ABSTRACT

WILLIAMS, TESHANEE TAMARA. Narrative Policy Framework: Examining Policy Narratives as Tools of Influence in the Regulatory Review Process of Bioengineered Salmon in the United States and Canada. (Under the direction of Dr. Jennifer Kuzma and Dr. RaJade Berry-James).

This dissertation illustrates how policy narratives might function to influence risk governance decisions for foods that are derived from bioengineered (BE) animals. It also explores how these narratives relate to different policy actors, cultural worldviews, and anti- versus pro-BE positions. Many scholars have appealed for more meaningful democratization that is inclusive of multiple viewpoints beyond those associated with the elitist, reductionist approach to risk assessment. Regulatory agencies contend that risk assessments for emerging food biotechnology should be based on “sound science”; a phrase which is cited in guiding policy and regulatory documents and signals pure objectivity about a limited set of harms. Opposition to this “science-based” approach has been dismissively described as emotion and dogma that fails to adhere to scientific facts.

Still, there are numerous examples of emerging technologies with completed risk assessments that fail to address important harms and additional legitimate concerns. A growing number of scholars have suggested that decision making focused on bioengineering and other emerging technologies is fraught with ambiguities and uncertainty – requiring a more cognizant account of the cognitive biases that influence outcomes. Thus, this case study explores how certain policy narratives correlate with policy preference, stakeholder or scientific expert opinion, and cultural world views and to understand how this might influence decision-making and shape the regulatory review process. The ability to exert influence first depends on whether the narratives and issues of concerns from people other than the technologists and regulators associated with BE foods are considered and incorporated into decisions or final policy. To

further understand these issues, this research examines the case study of the AquAdvantage Salmon (AAS), a BE salmon variety that was recently approved for human consumption and commercial sale in Canada and the United States (US). This case study presents an opportunity to explore points of public participation in the policy processes for decision making about BE salmon across two different countries, Canada and the US. Specifically, this research evaluates the diversity of policy narratives that are comprised of different cultural worldviews and narrative strategies involved in the decision-making process. I explore how these policy narratives correlate with different policy actors based on anti- versus pro- policy positions about BE salmon and assess what narratives are incorporated into the final policy.

To this end, this study uses the Narrative Policy Framework (NPF) and cultural cognition theory to address the following questions: what narratives are being used to influence decisions and policy uptake, which cultural world views seek to broaden the scope of risk (i.e. "science-plus" vs. "science-only"), what arguments are used to support or reject the approval of GE animals (Chapter 2); to what extent do public comments contain policy narratives, what narrative strategies are associated with pro- and anti-BE policy narratives, and what cultural worldviews are associated with pro- and anti-BE policy narratives (Chapter 3); and what narrative strategy appeals and cultural world views are reflected in response documents to indicate influence (Chapter 4). This study employs quantitative and qualitative content analysis guided by Narrative Policy Framework and cultural cognition theory. Key findings indicated that policy narratives comprised of hierarchical or individualist worldviews and pro-BE attitudes were more likely to seek to expand the scope of the issue to denounce the views of others. Institutional uptake also differed greatly by country as policy response documents only reflected certain perspectives. Ultimately, the results of this study suggest that future regulatory review processes for emerging

technologies should actively seek to incorporate broader perspectives and generate a deliberative decision-making process that takes cognitive bias into consideration.

Keywords: influence, regulatory review, rule-making, narrative policy framework

Narrative Policy Framework: Examining Policy Narratives as Tools of Influence in the Regulatory Review Process of Bioengineered Salmon in the United States and Canada

by
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DEDICATION

I dedicate this dissertation to my family.

To my loving husband and kids,

Cranos Williams, Ethan Williams, Zerée Williams,

my mother,

Cecelia England

my siblings,

Geraldine Vaval, Geo-Ann Strann, Barbara Strann, Natasha Leonard, Emris Rogers,

and my “sister friends”.

Without your love, support, and prayers none of this would have been possible.

BIOGRAPHY

Teshanee Tamara Williams was born and raised on St. Thomas, US Virgin Islands. Growing up she attended Bethel Baptist Church elementary school, Jane E. Tuitt elementary school, Wesleyan Academy Middle School, and Charlotte Amalie High School. After graduating high school, she traveled to Raleigh, North Carolina to pursue higher education opportunities. She completed her bachelor's degree in Business Administration in 2009 at Strayer University and entered the workforce before taking some time off to focus on her family. Intending to change career paths, she pursued a bachelor's degree in Psychology while engaging in multiple research projects. After earning her Bachelor's in 2014, she decided to pursue a career focused on policy implementation research. She earned her Masters in Public Administration in 2016 and continued to the doctoral program to further pursue the goal of a research career in the Fall of 2016. Her research interests include understanding the influence of public participation on the federal policy process and the role that social context plays in the strategic management of public and nonprofit organizations.

While at NC State, she received several awards and research funding opportunities, to include: American Society for Public Administration (ASPA) Founders Fellow (2017); Funding scholarship award to attend ICPSR Summer Program in Quantitative Methods of Social Research (2017); American Society for Public Administration (ASPA) Annual International Young Scholars Fellowship Award in Public Policy and Administration Research (2018).

She also participated in several internships and research projects. Past internships include a role as a research analyst for the North Carolina State Auditor's Office and the Office of Partnership and Economic Development at North Carolina State University. Teshanee's career goal is to produce research that bridges the gap between theory and practice.

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Chapter 1: Introduction to the Tools of Influence of the Regulatory Review Process for Bioengineered Foods: Case study of Bioengineered Salmon Approval

The tools of influence in the regulatory review process is a phenomenon that many scholars have sought to understand. Much of the literature has focused on which groups exert influence during the regulatory review process (Kerwin 1994; Furlong 1997; Golden 1998; West 2005; McKay 2006; Yackee and McKay 2007). Still, there is a limited focus on what mechanisms function to have an effect on decision making (Emery and Emery 2005). While there is no doubt that these studies have helped to explain the influential factors involved in the rule making process, some scholars have questioned the causal path between influence and policy outcomes because it is difficult to measure and outcomes are attributed to unmeasured circumstances (Golden, 1998; Webb Yackee, 2019). The Narrative Policy Framework offers systematic approaches for examining tools of influence used by policy actors.

According to the NPF, policy narratives are socially constructed stories that contain consistent elements and strategies with a goal of influencing others to gain support for a particular policy decision (Jones & McBeth, 2010). Socially constructed policy narratives are assessed using narrative form (i.e. the structure of a story) and content (i.e. the narrative strategies and beliefs). Narrative form and content are the systematic tools necessary to shed light on the causal path between influence and policy outcomes, thereby defending against the argument of unmeasured circumstances (E. A. Shanahan, Jones, & McBeth, 2011; E. Shanahan, Jones, McBeth, & Radaelli, 2017; Steel, 2004). These socially constructed policy narratives are the focus of this research. To examine how policy narratives may influence the regulatory review process, this dissertation incorporates insight from narrative policy framework and cultural cognition theory to examine the tools of influence being leveraged to impact the rulemaking process as it relates to bioengineered (BE) foods in two industrialized countries: Canada and the United States (US).

Industrialized countries have different rulemaking approaches for regulating BE foods. This dissertation uses the approval of AquAdvantage salmon (AAS) as a case study to examine the limited points where the public can have a voice in the rulemaking process in Canada and the US, and to examine the diversity of policy narratives that convey opinions based on the policy preference, cultural worldviews, and narrative strategies. It also looks at the uptake of these policy narratives in the policy response documents related to the participatory processes and compares the US and Canadian policy context. The case of AAS is significant because this is the first time that a BE food has been approved for human consumption and it will likely influence the way that other emerging food technologies will be defined and regulated.

The US Food and Drug Administration (FDA) and Health Canada (HC), which has authorized BE animals and BE foods, contend that risk assessments for emerging food biotechnology should be based on objective, value-neutral science, also cited as "sound science" or "science based" (Health Canada, 2008; US FDA, 2015). Some scholars have emphasized the need for regulatory assessment to be inclusive of narratives beyond that of an elitist risk assessment and reduction approach (Berry-James, 2014; Jennifer Kuzma & Besley, 2008a; Meghani, 2014; Smith & Larimer, 2016). The value-neutral approach rejects societal and ethical concerns and instead emphasizes evidence of harms that are direct and dismisses indirect harms, thereby excluding other dimensions of risk (Frewer et al., 2013; Kuzma & Besley, 2008). The public administration literature suggests that there is significant benefit to incorporating "value" into decisions that affect the public (Berry-James, 2014; Jennifer Kuzma & Besley, 2008b; Stephens & Berner, 2011). Thus, the value-neutral approach to assessing risk is deficient and limits the conversation on risk such that only certain narratives are reflected in uptake (Panisset et al., 2012)[1].

Given the important role of values in personal attitudes towards BE animals, the purpose of this dissertation is to explore policy narratives that are constructed by different policy actors and to assess whether or not influence is leveraged. This is evidenced by incorporation of socially constructed narratives into policy response documents. This case study serves as a current example for governance of BE food animals and is an instructive case shaping how policy makers consider different policy perspectives for future governance of bioengineered animals and their food.

Examining the tools of influence: Cultural Theory of Risk, Cultural Cognition and Narrative Policy Framework

Differences in perceptions inform how risks are assessed (Kahan, Braman, Monahan, Callahan, & Peters, 2010). Previous studies suggest that citizens and scientist alike perceive risk using the same cultural cognitive lenses that may allow for cognitive bias (Andreas et al, 2010; Lorente & Alonso, 2014). Consequently, it is not just the public that is capable of exhibiting biased thinking or heuristics that are dependent on world views and availability of information. For example, Beaudrie et al. (2014) found that in the case of nanotechnology, experts on the product development side typically exhibited "optimism bias" toward lower risk and product approval (Beaudrie, Satterfield, Kandlikar, & Harthorn, 2014). Meghani & Kuzma (2017) recently found similar evidence for GE animals and FDA assessments.

Although, there is a vast body of literature that provides criteria for evaluating the regulatory review process (Brant et al., 2017; Jennifer Kuzma et al., 2008; Neshkova & Guo,

[1] Uptake refers to when an issue is brought to the attention of government officials and they respond to or "uptake" considerations into their final decisions (Panisset et al., 2012).

2012), there is limited empirical research that examines the mechanisms that function to affect outcomes (Emery and Emery 2005). Furthermore, the examples that do exist in the literature for BE foods and other emerging technologies in the U.S. are limited and are not based on policy formulation but instead on the operation of oversight systems once they are formulated (Kuzma et al. 2008; Kuzma et al. 2009a; Paradise et al. 2009; Kuzma et al. 2009b). Many of the studies that exist are guided by the literature on public participation, perceptions of risk, and developing oversight systems (Eckerd, 2014; Jennifer Kuzma et al., 2008; J. W. Yackee & Yackee, 2006; S. W. Yackee, 2015). While these studies contribute to our understanding of influence, they do not incorporate concepts from the theories of cognition which helps to explain how and why some groups use certain policy narratives to try to influence decisions. Therefore, to examine the policy narratives that arise when different versions of the public try to leverage influence on the regulatory review process, this dissertation integrates concepts from cultural theory of risk (Douglas, 1982), cultural cognition (Kahan et al., 2010), and Narrative Policy Framework (NPF) (Jones & McBeth, 2010). The following section provides an overview of the theories that will be used throughout this dissertation.

Cultural Theory of Risk

Cultural theory of risk as presented by Mary Douglas (1970;1982;1992) asserts that individuals are more likely to form perceptions of technologies based on personal world views such as those that match their moral evaluations of risk. Previous research has used this theory to show that individuals that perceive a technology as a benefit will use affective language that describes it as acceptable, while those that perceive the same technology as a risk will use affective language that describes it as a detriment (Finucane, Alhakami, Slovic, & Johnson, 2000; Slovic, 2010; Slovic, Peters, Finucane, & MacGregor, 2005; Jones & Song, 2014).

Cultural theory of risk helps to explain why the perception of risk becomes politicized and polarized such that decisions concerning risk become entangled in the allocation of blame and the distribution of power associated with cultural world views that are generally not malleable (Douglas, 1997).

Douglas (1982) put forth a typology to explain different perceptions of nature as a collective representation of risk. This typology was later expanded by Thompson (1990) to describe belief systems based on a group's preferred level of interaction and the degree to which these groups constrain beliefs and behavior. The typology includes four cultural types that discuss how certain groups perceive and frame issues concerning risk. They include: egalitarians, hierarchs, individualist, and fatalists. Egalitarians exhibit strong beliefs about equality and thus perceive that human decisions concerning nature should be based on caution to avoid negative consequences (Thompson, 1990). Hierarchs revere the knowledge of higher authority and perceive that decisions concerning nature should only be based on the perspectives of skilled experts and managers (Thompson, 1990). Individualist perceive government intervention as an intrusion, and they believe that progress is the most important byproduct of nature (Thompson, 1990). Fatalists consider negative consequences as inevitable and thus they believe that decisions concerning nature will impose negative consequences on others because little can be done to avoid or reduce potential harm (Thompson, 1990). This research operationalizes the four typologies to illustrate cultural cognition, which refers to the tendency of individuals to form perceptions based on personal worldviews.

Cultural Cognition Theory

Cultural cognition is the tendency for individuals to be more likely to form perceptions based on personal world views (Kahan et al., 2010). Cultural cognition theory posits that individuals that perceive ideas as trustworthy will consider them to be socially acceptable, while individuals that perceive ideas as deceptive will consider them to be a social detriment (Kahan et al., 2010). Cultural cognition builds on the basis of cultural cognition theory of risk and provides a more comprehensive framework of the social and psychological mechanisms that explain how cultural world views shape attitudes and beliefs (Kahan et al, 2010). These soci al and psychological processes interact with cultural worldviews to create differences in risk perceptions among competing worldviews.

According to Kahan (2012) these processes include: identity protective cognition (individuals are likely to fit their views to those of others whom they share a group membership—often typed as hierarchical, egalitarian, fatalistic, and individualistic); culturally biased assimilation (individuals are unconsciously motivated to dismiss evidence as not being credible if it counters the dominant view held within their group); cultural availability (individuals are likely to notice, assign significance, and remember information that is salient within a group); cultural credibility heuristic (individuals will assign the qualities that make an expert credible with those whom they perceive as sharing their values) and cultural identity affirmation (individuals will likely react dismissively with information that is not in agreement with the values dominant within their group).

Kahan, Jenkins-Smith, & Braman (2011) tested these processes and found that narratives can be used to influence, persuade, or inform and that these effects were dependent on personal worldviews. These findings assert that individuals craft information by fitting it to certain narratives that is based on information which aligns with their worldviews. This is referred to as *narrative framing* (Kahan et al, 2011). Therefore, relying on the original typology of cultural worldviews as described in cultural theory of risk and this understanding of narrative frames, this research uses these four cultural types to examine the ways that issues concerning the risk of BE foods are framed as policy narratives based on cultural world views. In fact, previous research has used these four cultural types to examine the way that issues concerning risk are framed as narratives (i.e. stories) depending on the cultural worldview (Jones, 2014). This brings the discussion to the role of the narrative.

Why Narrative Policy Framework?

The narrative policy framework (NPF) was developed to empirically test the presence and influence of different policy narratives on the policy process (M. McBeth, Jones, & Shanahan, 2014b). The framework allows scholars to produce a scientific understanding of the role of policy narratives (M. McBeth et al., 2014b). According to Stone (2012), policy narratives are used by policy actors (e.g. citizens or decision makers) to articulate and promote a specific understanding of an issue (Sabatier & Weible, 2014). Policy actors socially construct policy narratives to communicate information about policy problems with a goal of influencing potential solutions (Pierce et al., 2014). These policy narratives often exclude alternatives that they do not support to manipulate the scope of the issue (Pierce et al., 2014). Some post-positivist scholars argue that narratives are not adequate for forming causal and generalizable statements but there have been consistent findings indicating that narratives can inform hypotheses through the identification and analysis of narrative components (M. K. McBeth, Shanahan, & Jones, 2005; M. McBeth et al., 2007; Shanahan, Mcbeth, & Hathaway, 2011). The primary goal of the NPF framework is to provide scholars with narrative components that allow for generalization across different policy issues and domains (Jones & McBeth, 2010; Shanahan, Mcbeth, et al., 2011).

Policy narratives are described as having three structural components that allow them to be systematically analyzed: narrative elements, narrative strategies, and beliefs. Systematic analysis is possible, because the structure of the framework can be applied to multiple narratives and findings can therefore be generalized across different policy contexts (i.e. across different applications of emerging technologies) (M. McBeth et al., 2014b). This systematic-structuralist approach makes the NPF unique because it takes insight from critical policy analysis and combines it with traditional social science techniques to measure socially constructed realities (M. McBeth, Jones, and Shanahan 2014a).

NPF Assumptions

NPF has five explicit assumptions that reinforce its use as a tool for examining the influence of the regulatory review process. The five core assumptions include: the *homo narrans model* of the individual, social construction, bounded relativity, generalizable structural elements, and simultaneous operation at three levels. The first assumption is based on what NPF scholars have described as the *homo narrans model* of the individual. This assumption states that narratives play a central role in how individuals process information, communicate, and reason (E. Shanahan et al., 2017). Social construction refers to the subjective meaning assigned to different objects, persons, or processes linked to public policy (E. Shanahan et al., 2017). Bounded relativity explains how social constructions adapt to generate different policy realities (E. Shanahan et al., 2017). This assumption counters the structuralist argument of variation by assuming that variation is bounded because of specific narrative elements that lead to consistencies across multiple contexts (i.e. geographic or policy context). The generalizable structural elements states that every narrative has a specific generalizable structure (i.e. setting, characters, plot, and moral). The assumption of simultaneous operation provides a focal point for the variables that are examined within studies that employ this framework: narrative elements, narrative strategies, and policy beliefs. Simultaneous operation occurs through simultaneous interaction of policy actors involved in the policy process.

NPF assumes that narratives play an important role in public policy outcomes, processes, and designs through the phenomena referred to as simultaneous interaction (M. McBeth, Jones, & Shanahan, 2014a). An adapted version of the model of the simultaneous interactions can be seen in Figure 1.1. This is the assumption that policy outcomes are influenced through simultaneous interaction of three different categories of policy actors: the individual, group and coalitional level, and institutional level (M. McBeth, Jones, and Shanahan 2014a). The micro-level focuses on how individuals both form and are informed by policy narratives (E. A. Shanahan, Jones, & McBeth, 2018). The meso-level focuses on how policy actors, as groups or coalitions, construct and communicate narratives to influence the policy process (E. A. Shanahan et al., 2018). The macro-level focuses on how policy narratives permeate institutions and become embedded in cultures and institutions to shape public policy. This dissertation explores the meso and macro levels to examine how policy narratives are used in the regulatory review process to discuss the approval of bioengineered salmon. Examining policy narratives at multiple levels, and how they associate with different risk-based arguments and groups in a technological domain (BE food) will help to better understand simultaneous interaction of these levels, which will further contribute to the nascent NPF literature. Per the author’s knowledge, to date, the NPF has not been used to examine regulatory decisions concerning BE foods and only a small portion of studies explore how policy narratives and strategies of NPF relate to science in the decision-making process and uptake.

