year]	
Aim: Ensure the public report could not lead to identification of female	2
Aim: Ensure that the names/IDs of the reporting physicians [shall] remain confidential	
Condition: At all times [implicit]	
Deontic: May	1
Aim: Alter the dates to achieve administrative convenience	
Condition: As long as forms are sent out at least once every year	
Topic 2: Publishing Information about Abortion / Reference: 31-9A-4(a–d)	19
Deontic: Must (shall)	18
Aim: Publish printed materials [e.g., including materials informing the female about abortion]	
Condition: Within 90 days [of current year] or at all times on the State website	
Deontic: Must not (shall not)	1
Aim: Collect information regarding who uses the website	
Condition : At all times [implicit]	
Topic 3: Reporting Forms / Reference: 31-9A-6(a–h)	15
Deontic: Must (shall)	4
Aim: Prepare a form for physicians [e.g., the number of females provided materials in 31-9A-4(a)]	
Condition: Within 90 days [of the current year]	
Aim: Ensure copies of the form are provided to licensed physicians	4
Condition: Within 120 days [of the current year] or by Dec 1 of every other year	
Aim: Ensure copies of the form are submitted from licensed physicians	1
Condition: Reports not submitted within 30 day of grace	
Or else: Fine of $500	
Aim: Issue public reports providing statistics for the previous calendar year	2
Condition: By June 30th of each year	
Aim: Ensure names and identifications remain confidential	2
Condition: At all times [implicit]	
Deontic: May	2
Aim: Alter the dates to achieve administrative convenience as long	
Condition: As forms are sent out at least once every year	

must in sixteen units of observation and allows action by *may* in only one unit.

Furthermore, by nesting the data, as in Tables 6 and 7, the specific conditions that restrict aims are highlighted to the analyst. The conditions for Table 6 are mostly temporal in nature. For example, in topic 1 of Table 6, the DHR must prepare the reporting forms within ninety days of the bill's passing (of the current year). In topic 3 of Table 6, the DHR must issue public reports by June 30th of each year about the number of times physicians provided abortion-related information to females seeking abortion. The conditions for Table 7 show a mix of

Table 7. Attribute Analysis for Metropolitan Planning Organization, the Transportation Bill

Units of Observation for Each Particular Syntactic Configuration	Number of Units
Topic: Developing Transportation Improvement Plans / Reference: Section 134(g)	17
Deontic: Must (shall)	2
Aim: Develop a transportation improvement plan in a form the Secretary determines to be appropriate	
Condition: According to a schedule that the Secretary determines to be appropriate	
Aim: Contain the identification of transportation facilities [e.g., major roadways, transit]	10
Aim: Consider the factors described in section 134(f) [e.g. , increase safety]	
Aim: Contain a financial plan	
Aim: Assess capital investment and other measures necessary to ensure the preservation of existing metropolitan transportation system and make the most efficient use of existing transportation facilities	
Aim: Indicate as appropriate proposed transportation enhancement activities	
Condition: When developing a transportation improvement plan	
Aim: Coordinate with the State implementation plan required by the Clean Air Act	1
Condition: When developing a transportation improvement plan in non-attainment areas [e.g., ozone]	
Aim: Provide citizens, affected public agencies, etc., a reasonable opportunity to comment	1
Condition: Before approving a long-range transportation plan	
Aim: Publish a long-range transportation plan for public review and submit it to the Governor	2
Condition: After approval of a long-range transportation plan	
Deontic: May	1
Aim: Include in the financial plan an illustrative project list	
Condition: When developing a transportation improvement plan and if additional resources were made available	

procedural and temporal conditions. An example of a procedural condition includes "when developing a transportation improvement plan" for the second through the sixth aims. An example of a temporal condition is the first aim, charging the MPO with developing a transportation improvement plan, conditioned by the schedule determined by the secretary.

Table 6 indicates that the aims and conditions, requiring the most units, tend to be those with long descriptions describing the actions (or aims) of the DHR. For example, in topic 2, the first aim and condition require eighteen units to describe the material that is to be published within ninety days of the current year and at all times in any other year on the state Web site. This information includes, for example, existing birth facilities and adoption agencies, the characteristics of fetus, abortion procedures, and medical risks. Similarly, the second through the sixth aims on Table 7 take up ten units and give instructions to the DHR for developing a transportation plan.

