Paper Title

Policies and Perceptions: Using the Institutional Grammar Tool to Assess Policy Design, Appropriateness, and Coerciveness

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Paper Abstract

A necessary pursuit in public policy scholarship is better understanding of the language of policies intended to structure behavior and the implications thereof. Currently lacking in this literature are methodological approaches that yield micro-level depictions of the linguistic elements constituting policies, while at the same time supporting analyses of macro-level governance questions, such as (i) what is the perceived appropriateness of policies; and (ii) are there differences between actual and perceived policy coerciveness? In this paper, these questions are answered in the context of U.S. aquaculture. Data were obtained through a coding of state level aquaculture policies in Virginia and Florida using the institutional grammar tool (IGT) and semi-structured interviews involving a Q-Sort exercise with thirty members of the aquaculture communities in the two study states. Overall, the findings from this research indicate that policies are likely to be perceived as being less coercive than they really are when policy directives are ambiguous, when they are perceived as being inappropriate, and when enforcement of policies is non-stringent. Further, another finding from this research is that perceptions of policy coerciveness vary based on the substantive focus of policy directives.

Keywords

Institutional analysis and development framework, Q-Sort, aquaculture

I. Introduction

Effective governance requires a keen understanding of the policies designed to shape human behavior. Through the specification of activities that are allowed, required, and forbidden, policies have the potential to profoundly shape individual behavior, and ultimately, the contexts in which they are applied (Bobrow and Dryzek 1987; Linder and Peters 1989; Schneider and Ingram 1997). To truly assess the valence of policies, however, one must obtain a comprehensive understanding of their content as well as how individuals perceive and respond to the individual directives contained within them. Currently lacking in the public policy literature are methodological approaches that yield micro-level depictions of the linguistic elements constituting policies, while at the same time supporting analyses of macro-level governance questions. Of these, include, what is the perceived appropriateness of policies and the individual directives that comprise them? Are there differences between actual and perceived policy coerciveness?

Much of the policy design scholarship that has been conducted to date has focused either on the types of policies that result in particular contexts (Lowi 1964; Wilson 1979) or has examined policy designs along broad categories of variables, such as policy tools, instruments, benefits and burdens, and target populations (Dahl and Lindblom 1953; Schneider and Ingram 1997). For example, in the theory of social construction and policy design (1997), Schneider and Ingram provide expectations regarding the relationship between policy benefits and burdens, the use of different types of policy tools, and positively and negatively constructed target populations. Recently, policy scholars have also sought to apply analytical approaches that more finely and systematically parse the language of policies (Mondou and Montpetit 2010; Siddiki et al. 2011). For example, Mondou and Montpetit (2010) conducted a propositional analysis on Canadian poverty policy to identify issuers of policy related activities and policy goals, instruments, target groups, and messages associated with directives.

The varied approaches employed by scholars to study policy design have yielded important insights regarding the relationship between policy design and politics. To further develop this literature, this paper contributes to recent research efforts focused on deconstructing the language of policies and examining the relationship between policy language and broader governance implications (Mondou and Montpetit 2010; Basurto et. al. 2010; Siddiki et al. 2011; 2012). Toward this pursuit, the institutional grammar tool (Crawford and Ostrom 1995; 2005) is applied to code policies governing the aquaculture industry in Virginia and Florida, United States. Data obtained through the coding exercise is then paired with data from interviews involving a Q-Sort exercise of thirty members of the aquaculture communities of the two study states. This application demonstrates (i) how the IGT can be used to understand the content of policy design; (ii) how the IGT can be used as a basis upon which to capture data on perceived policy appropriateness; and (iii) how the IGT can be used to assess congruencies and/or discrepancies between actual and perceived policy coerciveness. The application of the IGT to study policy coerciveness also offers a more precise operationalization of the concept than has been used in past policy scholarship (Lowi 1972; Macdonald, 2001; Salamon 2002; Woodside, 1986).

This paper proceeds as follows. Section II provides an overview of the policy design literature as it relates to this research and the institutional grammar tool. In Section III, the study contexts in which this research was conducted are described. Section IV describes how the institutional grammar tool can be applied to assess policy design and support analyses of perceived policy appropriateness and coerciveness. Finally, Section V provides a summary of findings from this research.

II. Theory

A logical pursuit for public policy scholars is an examination of the structure and design of policies. Varied perspectives have been applied toward this endeavor. In recognizing the context

dependent quality of policies, some scholars have sought to identify relationships between policy designs and the political and social dynamics of the environments in which they are applied (Lowi 1964; May 1991; Wilson 1979; Schneider and Ingram 1997). Other scholars have focused their attention on answering broader societal level questions, such as, what is the relationship between policy design and democracy (Mondou and Montpetit 2010; Schneider and Ingram 1997)? Still others' efforts have been aimed at gaining a systematic understanding of the content of policies and uncovering the policy, administrative, and behavioral implications of such (Bardach 1977; Gormley 1990; Huber and Shipan 2002; Linder and Peters 1989; Schneider and Ingram 1997, 72). Building on this research, Siddiki et al. (2012) applied a content analytic technique to systemically identify the linguistic elements comprising policies and then used this data as a basis upon which to examine individual compliance.

Two Important Governance Dimensions: Policy Appropriateness and Policy Coerciveness

What past policy design research demonstrates is that analyzing policies independently of the contexts in which they are applied is an unavailing pursuit. With respect to governance, an even more fruitful endeavor is better understanding how policies are interpreted and responded to by policy target populations and factors that influence this response. This research explores how two factors in particular temper individuals' responses to policy – perceptions of policy appropriateness and perceptions of policy coerciveness. The first of these is perceptions of policy appropriateness. In varying respects, it has been found that policy receptivity and response is tightly coupled with the degree to which policy designs are viewed as being appropriately crafted to the contexts in which they are being applied (Jentoft 2004; Ostrom 1990; 2005; Young 2002). Ostrom (1990; 2005), for example, draws upon extensive empirical research to show that an influential compliance determinant is the perceived appropriateness of rules (such as policies, regulations, etc.), particularly in relation to local resource, political, and social conditions. Similarly, Jentoft (2004) asserts within a

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fisheries context that when fishers lose the ability to feel morally committed to "values such as honesty and respect for rules" (Jentoft 2004, 144), the ascendancy of regulatory over regulated agents begins to diminish, thereby increasing chances of policy non-compliance. Further, where regulating and regulated actors possess disparate beliefs regarding how an industry should be managed, scholars argue that those being governed may question the legitimacy of governing bodies as well as the legitimacy and fairness of the directives themselves (Gezelius 2003; May 2005; Ostrom 1990). This, in turn, may negatively impact compliance levels (May 2005, 321; Bardach and Kagan 1982; Levi 1988).