Given that previous studies have concluded that only technological elites have voice in BE food policy debates and formulation and demand the use of "science only" arguments (e.g. Meghani & Kuzma 2011; Meghani & Kuzma 2017), this study tests hypotheses related to these using NPF and cultural cognition theory (Chapter 2 and 3) and thus also contributes to the Science and Technology Studies (STS), S&T Policy literatures, and public participation in S&T literatures. This work also develops exploratory hypotheses to examine how and when different cultural cognitive and narrative story appeals resonate with decision makers and whether or not there is evidence of influence in policy response documents (Chapter 4).

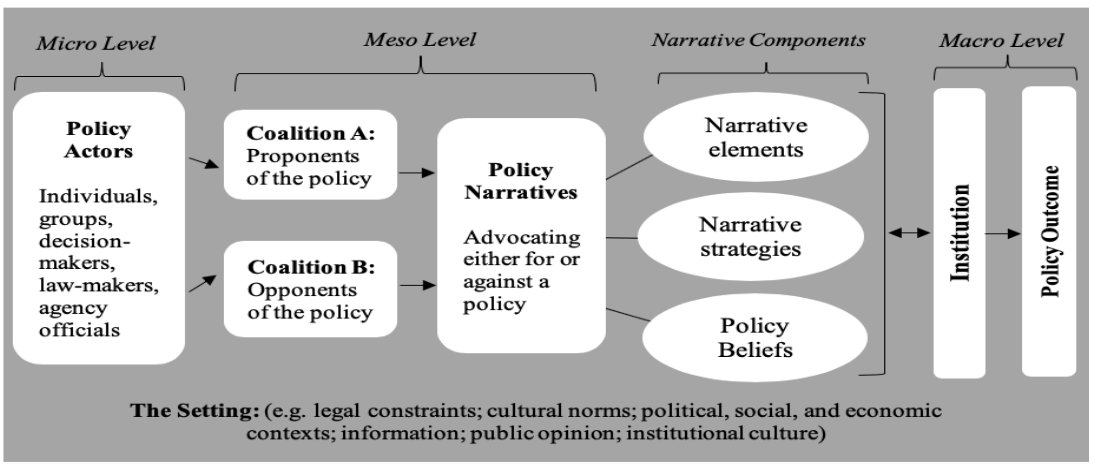

Figure 1.1: Adapted model of the Simultaneous Interaction of Policy Actors from McBeth, Mark, Michael D Jones, and Elizabeth A Shanahan. "The Narrative Policy Framework." In Theories of the Policy Process, Third edition. Boulder, CO: Westview Press, 2014.

Policy Narrative Components

Narratives are described as having three structural components that allow them to be systematically analyzed: narrative elements, narrative strategies, and beliefs. Systematic analysis is possible, because the systematic-structuralist interpretation of a narrative allows specific narrative elements to be generalized across different policy contexts (i.e. across different applications of policy domains) (M. McBeth et al., 2014b). This systematic-structuralist approach makes the NPF unique because it takes insight from critical policy analysis and combines it with traditional social science techniques to measure socially constructed realities (M. McBeth, Jones, and Shanahan 2014a).

Analogous to the structural elements of a story, narrative elements are composed of a setting, characters, plot, and a moral (Jones & McBeth, 2010). The setting describes the context of the policy situation, which may include factors relating to the legal and constitutional parameters, demographics, geography, and scientific evidence such as rules and guidelines established by agencies for definitions of risks. Characters are policy actors (i.e. individuals or groups) seeking to influence policy outcomes. NPF studies typically describe characters as heroes (protagonist or saviors), villains (antagonist or harmers), and victims (those that are harmed by villains and receive help from heroes) (M. McBeth et al., 2014b). The plot functions to situate the different components within the context of the story by establishing relationships between characters (i.e. policy actors). Lastly, the moral refers to the policy solution that is being promoted.

The second component of a policy narrative, the narrative strategy, refers to a specific method of persuasion used by policy actors to influence decision-makers or the public. Though there are many types of narrative strategies, McBeth, Shanahan, Arnell, & Hathaway (2007) have operationalized three types that fit with the structural elements of a narrative: (1) constructing narratives that expand or maintain the scope of conflict, (2) causal mechanisms that assign responsibility and blame, and (3) the devil/angel shift which ascribe blame and vilify policy actors (M. McBeth et al., 2014b). This dissertation examines the construction of narratives that expand or maintain the scope of conflict (e.g. science plus or science only, benefits and costs, policy surrogate, and condensation symbols) to provide insight into (1) how and to what extent are certain narratives associated with different policy actors, cultural worldviews, and narrative strategies, and (2) to explore what narratives become embedded within institutions and are taken up into policy documents.

The third and final component of a policy narrative focuses on the belief system. Weible, Sabatier, and McQueen (2009) define a belief system as a common or shared approach for understanding and knowing amongst policy actors. The NPF assesses policy beliefs as an operational measure of beliefs through narrative elements and how they are utilized by groups (M. McBeth et al., 2014b). In this dissertation (see Figure 1.2), policy narratives are identified according to the policy preference, pro- or anti- BE policy, as the core policy belief. This is discussed as winning or losing policy narratives. These winning and losing narratives are then examined for narrative cognition. Narrative cognition refers to how individuals organize, process, and convey information (Jones & McBeth, 2010), specifically, as it relates to cultural world views (e.g. hierarchical, individualist, egalitarian, or fatalist). Policy narratives utilizing certain narrative cognitions are then assessed for how they utilize narrative strategies.

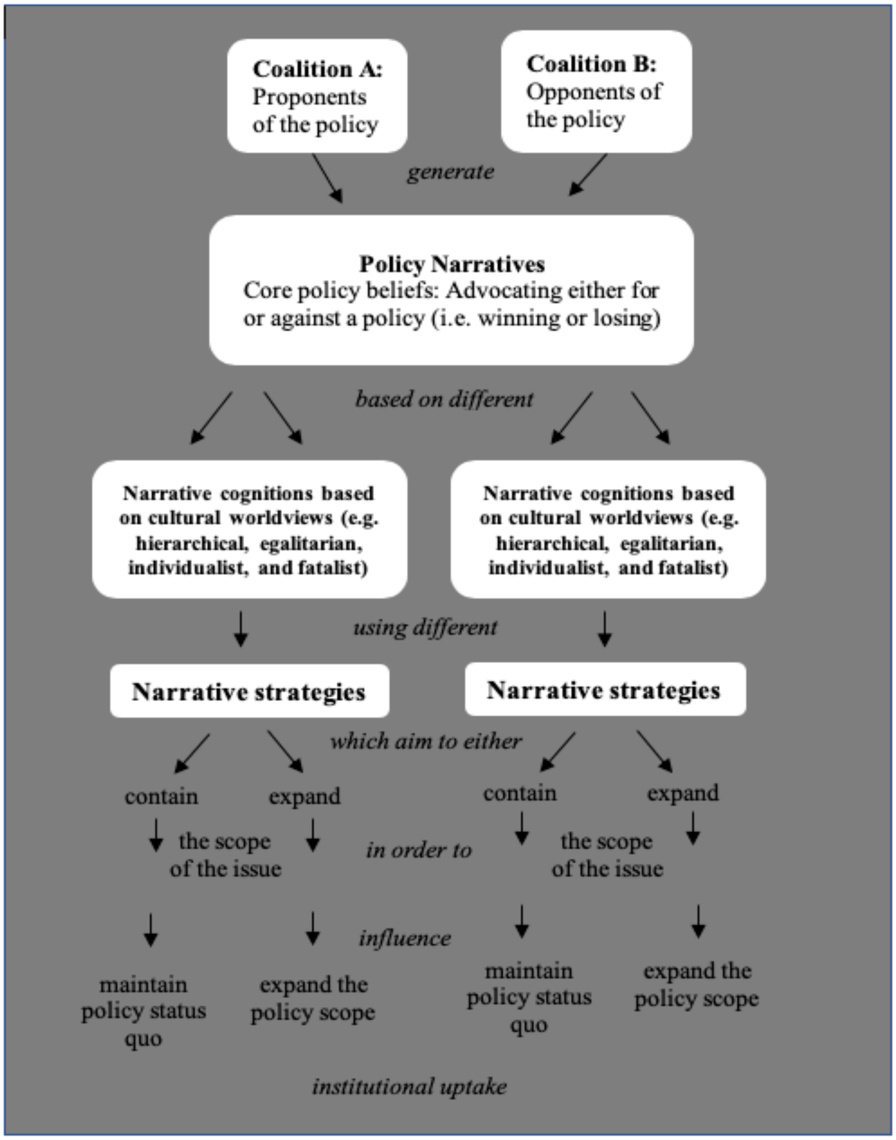

Figure 1.2: Adapted model of Narrative Policy Framework from Shanahan, Elizabeth A., Michael D. Jones, and Mark K. McBeth. "Policy Narratives and Policy Processes." Policy Studies Journal; Washington 39, no. 3 (August 2011): 535–61.

Narrative Strategies: Manipulating the scope of conflict

As mentioned before there are many narrative strategies that have been operationalized by previous NPF studies: constructing narratives that expand or maintain the scope of conflict, causal mechanisms that assign responsibility and blame, and the devil/angel shift which ascribe blame and vilify policy actors (M. McBeth et al., 2014b). This research focuses on constructing narratives that expand or maintain the scope of conflict. McBeth et al. (2007) found evidence of five issue scoping strategies that have been utilized by groups: winners and losers, scientific certainty and disagreement, construction of benefits and costs, the use of condensation symbols, and policy surrogate. These narrative strategies will be examined in chapters 2 and 3.

Winners or losers. Policy narratives typically identify characters as winners or losers. The winner or loser in a situation can be identified in this case based on the policy outcome. Policy actors seek to manipulate narratives based on whether they perceive themselves as winning or losing (Baumgartner & Jones, 2010).

Construction of risk ("science only" vs. "science plus"). Policy outcomes concerned with science are often contentious, especially those concerning emerging technologies. McBeth et al. (2007) examined the issue of scientific certainty and disagreement and found no difference in the use of science within winning or losing policy narratives. This lack of difference was attributed to core policy beliefs. However, Nie (2003) found that certain groups used science to promote the issue based on their preferred policy outcome. As a unique approach, this dissertation examines the way that risk is constructed by different groups as a narrative strategy. The literature that explores the definition of risk in relation to GE foods typically discuss risks as "issues", "concerns", or "harms" (Finucane & Satterfield, 2005; Frewer et al., 2013) in reference to both direct and indirect risks. "Science only" concerns deal mainly with direct effects that are easy to measure or mimic in laboratory or small field trials and "science plus" refers to concerns that are outside of the scope of the assessment, which include both direct and indirect risks that cannot be addressed using a science-based approach.

Construction of Benefits and Costs. Previous studies have found that groups will attempt to influence policy change by discussing the ways in which a specific policy solution is beneficial or in ways that it can create diffuse costs (Baumgartner & Jones, 2010; M. McBeth et al., 2007). We suspect that policy actors will construct narratives based on whether they are for or against the policy. In other words, those against the policy will construct narratives to illustrate negative costs (i.e. financial or economic burdens) and concentrated benefits (few groups benefits). Contrarily, those in support of the policy will construct narratives that show diffuse benefits (many groups benefit) and concentrated costs (economic benefits or financial gains).

Condensation symbols. Symbols or images are inserted within narratives to emphasize or to simplify a policy issue (Baumgartner & Jones, 2010; M. McBeth et al., 2007; Stone, 2012). These studies have shown that losing groups typically seek to bring attention to an issue by using condensation symbols. In contrast, winning groups will use images that maintain the status quo. We suspect that policy actors will seek to use condensation symbols based on whether or not they perceive themselves as insiders or outsiders. We also suspect that narratives utilizing condensation symbols will present narratives that are biased towards different cognitive frames

Policy Surrogate. Policy actors will also seek to bring attention to an issue by referencing a larger policy issue. Often times actors will utilize a less controversial policy issue as a surrogate for one that may be more complex and controversial (M. McBeth et al., 2007; Nie, 2003). We address this by looking at whether larger issues surrounding AAS are evoked in the narratives. For example, certain narratives may describe risks as larger policy issues such as ownership of seeds and intellectual property to shift the focus to disdain for corporate farms. We suspect that policy actors will utilize policy surrogates based on whether they are for or against the policy.

Case Study

United States. As mentioned before, the U.S. Food and Drug administration (FDA) has approved genetically modified salmon, AquAdvantage salmon (AAS), for entry into the marketplace. Some scholars believe that the conditions of the approval are narrowly defined with a limited scope that bestows significant leverage to AquaBounty Technologies (ABT), the company that develops AAS (Meghani, 2014).

During the approval process for AAS, the formal regulations were mainly focused on environmental concerns and they disallowed the production or growth of AAS in ocean net pens or in the United States (Center for Veterinary Medicine, 2015). The initial application stated that AAS eggs would be fertilized at a facility on Prince Edward Island, shipped to a land-based facility in Panama for growth, and then transferred to packaging facilities. The potential for environmental impact would have been confined to sovereign countries other than the US and Canada. Since the initial approval, ABT has received approval for multiple grow out cites in the US and Canada.

The FDA regulates the BE salmon, and other BE animals, under the New Animal Drugs Act (see Meghani, 2014; Meghani & Kuzma, 2018). This is because the DNA introduced is considered a drug and primary safety concerns are to the fish under a narrow interpretation of the act. However, the FDA also voluntarily reviews food from BE animals under its policy on bioengineered foods (US FDA, 2015). Here they consider substantial equivalence of the BE salmon to wild or non-BE farmed salmon according to nutritional composition, toxicity assessment, and allergenicity (US FDA, 2015). But this process is voluntary for the industry producers to comply with. The National Environmental Policy Act of 1970 (NEPA) provides the framework for the environmental assessment of BE salmon (US EPA, 1970). However, NEPA does not necessitate an environmental impact assessment in foreign sovereign countries regarding social, economic, and/or cultural effects. In the US, an evaluation of the social, economic, and cultural effects is supposed to be considered under NEPA, but they do not provide regulatory authority for the FDA to mitigate such concerns if the environmental assessment concludes that the proposed technology will not have an impact on the physical environment (US EPA, 1970) . In practice, concerns pertaining to broader ecosystem harm, indirect health risks, and ethical concerns are paid little attention and the FDA does not have authority to act on such concerns under the New Animal Drug Act (given limited scope) or NEPA (given that it is a procedural statute only).

The road to approving BE salmon in the U.S. was a long one. Extending almost two decades from 2000 to 2019. In 2002, a report by the National Academy of Science (NAS) raised concerns regarding the high levels of uncertainty associated with BE animal development and the FDA's expert capacity for decision making (National Research Council, 2002). Guidance policies were developed to evoke The Federal Food, Drug, and Cosmetic act to exert its authority to regulate BE animals in 2009, by classifying the gene put into the animal as a "drug" and the BE animal as a new animal drug (21 CFR 10.115). Given these provisions, the definitions for safety were mainly focused on the health of the animal that is treated with a drug and the efficacy of the drug (which would be related to its intended function like faster growth in the AAS salmon), but these provisions did not transfer well in the context of BE animals where safety concerns surpass the health of the animal (National Research Council, 2002). The FDA's Center for Veterinary Medicine was required to confer with an advisory board on veterinary medicine that functions to provide additional expertise for concerns regarding environmental and indirect health risks (National Research Council, 2002).

This process initiated the public involvement process. The Veterinary Medicine Advisory Committee (VMAC) and the FDA hosted a public hearing to review the findings of the CVM and to receive public input. The VMAC committee recommended additional studies focused on adequate sample size used to assess human health risks and to further investigate the effect of AAS on the ecosystem as it relates to predation or spread (Senior, 2010). The VMAC concluded that there should be additional sensitivity studies to assess potential allergens (Senior, 2010). Ultimately, the decision was made by FDA-CVM to approve AAS despite the VMAC's concerns. In response, a group of US senators that were prompted by their constituents, introduced a bill to block the approval of AAS without a full Environmental Impact Statement (EIS) (H.R. 2112, 2011).

The FDA released the draft Environmental Assessment along with the Finding of No Significant Impact (FONSI) (US FDA, 2012). The public was invited to submit public comments on the FONSI. to review the proposed conditions for approval. The comment period remained open from December 26, 2012 through April 26, 2013. A total of 1,217 comments were received with 15,914 write-in campaigns. This public comment period was utilized as the data point for this dissertation. Public comments on the draft EA and FONSI were assessed to explore the narratives of different stakeholder groups coming from pro- vs. anti-BE positions. The Federal Notice of Public Comment in Rulemaking is the one place in the U.S. biotechnology regulatory system for which the public has an opportunity to participation with a voice. Although many studies have criticized that it is not a rigorous form of public engagement, it is a window into the views and narratives of the wider public.

Canada. The motivation to include Canada is driven by the significant distinction between the way that Canadian decision makers create and implement policies. There are policies in place that seek to ensure that the process is legitimate and transparent, however, AAS was approved for production without notifying the public. Public consultation was not solicited prior to the decision to approve AAS for sale. Instead, a review of the BE Salmon approval was initiated by Environment Canada (EC) and Health Canada (HC). AAS underwent multiple assessments by different agencies.

The *Canadian Environmental Protection Act*, 1999 (CEPA 1999), administered by Environment Canada (EC) and Health Canada (HC), is the key authority for novel organisms like the AAS. The Government of Canada ensures that all new substances, including organisms, are assessed for their potential harm to the environment and human health. Under CEPA 1999, the New Substances Notification Regulations [NSNR (Organisms)] prescribe the information that must be provided to EC prior to the import or manufacture of new organisms that are living products of biotechnology, including fish like AAS.

Fisheries and Oceans Canada (DFO), EC and HC signed a memorandum of understanding to implement the NSNR (Organisms) for fish. DFO assisted by conducting an environmental and indirect human health risk assessment for GE fish like AAS and recommended assessments to manage risks. The risk assessments evaluate whether the notified fish product of biotechnology is “CEPA toxic”. A substance is toxic if it may enter the environment and a) have or may have an immediate or long-term harmful effect on the environment or its biological diversity; b) constitute or may constitute a danger to the environment on which life depends; or c) constitute or may constitute a danger in Canada to human life or health.