Finally, the analyst can clearly determine that all the institutional statements nested in Table 7 are norms, while only two institutional statements with DHR as the attribute in Table 6 are rules: (1) The DHR must subject physicians to a fine of $500 for submitting late reports (on the number of abortions), and (2) the DHR must ensure that copies of the forms (regarding information presented to females seeking abortion) are submitted from the licensed physicians, given a grace period of 30 days, or else it will

fine the physicians $500. In this example, the sanction is applied not to the actor in the attribute but to an object in the aim (that is, the physician). Thus, this rule charges the DHR to play an enforcement role in monitoring and possibly sanctioning physicians who do not comply in submitting the forms.[8]

In sum, Tables 6 and 7 show how Crawford and Ostrom's grammatical syntax can be used to code legislation and configure it around a common attribute to simplify complex policies. Both tables illustrate that the coding and presentation of Crawford and Ostrom's syntax can clarify what the DHR and MPO must, must not, or may do across different aims and under different conditions. Such information surely could have been gleaned from the bill itself without the syntax. Notwithstanding, the value of the syntax is the systematic and reliable way in which the information was collected, presented, and analyzed.

Conclusions

This article provides a systematic and reliable approach to applying Crawford and Ostrom's grammatical syntax to provide meaning to the content of policy. The results show how the coded institutional statements can be analyzed as units of analysis to identify the legislative emphasis or by nesting units to understand the roles and responsibilities of attributes. While this article provides a proof of concept

in the application of the Crawford and Ostrom grammatical syntax, many challenges remain in its application. We identify a few of the most important challenges with the following points:

Can deontics be both implicitly and explicitly stated in the institutional statements? The absence of an explicit or implicit deontic is what will determine whether the institutional statement is a strategy or not. Thus, the analyst must determine the implicit presence of a deontic with a strong degree of certainty, which is often difficult to do. In the approach outlined in this article, implicit deontics were allowed because many institutional statements were clearly linked through the structure of the legislation to previously stated deontics. However, a potential drawback of implicit deontics is an overcount of norms and an undercount of strategies. What is needed is a concerted effort to investigate the effects of different coding assumptions on identifying deontics and calculating the distribution of strategies and norms.

How should the attribute be conceptually defined? It can be challenging at times to identify the attribute when applying the grammatical syntax. The attribute is conceptually defined as to whom or what the institutional statement applies, which means the attribute is the focal actor of the institutional statement. Such a definition is, however, ambiguous. What does *apply* mean? What does it mean to be the focal actor of the institutional statement? In some instances, the concept *apply* can mean "to carry out" or "to act out" the aim of an institutional statement. In other instance, the concept *apply* refers to the object upon which the aim acts. Both interpretations place the attribute at the focal point of the institutional statement but in different references to the aim, that is, the agent or the object of the action. We see this as one of the biggest challenges in future applications of the syntax.

How does one determine the subset of actors in the attribute? The purpose of the attribute is to define the subset of actors to whom or to what the institutional statement applies. At times, this subset of actors might include a subgroup of individuals or a sub-subgroup of individuals. Likewise, a subset of actors might include an organization or subgroup within an organization. We found one of the biggest challenges of agreement between coders was determining whether the attribute referenced not just a subgroup but a sub-subgroup of actors. In the abortion legislation, for example, it was unclear whether an institutional statement referred to females in general, females seeking an abortion, or females under 18 seeking an abortion. Analysts can address this issue at the beginning of their coding effort by determining what level of grouping makes the most sense given the substantive knowledge the analyst has about the text and the research question at hand.