A second aspect of policies that is important to consider is the degree of congruence between actual and perceived policy coerciveness; ultimately, which can signal the likelihood of individual compliance. All policies, to some degree are coercive. Two qualities of policies in particular underlie this statement. First, policies identify behavioral opportunities and constraints; that is, they specify behaviors that are allowed, required or forbidden within a given context (Huber and Shipan 2002; Hart 1997; Ostrom 2005). Second, policies designate sanctions for non-compliance (Hart 1997). Sometimes, these sanctions are explicitly stated within the specific policy being applied. Other times, given the nested nature of policies (Ostrom 2005), sanctions are implied or carried over from related policies. Both of these coercive qualities of policies can be operationalized through a linguistic analysis of their content.

For example, the identification of behavioral opportunities and constraints can be assessed by examining the Deontics linked to different policy activities. Deontics are the prescriptive operators (e.g., must, must not, may, may not) that are intended, to varying degrees, to constrain human behavior. Ostensibly, directives containing "may" Deontics afford individuals greater freedom in making behavioral choices than directives that contain "must" and "must not" Deontics. According to scholars of Deontic logic (Bucciarelli and Johnson-Laird 2004; Beller 2008), directives

containing Deontics can be either categorical or conditional. In categorical statements, an actor is required (must), forbidden (must not), or permitted (may) to perform an activity without clear exceptions that would modify the applicability of the Deontic. In a conditional Deontic statement, a temporal, spatial, or procedural parameter is identified that modifies the applicability of the Deontic in the statement. For example, the following statement is a categorical directive: "Any person permitted as an oyster aquaculture harvester must possess a permit on his person while harvesting." The same example in conditional form is: "Any person permitted as an oyster aquaculture harvester must possess a permit on his person while harvesting unless that permit is in the possession of a legally permitted oyster aquaculture product owner, and the permitted harvester is harvesting oysters of that oyster aquaculture product owner." In the second example, where the Deontic containing directive is conditional, the "must" Deontic is modified to "may" Deontic under certain circumstances. In general, within a shared linguistic context, scholars have found that individuals have a reasonably high level of Deontic competence (Beller 2008) and perceive differing levels of constraint from must/must not Deontics and may/may not Deontics. Beyond Deontics, another way policy coerciveness is also linguistically determinable is through an examination of the number and types of sanctions associated with non-compliance with policy directed activities (ex. financial or administrative penalties).

Linguistic based operationalizations (e.g., Deontic based operationalizations) of the concept of policy coerciveness such as those described in the preceding paragraphs represent a slight departure from the extant literature on policy coerciveness. Most of the policy literature on policy coerciveness has offered general definitions of the concept relating it to different types of policy instruments (Lowi 1972; Macdonald 2001; Salamon 2002, 25; Woodside 1986). For example, Lowi (1972) differentiated between policies that seek to control individual behavior directly versus those which seek to control behavior indirectly through the environment; the former being more coercive

than the latter. In a similarly general way, Salamon (2002, 25) defined coerciveness as: "the extent to which a tool restricts individual or group behavior as opposed to merely encouraging or discouraging it." Rigby (2007) sought to provide a more concrete definition of coerciveness in her study of early childhood education policy. Concrete measures indicating policy coerciveness within her research context included items such as the number of pre-service education required for teachers and requirements regarding teacher: child ratios in childcare centers. While these measures offer a contribution in their more detailed operationalization of the concept of policy coerciveness, they are limited in the extent to which the measures are transferable to different contexts. That is, they are tied to the substantive context of the research. Linguistic based approaches are more transferable in that the types of prescriptive operators used across policy contexts are typically comparable. The ability to identify these and policy sanctions is made even easier with the aid of methodological tools designed to deconstruct the language of policies.

In the following section, a policy analysis tool is presented that is particularly well-suited for gaining a system understanding of the content of policy design as well as supporting analyses of perceptions of policy appropriateness and policy coerciveness – the Institutional Grammar Tool (IGT).

Institutional Grammar Tool

The Institutional Grammar Tool (IGT) was first developed by Sue Crawford and Elinor Ostrom (Crawford and Ostrom 1995) as a tool within the Institutional Analysis and Development (IAD) framework with which to systematically dissect the content of institutions (e.g., policies, laws, regulations) by parsing the individual components that comprise them in accordance with a grammatical syntax. Institutions can be embodied in written form, such as in laws, regulations, or policies, or be reflected in social norms. Regulatory policies are the particular type of institution

under consideration in this paper and the subsequent discussion will use the term "policy(ies)" in place of "institution."

A first step in applying the IGT is parsing the policy under consideration into individual institutional statements. Crawford and Ostrom (1995, 583) define institutional statements as "the shared linguistic constraint or opportunity that prescribes, permits, or advises actions or outcomes for actors (both individual and corporate)." Institutional statements are often captured within individual sentences in a formal document, and are treated as individual units of observations. They are the individual directives that describe activities that a particular actor is required, permitted, or forbidden to perform within certain conditions and penalties associated with not carrying out the activity as prescribed.

A second step in applying the IGT is further parsing institutional statements into words or phrases using a grammatical syntax based on the part of the statement they represent. The six syntactic categories included under the IGT include the: (1) Attribute [A], the actor to whom the statement applies; (2) oBject[i] [B], the animate or inanimate receiver of action within the statement; (3) Deontic [D], the prescriptive operator that indicates whether the focal action of the statement may, must, or must not be performed; (4) aIm [I], the action of the statement; (5) Condition [C], the temporal, spatial, or procedural boundaries in which the action of the statement is or is not to be performed; and (6) Or else [O], the punitive sanction associated with not carrying out the statement directive as prescribed. At a minimum, institutional statements must contain an Attribute, an aIm, and a Condition. The following statement is dissected using the IGT to demonstrate how the coding syntax is applied: "Any person violating any provision of this chapter [pertaining to restrictions on shellfish harvesting] shall destroy all shellfish in his possession in the presence of a Marine Police Officer."