A notification under the NSNR (Organisms) was submitted to EC by AquaBounty Technologies in April 2013. DFO conducted environmental and indirect human health risk assessments to make recommendations to EC and the Minister of the Environment about any necessary risk management measures for the AAS. In addition, a peer review assessment was undertaken by the Canadian Science Advisory Secretariat (CSAS) in July 2013. The purpose of this peer review was to discuss the conclusions presented in DFO's preliminary comprehensive Environmental and Indirect Human Health Risk Assessment AAS. However, the process did not involve an external advisory process, as only 3 of 23 participants were from outside of government sector (1 consultant, 1 academic, and 1 from Atlantic Salmon Foundation). Of the remaining participants, 16 were from DFO itself, 3 from other federal govt agencies (HC and EC), and 1 from PEI Province. The public was not directly solicited for input on the decision-making process for the approval of AAS production under the NSNR (NSO) process.

In response to the approval of AAS production, two environmental groups, Ecology Action Centre (EAC) and Living Oceans (LOS), took the Federal government to court for the approval of AAS (Wristen, 2014). Opposition to AAS approval was primarily rooted in the fact that the review did not include an assessment of "whether the genetically engineered salmon could become invasive, potentially putting ecosystems and species such as wild salmon at risk" (Wristen, 2014). AquaBounty (the company that produces AAS) had also been given permission to develop and grow-out the AAS at other locations in the country that had not yet been assessed (Wristen, 2014) by EC and DFO under CEPA. In addition, the process for approval lacked transparency and did not involve public consultation (J. Kuzma & Williams, 2018). In fact, public notices were only generated to inform the public after these NGO groups took the Federal government to court. In the end, the court ruled in the favor of the Federal government in upholding the original approval, but the court ruled to restrict AquaBounty egg production to a single facility on Prince Edward Island and did not grant permission to grow out at other locations within Canada. The court also ruled that the Federal Government's current practices of issuing waivers without public notification could not be continued.

Soon thereafter, in May of 2016, AAS received approval for consumption and sale. At this point, Parliament's House of Commons Committee on Agriculture and Agri-food was asked by the Minister of Agriculture and Agri-Food to examine the legal and regulatory framework around BE animals and their increasing availability for human consumption. On 1 June 2016, the Committee agreed to "study genetically modified animals for human consumption, including any changes which may be needed to adequately address the full range of potential issues around the approval of products involving genetically modified animals beyond health and safety, the challenges and opportunities this presents to Canada, and what steps should be taken to best inform the public about new products planned for introduction to the market; and that the Committee report its findings to the House no later than Thursday, December 8, 2016" (Finnigan, 2016, p. 1).

The Committee held four public hearings in September and October 2016, hearing from representatives of the agriculture and agri-food sector, regulatory authorities and advocacy groups about the issues raised by the arrival of BE (or Genetically modified) animals for human consumption. In October 2016, stakeholders were invited to present their viewpoints at a committee hearing. In Dec 2016, the summary report was released, which is available online along with full transcripts of the meetings (House of Commons 2016). In April 2017, government agencies responded to the report. Although, this public input process occurred after AAS was approved, these reports and transcripts of the meetings provided the only window of participation and transparency into regulatory policy setting for GE animals and the AAS BE Salmon in Canada (see Figure 1.3 for illustration of windows of opportunity). The House of Commons subcommittee agriculture and agri-food transcripts and reports will be used to examine pro and anti- BE salmon policy narratives, the narrative strategies being used, and the narrative cognition being used. These results were used to assess what narrative positions are taken up in the final policy documents from the Parliament sub-committee.

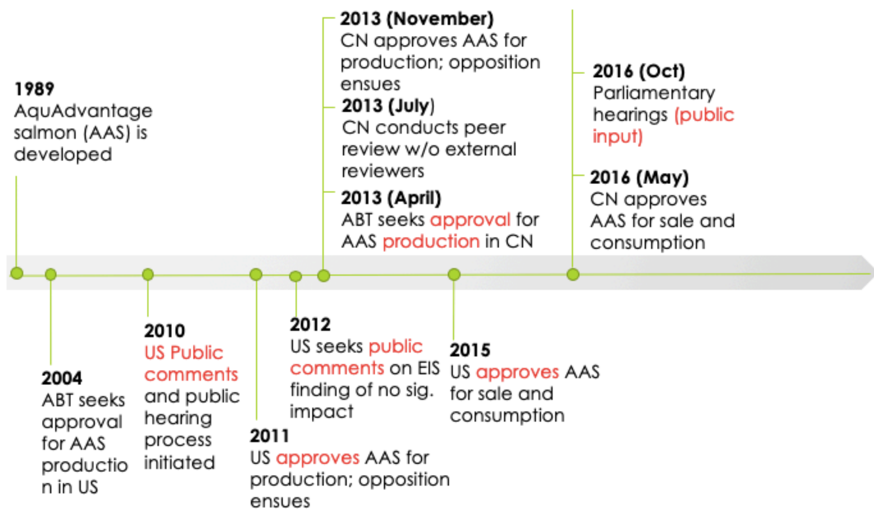

Figure 1.3: Cursory timeline of BE Salmon approval and windows of opportunity for public participation.

Comparison of regulatory governance in the US and Canada

In Canada, it is notable that the risk assessment required by the CEPA NSNR for novel foods and novel feeds are not published online for public viewing, instead only summaries are provided on the HC and EC websites. In contrast, in the U.S., one can obtain the risk assessment documents for biotech products online in most cases, and thus see how the data is interpreted (e.g. see Meghani & Kuzma 2017). In the U.S., there are also mandates under the Administrative Procedures Act (APA) of 1946 for public comment periods on regulatory decisions. The approval of individual GE food animals, in addition to broader policies on how to regulate GE animals come under the APA. In contrast, without such mandates in Canada this is a key weakness in transparency ---external academics and stakeholders with subject matter knowledge, and other interested publics, cannot judge the data, its interpretation, and risk conclusions from just a summary after the decision was already made. One could argue that this lack of *external* peer review and scrutiny is harmful to the scientific enterprise. Note, however, that DFO did have peer review committee on its own assessment (see description of committee mentioned above) but we argue that an agency should not peer-review its own assessment. This does not meet scientific standards, and likely presents issues of conflict, bias, and agency political pressures.

In the U.S. there are sometimes external advisory committees to review biotech product decisions (e.g. at FDA and EPA, not as much at USDA). These committees operate under federal laws, which require the reporting of conflicts of interest and dictate that meetings must be open to the public and notifications of them published in advance (Federal Advisory Committee Act). There are also laws that require government agencies to provide regulatory documents and correspondence to the public who request them (Freedom of Information Act), although often confidential business information can be claimed by the company, blacked out and removed. There are also procedures to mandate public comments in rule making (Administrative Procedures Act 1946). In Canada for the AAS federal governance system, these processes seem absent. Without external eyes and drawing upon a wide expertise of various publics and stakeholders, scholars have argued that the analyses will suffer from a deficit of important standpoints (Meghani & Kuzma 2014)—quality may suffer and public legitimacy of decisions may decrease. The only window the public had was the Parliamentary hearings on GE animals, which took place after the BE Salmon decision was made.

Canada does have a desire to operate in a more open and transparent manner, however. In particular, agency staff recognize that BE animal products are controversial and that there will soon be an explosion of them as gene editing and CRISPR make genetic modification of animals easier to do (Kuzma & Williams, 2018). In informal interviews with decision makers from EC, AAFC, and HC (Kuzma & Williams, 2018), we found that biotechnology government staff are currently struggling with broader, recent Canadian efforts to engage the public in decision making and increase transparency.

Dissertation Approach

A need exists to understand the opportunities for actors to influence policy outcomes and to understand how narratives affect the regulatory review process to ensure that certain world views are not privileged. To this end, this study has four goals: (1) to explore the ways that certain policy narratives (winning pro-BE vs. losing anti-BE) are associated with cultural world views and narrative strategies in the Canadian BE food policy system (Chapter 2); (2) to examine how public comments contain winning or losing policy narratives that are associated with certain cultural world views and narrative strategies in the US context (chapter 3); finally (3) to examine what cultural world views and narrative strategy appeals are most dominant in policy response documents used to inform the final decision in both countries (Chapter 4). To accomplish this goal, this study employs content analysis guided by Narrative Policy Framework and cultural cognition theory of risk. This research contributes to the narrative policy framework literature by examining the role of meso level policy narratives that function to influence macro policy narratives. It is also one of the first studies to type stories by cultural worldviews to examine narrative strategies and anti- versus pro- policy attitudes. In addition to building upon theory, this research also offers insight for regulatory agencies and policy makers to help them acknowledge cognitive bias as a part of the regulatory review process. Future regulatory review processes for emerging technologies should actively seek to incorporate broader perspectives and generate a deliberative decision-making process that takes cognitive bias into consideration.

Given this need to explore the types and strategies of narratives that exist in BE food regulatory processes and which ones are taken up in policy documents, Narrative Policy

Framework (NPF) and cultural theory of risk will be used to examine the points in the regulatory review processes that invite participation from the public or stakeholder groups (e.g. public comments and public hearings) and the outcomes produced (e.g. policy response documents).

Here, the focus is to examine narrative structure and narrative strategies (this will be explained in greater detail later) to provide a greater understanding of how policy actors try to influence the regulatory review process. Policy narratives (i.e. stories) are used by policy actors to articulate and promote a specific understanding of an issue, while also excluding alternatives (Jones & McBeth, 2010). Public comments typically incorporate narratives as a means of conveying information through the informal rule making process (C. Farina, Epstein, Heidt, & Newhart, 2012). These policy actors socially construct narratives to communicate information about policy problems with a goal of influencing potential solutions (Pierce, Smith-Walter, and Peterson 2014).

This research explores the relationship between cultural cognition theory of risk, structural elements, and narrative strategies. The interaction between these relationships help to explain the mechanistic functions of influence at the core of narrative strategies (Raile et al., 2018). This approach is unique because while previous narrative risk-based studies show that narratives influence risk perceptions and decision making (de Wit, Das, & Vet, 2008; Janssen, Osch, de Vries, & Lechner, 2013), the mechanistic functions involved in narrative persuasion are not clearly understood (Raile et al., 2018).

Furthermore, many scholars believe that democratic values such as meaningful participation should be integral to any legitimate regulatory process (deLeon & deLeon, 2002; Jennifer Kuzma & Besley, 2008a; Meghani, 2014) . This research investigates how the regulatory process for AAS involves different perspectives and seeks to understand whether or not certain worldviews are being privileged (i.e. incorporated into decision documents) over others. Thus, it also contributes to the literature on how to design effective public engagement as a tool for decision making in the regulatory review process (Kahan et al., 2011). It also offers practical guidance for public communication by examining narratives that have greater or less influence on institutional uptake and policy change. These findings, also, contribute to our understanding of how groups can be more effective at influencing policy outcomes.

This research will be one of very few studies to use NPF to examine public comments in regulatory rule-making. Farina et al. 2012 found that narratives are used in public comments in order to articulate and promote a specific understanding of an issue, whether or not a commenter exhibited the ability to provide sophisticated and detailed commentary (Farina et al. 2012). Prior studies also show that actors socially construct narratives to communicate information about policy problems with a goal of influencing the potential solutions (Pierce, Smith-Walter, & Peterson, 2014).From these studies, an appropriate role is suggested for use of the narrative policy framework (NPF) to systematically examine public comments during the regulatory review process.

However, previous research was limited in scope to understanding connections between the micro, meso, and macro levels of analysis of the NPF (Figure 1.1). In our analysis of GE salmon and regulatory review, we make a unique contribution to the application of NPF theory by using it as a lens to not only the individual and meso levels of policy but also the macro level (Figure 1.1). Although the primary goal of this study is to understand the influences on the regulatory policy process that may be achieved through public participation, this research will also contribute to the macro-level literature in NPF. Thus far, existing studies only inform possible approaches to using the NPF for macro-level analysis (McBeth & Shanahan, 2004).

This research focuses on how policy narratives embedded in cultures and institutions shape public policy. Macro-level narratives will be examined through cross country comparison of agency official responses in public hearings and congressional hearings. Specifically, this research helps to explain how policy narratives develop among policy actors at the meso-level but then go on to influence narratives that become embedded within agencies and therefore continually shape public policy outcomes (macro-level). Therefore, an important theoretical goal of this study is to identify meso-level narratives that come to shape macro-level politics, that in turn, create macro-level policy climates within regulatory agencies. By identifying the connections between narratives within the different levels of the NPF, this study will make an important contribution to understanding the dynamics of narratives in the policy process (M. McBeth et al., 2014a). The following section provides an overview of the organization of this dissertation.

In the first article (chapter 2), insight from the Narrative policy framework (NPF) and cultural cognition theory is used to analyze parliamentary hearings in Canada. It is acknowledged that public data are sparse in the public domain, as there are few “windows” to participate in the Canadian risk governance system for GE animal foods. This makes it difficult to determine how different groups and their motivations affect decision making. The research examines public hearings focused on the regulation of GE animals as an opportunity to understand narrative use within the AAS risk governance system in Canada to influence uptake[2]. Since previous research has yet to identify the relationship between cultural cognition and narrative strategies, this research asks the following questions: How does cultural story type

[2] Uptake refers to when an issue is brought to the attention of government officials and they respond to or “uptake” considerations into their final decisions (Panisset et al., 2012).

influence the construction of risk? How does cultural story type relate to whether "science plus" or "science only" arguments are made (issue expansion and contraction as a narrative strategy)? How does cultural story type relate to the narrative strategy being used? What associations exist between cultural story type and policy stance (i.e. winners and losers)?

In the second article (chapter 3), an approach that integrates concepts from Narrative Policy Framework (NPF) (Jones & McBeth, 2010) and insight from the cultural theory (Douglas, 1982; Thompson, 1990) is utilized again, but this time in the U.S. context. First the article addresses the issues of narrativity because it is a contentious issue in the literature (Crow & Berggren, 2014; M. K. McBeth, Shanahan, Arrandale Anderson, & Rose, 2012). To address this issue, this research examines the extent to which policy components are used in public comments by establishing an index of narrativity (as seen in (Crow & Berggren, 2014; M. K. McBeth et al., 2012). We expect to find a strong index of narrativity among the majority of the public comments, to show that narratives can be identified in public comments. In addition, as a unique approach, this dissertation examines the way that risk is constructed by different groups as a narrative strategy. Given this need to examine influence in the regulatory review process, this study has three primary goals: (1) to examine the narrative structure of public comments, (2) to understand what narrative strategies are being used in public comments to influence institutional uptake and those that are not, and (3) to understand what types of cultural narratives are associated with certain narrative strategies being used by winners or losers. The regulatory approval process of BE salmon in the United States is used as a case study.

Lastly, in article three (chapter 4), the research builds upon previous approaches by using the theoretical framework of cognition theory and narrative policy framework to examine appeals that appear more prominently in policy response documents: these documents represent the policy uptake which informs the final rule. Given that policy response documents may reflect privilege given to certain appeals, examining these documents for dominant cultural cognitive story appeals and narrative strategy appeals will provide insight into understanding to what extent and in what way these appeals manifest in uptake based on the final rule. It is expected that hierarchical cultural cognitive appeals and "science only" narrative strategy appeals will be more dominant than others. The following research questions are examined: What cultural cognitive story appeals appear more prominently in policy response documents? What narrative strategy appeals appear more prominently in policy response documents? For these questions, both the Canadian and the U.S. case of BE salmon are used and compared.

Abstract for Article 1: Using Narrative Story Structures and Scope to Examine the Tools of Influence Used in the Regulatory Review Process for Bioengineered Salmon approval in Canada

Genetically engineered salmon have been approved for human consumption in the United States (US) and Canada, but it has only been released for sale in Canada. In the US, opposition to the approval caused regulatory agencies to switch from the voluntary labeling guidance to mandatory labeling, thereby requiring food manufacturers to label foods disclosing information about bioengineered foods and bioengineered food ingredients. Still, some scholars have emphasized the need for risk management to be inclusive of viewpoints beyond that of the elitist risk assessment and reduction approach. The US FDA contends that risk assessments for emerging food biotechnology should be based on an objective, science-based, value-neutral approach: as it should. However, risk management or managing risks involves using information (i.e. both values and science) to make decisions concerning policy. Moreover, we posit that the science-based approach is not value-neutral. Some scholars have suggested that proponents of the science-based

approach exhibit biased thinking by using heuristics that are largely dependent on world views and ways of interpreting information. The differing responses of the Canadian government and the US government provides us with the opportunity to explore narratives that are being used to influence decision making in risk management and those that are not. With this in mind, we use the public hearings focused on the regulation of GE animals as an opportunity to examine, how and what, narratives are being used within the AAS risk governance system in Canada to influence policy uptake and those that are not. To accomplish this goal, the research employs content analysis informed by the Narrative Policy Framework and Cultural Cognition theory. Findings suggest that winning policy that are composed as hierarchical and individualist stories are likely to expand the scope of the issue “science-plus”, only when it promotes their pro-BE policy stance.

Abstract for Article 2: Examining Narrativity and Influence in Public Comments in the Rulemaking process for Genetically Engineered Salmon approval in the United States

The debate concerning genetically modified animals used for consumption continues in the United States. These debates center on the definitions of risk and the appeal for meaningful democratization of the regulatory review process. This study addresses the question of what types of policy narratives are used to influence uptake in public comments by focusing on the case of the approval of BE salmon by the FDA in the U.S. through the public comment period for rule making. Previous studies have revealed that certain groups exert strategies of influence in the regulatory review process based on whether they are winning or losing. Studies using the narrative policy framework (NPF) have found that certain strategies can be used to leverage influence. NPF posits that policy narratives containing strategies and play a central role in how policy actors process information, communicate, and reason. Cultural cognition theory argues that individuals craft information by fitting it to certain narratives that is based on information

which aligns with their worldviews. To better understand how policy actors, try to influence policy uptake in the regulatory review process in the US for BE foods, the research utilizes the four typologies associated with cultural cognition theory in combination with the narrative elements of a story. This approach is taken to explore the extent to which public comments contain policy narratives, the narrative strategies associated with winning (pro-BE) and losing (anti-BE) policy narratives, and to understand what cultural cognitive stories are associated with winning and losing policy narratives. Findings indicate that public comments exhibit a high level of narrativity despite being brief. This suggests that future research should contribute to informing the quality of the participatory process. Additional findings suggest that there was a significant association between hierarchical cultural stories and winning narratives. There was also a significant association between science only and winning narratives.