How does one distinguish between aims and conditions? The hardest part of the syntax to apply was distinguishing between aims and conditions. In other words, when does the description of the action shift to qualifiers of the action? Because legislation may be purposively vague, to determine if the difficulty of distinguishing between aims and conditions is inherent to the syntax, it is necessary to code nonlegislative text and compare it with our results. In any case, we attempted to resolve this issue by restricting the conditions to temporal and procedural restrictions, highlighted by *when*, *where*, *if*, and *unless* operators. Despite the low reliability in coding aims and conditions, it is important to recognize that the number of strategies, norms, and rules would be the same regardless because all three institutional types involve aims and conditions. Additional theoretical and empirical effort is needed to clarify the difference between aims and conditions. One suggestion is to restrict the condition to the operators mentioned above and then, as Smajgl and collaborators (Smajgl, Izquierdo, and Huigen 2008) have proposed, disaggregate the aim into two types, one consisting of the verb and the other of the object that complements the verb and qualifies how the action denoted by the verb is going to take place.

How does one better account for the implicit effect of or else statements? In designing our coding framework and for the purposes of this article, we decided to code explicit *or else* statements and view institutional statements as holons, that is, operating simultaneously as part and/or whole units in a complex system (Ostrom 2005, 11). When viewed as a part of a larger system, the coded institutional statements in this article might all be viewed as rules—regardless of the presence or absence of an *or else* statement—as the policy is nested in a broader constitutional system that authorizes penalties for violations. This is discussed in the section on the MPO of the U.S. Transportation Policy, where it is stated that the requirements of MPOs are financially binding and their nonadherence can induce federal funding lapses. What this means is that *or else* statements, while absent within the piece of legislation being studied, can be present in a separate piece of legislation and still affect the original piece of legislation under study.

It is important to underscore that we have coded the two policies as two whole systems unto themselves; thus, we put aside the broader constitutional system to focus on the distribution of strategies, norms, and strategies. Focusing on the policies while temporarily ignoring the broader constitutional system allows us to focus on the application of the ADICO grammatical syntax—which is the primary goal of the article—and because doing otherwise would remove all variance across the statements; that is, all statements would likely be rules. A solution to this dilemma is to expand the theory underlying the

ADICO grammatical syntax to encompass the holon concept, which would lead to a revised definition of rules that would be defined independently as well as interactively with other elements in the broader system. Such a research approach might also look at the entire action arena or policy subsystem, paying attention to the presence and effect of "grammatical interlinkages" across holons. Finally, it would also be interesting to compare the ADICO-coded results to legal interpretations by lawyers.

Future application of the grammatical syntax under different contextual and theoretical angles might shed some light on the challenges posed above. From a theoretical perspective, the utility of the approach in this article is clarifying and refining the analysis of any type of policy. As an approach to institutional analysis, the grammatical syntax should not be interpreted solely as a policy analysis tool under the IAD framework. For example, the grammatical syntax can complement the social constructions framework by identifying the recipients of rules compared with norms among different target populations, from deviants to advantaged (Schneider and Ingram 1997). The approach can aid in understanding the translations of beliefs into policy, as viewed by the advocacy coalition framework (Sabatier and Jenkins-Smith 1993). Changes in the content of institutional statements can be analyzed via the punctuated equilibrium theory or the advocacy coalition framework (Baumgartner and Jones 1993; Sabatier and Jenkins-Smith 1993). The changes in institutional statements across states or other jurisdictions could be modeled along the lines of Berry and Berry's theory of diffusion and innovations (Berry and Berry 2007). The approach can also be applied to understand how causal stories are presented in policy documents (Stone 1997). Indeed, the potential is great for applying the syntax to questions and hypotheses derived from other theoretical frameworks.

What can be said about the generalizations of the results and the techniques of this article? As for the results, we expect that most legislation will include a majority of *must* deontics but that the distribution of strategies, norms, and rules will vary; but this expectation is really an empirical proposition that ought to be investigated. As for the technique, we agree with Crawford and Ostrom (2005, 165-73) that the analytical approach for applying the syntax is surely applicable to other types of policies, from legislation to rule-making documents. The technique is also applicable to field studies. To adapt the syntax to the field, the researcher can focus the interview questions or questionnaire items on a valid sample of institutional statements in an action arena. The sample of interview statements can be drawn in a way as to create a desired nested structure, as the one illustrated in this article, by focusing, for example, on a particular attribute or aim. A researcher could also analyze the perceptions of institutional statements among actors with the purpose of identifying where in the syntax (e.g., in the conditions or the aims) are the misperceptions. One could then hypothesize that these misperceptions could very well be indications of conflict in the action arena.