Attribute = "any person violating any provision of this chapter"

oBject = "all shellfish in his possession"

Deontic = "shall"

aIm = "destroy"

Condition = "in the presence of a Marine Police Officer"

Or else = N/A

By aggregating coded data for each individual grammar component the coder can gain a comprehensive understanding of the document being analyzed; in the case of this research, of the design of a policy. By aggregating Attribute data, for example, one can identify the primary target audiences of the document. By aggregating Deontic and Or else data, the coder can gain an understanding of the level of coerciveness associated with a particular document (e.g., a document in which most of the institutional statements contain "must" Deontics and serious administrative or financial penalties would be deemed as being more coercive than a document in which most statements contain "may" Deontics and does not specific any sanctions for non-compliance). A more complete understanding of the document may be ascertained by linking data across Grammar components. For example, by linking Attribute and oBject data, one can get a sense of the scope of policy activities assigned to particular actors. Where an actor is linked with relatively few oBjects, it can be assumed that an actor's role in the context being discussed may be limited, and vice versa (Siddiki et al. 2011). In linking aggregated Attribute, oBject, Deontic, and aIm data, one can understand the complete array of activities associated with particular actors as well as whether or not they are required, permitted, or forbidden to perform those activities. By further linking this with Condition data, one can gain a detailed understanding of the temporal, spatial, and/or procedural boundaries under which actors are required, forbidden, or permitted to perform certain activities.

In the past several years, the IGT has been increasingly applied to clarify the conceptual

underpinnings and coding guidelines of the Tool and to assess its utility in examining policy design and related outcomes (Schluter and Theesfeld 2010; Basurto et al. 2010; Siddiki et al. 2011). For example, in a study of regulatory compliance, Siddiki et al. (2012) used IGT coded data as a basis upon which to examine congruence between prescribed and actual behavior. The research reported in this paper builds on the work of Siddiki et al. to further evaluate the functionality of the Tool to assess human behavior in an alternative case study setting.

III. Study Setting: Virginia and Florida, United States

This research was conducted in the context of aquaculture in two states, Virginia and Florida, U.S. The U.S. currently produces approximately twenty percent of its seafood consumed while importing eighty percent, resulting in a seafood trade deficit that exceeds nine billion dollars (NOAA 2009). This deficit has prompted federal and state policy makers to encourage the development of a domestic aquaculture industry. The production of aquaculture involves consideration of complex interdependencies among ecological, economic, technical, and social factors (Firestone et al. 2004), resistance from the public regarding farmed seafood (Amberg and Hall 2010; Mazur 2006), and numerous concerns about the industry from disease control to degradation of marine ecosystems (Black 2001; Francik 2003; Naylor et al. 2000; Mazur 2006; Treece 2002).

As the U.S. aquaculture industry grows, so too are the number of state level regulations designed to govern it, taking into account all of the above factors. Similar to regulations designed for other natural resource based industries, aquaculture regulations tend to be fairly technical and decentralization of regulatory governance is commonly observed (May 2005). Such decentralization has meant that the types of regulations and supporting regulatory mechanisms vary widely from state to state. The receptivity of recent regulatory efforts in different state aquaculture industry contexts also varies. When new regulations are applied in states that have well established industries,

receptivity to them depends, in part, on how consistent they are with industry level best management practices and norms. It also depends on how contextually appropriate regulations are perceived as being.

In recent decades, both Virginia and Florida have supported active aquaculture industries, producing both finfish and shellfish. Both states are generally better known for their shellfish production; though, recently, Florida has also housed a thriving ornamental fish industry. Virginia and Florida share bio-physical characteristics making the states amenable to broad scale shellfish production, though state leasing and siting policies may limit the availability and/or access to such resources. Both states, for example, have abundant water sources for supporting shellfish aquaculture. In addition to the Chesapeake Bay in Virginia, the state contains a number of estuaries along the Atlantic coast (Luckenbach et al. 1999). In Florida, both the Atlantic and Gulf Coasts provide many suitable locations for shellfish production.

The governments of both states have expressed state level support of aquaculture, touting economic and environmental benefits of shellfish production. This is, no doubt, partly attributed to the fact that aquaculture is a multi-million dollar industry that provides employment opportunities in addition to supporting the state economy. Additionally, states support aquaculture from an environmental standpoint as shellfish production improves water quality in the areas where it is being conducted, supports local ecosystem diversity, and preserves wildstock (Virginia Marine Resources Commission 2011). In fact, the preservation of wildstock was a primary impetus in both states to grow the aquaculture industry. In order to facilitate the development of the industry, both states implemented work transition programs for commercial shellfishermen who were encouraged to seek careers in aquaculture. They were provided basic aquaculture training, and, in some cases, subsidies to establish shellfish aquaculture operations. In addition to such programs, both Virginia and Florida have created aquaculture opportunity zones in which individuals interested in entering

the aquaculture industry may do so with the aid of state subsidies in an effort to reduce start-up and input costs. By inviting newcomers to the industry such state level efforts have contributed to more heterogeneity within traditional aquaculture communities.

Altogether, state support of aquaculture has resulted in the growth of the industry, both in terms of sales and the number of farmers, punctuated positive and negative impacts associated with aquaculture, and increased attention by policy makers and the general public. To respond to these developments, a variety of regulations have been established in Virginia and Florida to manage the industry. In Virginia, the Virginia Marine Resources Commission is the primary regulating agency charged with implementing and enforcing state level aquaculture regulations. In Florida, the Division of Aquaculture was established in 1999 within the Department of Agriculture and Consumer Services for this purpose.

IV. Methodological Approach

Case Selection

This research involved a two state, comparative, most similar case study design. A preliminary study was first conducted to select an appropriate sample of study states[ii]. Using data from this preliminary study, two states were chosen for the analysis that were reportedly similar with respect to multiple political, regulatory, social, community, and industry characteristics, bio-physical attributes, and overall levels of regulatory compliance, but differed with regard to the level of stringency of state aquaculture regulations: Virginia and Florida.[iii] The preliminary study data indicated that Virginia's regulations are relatively non-stringent as compared to Florida's. In addition to comparability on theoretically important variables, these states are comparable in additional ways, including the types of aquaculture produced, the presence of both marine and inland aquaculture, and the relative establishment of the aquaculture industry. To corroborate findings from the

preliminary study, informal interviews with three state aquaculture coordinators[iv] were conducted to

ensure that the cases were appropriate selections given the analytical objectives of the researcher.