Abstract for Article 3: Examining Uptake: A Deeper Look into the Policy Making Black Box

Different factors function to influence policy uptake[3] of ideas and viewpoints. Still, much of the rulemaking literature has focused primarily on the *inputs* of the decision-making process. These studies have helped to explain the influential factors involved in the rule making process but the causal path between narrative influences and policy outcomes have been challenged and are difficult to measure because of unseen influences in the rule-making process. Therefore, this research uses insight from cultural cognition theory and narrative policy framework in a comparative context to examine the narratives and policy stances embedded within them that are being “taken up” in the rulemaking process to understand whether certain ways of thinking become embedded within institutional documents, and thus institutions. Findings illustrate a

[3] Uptake refers to when an issue is brought to the attention of government officials and they respond to or “uptake” considerations into their final decisions (Panisset et al., 2012).

substantial difference between Canada and the U. in the types of narratives that were “taken up” into regulatory and policy documents in BE food debates and thus the policy outcome for both countries.

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Chapter 2: Using Narrative Story Structures and Scope to Examine the Tools of Influence Used in the Regulatory Review Process for Bioengineered Salmon approval in Canada

For the first time in history a bioengineered (BE) animal, AquAdvantage salmon (AAS), was approved for consumption and will be released into the food marketplace in both the United States (US) and Canada (Ledford, 2015). In the US, among other reasons such as state level labeling laws, opposition to the approval caused regulatory agencies to update the voluntary labeling guidance leading to the development of the National Bioengineered Food Disclosure Standard (National Bioengineered Food Disclosure Standard, 2019). The standard requires food manufacturers to label foods disclosing information about bioengineered foods and bioengineered food ingredients that contain modified genetic material (National Bioengineered Food Disclosure Standard, 2019) . However, exemptions to this standard include products containing gene edited products and products containing GE ingredients that do not contain genetic material. Regarding the labels themselves as to what should be presented to the public are disclosure options that include a text, a symbol, a phone number, a web address, information to receive text messages, and/or an QR code (National Bioengineered Food Disclosure Standard, 2019). Conversely, in Canada AAS has been sold under voluntary labeling guidelines and AquaBounty, the company that develops AAS, chose not to label the fish.

The regulatory agencies in both countries used similar risk assessments, but the policy outcome in Canada did not include labeling and the process for decision making was different, suggesting differences in influential factors, between the United States and Canada. Beyond labeling regulations, the preliminary analysis of the AAS risk governance system in Canada indicated that there were very few opportunities for public participation in the process (relative to other countries, including the U.S.). Notably, the risk governance system for AAS required citizens and advocacy groups to seek out alternative venues (i.e. court system) to further expand the scope of the regulatory review process. For example, an additional site acquired for AAS production was approved prior to completing an environmental impact assessment: despite the fact that the production was within close proximity of the natural Atlantic Salmon (Lee & Cloutier de Repentigny, 2018). The issue had to be settled in Federal court, with a final ruling which stated that an environmental assessment was necessary (Lee & Cloutier de Repentigny, 2018). However, the only opportunity for the public to participate in the policy process occurred after AAS was approved for production. Parliamentary hearings conducted within the House of Commons by the Standing Committee on Agricultural food represented the only opportunity for public input. This opportunity provided a window into the attitudes of public and stakeholder representatives as well as decision makers, experts from industry and academia, and government officials.

In this research, insight from the Narrative policy framework (NPF) and cultural cognition theory is used to analyze these parliamentary hearings in Canada. It is acknowledged that public data are sparse in the public domain, as there are few opportunities for the public to participate in the Canadian risk governance system for GE animal foods, and it is difficult to determine how different group motivations affect decision making. This dissertation research examines the public hearings which were focused on addressing any inadequacies in potential issues related to the approval of BE animals used for human consumption and to identify steps for informing the public. This public hearing represents an opportunity to understand policy narrative use within the AAS risk governance system in Canada to influence uptake[4].

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[4] Uptake refers to when an issue is brought to the attention of government officials and they respond to or "uptake" considerations into their final decisions (Panisset et al., 2012).

Why is this important?

The Canadian AAS case is the first time that a bioengineered (BE) animal has been approved for human consumption and sold in the marketplace. BE animals in the food supply are destined to be even more controversial than BE plants. BE plants have been widely consumed in Canada and around the world and have faced significant opposition, often coupled with concerns about the ownership and structure of agriculture, the change in landscapes due to large-scale farming, and the desire for "natural" and local foods . Surveys suggest that the public is more notably concerned about GE animals for food than GE crops (Royal Society 2017; Frewer et al 2014; Cuite et al. 2005; Hoban 1998). Recent research using "disgust sensitivity" measures found that GE animals are viewed as the most negative of various food technologies; more than pesticides and hormones (Henson et al. 2008). Deeply held attitudes, values and beliefs often underlie this negativity. For example, measures of "disgust sensitivity" are strongly correlated with resistance to GE animals (Scott *et al.* 2016) and genetically engineered animals provoke diverse ethical concerns outside of scientific safety (Thompson 1997). This suggests a need for a more inclusive regulatory decision making and assessment in that a wider range of concerns can be identified and addressed through public participation (Meghani & Kuzma 2011; Meghani 2017).

Some scholars have emphasized the need for regulatory assessment to be inclusive of narratives (i.e. public input) beyond that of the elitist risk assessment and reduction approach to foster meaningful democratization within the regulatory review process (Berry-James, 2014; Jennifer Kuzma & Besley, 2008a; Meghani, 2014; Smith & Larimer, 2016). Public input is intended to improve the quality of decisions, enhance the legitimacy of decision-making in the regulatory review process, and to allow the questions addressed by the science to be influenced by the public concerns (Cobb & Macoubrie, 2004; National Research Council, 2008; Rowe &

Frewer, 2000). Still, previous studies indicate that certain organized groups have the ability to disproportionately influence policy outcomes (Meghani, 2014; Naughton, Schmid, Yackee, & Zhan, 2009; Nelson & Yackee, 2012; J. W. Yackee & Yackee, 2006). These studies found that agencies were more likely to be influenced by groups that had the ability to craft narratives describing risks and potential economic benefits that were similar to their own narratives (Bevan & Rasmussen, 2017; Eckerd, 2014; J. W. Yackee & Yackee, 2006).

Other scholars argue that the regulatory review process is unbiased and public input does not contribute to increasing legitimacy (Cropper, Evans, Berardi, Ducla-Soares, & Portney, 1992). For example, Christiansen et al. (2017) posited that increased public input did not create a democratic deliberative process but instead increased the level of controversy in the process: specifically, in cases where science was at the core of the debate. This literature failed to acknowledge that decision making focused on bioengineering and other emerging technologies was fraught with ambiguities and uncertainty and cannot be based purely on objective science and is rather based on the values that scientists and decision makers hold in interpreting scientific information (Jasanoff, 1987; Jennifer Kuzma & Priest, 2010).

In the case of GE animals, the completed risk assessments arguably fail to consider all of the scientific and legitimate concerns regarding toxicity and allergenicity of GE Salmon and food derived from it, and other broader health and environmental risks (Canadian Science Advisory Secritariat, 2017; Center for Veterinary Medicine, 2015a; Health Canada, 2008). Furthermore, agencies need to interpret the of meaning of scientific information under conditions of uncertainty in order to make a decision. For example, in the government assessment documents qualitative rankings of risk and uncertainty (e.g. of “reasonable uncertainty”) are not transparently derived or sometimes even based on data (see also, Meghani & Kuzma, 2018 for analysis of FDA's assessment of GE insects). While some studies suggest that citizens perceive risk using cultural values and cognitive bias (Andreas et al, 2010; Lorente & Alonso, 2014) and that scientist rely on technical language (Kahan, Jenkins-Smith, & Braman, 2011; Leiserowitz, 2006; McNeil et al., 2013; Slovic, 2010), other studies reveal that scientists and decision makers also exhibit bias when making decisions about risk and use their cultural world views to interpret and assimilate scientific information (Beaudrie et al. 2014). In other cases, multiple interpretations of evidence of potential risks led to product approval despite lingering issues of concerns (see *The Fight Against Monsanto's Round up* and Chlorpyrifos approval) (cites). Meghani & Kuzma (2017) have recently shown this to be the case for GE animals and FDA assessments. These findings show that decision makers often exhibit biased reasoning by using heuristics that are largely dependent on world views and ways of interpreting information (see Meghani & Kuzma, 2018). According to Lodge and Taber's (2006) motivated reasoning model, those with the greatest knowledge and political sophistication are more likely to disconfirm the values of others when the other values do not match. This suggests that differences in knowledge and prior beliefs influence the standards used for risk assessments.

Given the importance of incorporating diverse concerns in decision making, the purpose of this paper is to explore how different stakeholders and public representatives use narratives to try to influence policy processes for controversial technologies, such as BE, applied to food. To further understand these issues, the researcher investigated the case study of the AAS approval process in Canada. The research serves as a current example for governance of BE food animals and an instructive case for future governance of gene-edited food products derived from BE animals. Questions of how different cultural world views and policy stances associate with narrative strategies, such as expanding the scope of the issue, are explored. In particular, we focus on how different groups expand the scope to include a broader range of concerns beyond those considered as “science-based” in regulatory review (e.g. direct toxicity).

The following section discusses the approval process of AAS, that markedly shows evidence of limited public participation only after AAS had been approved for production and consumption.

Background: What is AquAdvantage Salmon?

AquAdvantage Salmon (AAS), a genetically engineered (GE) salmon variety, has been genetically manipulated to grow to adulthood in half the time in comparison to Atlantic salmon. The process involves the insertion of recombinant gene construct which contains the growth hormone gene from Chinook salmon and a promoter gene inherently expressed by ocean pout.

AquaBounty Technologies submitted an application requesting approval of AAS in April 2013 (see Figure 2.1). The agencies responsible for assessing environmental and direct human health risks approved AAS for production in November 2013. However, the public was not directly solicited for input in the decision-making process for the approval of AAS production as is usually required under the New Substances Notification Regulations (NSNR) process. In response, environmental advocacy groups, Ecology Action Centre (EAC) and Living Oceans (LOS), took the Federal government to court to challenge the approval of AAS . Their opposition to AAS approval was primarily rooted in the fact that the review did not include an assessment of “whether the genetically engineered salmon could become invasive, potentially putting ecosystems and species such as wild salmon at risk” (Wristen, 2014). AquaBounty was also given permission to develop and grow-out AAS at additional locations in the country that had not yet been assessed for environmental impact. In the end, the court ruled in favor of the approval of AAS, but also to restrict AquaBounty egg production to a single facility on Prince Edward Island. The court did not grant permission to grow out at other locations within Canada without environmental impact assessments. The court also ruled that the Federal Government's current practices of issuing waivers to avoid public notification could not be continued. AAS now faced the challenge of being approved for consumption and entry into the market.

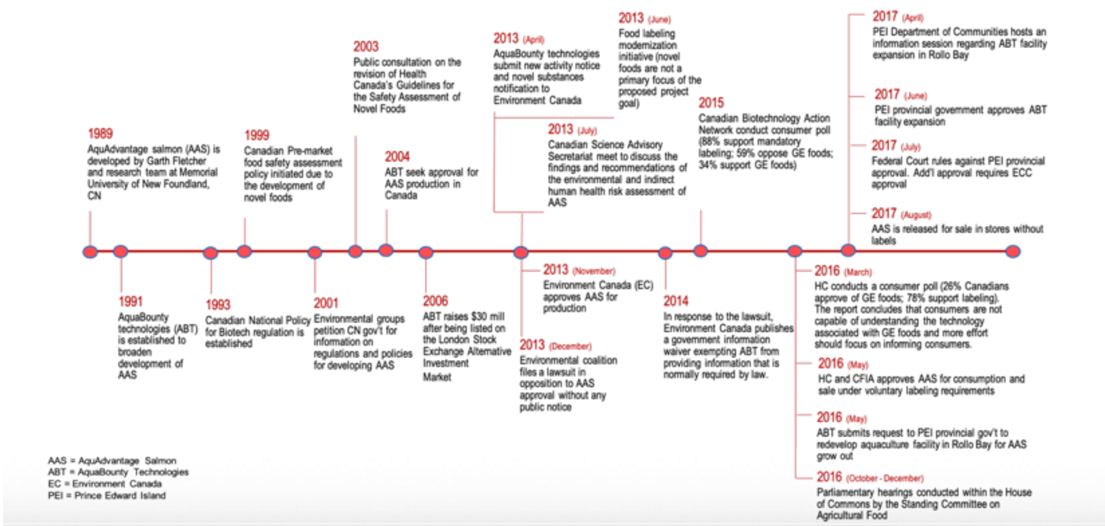

Figure 2.1: Timeline of AquAdvantage Salmon Approval in Canada

Public disclosure or comment on the rule was not a requirement for approval of consumption and entry into the market in Canada, but Health Canada in a separate effort launched a study to understand the views of Canadians towards novel foods (Health Canada, 2016) at about the time the BE salmon was approved. The results indicated that the public was largely opposed to novel foods, specifically those associated with BE foods or "Franken-foods". In fact, only 26% of respondents indicated that they were content with the idea of eating GE foods or foods made with GE ingredients. In addition, only 22% expressed support for the development and sale of GE foods in Canada. When respondents were educated about the benefits of GE foods, it did very little to change their attitudes. This could be because they exhibited very little trust for the government given the recent approaches to decision making and regulation. In the report, responses from participants were described as "emotional" and based on "little relevant knowledge". Subscribing to the deficit model[5], the report concluded that "significant efforts to inform and educate Canadians would be required to shift views in a more positive direction" (Health Canada, 2016).

Regulating Risk

In the context of AAS, regulation is largely based on scientific risk assessment without explicit consideration of other authentic concerns. This science-based approach rejects societal and ethical concerns as a basis for decision-making and instead focuses on direct harms to health and environment with a goal of managing risk (Eckerd, 2014; US FDA, 2015). This approach employs criteria which focuses on evidence of harms that are direct, such as toxicity from ingestion, and dismisses indirect harms, such as system wide changes that may impact human or ecosystem well-being. These systems may include water, land use, maintaining healthy ecosystem dynamics, or long-term food sensitivities from ingesting the whole food. In addition, societal, economic, and cultural risks are not taken into consideration (Eckerd, 2014). Some scholars argue that construction of risk should be inclusive of diverse voices beyond that of the technocratic pure science, risk assessment approach (Jennifer Kuzma & Besley, 2008a; Meghani, 2014; Smith & Larimer, 2016). Generally, this is a controversial area in society writ-large as food needs to be consumed by everyone and people have variable preferences for how their food is produced and the safety of it. Risks are generally undertaken involuntarily especially in

[5]The deficit model is a term used to describe responses that are based upon a belief in the public's lack of knowledge and scientific literacy and seek to remedy it by providing additional information that is correct (Bak, 2001).

countries like Canada where there are no mandatory labeling laws. The following section will review both direct and indirect risks.

In general, concerns regarding AAS include ecological impacts, such as risks to native salmon populations should the BE salmon escape, as well as indirect consequences from facilities that produce the eggs or grow out the fish (such as water use) (Canadian Science Advisory Secretariat, 2017). Human health concerns include those that come from consumption of the salmon purchased, such as toxicity or allergenicity of the gene or gene

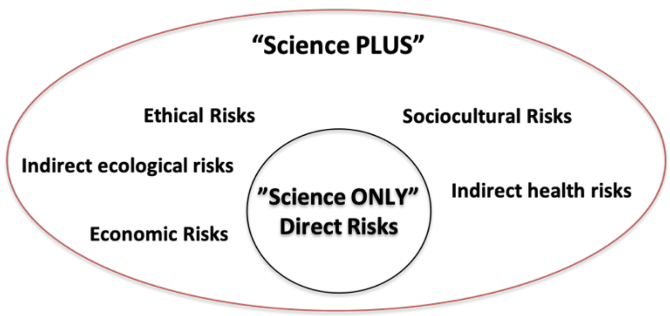

Figure 2.2: Indirect risks (i.e. "Science PLUS") versus Direct Risks (i.e. "Science Only")

products, or from environmental contact with the eggs, facility, or grown-out of the salmon (Canadian Science Advisory Secretariat, 2017) as well as, direct and indirect risks that were not regarded as part of the assessment, see Figure 2.2.

"Science Only"

Regulatory assessments for AAS deal mainly with direct effects that are easy to measure or mimic in laboratory or small field trials. Some scholars argue that consideration should be given to indirect environmental, health, economic, social, and cultural risks (Frewer et al., 2013). For example, epidemiological assessments related to human consumption of GE food over longer periods of time are only conducted on a voluntary basis. However, the Department of Fisheries and Oceans (DFO) did consider the indirect human health risk focused on the "adverse effects to humans in Canada relative to wild Atlantic salmon as a consequence of dermal contact through environmental (e.g. recreational swimming and fishing) or occupational exposure to AAS" (Department of Fisheries and Oceans Canada, 2013).

The summary of the Environmental and Indirect human health risk assessment of AquAdvantage salmon provides information on how uncertainty was addressed during the assessment (Department of Fisheries and Oceans Canada, 2013). Uncertainty analysis associated with food and nutritional safety, direct and indirect health risks, and direct and indirect environmental risks was conducted by a qualitative ranking process--- as highly certain, reasonably certain, reasonably uncertain, or highly uncertain.

Health Canada assessed the safety of AAS-derived food according to whether it was substantially equivalent to non-BE counterparts. Substantial equivalence is the argument that the novel food product is equivalent to conventional foods in terms of safety and nutritional standards (Health Canada, 2008). Substantial equivalence is established through adopted principles of risk analysis. These guidelines are based on analysis of discrete chemical particles and how the composition of the conventionally produced food compares to the bioengineered food (Canadian Science Advisory Secritariat, 2017; Health Canada, 2008). Substantial equivalence investigations can only measure certain compounds and does not include all of the compounds in a food product due to some level of natural variation in these compounds. Nevertheless, concerns regarding toxicity and allergenicity were considered "reasonably uncertain".

Environmental hazards were assessed based on direct and a set of limited indirect risks related to containment. Uncertainty associated with the included indirect hazards were categorized as "reasonably uncertain". Indirect risks stemming from a failure of containment included, possible facility failure due to natural events and the possibility of environmental exposure during transport (between Panama and Canada). These risks were all considered negligible due to the inland location of the facilities and the presumed low survival rate. At this point, ocean pens are not allowed and AAS were only approved for development within containers inside of AquaBounty facilities. Concerns regarding facility failure, predation habits, toxicity to predators in the wild were considered to be reasonably uncertain (i.e. ranges of high and reasonable uncertainty) and negligible (Department of Fisheries and Oceans Canada, 2013). Overall, the findings for all environmental risks were considered negligible despite high levels of uncertainty due to limited information.

Experimental data revealed low allergenic potency of AAS. This was the result of limited data comparing allergenic potencies of diploid and triploid[6] AAS with the non-engineered domesticated Atlantic salmon. Concerns regarding indirect health risks were considered "reasonably uncertain" because the differences in allergenicity between the wildtype and engineered salmon were argued to not have health significance unless salmon was consumed at unreasonably large quantities by those who are allergic to seafood (Canadian Science Advisory Secritariat, 2017).