This article develops an approach toward the application of Crawford and Ostrom's grammatical syntax. The strength of this approach is the systematic and explicit recognition that institutional statements can be coded as small, single units of observation and aggregated into broader units of analysis. Given the limitations of human cognition, the complexity of policy issues, and the need for systematic approaches toward knowledge development, this article shows that Crawford and Ostrom's grammatical syntax can serve as a useful analytical tool to understand complex policy issues.

Authors' Note

Notes

1. The term *holon* was coined by Arthur Koestler (1973) to refer to nested elements that operate at one level as a whole system and at a different level as part of another complex system (see Ostrom 2005, 11-12).

2. Strategies, norms, and rules are also defined under the concept of institutions, but the definitions are more abstract in comparison to the ADICO syntax later described in this article. For example, Ostrom (2007, 3) defines *rules* as "shared prescriptions (must, must not, or may) that are mutually understood and predictably enforced in particular situations by agents responsible for monitoring conduct and for imposing sanctions"; *norms* as "shared prescriptions that tend to be enforced by inducements"; and *strategies* as "regularized plans that individuals make within the structure of incentives produced by rules, norms, and expectation of the likely behavior of others in a situation affected by relevant physical and material *Conditions*." In contrast, Crawford and Ostrom's grammatical syntax is more specific, is less abstract, and can be more easily used to study institutional statements.

3. The Crawford and Ostrom (1995, 585) definition of *condition* includes the descriptive operators *when*, *where*, and *how*. The Crawford and Ostrom (2005, 149) definition does not include the descriptive operator *how* to describe conditions but instead focuses on *where* and *when*. The *how* operator refers to the process by which an action can or ought to occur. This process type of description is used to describe the aim in Crawford and Ostrom (2005, 148). Therefore, for the current application, we classify the *how* operator as an

aim. It should be noted that, as we discuss later in the text, distinguishing the aim from the condition is one of the biggest challenges in applying the syntax.

4. In any empirical study involving data collection, *unit of analysis* refers to the entities under study and to the level at which the data are analyzed and generalizations are made (Singleton and Straits 1999, 67). A slightly different concept is *units of observation*, which refers to the entities at which data are collected (Babbie 2004, 95). Often, the units of analysis and units of observation are the same and easily identified, such as the individual in a survey or a sentence in a newspaper content analysis. The units of analysis and units of observations are sometimes different, which often occurs when the units of observation are aggregated (for a discussion, see Singleton and Straits 1999, 67-68; Babbie 2004, 94-100). For example, a researcher might aggregate individual survey responses to draw conclusions about organizations, thereby making survey respondents the units of observation and organizations the units of analysis. Identifying the units of analysis and observation is critically important in studying institutions because institutional statements are often configured or combined into aggregated forms. In this article, we provide guidance for finding and coding institutional statements at the smallest units of observation. We then discuss in the configuration analysis that depending on the research objectives, the units of observation can be analyzed without aggregation as units of analysis or combined and analyzed as new, aggregated units of analysis.

5. For the abortion legislation, the first round of coding gave the following results (percentage agreement): institutional statements (95%), attributes (65%), deontic (94%), aim (88%), condition (47%), or else (100%), rules (100%), norms (59%), and strategies (100%). For the transportation legislation, the first round of coding gave the following results (percentage agreement): institutional statements (71%), attributes (40%), deontic (90%), aim (60%), condition (35%), or else (100%), rules (100%), norms (45%), and strategies (100%). Interestingly, in some instances, the percentage agreement slightly decreased after modifying the rules, but more often than not, the percentages increased. It should be noted that the second round of coding was on a different section of the legislation.

6. Indeed, the transportation bill is more than fifty years old.

7. The Metropolitan Planning Organization (MPO) is involved in nine topics: (1) designation and redesignation of MPOs, (2) MPO boundaries, (3) coordination across MPOs, (4) scope and planning processes for the MPOs, (5) development of long-range transportation plans, (6) requirements for nonattainment areas, (7) statutory limitations, (8) use of unused funds, and (9) development of transportation improvement programs.

8. The abortion legislation actually includes four rules in total (see discussion of rules in part 2 of the Results section). Two

of these rules have the Department of Human Resources as the attribute.

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