Data Collection

Data collection for the research reported in this paper was conducted via a coding of

aquaculture policies and interviews that involved a Q-Sort exercise. Each of these data collection

steps and their analytical purposes are discussed in detail below and summarized in Table 1.

Insert Table 1 Here

Data Collection Step 1: Coding Aquaculture Policies Using the IGT

As a first step in the data collection process, all aquaculture policies, or parts of policies

pertaining to aquaculture, from the two study states were coded using the IGT; in Virginia, there

were eight such documents and in Florida there were four. The documents were first divided into

institutional statements, each of which was then further parsed into the six syntactic categories:

Attribute, oBject, Deontic, aIm, Condition, Or else. Following the coding of all regulations, a test of

inter-coder reliability was conducted in which an additional person other than the researcher coded

one of the aquaculture policies from Virginia in entirety – the Virginia Enclosures Rule. The

Enclosures Rule contains 63, or five percent, of the total statements coded between Virginia and

Florida. The coding for each syntactic element per institutional statement between the researcher

and this person's coding was compared to assess the degree of agreement. The goal was greater than

80% agreement among coders across syntactic components. For each of the components, the

following percentage agreement was observed between the two coders: Attribute (95%), oBject

(83%), Deontic (94%), aIm (95%), Condition (79%), and Or else (97%). The lowest agreement was

observed for oBjects and Conditions. These results from the inter-coder reliability test are consistent

with Siddiki et al. (2011) and Basurto et al.'s (2010) in which the authors observed lowest agreement

on Conditions (Siddiki et al. agreement on Conditions = 80%; Basurto et al. = 67%). After

Conditions, Siddiki et al. observed lowest agreement on oBjects (Siddiki et al. agreement on oBjects = 86%; Basurto et al. = N/A).[v]

This coding exercise was conducted primarily to gain a thorough understanding of the policies' design and content. Additionally, coded data were used to identify an appropriate sample of participants for the interviews as well as serve as a basis for interview questions. For interview sampling purposes, modal Attributes (i.e., actors/types of entities occurring most frequently in the policies) from each of the policies were identified and recruited. Examples of modal Attributes from the policies included aquaculture producers, aquaculture processors and handlers, and the Marine Resources Commission. Coded data also served as a basis for interview questions and the Q-Sort exercise. For example, data on perceived policy appropriateness and coerciveness were collected using questions crafted to reflect IGT syntactic categories (note: exact questions provided in the following section). Using the IGT coded data alone (i.e., without interview data) policy coerciveness was operationalized in two ways: (1) frequency of different types of Deontics; and (2) presence of Or elses, or sanctions in the policy.

Data Collection Step 2: Interviews

As a second step in the data collection process, interviews with thirty members of the aquaculture communities of the two study states were conducted (15 per state). The interviews consisted of two parts. In the first part, the researcher conducted a semi-structured interview using a predesigned protocol. The purpose of the first part of the interviews was to collect perceptions regarding policy appropriateness and coerciveness. A modified random sampling procedure was used to select interview participants in Florida. A regulatory official provided a demographically representative list (with respect to the composition of the industry) of fifty aquaculture producers and processors/handlers to the researcher to contact for participation in the study, from which 10 individuals were randomly selected and agreed to participate. The remaining five interviewees in

Florida were regulators. In contacting individuals from this list it was evident that the regulator randomly selected these individuals from a list of Florida aquaculture producers as those contacted expressed varying degrees of familiarity with the state regulators. For Virginia, the researcher randomly selected thirteen participants from an online directory of Virginia aquaculture producers. The remaining two interviewees in Virginia were regulators. The final sample of interview participants across the two states consisted of eighteen shellfish producers, seven regulatory officials, two ornamental fish producers, two aquaculture processor/handler and ornamental fish producers, and one shellfish and finfish producer.

The following questions were asked of interviewees in this portion of the interviews. These questions were crafted in accordance with IGT syntactic components. In preparation for the interviews, the researcher compiled and familiarized herself with all institutional statements related to the different modal Attributes so that interview questions could be well tailored to the person being interviewed.

Attribute [A]	You are one of the people most often referred to in this legislation. Does this accurately reflect your level of involvement in the aquaculture industry?
oBject [B]/aIm [I]	You are/are not listed is relation to many "items." For example [oBject 1, oBject 2, etc.]. How do you think this reflects the scope of activities that you are involved in on a daily basis?
Deontic [D]	Some of the prescribed processes assigned to you in the legislation include [X]. How do you interpret different prescriptive operators in relation to these [may/may not/must/must not]?
Condition [C]	How do prescribed Conditions influence how you interpret prescriptive operators?
Or else [O]	I noticed there [are/are not] a lot of sanctions described in the legislation for instances in which compliance is not achieved. Why do you think this is the case? How do you feel about the current level of stringency of state aquaculture regulations?

In the second part of the interviews, study participants were asked to participate in a modified, structured Q-Sort exercise. The Q-Sort is a methodological technique that allows study participants to subjectively sort a pre-selected set of statements into a set of categories designated by the researcher (McKeown and Thomas 1988). Sample statements can be chosen following an unstructured or structured approach. In the structured approach, the researcher chooses the statements that will be sorted based upon prior collected information, such as through preliminary interviews or from the examination of existing documents.

The purpose of the second part of the interviews was to assess congruencies between stated and perceived policy coerciveness. As such, coerciveness was operationalized in various ways in this research. Through the IGT coding, coerciveness was operationalized in terms or the presence and types of different Deontics and sanctions within the various policies. Through the semi-structured interviews, coerciveness was operationalized in the Deontic and Or else based questions in which individuals were asked to comment on their perceptions of policy Deontics and whether they felt policies are appropriately stringent. Finally, coerciveness was also assessed using the Q-Sort, which is described in more detail below.