"Science Plus"

There is a body of literature that explores concerns that are outside of the usual scope of regulatory risk assessments, including both direct and indirect risks that are not typically addressed using a "science-based" approach (Finucane & Holup, 2005; L. Frewer, 1999; L. J. Frewer et al., 2013; Jennifer Kuzma, 2017; Jennifer Kuzma & Besley, 2008a). For example, the following concerns regarding AAS were not included as part of the Canadian assessment.

[6] Triploid refers to fish that have three sets of chromosomes in the cells of their body; diploid refers to having two sets (Canadian Science Advisory Secretariat Science Response, 2013). AAS undergo a method referred to as triploidy, which prevents the ability to mate and increases the probability of sterility. This is a common method used in commercial aquaculture following fertilization.

Economic risks include creating an unbalanced market and disrupting the native way of life. Small scale fisheries have the potential to be placed at economic risk that may occur due to a potential increase in food prices, changes in water quality, and land availability due to AAS salmon. For example, AAS production has the potential to create dependence on a limited number of suppliers. Sociocultural risks are related to how the introduction of the technology might impact communities and their way of life. One important example is indigenous food sovereignty. The Declaration on the Rights of Indigenous People state that Indigenous people, have a right to approve or disapprove any environmental risks that correspond with food sovereignty (United Nations, 2008, 2016). Food sovereignty refers to the cultural, political and environmental aspects of food systems. This is important because in the past indigenous people have experienced food insecurity due to manipulation of food systems (e.g. disappearance of the bison) which were integral to their way of life.

Historically, when discussing emerging technologies, issues of concern that are outside of the pure science realm are often discounted for informing decision making. In other words, only risks that can be directly measured in laboratory or field studies and involve endpoints of harm to species or health are given priority in regulations and law, and thus are the focus of regulatory risk assessments. Scholars argue however that the high levels of uncertainty associated with these assessments preclude a quantification of risk based solely on scientific evidence. In the words of Jasanoff (1990), “agencies and experts alike should renounce the naïve vision of neutral…regulatory science, more even than in research science, there can be no perfect, objectively verifiable” (250).

Hence, this research seeks to understand how different policy narratives containing pro or anti BE salmon views construct risks in the policy processes. It looks at which groups manipulate the scope of the issue with the aim to influence policy. To accomplish this goal, the we use insight from narrative policy framework (NPF) in combination with insight from cultural cognition theory to explore, what narratives are being used to try to influence decisions and policy uptake, which groups seek to broaden the scope of risk in the public hearings (i.e. science plus vs. science only), and what arguments are used to support or reject the approval of GE animals. The Parliamentary hearing on GE animals in Canada is used as a case for exploring these narrative strategies as it was the only place where stakeholder and public participation occurred for AAS approval in Canada.

Research Questions

This research explores the relationship between policy stance (pro- vs. anti- BE), cultural cognition world views (e.g. hierarchical, egalitarian, individualist, and fatalist) defined by the structural elements of narratives in comments, and narrative strategies (see Figure 2.3). The interaction between these relationships can help to explain the mechanistic functions related to how narratives may function to exert influence, which is at the core of narrative strategies (Raile et al., 2018). The approach in this paper is unique because although there have been numerous studies that show that narratives influence risk perceptions (Crow & Berggren, 2014; Hinyard & Kreuter, 2007), the mechanistic functions involved in narrative persuasion are not clearly understood (Raile et al., 2018). This is important because it underscores the motivations of those on both sides of the issue, specifically, by illustrating their ways of thinking. The interaction between cultural cognition (i.e. ways of thinking) and narrative strategies is important because it allows us to understand how influence is leveraged by certain groups.

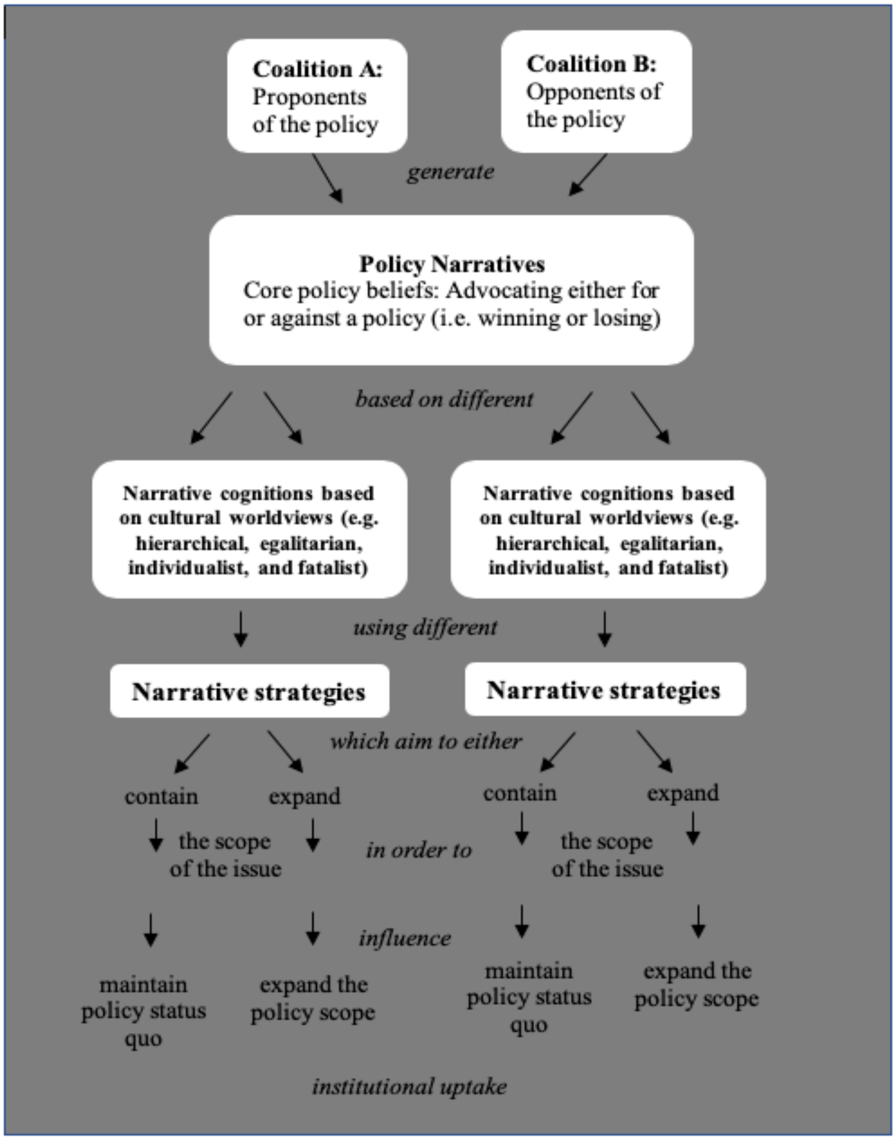

Figure 2.3: Adapted model of Narrative Policy Framework from Shanahan, Elizabeth A., Michael D. Jones, and Mark K. McBeth. "Policy Narratives and Policy Processes." Policy Studies Journal; Washington 39, no. 3 (August 2011): 535–61.

Since previous research has yet to identify the relationship between cultural cognition and narrative strategies, this research asks the following questions: How does cultural story type influence the construction of risk as “science-only” (direct toxicity or health harm) vs. “science-plus” (broader or indirect harms)? How does cultural story type relate to whether “science plus” or “science only” arguments are made? How does cultural story type relate to the narrative strategy being used? What associations exist between cultural story type and policy stance (i.e. winners and losers)? (see Figure 2.3).

Narrative Policy Framework: Narrative Strategies

The literature on Narrative Policy Framework (NPF) posits that narratives can help to explain strategies that are used to influence uptake. Previous NPF studies indicate that groups will employ political strategies based on whether they perceive themselves as winning or losing on the policy issue to either increase or decrease attention to the issue (M. D. Jones & McBeth, 2010; M. K. McBeth, Clemons, Husmann, Kusko, & Gaarden, 2013; M. McBeth et al., 2007). In the process of developing this research approach, it was difficult to tell whether the different stakeholders perceived themselves as “winners” or losers, so instead policy stance was assessed based on the narrative. For example, “winners” were described based on narratives that argued in favor of the actual final decision (i.e. those that supported BE salmon approval as the outcome)) and “losers” was described as narratives that argued against the final decision (those not in favor of BE salmon approval). In the analysis support for BE salmon approval (the final decision) was measured on a scale from 1 through 5: “not supportive” (i.e. losing) through “most supportive” (i.e. winning).

M. McBeth et al. (2007) found that when these issues were concerned with definitions of science, groups construct policy narratives to alter the way that policy solutions were perceived.

Given the complex and specific nature of the policy domain (i.e. environmental policies) they studied, McBeth et al. (2007) found evidence of additional strategies that were used within policy specific domains to manipulate the scope of conflict. In the context of food-biotechnology, construction of risk is explored in this paper based on the ways that policy narratives sought to manipulate the scope of BE salmon approval.

Construction of risk. The construction of risk is a contentious issue in this policy domain because of the various issues and concerns surrounding GE foods: specifically, direct versus indirect risks, or "science-based" harms like toxicity and allergenicity versus other broader harms like economic or socio-cultural. Previous research found that both opponents and proponents of technologies tend to argue for or against scientific certainty to support their policy preference (Nie, 2003). As such, this research asserts that the way that risk is constructed and how the uncertainty is portrayed in discourse is a political strategy to support a policy or refute it. Therefore, this dissertation examines the way that risk is constructed as a form of issue expansion (science-plus) or contraction (science only) and explores how different groups use it as a narrative strategy in the NPF. Narrative strategies will be coded based on the way that risks are constructed: "science only" (value-free, only science-based, and direct harms) vs. "science plus" (economic, ethical, religious, science-based, and socio-cultural): see Table 2.3 for a full description. NPF studies have found in the past that groups who are winning tend to contract the issues, whereas losing groups will tend to expand the scope of the issue to recruit others to their side. Therefore, in this research, we test the hypotheses that winning policy actors (pro-BE) will employ narratives that serve to narrow ("science only") the risk issues surrounding GE salmon and those that are losing will try to broaden the construction of risk (i.e. "science plus").

The Structure of a Narrative

Jones & Song (2014) found that cultural stories aid with understanding how individuals interpret information while using stories to influence decisions. To identify the four cultural story types, we utilize the structural components of a policy narrative as described by Jones and McBeth (2010). Narratives are described as having two structural components that allow them to be systematically analyzed: narrative elements and narrative content. However, our analysis extends this work as it also includes the intersection of the structural narrative element with the cultural cognitive story type (the narrative content), and also with the narrative strategy (manipulation of the scope of the issue) being used in an effort to increase influence.

Systematic analysis is possible in NPF, because the structure of the framework can be applied to multiple narratives and findings can therefore be generalized across different policy contexts (i.e. across different applications of emerging technologies) (M. McBeth et al., 2014b). This systematic-structuralist approach makes the NPF unique because it takes insight from critical policy analysis and combines it with traditional social science techniques to measure socially constructed realities (M. McBeth, Jones, and Shanahan 2014a) such as those based on based on cultural cognition.

Analogous to the structural elements of a story, narrative elements are composed of a setting, characters, plot, and moral (M. D. Jones & McBeth, 2010). The setting describes the context of the policy situation, which may include factors relating to the legal and constitutional parameters, demographics, geography, and scientific evidence such as rules and guidelines established by agencies for definitions of risks. Characters are policy actors (i.e. individuals or groups) seeking to influence policy outcomes. NPF studies typically describe characters as heroes (protagonist or saviors), villains (antagonist or harmers), and victims (those that are harmed and receive help from heroes) (M. McBeth et al., 2014b). The plot functions to situate the different components within the context of the story by establishing relationships between characters (i.e. policy actors). Lastly, the moral refers to the policy solution that is being promoted. It is these narrative elements that are used to categorize narratives according to cultural cognition theory.

Cultural Cognition Theory

Cultural theory of risk as presented by Mary Douglas (1970;1982;1992) asserts that individuals are more likely to form perceptions based on personal world views such as those that match their moral evaluations of risk. Previous research has used this theory to show that individuals that perceive a technology as a benefit will use affective language which describes it as acceptable, while those that perceive the same technology as a risk will use affective language that describes it as a detriment (Finucane, Alhakami, Slovic, & Johnson, 2000; Slovic, 2010; Slovic, Peters, Finucane, & MacGregor, 2005; Jones & Song, 2014). Cultural theory of risk helps to explain why the perception of risk becomes politicized such that decisions concerning risk become entangled in the allocation of blame and the distribution of power (Douglas, 1997).

Thompson (1990) built upon Douglas' original typology to describe belief systems based on a group's preferred level of interaction and the degree to which these groups constrain beliefs and behavior. The typology includes four cultural types that discuss how certain groups perceive and frame issues concerning risk, they include: egalitarians, hierarchs, individualist, and fatalists. Egalitarians exhibit strong beliefs about equality and thus perceive that human decisions concerning nature should be based on caution to avoid negative consequences (Thompson, 1990). Hierarchs revere the knowledge of higher authority and perceive that decisions concerning nature should only be based on the perspectives of skilled experts and managers

(Thompson, 1990). Individualist perceive government intervention as an intrusion, and they believe that progress is the most important byproduct of nature (Thompson, 1990). Fatalists consider negative consequences as inevitable and thus they believe that decisions concerning nature will impose negative consequences on others because little can be done to avoid or reduce potential harm (Thompson, 1990). The four typologies can be used to understand the tendency of individuals to form perceptions based on personal worldviews, this refers to cultural cognition.

Cultural cognition is the tendency for individuals to be more likely to form perceptions based on personal world views (Kahan et al., 2010). Cultural cognition builds on cultural cognition theory of risk and provides a more comprehensive framework of the social and psychological mechanisms that explain how cultural world views shape attitudes and beliefs (Kahan et al, 2010). These social and psychological processes interact with cultural worldviews to create differences in risk perceptions among competing worldviews.

According to Kahan (2012) these processes include: identity protective cognition (individuals are likely to fit their views to those of others whom they share a group membership); culturally biased assimilation (individuals are unconsciously motivated to dismiss evidence as not being credible if it counters the dominant view held within their group); cultural availability (individuals are likely to notice, assign significance, and remember information that is salient within a group); cultural credibility heuristic (individuals will assign the qualities that make an expert credible with those whom they perceive as sharing their values) and cultural identity affirmation (individuals will likely react dismissively with information that is not in agreement with the values dominant within their group).

Kahan, Jenkins-Smith, & Braman (2011) tested these processes and found that narratives can be used to influence, persuade, or inform and that these effects were dependent on personal worldviews. These findings assert that individuals craft information by fitting it to certain narratives that is based on information which aligns with their worldviews, they referred to this as *narrative framing* (Kahan et al, 2011). Therefore, relying on the original typology of cultural worldviews as described in cultural theory of risk and this understanding of narrative frames, this research uses these four cultural types to examine the way that issues concerning risk are framed as policy narratives based on cultural world view. In fact, previous research has used these four cultural types to examine the way that issues concerning risk are framed as narratives (i.e. stories) depending on the cultural worldview (M. D. Jones, 2014). Narratives in the Canadian parliamentary debates were categorized as the four cultural types: hierarchical, egalitarian, individualistic, and fatalistic, based on Jones (2014) (see Table 2).

Hypotheses

In the context of AAS, the policy situation is illustrated using the strategic action model (Simmons, 2007). According to the public participation literature, when the public are not included in the decision-making process, they seek out alternative methods to influence the system (i.e. parliament, court systems, appeals to agency officials, etc.). As seen in figure 2.4, influence is illustrated as narrative strategies being explained by cultural cognitive stories (Hierarchical, Individualist, Egalitarian or Fatalist) and policy stance (pro vs. anti-BE), see figure 2.3. Figure 2.3 extends the strategic action model to NPF and shows how the two coalitions (pro-BE vs. anti-BE) may seek to contract or expand the issue in order to exert influence.

Scholars have found across multiple technology domains that people who have more egalitarian and communitarian views (according to cultural cognition) tend to perceive the risks of technologies as greater and are more precautious towards technology acceptance and use (Finucane 2010; Kahan 2012). These findings were considered in formulating our hypotheses that hierarchical narratives would be associated with those that are pro-BE and winning the policy debates. Furthermore, other studies have indicated that groups with strong pro-BE views, generally technology developers or government regulators, tend to want to stick to "sound-science" in regulation, thus marginalizing other concerns like social or economic harm that people with objections hold (e.g. Meghani and Kuzma 2011; etc etc.). Therefore, we also hypothesize that Hierarchical stories will tend to constrain the scope of the issues to "science-only".

Based on these propositions, prior NPF and cultural cognition research, and the historical knowledge of BE salmon policy debates, we put forth the following hypotheses regarding the relationship between cultural cognitive stories and narrative strategies:

H1: Hierarchical story narratives are more likely to construct risk as "Science Only", more so than any other cultural cognitive stories.

H2: Hierarchical story narratives are more likely to be associated with winners (pro-BE), more so than egalitarian cultural stories.

H3: Hierarchical story narratives are more likely to use science only constructions to refute arguments that do not match their way of thinking, more so than any other cultural cognitive stories.

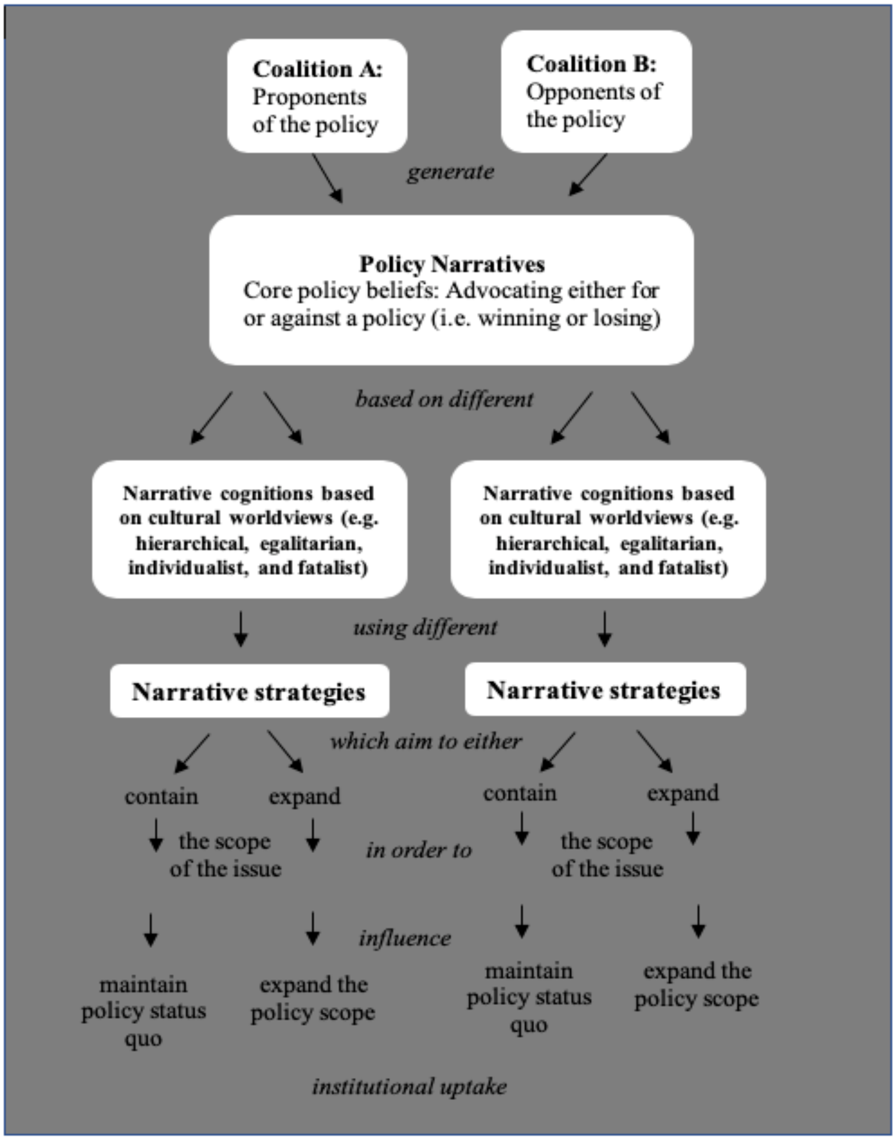

Figure 2.4: Adapted model of Narrative Policy Framework from Shanahan, Elizabeth A., Michael D. Jones, and Mark K. McBeth. “Policy Narratives and Policy Processes.” Policy Studies Journal; Washington 39, no. 3 (August 2011): 535–61.

Methodology

This study utilized a systematic analysis of Canadian parliamentary hearings (four documents), the sub-committee report and the final response document to understand the influential factors involved in the decision-making process. To accomplish this goal this study used both, quantitative content analysis informed by Narrative Policy Framework and Cultural Cognition theory. In general, content analysis should be informed by explicit theory when being used for identifying phenomena that is not directly observable (Krippendorff, 2012). Quantitative content analysis involves coding data based on predetermined categories to create variables that can be used for statistical analysis (Krippendorff, 2012). Binomial logistic regression and correlational analysis were both used to analyze the relationship between the variables created.

Data were collected from transcripts of parliamentary hearings which took place within the House of Commons and was conducted by the Standing Committee on Agricultural food. There were four public hearing which occurred between October and December 2016. Witnesses included representatives from the agriculture agri-food sector, regulatory agencies, business associations, and advocacy groups (see Table 2.1 and Table 2.8). Parliamentarian comments were also included in the analysis because the members of parliament often "use this forum to ask specific questions" that represent the perspectives of constituents (Miliken & Hays, 2002). The specified purpose of the hearings was to discuss any issues raised by the decision to approve genetically engineered animals to be used for human consumption; to address any possible inadequacies in the regulatory system; and to identify next steps should to be taken to inform the public about new products prior to introducing them to the market (see chapter 1 for more detail).

Data were coded using MaxQDA, a software package that is useful for collecting data meant to be used for qualitative and quantitative analysis. MaxQDA helped to collect, organize, analyze and visualize data (VERBI GmbH, 2019). Once the coding process was completed, data were then exported to excel for cleaning and organization prior to being transferred to Stata. Stata is a general statistical software package used for various quantitative analyses (StataCorp, 2019). Each individual comment was used as the unit of analysis (N = 263).

Table 2.1

Description of Parliamentary Hearing Attendees and comment frequencies.

Commenter Type	Description	Frequency (%)
Member of Parliament	Liberal, Conservative, NDP	125 (48)
Alliance/Coalition	Canadian Cattlemen's association, BioteCanada	67 (26)
Fishing industry	AquaBounty Technologies, Canadian Aquaculture Industry Alliance	14 (5)
Agency official	Department of Agriculture and Agri-Food, Canadian Food Inspection Agency, Department of Health	34 (13)
Advocacy group	Canadian Biotechnology Action Network, CropLife Canada, Ecology Action Centre, Vigilance OGM	19 (7)
Researcher/Scientist	University professor/Board member of AquaBounty	4 (2)
	Total	263 (100)

Coding instrument for Cultural Story type

In order to analyze the data for cultural story type, an adapted coding strategy was developed based on past studies that have analyzed cognitive frames using cultural theory and cultural cognition framework (M. D. Jones & Song, 2014a; M. K. McBeth, Shanahan, Hathaway, Tigert, & Sampson, 2010a); examined narrative structure across policy issues (M. McBeth et al., 2007; E. Shanahan et al., 2017). Cultural story types are narratives that are framed based on the cultural perception of risk (M. D. Jones & Song, 2014a). An original coding scheme was developed by operationalizing the structure of the narrative (character, setting, and moral) in a way that aligned with the operationalization of each cultural worldview (i.e. Hierarchical, Egalitarian, Individualistic, and Fatalist) within the context of food policy (see Table 2). Data were coded for presence or absence.

As a test for reliability, two additional coders analyzed a sample of 20% of individual comments from the transcripts. After several rounds of iterative coding, the cultural story types were refined to achieve higher reliability. As a consequence of this process, only the moral of the story was used for identifying policy narratives and for further quantitative analysis. The moral of the story was operationalized based on the policy solution that was being promoted and was deemed sufficient for inference. As a test for reliability, three coders analyzed a sample of 20% of individual comments from the transcripts (Neuendorf, 2016).

Interrater reliability was calculated using MaxQDA. A Cohen's kappa was performed and the results were significant with 93% agreement on policy stance; 81% agreement on narrative strategies; and 77% percent agreement on cultural story types. Previous NPF scholars have published work with adequate agreement between coders ranging between 75% to 100% agreement among two coders (Jones, Shanahan, & McBEth, 2015).

Control Variables

The policy stance (pro-BE vs. anti-BE) and commenter type provide additional context to further understand, how, and why certain narrative strategies were utilized within the dialogue, (see coding strategy and description in Table 2.2). Commenter type was included in the quantitative analysis, because it provided a more nuanced understanding of those involved in the public hearing (see Tables 2.1 and 2.2) and those that expressed pro-BE versus anti-BE views. In reference to the policy stance (i.e. winning or losing), this hearing occurred after the policy was already approved. Policy actors that are in favor of the approval were considered to be using winning narratives and those that are opposed were considered to be using losing narratives. Based on what is known from previous research related to narrative strategy (M. K. McBeth et al., 2010a; M. McBeth et al., 2007) it is expected that whether a policy narrative is for (i.e. winning) or against the policy (i.e. losing), in combination with the cognitive ways of thinking, influences the choice of narrative strategy (i.e. construction of risk). To assess this relationship between narrative strategies (scope expansion or contraction) and cultural story type, binomial logistic regression and chi-square analyses were used while controlling for the policy stance of the narrative. Comments that did not discuss risk were not included in the sample.

Table 2.2

Operationalization of Independent Variables.

Variable	Definition
Plot 0 = none identified (no) 1= identified (yes) (M. D. Jones & Song, 2014a)	Contains a discernible plot that describes the relationship between the mentioned or inferred characters and the issue being discussed
Victim 0 = none identified (no) 1= identified (yes) (M. D. Jones & Song, 2014a)	Identify those that are harmed by villains and/or receive help from heroes.
Hierarchical 0 = none identified (no) 1= identified (yes) (M. D. Jones & Song, 2014a)	*Heroes:* Refers to that which defers to impartial scientists and governments that employ them. *Villain:* Refers to that which seek to promote a system that does not make advancement a priority. *Setting:* Describes the problem as one where humans have not properly managed economic and societal systems to allow for growth at a responsible pace *Moral:* Describes solutions that favor skilled experts and managers to maintain stability and avert disaster

Table 2.2 (continued)

Operationalization of Independent Variables.

Variable	Definition	n
Individualistic 0 = none identified (no) 1= identified (yes) (M. D. Jones & Song, 2014a)	*Heroes:* Refers to that which seeks to be more sympathetic to market-like solutions.	27
	Villain: Attributes real causes of harm to dangerous idealists (egalitarians) and self-interested government representatives (hierarchs) that have fabricated the issue.	8
	Setting: Describes the situation as one where market forces are allowed to vacillate naturally as individuals compete and innovate to create new technologies.	53
	Moral: Describes a solution which indicates that markets must operate with minimal interference because nature is resilient.	65
Egalitarian 0 = none identified (no) 1= identified (yes) (M. D. Jones & Song, 2014a)	Character *Heroes:* Refers to that which seeks to advocate for fundamental changes in the human relationship with nature.	39
	Villain: Refers to that which promotes ideas that are associated with profit-driven corporations, governments that facilitate these corporations, and any group that supports the status quo.	6
	Setting: Describes the situation as one where nature is fragile, human activity needs to always be cautionary or nature will be destroyed.	74
	Moral: Describes solutions based on the idea that humankind and nature is doomed if it does not correct for past mistakes	83
Fatalist 0 = none identified (no) 1= identified (yes) (Thompson, 1990)	Character *Heroes:* Refers to that which advocates for humans to refrain from altering nature.	1
	Villain: Refers to that which promotes ideas related to nature as a controllable commodity.	0
	Setting: Describes the situation as one where issues concerning nature will impose negative consequences on others because little can be done to avoid or reduce potential harm	0
	Moral: Describes solutions based on the idea that we should avoid altering nature because no matter what bad things occur	1
Policy stance	Describes whether or not the narrative states that the policy actor is for or against the policy (i.e. winning or losing). 5=supportive; 4=supportive against labels; 3=supportive, supportive of labeling; 2=not supportive, but supportive of labeling; 1=not supportive	263
Commenter type	Group or individual commenter (Researcher = 7; Advocacy Group = 6; Agency official = 5; Industry (i.e. business association) = 4; Fishing industry or aquaculture = 3; Alliance = 2; Elected member (or representative) = 1)	263
Risk Context	Does the comment discuss risk (i.e. harm, concern, issue, etc.)? 0 = none identified (no);1= identified (yes)	

Coding instrument for Narrative Strategies

In addition to coding for cultural story type, a coding strategy was developed for the relevant political strategies that appeared within the decision-making process. The coding schemes for narrative strategies were generated by modifying those used in previous NPF studies focused on the environment (M. K. McBeth et al., 2007; Schlaufer, 2016; Stone, 2012). This research builds on previously tested hypotheses to explore findings across different policy domains. Similar to M. McBeth et al. (2007), the dependent variables being established here were the manipulation of the scope of the issue, which is referred to as the construction of risk ("science only" or "science plus). However, this study goes beyond the previous approach by explaining the association with the cultural story type. As described in Table 2.3, the narrative strategies were coded for presence or absence to explore the policy domain.

Table 2.3

Operationalization of Dependent Variables.

Variables	Definition	*n*
Construction of Risk	Constructs definitions of risk in a way that broadens the scope of the issue: Science PLUS = 1	176
	Constructs definition of risk in a way that narrows the scope of the issue: Science Only = 0	83
Argument for the definition of risk	Describes the way that the definition of risk is used. (To support an argument in support of the policy = 4; To support an argument in opposition to the policy = 3; To refute an argument in support of the policy = 2; To refute an argument in opposition to the policy = 1)	263

Results

The first hypothesis examined the relationship between the cultural story type and the narrative strategy, construction of risk (i.e. manipulation of the scope of the issue). It was hypothesized that hierarchical story narratives were more likely to construct risk as "science only" as opposed to egalitarian stories that would seek to contain the construction of risk.

A binomial logistic regression was employed to understand the effects of cultural story type (hierarchical, individualist, or egalitarian) on the likelihood that policy actors would expand or contain the construction of risk. The logistic regression model was statistically significant, $\chi2(5) = 76.52$, $p < .00$. The model explained 33.0% (Nagelkerke R2) of the variance in the construction of risk variable and correctly classified 81.32% of cases. The results of the data analysis presented in Table 2.4, show the logistic regression coefficients and odds ratios for each of the predictor variables controlling for commenter type. Egalitarian cultural story types were 20.77 times more likely to expand the definition of risk ($p = 0.001$). Individualistic story types were only 3.05 times more likely to expand the construction of risk ($p= 0.004$). Hierarchical cultural story types were not as likely to expand the construction of risk and were more likely to stick to "science only" ($p = 0.021$). As expected, winners of the policy, pro-BE, were also not as likely to expand the definition of risk ($p = 0.003$). However, policy actors that used both hierarchical and individualistic cultural story types were 6.21 times more likely to expand the scope of the issue, see Table 2.5 ($p = 0.017$). Fatalistic cultural story types were not present in the data and so they were not included in the analysis.

Table 2.4

Binomial Logistic Regression of Construction of Risk (i.e. Narrative Strategy)

Predictors	β	SE β	Wald's χ2	*df*	*p*	eβ
Hierarchical cultural story	-0.820	0.356	-2.30	5	.021	0.440
Individualistic cultural story	1.116	0.382	2.92	5	.004	3.054
Egalitarian cultural story	3.034	0.884	3.43	5	.001	20.773
Policy stance (i.e. winners)	-0.397	0.134	-2.97	5	.003	0.673
Commenter type	-0.235	0.075	-3.14	5	.002	0.790
Overall model evaluation						
Likelihood ratio test	107.36	*p. = .000*				
Wald test	76.52					
Pseudo R^2	0.33					
n	257					

Note: The dependent variable in this analysis is construction of risk coded so that 0 = Science Only and 1 = Science Plus

The second research looked at the association between cultural cognitive stories and winners and losers. The results in Table 2.6, display the results of the hypothesis test showing statistically significant associations between cultural cognitive story types and winners and losers. Hierarchical stories were found to be associated with "winning narratives" or pro-BE 67 percent of the time, (X^2 (5, N = 119) = 45.04, p <.000). Individualist stories were found to be associated with "winning narratives" 66 percent of the time, (X^2 (5, N = 65) = 34.91, p <.000). In contrast, egalitarian cultural story narratives were associated with "winning narratives" 11 percent of the time, (X^2 (5, N = 82) = 162.59, p <.000).

Table 2.5

Binomial logistic regression of Construction of Risk (i.e. Narrative Strategy) with interaction between Hierarchical and Individualistic

Predictors	β	SE β	Wald's χ2	*df*	*p*	eβ
Hierarchical cultural story	-1.478	0.464	-3.19	6	.001	0.227
Individualistic cultural story	0.173	0.549	0.32	6	.749	1.89
Egalitarian cultural story	2.982	0.881	3.39	6	.001	19.727
Hierarchical**Individualistic cultural story	1.827	0.767	2.38	6	.017	6.218
Policy stance (i.e. winners)	-0.357	0.134	-2.67	6	.008	0.699
Commenter type	-0.232	0.077	-2.99	6	.003	0.792
Overall model evaluation						
Likelihood ratio test	113.40	*p. = .000*				
Wald test	82.27					
Pseudo R^2	0.35					
n	257					

Note: The dependent variable in this analysis is construction of risk coded so that 0 = Science Only and 1 = Science Plus

Table 2.6

Chi Square results for cultural cognitive stories by policy stance

	Supportive of GE Animal Approval	Supportive & against labels	Supportive but supportive of labeling	Not supportive, but supportive of labeling	Not supportive	Total
Hierarchical	80 (67%)	21 (18%)	7 (6%)	5 (4%)	6 (5%)	119 (100%)
	$X^2(5, N=119) = 45.04$, $p = 0.000$; Cramér's $V = 0.415$, $p = 0.049$; OR = 6.75					
Individualist	43 (66%)	16 (25%)	0	6 (9%)	0	65 (100%)
	$X^2(5, N=65) = 34.91$, $p = 0.000$; Cramér's $V = 0.365$, $p = 0.050$; OR = 1.44					
Egalitarian	9 (11%)	0	18 (22%)	24 (29%)	31 (37%)	82 (100%)
	$X^2(5, N=82) = 162.59$, $p = 0.000$; Cramér's $V = 0.789$, $p = 0.045$; OR = 0.38					

Note: 5=supportive; 4=supportive against labels; 3=supportive, supportive of labeling; 2=not supportive, but supportive of labeling; 1=not supportive

The third research question looked at how certain cultural stories utilize the construction of risk to support or refute the position on the policy (i.e. to support an argument in support of the policy = 4; to support an argument in opposition to the policy = 3; to refute an argument in support of the policy = 2; to refute an argument in opposition to the policy = 1).

Table 2.7

Argument for the definition of risk by Cultural Cognitive Stories

		to support an argument in support of the policy	to support an argument in opposition to the policy	to refute an argument in support of the policy	to refute an argument in opposition to the policy	Total
Egalitarian	Science PLUS	13 (17%)	45 (60%)	3 (4%)	14 (19%)	75
	Science ONLY	1 (50%)	0%	1 (50%)	0%	2
	X^2 (4, N = 57) = 140.47, *p* =.000; Cramér's *V* = 0.716, *p* =0.057; OR = 1.18					
Individualist	Science PLUS	31 (67%)	1 (2%)	14 (30%)	0%	46
	Science ONLY	4 (24%)	1 (6%)	11(65%)	1 (6%)	17
	X^2 (4, N = 57) = 34.86, *p* =.000; Cramér's *V* = 0.336, *p*=0.056; OR = 3.34					
Hierarchical	Science PLUS	32 (56%)	5 (9%)	16 (28%)	4 (7%)	57
	Science ONLY	13 (21%)	0%	48 (79%)	0%	61
	X^2 (4, N = 57) = 73.77, *p* =.000; Cramér's *V* = 0.504, *p* =0.058; OR = 5.71					

The results in Table 2.7, displays the results of the hypothesis test showing that there is a relationship between how the narrative strategy is being used to promote the argument related to the policy preference and the way that the risk is being constructed by hierarchical cultural story type (X^2 (4, N = 57) = 73.77, *p* <.000). Above, we found that overall hierarchs were less likely to expand the scope of risk beyond science-only; however, in the instances when they did expand the scope, it was to support their BE positions. Table 2.7 shows that hierarchical stories use science only arguments (issue contraction) to refute statements not in support of their way of thinking at a higher frequency than all other cultural story types. However, hierarchs use science plus arguments to promote arguments in support of their way of thinking. In other words, sticking to the "science" only mattered when refuting the risks of BE foods, but going beyond science was just fine to support approval of BE foods. This seems an important finding that can inform future dialogues about BE products.