For the Q-Sort exercise, each participant was given a set of twenty cards containing institutional statements that describe activities that relate to her/his position in relation to aquaculture as prescribed in the policy documents analyzed in this study. However, missing from the card was the Deontic associated with the activity identified in the institutional statement. For example, one of the statements applying to Virginia aquaculture producers was the following: "Aquaculture producers must submit a monthly harvest report to the Commission [Virginia Marine Resources Commission] no later than the fifth of the following month." The Q-card that was given to the interviewee for this statement only read: "Submit a monthly harvest report to the Commission." The interviewee was asked if s/he "must," "must not," "may," or "may not" perform

the activity described on the card based on what s/he actually does. Once the sorting exercise was completed, the researcher asked the participant to explain the placement of statements. For example, "why did you place card X in Deontic category A?"

As both Virginia and Florida had multiple policies from which Q-Sort statements were drawn, the number of statements chosen in the Q-Sort sample from each document was proportionate to the number of statements in a particular document relative to the total number of statements across all policy documents for a particular Attribute. To demonstrate this, Table 2 displays how the sample of Q-Sort statements was selected for Florida aquaculture producers. For example, the aquaculture Best Management Practices (BMPs) Rule contained 480 statements in which aquaculture producers was the statement Attribute, accounting for seventy-nine percent of the total statements pertaining to aquaculture producers across all Florida aquaculture regulations. As such, the number of statements to be included from the BMPs in the Q-Sort sample was twenty multiplied by seventy nine percent, or sixteen cards.

Insert Table 2 Here

V. Results

Coding

Eight regulatory documents were coded for Virginia (n = the number of institutional statements per document): Virginia State Code Ch. 28 relating to aquaculture (n= 82), Virginia State Code Ch. 150 relating to shellfish sanitation (n=13), Aquaculture Structures Rule (n=10), Harvest Reporting Rules (n=32), Enclosures Rule (n=63), Striped Bass Rule (n=55), Cobia Rule (n=16), and the Shellfish Restrictions Rule (n=32). The modal Attributes from these regulations included the VMRC, aquaculture producers, the Virginia State Legislature, the Graduate Marine Science Consortium, registered commercial fishermen, seafood landing licensees, the Commissioner of Marine Resources, and aquaculture purchasers. Four regulatory documents were coded for Florida:

Florida Statute Ch. 597 relating to aquaculture (n=281), Florida BMPs Rules (n=544), the Florida Submerged Lands Statute relating to aquaculture (n=14), and the Florida Submerged Lands Rule (n=172). The modal Attributes in the legislation included the Florida Department of Agriculture and Consumer Services, aquaculture producers, the Florida state legislature, the Florida Aquaculture Coordinating Council, the Florida Fish and Wildlife Conservation Commission, and the Board of Trustees of the Internal Improvement Trust Fund.

With respect to coerciveness, the results from a descriptive analysis of IGT coded data are provided in Table 3. Again, based on linguistic representation, coerciveness was operationalized in terms of the frequency of different types of Deontics used in the policy and the number and type of sanctions specified in relation to policy directives. The table differentiates Deontics and Or else statements that were explicitly stated in relation to particular directives versus that were implicitly stated. In the case of implied Deontics and Or elses, the policy documents contained clauses that indicated that a violation of any of the directives contained therein was subject to legal penalties. In the interpretation of Deontics, this means that all directives contain an implied "must", though the actual statements contain different Deontics. For the Or else category, the interpretation of this is that all statements have an implied sanction for non-compliance. An example of such as clause from the Florida BMP Rule is the following:

"Any person who violates any provision of Chapter 597, F.S. [Florida Statute] or Rule 5L-3 F.A.C. [Best Management Practices Rule], commits a misdemeanor of the first degree and is subject to a suspension or revocation of his or her certificate of registration. The Department may, in lieu of, or in addition to the suspension or revocation, impose on the violator an administrative fine in an amount not to exceed $1,000 per violation per day. First time offenders will receive written notice of the BMP deficiencies and will be given 60 days to comply. Operators not in compliance with BMPs after 60 days will be fined $100 - $500 per day per occurrence depending upon the type of violation and circumstances contributing to the violation" (Florida Aquaculture Best Management Practices Rule).

For each of the Florida aquaculture policies at least 70% of the total number of statements contained "must" Deontics. The percentage of "must" statements in the Virginia regulations varied widely from 13% to 90% (VA Code Ch. 150 = 13%, Aquaculture Structures Rule = 50%, Enclosures Rule = 54%, Cobia Rule = 56%, VA Code Ch. 28 = 66%, Striped Bass Rule = 67%,

Shellfish Restrictions Rule = 72%, Harvest Reporting Rule = 90%). The highest number of "must"

statements was observed in the Harvest Reporting and Shellfish Restrictions Rule. Both of these

policies pertain to health and sanitation aspects of aquaculture production. Given the potential

gravity of violating the directives contained in such policies, it is unsurprising that they contain

stringent Deontics. Interestingly, while "must not" statements did not represent a significant portion

of the total statements in either state, there were markedly more "must not" statements across the

Virginia policies than across the Florida policies. In Virginia, the percentage of "must not"

statements per document ranged from 8% to 30% (VA Code Ch. 150 = 8%, Harvest Reporting

Rule = 10%, VA Code Ch. 28 = 12%, Cobia Rule = 13%, Shellfish Restrictions Rule = 16%,

Striped Bass Rule = 16%, Enclosures Rule = 21%, Aquaculture Structures Rule = 30%), whereas in

Florida the percentage of "must not" statements ranged from 0% to 7% (FL Submerged Lands

Statute = 0%, FL Statute Ch. 597 = 7%, FL BMP Rule = 7%, FL Submerged Lands Rule = 7%).

Given, however, that "must not" statements did not compromise a significant proportion of overall

statements, Florida is still considered to have more stringent regulations based on the high presence

of "must" statements.

Insert Table 3 Here

Semi-Structured Interview

Perceptions of policy appropriateness were assessed using interview responses from

Attribute and oBject/aIm questions in the interview protocol. By and large, interviewees across the

two states indicated that modal Attributes from the policies were also those who are most involved

in their respective aquaculture industries. In Virginia, many interviewees commented that the one

important entity not included in the policies is the State Health Department. In Florida, several

interviewees commented that the role of State Water Management Districts and the Department of

Environmental Protection is not reflected in the policies. Interviewees across both states indicated

that the regulations are comprehensive or broad in scope (i.e., appropriately reflect the array of activities in which policy target populations are regularly engaged). A frequently observed comment by interviewees was that it is important for policies to be broad in scope in order to effectively capture the nuances of aquaculture production. However, there were two interviewees in Virginia who stated that policies were too broad and lacked attention to species specific considerations. Also in Virginia, there were several issues that interviewees felt were inappropriately dealt with in the policies, including those pertaining to temperature controls in aquaculture transport, leasing, aquaculture opportunity zones, and taxes.