Like for hierarchs, for individualistic stories, science plus arguments were used more frequently to promote arguments in support of their way of thinking (X^2 (1, N = 46) = 9.04, p <.002). But in contrast to hierarchs, they also use science plus framings of risk almost as much as they do science only framings to refute arguments not in support of their way of thinking. As expected, egalitarian stories display science plus arguments more often both when refuting ways of thinking that oppose theirs and to promote those agreeing with theirs (X^2 (1, N = 75) = 10.85, p <.001).

Table 2.8

Descriptive statistics for commenter type by cultural cognitive story types.

	Hierarchical		Individualist		Egalitarian		Total
Member of Parliament	53	(45%)	25	(21%)	39	(33%)	117
Alliance/Coalition	29	(37%)	30	(38%)	19	(24%)	78
Fishing industry	5	(31%)	3	(19%)	8	(50%)	16
Agency official	30	(83.3%)	6	(17%)	0	(0%)	36
Advocacy group	2	(11%)	0	(0%)	17	(89%)	19
Researcher/Scientist	2	(67%)	1	(33%)	0	(0%)	3
Total	121		65		83		

Discussion

This analysis significantly contributes to the research focused on understanding the relationship between cultural cognition, policy stance, and choice of narrative strategy to better understand how narratives are used to influence policy. As such, this study set out to examine the relationship between cultural story types based on the structural element, (i.e. moral – the policy solution being promoted) and use of narrative strategy.

Hierarchical story narratives are more likely to construct risk as "Science Only"

In support of the first hypothesis, the findings show that hierarchical story narratives were more likely to construct risk as being based on "science only". In contrast, egalitarian cultural story narratives were most likely to seek to expand the definition of risk as "science plus". However, policy narratives that used both hierarchical and individualistic cultural story narratives were also more likely to expand the definition of risk by using "science plus". Theoretically, those exhibiting narratives most in favor of the winning policy are least likely to seek to expand the scope of the issue (Baumgartner & Jones, 2009; M. McBeth et al., 2007). This was certainly true for the hierarchs who were most associated with winning views. In this sample, however, narratives containing hierarchical and individualistic cultural narratives that were most in favor of the policy also sought to expand the scope of the issue. Based on, what we know about how groups seek to contain the scope of the issue when they are in favor of a policy outcome, this finding was somewhat surprising.

Hierarchical story narratives are more likely to be associated with using science only arguments to refute unsupportive statements but expand the scope beyond science to promote technology adoption.

The next finding helps to explain why hierarchical cultural stories may be using narratives that seek to expand the scope of the issue at times. In support of the second hypothesis, the chi square analyses found that hierarchical cultural narratives were more likely to be associated with the use of "science only" arguments to refute statements not in support of the policy (e.g. like BE foods are bad for health), more so than other cultural narratives. However, interestingly hierarchical cultural narratives were also more likely to use “science plus” arguments in support of the policy. In other words, issues beyond science were fine to hierarchs if they were used to demonstrate why the technology should be used. These narratives focused on themes related to the potential for positive economic impact, a faster regulatory process, indirect environmental benefits, decreasing environmental burdens, advancing science and the country’s ability to succeed over other countries, and transparency. For example, one hierarchical cultural story narrative presented a science plus argument in support of the approval of GE products without labels because of the benefits despite receiving negative attention from the media.

> "…. when you look at genetically modified corn or some of the other products, in many cases you have to use far less pesticide and herbicide on that crop. You're actually improving the end product…unfortunately marketing is marketing. It's not fact-based…I will say that in terms of genetic modification, there are positive outcomes in some cases like that, where it's actually resulting in lower pesticide and herbicide use."

Similarly, narratives containing individualistic cultural stories were even more likely to use science plus arguments in support of the policy. These narratives reflected on issues related to the potential positive economic impact, decreasing environmental burdens, food scarcity, advancing science, reduced regulatory burdens, and a more expedient regulatory process. As an example, see the following excerpt from an individualistic narrative discussing the need for a hasty regulatory process.

> "I think our role is to try to encourage governments to have the regulatory environment needed so that innovation can thrive. We believe that when innovation thrives, Canadian farmers win and Canadian farmers can produce more. We've certainly seen that track

> over the last 20 years. We think we will continue to see that, provided there's a climate for innovation."

Narratives from both parliamentarians and witnesses reflected individualistic cultural stories. For example, several witnesses were questioned about their ambivalence towards the policy after presenting egalitarian cultural stories:

> "I heard your testimony…that you heard clearly from consumers that they don't want GMO products right now. What if, in five years, consumers say that they've heard a lot about GMOs, and the marketing of that science is clearer? Would your position change, or would you still believe that you can fulfill the market with the current technology? I'm assuming that within your alliance, if one producer were to adapt that new technology, we've heard from the company that's proposing it that they can actually produce more quickly from farming to market, there would be a competitive advantage for that particular company. If it were somebody from within your alliance, would that be a problem for you, or would you adapt a new vision or a new strategy?"

On the other hand, narratives echoing egalitarian cultural stories used "science plus" arguments to support their perspectives in opposition to the policy of approving GE salmon. Many of the statements and questions did not express outright disapproval of the policy, but instead had concerns about the long-term impacts, indirect environmental harms, indirect health risks, potential economic burdens, sound science, transparency, and socio-cultural concerns.

> "I must admit that you're influencing me more and more with regard to the use of GMOs... Still—and I want your opinion— some studies, such as the Quality of Life study conducted by Entransfood, state some harmful effects of GMOs on our food. They refer to the risks of toxicity, antibiotic resistance, allergenic effects, and the impact on our

ecosystem and environment… I want to hear your view on these points raised in various studies."

These findings are rather interesting because McBeth et al. (2007) posited that discussions of science are inherently associated with core policy beliefs and so therefore cannot be a dynamic narrative political strategy. However, based on the way that the construction of risk is being used within these hearings, indicates that the construction of risk is being used as a dynamic narrative strategy to contain the scope of the issue. The results from this research indicate that there is hypocrisy in how hierarchs argue with relation to the scope of issues that should be considered. The message is that concerns beyond "science-based" harms like toxicity are only allowed if they are to argue for BE technology approval.

Implications

These findings shed light on how dialogue can function to limit the scope of policy processes in imbalanced ways and thus create differentials in power during conversation among groups with opposing views. As hypothesized, narratives containing hierarchical cultural stories are more likely to be associated with winners (i.e. those in support of the policy). The evidence suggests that hierarchs use science strategically to limit the issues being discussed, *only,* when the argument doesn't support their world view. In other words, hierarchs are willing to go beyond science to support their own winning (i.e. in support of the policy) decisions but not those that are opposed to the policy (Raile et al., 2018). Overall, these findings underscore the historical bias in the oversight system to only incorporate "expert only" arguments, thereby negating the concerns of constituents and limiting the public input (Meghani & Kuzma, 2011).

The purpose of sub-committee hearings is to advance the concerns of constituents, because they are representative of a conduit between elected representatives and citizens

(Miliken & Hays, 2002; Simmons, 2007). By acknowledging the imbalance in the use of science in such dialogues, we may be able to better structure them to equalize the legitimacy of broader concerns whether they are used for or against a policy. This might make the process more democratic and responsive to a wider range of actors, such as egalitarians who are typically found to be opposed to BE technology and generate broader legitimate concerns.

Although, quantitative content analysis is an acceptable approach for understanding different perspectives on an issue (see Morgan, 1993; Morgan & Zhao, 1993), it does rely on interpreting secondary data. Future studies could focus on examining the relationship between cultural cognitive frames and narrative strategies using focus groups or survey data. Still, the practical implications of this analysis are not trivial and suggest that cognitive bias needs to be acknowledged within the regulatory decision-making process. These findings illustrate much of what has been suggested in prior examination of the regulatory decision making process (e.g. (Finucane & Holup, 2005; Meghani, 2014; Meghani & Kuzma, 2018, 2018).

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Chapter 3: Examining Narrativity and Influence in Public Comments in the Rulemaking process for Genetically Engineered Salmon approval in the United States

Public participation is intended to improve the quality of decisions, enhance the legitimacy of the decision-making in the regulatory review process, and advance the capacity of future participants (M. D. Cobb & Macoubrie, 2004; National Research Council, 2008; Rowe & Frewer, 2000). Regulatory agencies have been mandated to utilize public participation for developing regulatory guidelines for risk management (Clinton, 1996; Obama, 2010). As it relates to emerging technologies these guidelines inform the definitions of risk allowing a more deliberative process for establishing more inclusive risk assessment parameters. This functions to increase legitimacy in the process by inserting a form of deliberation into the regulatory review process that can often foster greater social acceptance (Eckerd, 2014; J. W. Yackee & Yackee, 2006; S. W. Yackee, 2015a, 2015b). Some scholars make the normative argument that public participation improves the opportunity for those that may consider themselves outsiders, to play an important role in public policy outcomes, processes, and designs (Berry-James, 2014; Jennifer Kuzma & Meghani, 2009; Stephens & Berner, 2011). Others disagree, arguing that the regulatory process is unbiased and public participation does not contribute to increasing legitimacy (Cropper et al., 1992).

Still, previous studies indicate that certain groups have the ability to disproportionately influence policy outcomes when specific interests are expressed (Meghani, 2014; Naughton et al., 2009; Nelson & Yackee, 2012; J. W. Yackee & Yackee, 2006). These findings show that agencies are more likely to be influenced by certain groups that provide specific narratives; especially, when the narratives describing risks and potential economic benefits are similar to their own narratives (Bevan & Rasmussen, 2017; Eckerd, 2014; J. W. Yackee & Yackee, 2006).

Given the normative argument that policy narratives generate influence, a need exists to understand what narratives are used by different groups and what strategies are used in public participation during decision making. Scholars have argued that when groups have the ability to disproportionately influence policy outcomes quality may suffer and public legitimacy of final policy decisions may decrease (Meghani & Kuzma 2014). This is important because drawing upon the perspective of a diverse set of opinions allows agency officials and scientist to address the necessary concerns, thereby increasing legitimacy in the process.

Legitimacy and Influence

The Administrative Procedure Act (APA) of 1946 granted agencies with lawmaking powers to draft federal rules for issues within their given jurisdictions Schmidt (2013). The legal capacity of these rules are equivalent to that of congressional legislation, presidential executive order, and judicial decisions (Kerwin & Furlong, 1992). To enhance legitimacy the provisions of the APA mandate that agencies publish a Notice of Proposed Rulemaking (NPRM) in the Federal Register, which includes: written data, views, or arguments, of interested parties in the rulemaking process, and to publish the rule 30 days prior to it going into effect (Administrative Procedure Act of 1946, 1946). This type of informal rulemaking was initially intended to incorporate democratic values, gather additional information to further legitimate the process, and reduce litigation issues (Eckerd, 2014; Kerwin, 2002) as a means of balancing the administrative lawmaking powers.

According to Schmidt (2013), legitimacy is enhanced when there is sufficient input into the process. Legitimacy of decision making (Schmidt 2013) is concerned with whether or not it gives unbiased consideration to all input, is effective in reaching a decision, and transparent in its functioning. There are two types of legitimacy being discussed here: substantive and procedural.

Substantive legitimacy increases perceptions of fairness in the process by incorporating a broader set of experiences and perspectives (Coglianese, Kilmartin, & Mendelson, 2009). Procedural legitimacy refers to ensuring that interested parties have sufficient input into the process (Schmidt 2013). This type of legitimacy is inherent to democratic policymaking that creates opportunities for meaningful public participation and generates a diverse set of alternatives reflecting some level of compromise. Legitimacy is also diminished when there are barriers present that limit access in the process.

Although the provisions of the APA require agencies to provide the public with an opportunity to comment on proposed rules (via online comments or public hearings), agencies maintain a level of discretion that may inadvertently insulate the regulatory review process from the public, thus decreasing legitimacy (R. Cobb, Ross, & Ross, 1976; Sharp, 1994). Agency officials must interact with members of the three government branches and different versions of the public (i.e. citizens, industry members, academics etc.) to make decisions regarding policy. Eckerd (2014) revealed that agency officials were more inclined to engage commenters that used narratives describing risks and potential economic benefits similar to their own. In other studies evaluating influence, findings indicate that groups with more resources and power have the ability to disproportionately influence policy outcomes (Meghani, 2014; Naughton et al., 2009; Nelson & Yackee, 2012; J. W. Yackee & Yackee, 2006).

Although there is a vast body of literature that provides criteria for evaluating public participation (Brant et al., 2017; Neshkova & Guo, 2012; Rowe & Frewer, 2000), there is limited focus on the factors that influence the legitimacy of the regulatory review process (Emery & Emery, 2005). Many of the existing studies are guided by the literature on public participation and perceptions of risk (Eckerd, 2014; J. W. Yackee & Yackee, 2006; S. W. Yackee, 2015a).

While, these studies contribute to the public participation literature they do not incorporate concepts from the theories of narrative structure and cognition which can help to explain, how and why, some groups use certain narratives to influence decisions. In order to explore the role of narratives in public participation in rule-making, in this paper, the NPF is used to structure an analysis of public comments on the approval of GE salmon in the United States. Below the NPF is briefly described followed by a description of the research questions to investigate narratives in public comment in rule-making.

Theoretical Framework

To examine the influences of the regulatory review process, this research integrates concepts from Narrative Policy Framework (NPF) (M. D. Jones & McBeth, 2010) and insight from the cultural theory (Douglas, 1982; Thompson, 1990).

NPF was developed to empirically and systematically test the influence of policy narratives on the policy process (M. McBeth et al., 2014b). Systematic analysis is possible, because the structure of the framework can be applied to multiple narratives and findings can therefore be generalized across different policy domains (M. McBeth et al., 2014b). This systematic-structuralist approach makes the NPF unique because it takes insight from critical policy analysis and combines it with traditional social science techniques to measure socially constructed realities (M. McBeth, Jones, and Shanahan 2014a).

According to Stone (2012) narratives (i.e. stories) are used by policy actors (e.g. commenters) to articulate and promote a specific understanding of an issue (E. Shanahan et al., 2017). Policy actors socially construct narratives to communicate information about policy problems with a goal of influencing potential solutions, while often excluding certain alternatives that they do not support in order to manipulate the scope of the issue (Pierce et al., 2014). Some post-positivist scholars argue that narratives are not adequate for forming causal and generalizable statements but there have been consistent findings indicating that narratives can inform hypotheses regarding narrative elements and strategies (M. K. McBeth, Shanahan, & Jones, 2005; M. McBeth et al., 2007; E. A. Shanahan, Mcbeth, & Hathaway, 2011). Based on the structuralist argument, structural components that explain the persuasive role of policy narratives in the policy process and the theories related to beliefs allow for generalizability across policy domains (M. D. Jones & McBeth, 2010; E. A. Shanahan, Mcbeth, et al., 2011).

Narrative components: form and content

Narratives are described as having two structural components that allow them to be systematically analyzed: form and content. The form of the narrative is analogous to the structural elements of a story, these are called narrative elements. Narrative elements are composed of a setting, characters, plot, and moral (M. D. Jones & McBeth, 2010). The setting describes the context of the policy situation, which may include factors relating to the legal and constitutional parameters, demographics, geography, and scientific evidence such as rules and guidelines established by agencies for definitions of risks (M. D. Jones & McBeth, 2010). Characters are policy actors (i.e. individuals or groups) seeking to influence policy outcomes. NPF studies typically describe characters as heroes (protagonist or saviors), villains (antagonist or harmers), and victims (those that are harmed and receive help from heroes) (Stone, 2012; Verweij et al., 2006). The plot functions to situate the different components within the context of the story by establishing relationships between characters (i.e. policy actors) (Abell, 2004). Lastly, the moral refers to the policy solution that is being promoted (Ney & Thompson, 2000; Verweij et al., 2006). The narrative content is built into the form (i.e. the definition) of the policy issue.

Narrative content functions to further establish generalizability. Content in this instance refers to the theories being used to explain the political strategies and the ways of thinking (i.e. belief-system). According to the NPF, narratives contain narrative strategies which are methods of persuasion used by policy actors to influence decision makers or the public. Based on the structuralist approach, these strategies are generalizable because they are grounded by belief system theories. Belief system theories can be thought of as ways of thinking that are used to frame the narratives being told (E. Shanahan et al., 2017). Based on this description of the narrative content, it can be hypothesized that belief system theories such as cultural theory can be used to explain how and why certain narratives are used to influence policy uptake.

Research Questions

To what extent do public comments contain policy narratives?

The first research question addressed is foundational in asking whether and to what extent public comments contain policy narratives. Public comments typically incorporate narratives as a means of conveying information through the informal rule making process (Farina, Epstein, Heidt, & Newhart, 2012). Narratives (i.e. stories) are used by policy actors to articulate and promote a specific understanding of an issue, while also excluding alternatives (M. D. Jones & McBeth, 2010). Policy actors[7] socially construct narratives to communicate information about policy problems with a goal of containing the scope of an issue or expanding the scope of the issue (Pierce, Smith-Walter, and Peterson 2014). Given the brevity of some public comments, however, some doubt that public comments contain narratives (Crow & Berggren, 2014; M. K. McBeth et al., 2012).

[7] Policy actors are "individuals or collectives, from groups to countries, some of whom actively seek to influence politics and public policy on a given issue" (E. Shanahan, Jones, McBeth, & Radaelli, 2017, p. 5).

To address this issue, this research examines the extent to which narrative components are used in public comments by establishing an index of narrativity (as seen in (Crow & Berggren, 2014; M. K. McBeth et al., 2012). Narrative components refer to the narrative elements, narrative strategies, and policy beliefs (McBeth, Jones, & Shanahan, 2014). An index was created using the following narrative components (elements and strategies): characters (i.e. hero, villain, victim), moral (i.e. policy solution), setting (i.e. policy problem), plot (i.e. description of the relationship between the characters), and narrative strategies (construction of risk, policy surrogate, condensation symbol, benefits, and costs). We expected that the majority of comments will exhibit a high index of narrativity based on the work of Crow & Berggren (2014) & M. K. McBeth et al (2012).

What narrative strategies are associated with winning and losing policy narratives?

Policy actors seek to manipulate narratives based on whether they perceive themselves as winning or losing on an issue (Baumgartner & Jones, 2010). Previous research on policy actors indicate that winners tend to construct narratives that narrow the scope of the issue, while losers construct narratives that expand the scope with a goal of increasing attention to the issue (Baumgartner & Jones, 2010). These winning or losing narratives can be identified based on the known policy outcome.

Relevant to the debates focused on the consideration of risk for food biotechnology, M. McBeth et al. (2007) tested this proposition and found that when issues are concerned with definitions of science, both winning and losing narratives construct policy narratives to alter the way that policy solutions are perceived. The findings also revealed additional narrative strategies that are useful for examining policy domains that address scientific uncertainty. Focused on the context specific nature of food-biotechnology, the following narrative strategies are explored in this paper: construction of risk, costs and benefits, policy surrogate, and condensation symbols.