Perceptions of policy coerciveness were assessed using interview responses from Deontic and Or else questions from the interview protocol. In both states, less than half of the interviewees reported a strict interpretation of Deontics. In Virginia, many interviewees stated that they adhere to those Deontics that make sense to them, are appropriate in the context of their aquaculture operation, or are perceived as being good for their product. In Florida, several interviewees commented that Division of Aquaculture purposefully allowed for flexibility in the policies by designing them to be "goal oriented rather than process oriented" (Interviewee IDs: 019, 021, and 022). One of these interviewees, who is an aquaculture producer, commented, "DACS [Division of Aquaculture and Consumer Services] has an end result that they want to achieve and there is some wiggle room for producers in getting to these end results" (Interviewee ID: 019). Finally, one regulatory representative commented that while the policies themselves are rigid, the flexibility comes into the process at the enforcement level.

Interviewees in both states did report that there is less flexibility on some issues than others. In Virginia, these issues were health and sanitation, temperature controls, and aquaculture product tracking. In Florida, these issues were water impacts, health and medication use, wetlands, and non-native species. Interviewees in both states reported that temporal, spatial, and procedural conditions

are important for specifying the applicability of policy directives in different contexts or situations. Echoing comments made in response to the scope related question (i.e., oBject/aIm question), many interviewees across both states that such details are necessary given that aquaculture production is site and species sensitive.

When asked to describe if they felt sanctions for non-compliance were appropriately stringent, the responses received by interviewees in the two states varied. In Virginia, interviewees expressed mixed perceptions. Two of the ten interviewees that responded to this question commented that policy sanctions are becoming more stringent over time, two stated that sanctions are not stringent, and two stated that they are appropriately stringent. Relating to this last point, another interviewee commented that strict sanctions are necessary to protect the industry. A regulatory representative stated that misdemeanors and felonies are commonly administered in cases of non-compliance. In contrast, consistent with responses to the Deontic question, interviewees from Florida indicated that enforcement of policies in flexible.

The findings from the semi-structured portion of the interviews provided an interesting contrast to the data collected through the IGT coding of state aquaculture policies, indicating discrepancies between actual and perceived policy coerciveness. Part of this contrast hinged on policy enforcement. The interview data indicate that while Virginia's aquaculture policies are relatively less stringent on paper than Florida's, Florida's are less stringent in reality due to lenient enforcement. Further informing the contrast between actual and perceived policy coerciveness in both states was a notably relaxed interpretation of policy Deontics for reasons other than enforcement practices. For example, in Virginia, several interviewees stated that they interpret Deontics more flexibly when policy directives are perceived as being inappropriate. Interviewees in both states did comment that their perceptions of Deontics are based on the substantive focus of the policy directives. Additional insight regarding perceptions of regulatory Deontics and the

reasons underlying these perceptions was gleaned from the Q-Sort exercise conducted with interview participants following the administration of questions from the pre-designed interview protocol. The results from this exercise are provided next.

Q-Sort

Table 4 displays the results from the Q-Sort exercise; specifically, agreement between prescribed Deontics associated with policy statements and Deontics selected by interview participants associated with policy directives. "Agreement" means that an interviewee placed the statement in a Deontic category in a manner that matched the form of the directive in the policy document. Table 4 also displays the issues on which there was the least amount of agreement on Deontics. The findings from the Q-Sort exercise show that agreement was highest for "must" statements (average agreement = 79%) and lowest for "may" (average agreement = 40%) and "may not" statements (average agreement = 38%). Such findings indicate that, consistent with the Deontic reasoning literature, individuals are attuned to the more constraining nature of obliging than permissible Deontics. As such, there perceptions of policy coerciveness more accurately reflect stated coerciveness. Virginia and Florida differed in levels of agreement relating to "must not" statements, with much higher disagreement being observed in Virginia.

In Virginia, the most disagreement was observed on issues pertaining to the use of hydraulic dredges (must not), infrastructure design (must not), placement of temporary protective enclosures (must not and may), and navigation (may not). Interviewees expressed mixed remarks relating to the use of hydraulic dredges indicating a high degree of ambiguity regarding this directive. Regarding directives pertaining to temporary protective enclosures and navigation, several interviewees commented on the inapplicability of such directives. In particular, several interviewees challenged a directive that forbids the placement of enclosures upon submerged aquatic vegetation saying that shellfish actually help this type of vegetation (Interviewee IDs: 007, 008, 010, 011) Further, one

interviewee commented that some of the statements relating to enclosures and navigation are only applicable in certain geographic areas (Interviewee ID: 008).

In Florida, most disagreement was observed, across all four Deontic categories, regarding treatment and discharge of effluent, particularly in wetlands. Regarding this type of directive, some farmers commented that aquaculture waste does not actually pose significant detriment to the environment (Interviewee IDs: 015 and 020). Several farmers commented that there is ambiguity in the definition of a wetland in the regulations and/or the enforcement of the directive. For example, one farmer commented, "The definition of a wetland is vague. It is difficult to know if something is actually a wetland. (Interviewee ID: 015). Another said, "This rule is currently handled subjectively but will probably be more defined in the future." (Interviewee ID: 020) In the "may not" category, the sale and transfer of Atlantic sturgeon and use of medications for extra label purposes were also issues on which high discrepancy was noted. Regarding the inappropriateness of the medication rule, one farmer commented, "It is very expensive for the aquaculture industry to get a Label to define a product as specific to aquaculture purposes. The industry is too small to afford such costs. So, sometimes use products for extra label use. For example, it might be a product that is meant for another animal but works for aquaculture" (Interviewee ID: 018). Another interviewee commented, "Some drugs are not always effective as they are prescribed to be used" (Interviewee ID: 020).

Insert Table 4 Here

VI. Discussion and Conclusion

Effective governance hinges on how individuals interpret and respond to policies. While heeding the contexts of policies and their target audiences is critical, so too is understanding individual perceptions of policy design and the stringency of directives. Confronting this task requires that the policy analyst first understand the content of policies s/he wishes to study. This research demonstrates how the IGT, when coupled with other methodological techniques, can

further an understanding of policy design, appropriateness, and coerciveness. In doing so, this research also offers a precise operationalization of the concept of policy coerciveness that can be translated across policy contexts. This offers a contribution to the study of the concept which has typically been operationalized in very general terms in the policy scholarship (Lowi 1972; MacDonald 2001; Salamon 2002; Woodside 1986). Furthering our conceptual understanding of policy coerciveness will help to better discern how individuals in rule governed contexts internalize directives, ultimately which signals important policy related behavioral outcomes (e.g., compliance). Overall, the findings from this research suggest that policies are likely to be perceived as being less coercive than they really are when policy directives are ambiguous, when those being governed do not perceive policy directives as being appropriate, and when enforcement of policies is non-stringent. Unsurprisingly, another finding from this research is that perceptions of policy coerciveness vary based on the substantive focus of policy directives.

Perceptions of policy appropriateness and coerciveness were collected through interviews with members of the aquaculture communities in the two study states. The first part of the interviews was based on a pre-designed protocol containing questions structured around syntactic components from the IGT. As such, these questions focused mainly on obtaining perceptions relating to whether the role of target populations was accurately reflected in the policies (Attribute), whether the activities assigned to individual Attributes in the policies accurately represent the scope of their daily activities (oBject/aIm), how individuals interpret different types of prescriptive operators or Deontics (must, must not, may, may not), how temporal, spatial, an procedural conditions affect Deontic interpretation, and whether policies are perceived as being appropriately stringent (Or else). Attribute and oBject/aIm questions were used to assess perceptions of policy appropriateness and Deontic, Condition, and Or else questions were used to assess perceptions of policy coerciveness.

With regard to policy appropriateness, results from the analysis indicate that aquaculture policies in both study states are largely perceived as accurately reflecting the main actors involved in the aquaculture industries of the two study states and the types of activities that aquaculturists are involved with on a daily basis, i.e., are appropriate in scope. However, several issues were raised in the Virginia context that interviewees did not feel were appropriately addressed in state policies, including, temperature controls during harvest and transporting of aquaculture products, leasing, aquaculture opportunity zones, taxes, and transportation of aquaculture products.

Relating to policy coerciveness, interviewees expressed mixed interpretations of Deontics. Many interviewees in Virginia indicated that they observed Deontics when they felt that they made sense to them, were applicable in the context of their operations, or when they perceived that adhering to the Deontic would produce a better product. In both states, many interviewees also stated that their interpretation of Deontics depends in large part on the substantive topic of the activity they relate to. In Virginia, interviewees stated that they are more likely to observe prescribed Deontics for directives relating to health and sanitation and/or product tracking. In Florida, interviewees cited strict interpretation of Deontics for policy directives relating to water impacts, medications and health, wetlands, and non-native species. When asked about the ways in which Conditions associated with different directives influence how they interpretation of Deontics, several interviewees touched upon the difference between categorical and conditional Deontic directives. These individuals all stated that Conditions modify the applicability of Deontics and thus are important for understanding the context specificity of individual directives.

An interesting finding emerged from the interviews regarding the relationship between policy coerciveness and enforcement in the two study states. While Virginia's aquaculture policies would be characterized as less coercive than Florida's in terms of Deontics and Or elses (i.e., sanctions for non-compliance), the findings indicate that, in actuality, enforcement of regulations is

quite stringent. One prominent regulatory official bolstered this finding by stating that misdemeanors and felonies are commonly administered in cases of non-compliance. In contrast, while Florida's aquaculture policies would be characterized as relatively coercive on paper, the interview findings indicate that enforcement of them is relatively lenient. Leniency in this case refers to allowing aquaculturists to use a variety of means to reach policy goals. Both interviewees and a regulatory official commented that regulations are interpreted as being more goal oriented than process oriented. In other words, aquaculture producers are given some leeway with which to interpret regulatory directives. The regulatory representative further commented that penalties are infrequently administered in instances of non-compliance. Instead, the regulators have espoused a culture of seeking to work with aquaculture producers when non-compliance is observed instead of administering a penalty outright. These findings are bolstered by research on Deontic logic which argues that, "must" implies obligations, but this sense of obligation is undermined by two things: one, the sanction for non-compliance is trivial or, two, individuals subject to directives perceive that the sanctioning authority is incapable or unwilling to actually implement the sanction (Hart, 1997). As such, discrepancies between stated and perceived policy coerciveness in Florida may be at least partially associated with relatively lenient enforcement.

A Q-Sort exercise was used to further assess perceptions of policy coerciveness. Interviewees were asked to link policy activities to Deontics based on their actual practices. Their identification of Deontics was then compared to the Deontics actually identified in the regulations for a percent agreement rate. This information was aggregated and averaged across all interviewees within each state and then across the two states. Average agreement varied widely; in Florida from 41-77% and in Virginia from 25-80%. The Q-Sort results show least disagreement among must statements, and most disagreement among may and may not statements. Such findings indicate that aquaculture community members know and comply with directives that are required and are less

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informed or have a deliberately looser interpretation of other types of Deontics (e.g., may and may not Deontics).

From the Q-Sort exercise, consistent with responses from the first part of the interviews, the most notable finding that emerged was that perceptions of policy coerciveness are linked to particular issues. In Virginia most disagreement between prescribed and actual practices concerned the placement of temporary protective enclosures. In Florida, most disagreement concerned the treatment and discharge of effluent, particularly relating to wetlands. Partly explaining low Deontic agreement with wetland relating directives was attributed to definitional ambiguity and inconsistent enforcement. Both producers and regulators in Florida indicated that there is a lack of clarity regarding what exactly constitutes a wetland.

The results from the interviews point to some degree of interaction between perceptions of policy appropriateness and policy coerciveness. The expectation, confirmed in the findings from this research, is that individuals are less likely to interpret Deontics stringently when they perceive policy directives as being inappropriate. Interviewees expressed this sentiment when describing their interpretation of regulatory Deontics, stating that they maintain a strict interpretation of Deontics when regulatory directives make sense to them or are perceived to be applicable to their aquaculture operations. Insofar as perceptions of policy coerciveness can be used as an indicator for policy compliance, this finding is consistent with previous research that links perceptions of policy appropriateness with higher levels of compliance (Bardach and Kagan 1982; Gezelius, 2003; Levi, 1988; Ostrom 1990, May 2005, 321).

There are two primary limitations in this research. First, what this analysis does not show are motivations relating to factors beyond policy design that can influence how individuals interpret policy directives. For example, individuals' interpretation of policy directives can be influenced by a wide array from motivations stemming from their personal experiences and social environments. Of

these, include, feeling morally compelled to follow the law, perceiving policy compliance to serve instrumental values, fears of financial penalties, or reputational concerns (Ryan and Deci, 2000). However, attention to these factors is outside of the analytical purview of this particular paper. Second, this research relies on a relatively small sample of aquaculture community members in each of the study states. Though small, the sample was carefully selected such that is representative in relation to the modal Attributes in the policies coded as well as in terms of respective industries at large.

Ultimately, understanding individuals' perceptions of policies has implications for both policy effectiveness and policy compliance, and thereby, governance in general. Using the IGT to deconstruct policies into individual directives, and then further into policy relevant syntactic components, helps the analyst hone in on the particular aspects of policies that are likely to be met with the most amount of resistance, i.e., non-compliance, as well as the aspects of policies which are considered to be the least effectual. As such, policymakers may utilize this research to identify areas where policies can be better tailored to meet the needs of their constituents or to achieve desired outcomes. Given the diversity of motivations that may inform how individuals interpret and respond to policies, a next step in this research is to analyze how motivations stemming from individual and social contexts that, in concert with policy design characteristics, influence behavior.

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Tables

Table 1. Summary of Data Collection Steps

Data Collection Step	Type of Data Collection	Purpose of Data Collection
Step 1: Coding	Coding of all policies or portions of policies pertaining to aquaculture in Virginia and Florida using the IGT	Policies were coded to gain a comprehensive and systematic understanding of their design and content. Coded data were also used to identify an appropriate sample for interviews and serve as basis for the semi-structured interview and Q-Sort exercise.
Step 2a: Interviews	Semi-structured interviews based on pre-designed protocol.	Assess perceptions of policy appropriateness [Attribute and oBject/aIm questions] and coerciveness [Deontic, Condition, and Or else questions].
Step 2b: Interviews	Q-Sort exercise with interview participants (administered immediately following the completion of the semi-structured portion of the interviews)	Assess perceptions of policy coerciveness.

Table 2. Sampling of Q-Sort statements -- Florida aquaculture producers

	Total No. of Statements in Document	Percentage of Total Statements	No. of Statements out of Twenty
Revised Statute	66	11%	2
Best Management Practices Rule	480	79%	16
Submerged Lands Rule	61	10%	2
Submerged Lands Statute	N/A	N/A	N/A
Total	607	100%	20

Table 3. Policy Coercion Measures from IGT Coding: Summary of Coded Deontic and Or else Data

Regulation	Total Statements	Deontics (% total for each Deontic)					No. of Or Else Statements (% total)	
		May	May Not	Must	Must Not	Should	Implicit	Explicit
Florida								
Florida Best Management Practices Rule	544	7	1	100 implicit; 53 explicit	7	7	100	<1
Florida Statute Chapter 597	281	17	1	100 implicit; 70 explicit	70	7	100	<1
Florida Submerged Lands Rule	172	6	0	76	7	-	-	<1
Florida Submerged Lands Statute	14	29	0	71	0	-	-	0
Total Statements	1011	-	-	-	-	-	-	-
Virginia								
Virginia State Code/Statute Ch. 28	82	16	0	66	12	-	-	<1
Enclosures Rule	63	16	0	54	21	-	-	<1
Striped Bass	55	13	2	67	16	-	-	<1
Harvest Reporting Rule	32	7	0	90	10	-	-	28
Shellfish Restrictions	32	13	0	72	16	-	-	22
Cobia	16	25	0	56	13	-	-	13
VA Code Chapter 150	13	8	0	13	8	-	-	0
Aquaculture Structures/On-Bottom Shellfish Structures Rule	10	10	10	50	30	-	-	0
Total Statements	303	-	-	-	-	-	-	-

Table 4. Summary of Q-Sort Results: Average Percentage Agreement between Actual and Perceived Policy Coerciveness

	Virginia	Florida	Total	Issues with Most Disagreement with Policies (VA)	Issues with Most Disagreement with Policies (FL)
Must	80%	77%	79%	Few issues with high disagreement	Treatment and retaining of effluent
Must Not	34%	69%	50%	Use of hydraulic dredge, extending structures higher than 12", placement of temporary protective enclosures	Discharge of effluent into wetlands
May	39%	41%	40%	Placement of temporary enclosures	Treatment and discharge of effluent
May Not	25%	52%	38%	Effects on navigation from aquaculture activities	Discharge of effluent, sale and transfer of Atlantic Sturgeon, medication use for extra-label purposes

[i] The original grammar did not include the oBject as an institutional statement component. The oBject was introduced by Siddiki et al. (2011) in an effort to clarify coding guidelines and enhance the applicability of the institutional grammar tool.

[ii] This preliminary study involved interviews with ten and a survey of fifty-six state aquaculture coordinator members of the National Association of State Aquaculture Coordinators (NASAC) (response rate = 57%). NASAC is an affiliate of the National Association of State Departments of Agriculture. NASAC's primary mission is to assist in the development of the U.S. aquaculture industry by providing resources to state aquaculture representatives. NASAC members are highly knowledgeable about regulatory and/or technical matters relating to the aquaculture industry. These individuals are either state aquaculture coordinators or selected to serve as representatives to NASAC either due to their professional position or influence in the respective aquaculture communities. Some states have one representative, while others have more. This preliminary study yielded both qualitative and quantitative data, describing perceptions of state regulatory and community characteristics pertaining to regulatory mechanisms and compliance with state level aquaculture regulations in 30 states.

[iii] Regulatory stringency was selected as the varying factor as it is considered to be of central analytical import. The primary variables under consideration are all anchored on state level regulations.

[iv] These state aquaculture coordinators were members of the National Association of State Aquaculture Coordinators at the time the study was conducted. Again, these individuals are highly knowledgeable about regulatory and/or technical matters relating to the aquaculture industry.

[v] At the time that Basurto et al. conducted their coding exercise, the oBject had not yet been introduced into the IGT coding framework. The oBject was introduced by Siddiki et al. (2011).