Construction of risk. The definition of risk is a contentious issue in this policy domain because of the various issues and concerns surrounding GE foods: specifically, direct "scientific" risks of toxicity or to health, versus indirect or broader risks, such as economic, cultural, or social. McBeth et al. (2007) examined the issue of scientific certainty and disagreement and found no difference in the use of science within winning or losing policy narratives. This lack of difference was attributed to core policy beliefs about science and its role in society. However, Nie (2003) found that certain groups used science to promote the issue based on their preferred policy outcome.

As a unique approach, this dissertation examines the way that risk is constructed by different groups as a narrative strategy. We expect that policy actors will employ narratives that serve to narrow ("science only") or broaden the definition of risk (i.e. science plus) based on whether they are for or against a policy or decision. In this paper, we expect those in favor of BE foods (and GE salmon approval specifically) to try to contain the scope of the risk issues to science-only.

Construction of benefits and costs. Previous studies have found that groups will attempt to influence policy change by discussing the ways in which a specific policy solution is beneficial or in ways that it can create diffuse costs (Baumgartner & Jones, 2010; M. McBeth et al., 2007). For example, (McBeth, Shanahan, Arnell, & Hathaway, 2007) found that policy losers (or those against the policy) try to argue that the benefits will accrue only to a few and that the risks or costs will be widespread. Therefore, we suspect that those against the policy (anti-BE) will construct narratives to illustrate negative costs (i.e. financial or economic burdens) and concentrated benefits (few groups benefits). While, those in support of the policy (pro-BE) will construct narratives that show diffuse benefits (many groups benefit) and concentrated costs (economic benefits or financial gains).

Policy surrogate. Policy actors will also seek to bring attention to an issue by referencing a larger policy issue. Often times actors will utilize a less controversial policy issue as a surrogate for one that may be more complex and controversial (M. McBeth et al., 2007; Nie, 2003). We address this by looking at whether larger issues surrounding AAS are evoked in the narratives. For example previous studies show that certain narratives may stray from arguing about policies to manage health risks from BE food consumption to larger policy issues such as ownership of seeds and intellectual property in order to shift the focus to disdain for corporate farms (Dale, Clarke, & Fontes, 2002). We suspect that policy actors will utilize policy surrogates based on whether they are for or against the policy.

Condensation symbol. Symbols or images are inserted within narratives to emphasize or to simplify a policy issue (Baumgartner & Jones, 2010; M. McBeth et al., 2007; Stone, 2012). These studies have shown that losing groups typically seek to bring attention to an issue by using condensation symbols. In contrast, winning groups will use images that maintain the status quo. We suspect that policy actors will seek to use condensation symbols based on whether or not they perceive themselves as insiders or outsiders. We also suspect that narratives utilizing condensation symbols will present narratives that are biased towards different cognitive frames as identified by cultural story types in narratives (see below).

What cultural cognition stories are associated with winning and losing policy narratives?

Cultural cognition theory posits that individuals are more likely to form perceptions based on personal world views such as those that match their moral evaluations of risk (Kahan et al., 2010). Individuals that perceive a technology as a benefit will use affective language which describes it as acceptable, while those that perceive the same technology as a risk will use affective language that describes it as a detriment (Finucane, Alhakami, Slovic, & Johnson, 2000; Slovic, 2010; Slovic, Peters, Finucane, & MacGregor, 2005). Kahan, Jenkins-Smith, & Braman (2011) tested these propositions and found that narratives associated with the cultural cognition typologies can be used to understand how narratives influence, persuade, or inform and that these effects depend on how the information is interpreted or perceived. The typology was initially used by Douglas (1982) to explain different perceptions of nature as a collective representation of risk. It was later expanded by Thompson (1990) to describe belief systems based on a group's preferred level of interaction and the degree to which these groups constrain beliefs and behavior. The typology includes four cultural types that discuss how certain groups perceive nature (Thompson, 1990) and frame stories (Jones & Song, 2014) concerning risk, they include: egalitarians, hierarchs, individualist, and fatalists. Egalitarians exhibit strong beliefs about equality and thus perceive that human decisions concerning nature should be based on caution to avoid negative consequences. Hierarchs revere the knowledge of higher authority and perceive that decisions concerning nature should only be based on the perspectives of skilled experts and managers. Individualist perceive government intervention as an intrusion, and they believe that progress is the most important byproduct of nature. Fatalists consider negative consequences inevitable and thus they believe that altering nature will create negative consequences on others because little can be done to avoid or reduce harm. Previous research has used these four cultural types to examine the way that issues concerning risk are framed as narratives (i.e. stories) (Jones & Song, 2014). Given previous research findings on winners and losers across many policy domains (M. K. McBeth, Shanahan, Hathaway, Tigert, & Sampson, 2010b; M. McBeth et al., 2007), we expect to find differences in cultural narratives and narrative strategies based on whether or not narratives are identified as winning or losing on an issue (see Figure 3.5).

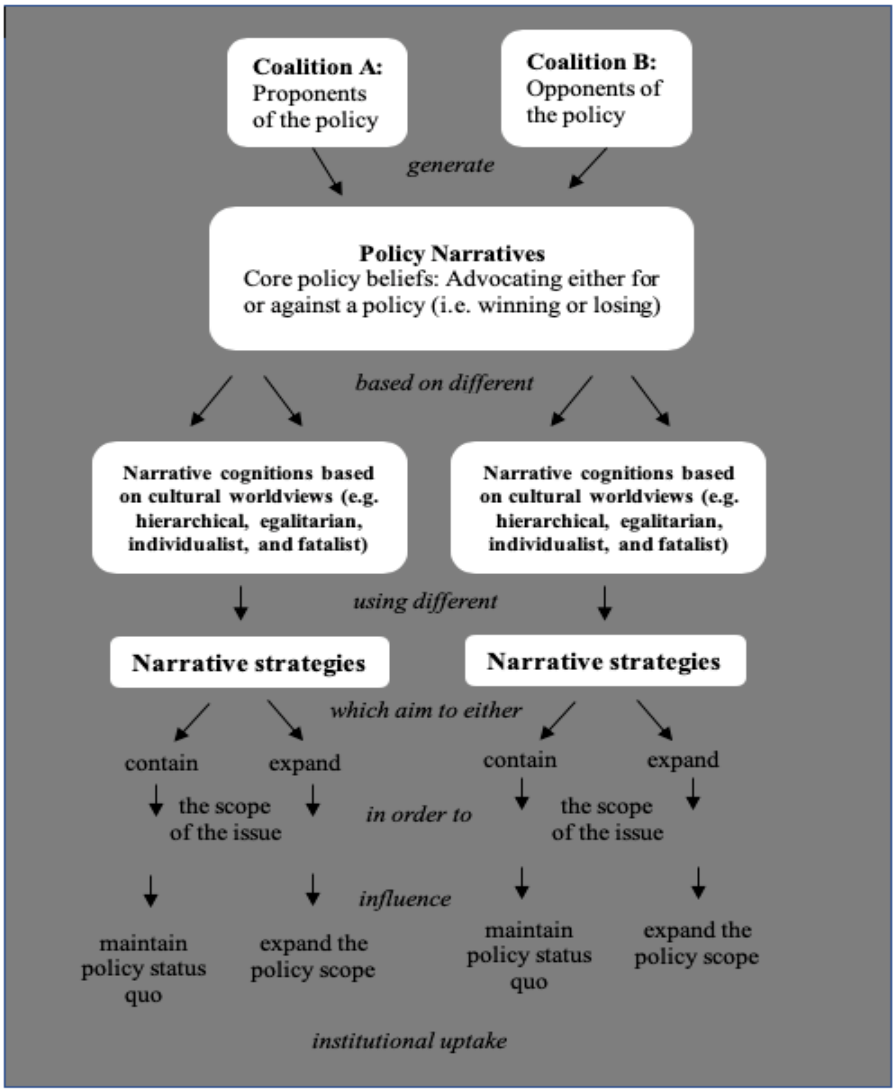

Figure 3.1: Adapted model of Narrative Policy Framework from Shanahan, Elizabeth A., Michael D. Jones, and Mark K. McBeth. “Policy Narratives and Policy Processes.” Policy Studies Journal; Washington 39, no. 3 (August 2011): 535–61.

Given this need to examine influence in the regulatory review process, this study has three primary goals: (1) to examine the narrative structure of public comments, (2) to understand what narrative strategies are being used in public comments to influence policy uptake and those that are not, and (3) to understand what types of cultural narratives are associated with certain narrative strategies being used by winners (pro-BE) or losers (anti BE). The regulatory approval process of genetically engineered salmon in the United States is used as a case study as described below.

Case Study

Regulation of bioengineered (BE) animals used for food consumption continues to be a contentious policy problem in the United States and beyond (Brody, 2018). This tension is in part centered on the ways that values and scientific information influence the risk governance of BE foods. The US Food and Drug Administration (FDA), which is responsible for risk governance of BE foods, contends that risk assessments for emerging food biotechnology should be based on objective, value-neutral science (US FDA, 2015). Many scholars have argued that value-neutral assessments exclude other dimensions of risks, or are even not possible, and they consider it a closed, technocratic approach (Berry-James, 2014; Jennifer Kuzma & Besley, 2008a; Meghani, 2014; Smith & Larimer, 2016). Meanwhile, proponents of BE foods consider critics irrational and have described opposition as a “war on science” (see Michael Shermer 2013). Still, many scholars have appealed for a more meaningful public participation process that incorporates values into governance of BE foods (L. Frewer, 1999; L. J. Frewer et al., 2013; Meghani & Kuzma, 2018). To examine this debate, this research focuses on the regulatory approval process of BE salmon, AquAdvantage salmon (AAS).

In the United States (US), AAS has been approved for human consumption and entry into the marketplace. Prior to this approval, a report by the National Academy of Science (NAS) raised concerns regarding the high levels of uncertainty associated with BE animal development and the FDA's expert capacity for decision making (National Research Council, 2002). FDA exerted authority under the The Federal Food, Drug, and Cosmetic act (21 USC 9) to regulate BE animals in 2009 by classifying them as containing a new animal drugs 221 U.S.C 321). Given these provisions, the definitions for safety focus on the health of the animal that is treated with a drug, but do not transfer well in the context of BE animals where safety concerns surpass the health of the animal to include indirect risks to human health or the environment, socio-cultural, and economic concerns. The FDA's assessment process only incorporates science-based issues, but several important issues fall outside its scope of review (Meghani 2014, Meghani & Kuzma 2017). Furthermore, what constitutes a "science-based" concern is a matter of debate (Jennifer Kuzma, Romanchek, & Kokotovich, 2008). The agency does not include indirect, system-wide risks of BE salmon that may arise from complex ecological or natural resource interactions. Neither does the agency include social science or economic based concerns typically. This leads questions as to whether the agency's claim of a "science-based" review is a way to narrow the scope of the risk issues to just a few of the legitimate concerns that are held by the product developers and federal agency. Furthermore, it has been previously found that world views cloud even agency "science-based" risk assessments (Meghani & Kuzma 2017). Thus, there is room for multiple stakeholders to criticize the scope of regulatory assessments for BE Salmon and to engage in deliberation over defining the scope of issues to be examined in risk analyses that feed into decision making. Issue contraction and expansion may be narrative strategies employed to expand or maintain the definition of risk based on certain ways of thinking: this is the narrative strategy on which we focus in this study.

Methodology

In the US, the public had multiple opportunities to comment on decisions related to AAS. These opportunities included public hearings, congressional hearings, and multiple public comment periods on draft environmental assessments and other regulatory documents. This research uses the case study approach to examine the public comments that were collected in reference to the “Draft environmental Assessment and Preliminary Finding of No Significant Impact Concerning AAS”(US FDA, 2012). The purpose of this comment period was to review the proposed conditions for approval of the BE Salmon. The comment period remained open from December 26, 2012 through April 26, 2013. A total of 1,217 comments were received with 15,914 write-in campaigns.

According to Yin (2009) case studies are useful for conducting an “empirical inquiry that investigates a phenomenon within its real-world context, when the boundaries between phenomena and context are not clearly defined” (Edmonds & Kennedy, 2012, p. 113). Case studies provide the context needed to examine and compare social phenomena such as the influences of the regulatory review process. This research design complements the NPF generalizable structural elements assumption which states that every narrative has a specific generalizable structure: narrative elements (i.e. setting, characters, plot, and moral) (M. McBeth et al., 2014a).

The purpose of this research is to explore narrative strategies used in public comments during AAS approval using the NPF. Content analysis is the dominant method used by NPF researchers (M. D. Jones & McBeth, 2010). Utilizing the NPF in combination with content analysis allows systematic structural analysis. Content analysis involves coding data using predetermined categories to create variables that can be used for statistical analysis (Krippendorff, 2012). Content analysis was performed to code for the narrative elements and narrative strategies, and cognitive frames. The codebook was developed using a deductive approach based on previously validated approaches (M. D. Jones & Song, 2014a; M. McBeth et al., 2007). The coding strategy involved a series of questions that was developed to operationalize the dependent variables (narrative strategies) and independent variables (narrative elements and cultural cognitive narratives), see Table 3.1 and 3.2 respectively. Data were coded for presence or absence of the strategy or cultural cognition story type.

Data were coded using MaxQDA, a software package that is useful for collecting data meant to be used for qualitative and quantitative analysis. MaxQDA helps to collect, organize, analyze and visualize data (VERBI GmbH, 2019). Once the coding process was complete, data were then exported to excel for cleaning and organization prior to being transferred to Stata. Stata is a general statistical software package used for various quantitative analyses (StataCorp, 2019). Each individual comment was used as the unit of analysis (N = 1154). As a test for reliability, two coders analyzed a sample of 20% of individual comments from the transcripts (Neuendorf, 2016).

To establish coding reliability, the data were analyzed by a second independent coder that was not aware of the research questions. As a test of reliability, a Cohen's kappa was employed to establish agreement between coders. The results were significant with 82% agreement on narrative strategies; 78 percent agreement on cultural story types; and 96% agreement on policy stance. Previous NPF scholars have published work with adequate agreement between coders ranging between 75% to 100% agreement among two coders (Jones, Shanahan, & McBEth, 2015).

Coding instrument for Narrative Strategy

In addition to coding for cultural story type, a coding strategy was developed for the narrative strategies that are used. The coding schemes for narrative strategies were generated by modifying those used in previous NPF studies focused on the environment (M. K. McBeth et al., 2007; Schlaufer, 2016; Stone, 2012).

This research builds on previously tested hypotheses to explore findings across different policy domains. Similar to M. McBeth et al. (2007), the dependent variables being established here is the narrative strategy of the manipulation of the scope of the issue, which we refer to as the construction of risk as “science only” or “science plus. However, this study goes beyond the previous approach by explaining the association of narrative strategies with the cultural story type (Figure 3.1). As described in Table 3.1, the narrative strategies were coded for presence or absence to explore the policy domain.

Table 3.1

Operationalization of Dependent Variables

Variables	Definition
Construction of Risk	Constructs definitions of risk in a way that broadens the scope of the issue: Science PLUS = 1 Constructs definition of risk in a way that narrows the scope of the issue: Science Only = 0
Benefits (M. McBeth et al., 2007)	Diffuse or concentrated benefits promote the policy objective 0 = concentrated; 1 = diffuse
Costs (M. McBeth et al., 2007)	Diffuse or concentrated costs promote the policy objective 0 = concentrated; 1 = diffuse
Condensation symbol (M. McBeth et al., 2007)	Reduces issue into loaded, dichotomous symbol 0 = no use; 1 = used condensation symbol
Policy surrogate (M. McBeth et al., 2007)	Incorporates a larger issue to expand the issue 0 = no use; 1 = use policy surrogate

Coding instrument for cultural story type

In order to analyze the comments for cultural story type, an adapted coding strategy was developed based on past studies that have analyzed cognitive frames using cultural theory and cultural cognition framework (M. D. Jones & Song, 2014a; M. K. Mcbeth et al., 2010a); and examined narrative structure across policy issues (M. Mcbeth et al., 2007; E. Shanahan et al., 2017). Cultural story types are narratives that are framed based on the cultural perception of risk (M. D. Jones & Song, 2014a). A coding scheme was developed by operationalizing the structure of the narrative (character, setting, and moral) in a way that aligned with the operationalization of each cultural type (i.e. Hierarchical, Egalitarian, Individualistic, and Fatalist) within the context of food policy (see Table 3.2). Data were coded for presence or absence.

Narratives were not required to be conforming to a single cultural story type. After several rounds of iterative coding, the story types were refined to achieve higher reliability. As a consequence of this process, only the moral of the story was used for quantitative analysis. The moral of the story is based on the policy solution that is being promoted and was deemed sufficient for inference.

Table 3.2

Operationalization of Independent Variables

Variable	Definition
Plot (M. D. Jones & Song, 2014a) 0 = none identified 1= identified	Describes relationship between mentioned or inferred characters and policy problem
Victim (M. D. Jones & Song, 2014a) 0 = none identified 1= identified	Those harmed by the problem
Hierarchical (M. D. Jones & Song, 2014a) 0 = none identified 1= identified	*Heroes:* Refers to that which defers to impartial scientists and governments that employ them. *Villain:* Refers to that which seek to promote a system that does not make advancement a priority. *Setting:* Describes the problem as one where humans have not properly managed economic and societal systems to allow for growth at a responsible pace. *Moral:* Describes solutions that favor expert driven approaches to regulate risk in nature
Individualistic (M. D. Jones & Song, 2014a) 0 = none identified 1= identified	*Heroes:* Refers to that which seeks to be more sympathetic to market-like solutions. *Villain:* Attributes real causes of harm to dangerous idealists (egalitarians) and self-interested government representatives (hierarchs) that have fabricated the issue. *Setting:* Describes the situation as one where market forces are allowed to vacillate naturally as individuals compete and innovate to create new technologies *Moral:* Describes a solution which indicates that markets must operate with minimal interference.

Table 3.2 (continued)

Operationalization of Independent Variables

Variable	Definition
Egalitarian (M. D. Jones & Song, 2014a) 0 = none identified 1= identified	Character *Heroes:* Refers to that which seeks to advocate for fundamental changes in the human relationship with nature. *Villain:* Refers to that which promotes ideas that are associated with profit-driven corporations, governments that facilitate these corporations, and any group that supports the status quo. *Setting:* Describes the situation as one where nature is fragile, and that humanity has overstepped its bounds. *Moral:* Describes solutions based on the idea that humankind and the environment is doomed if it does not correct for past mistakes; favors regulatory approaches that take this into consideration.
Fatalist (Thompson, 1990) 0 = none identified 1= identified	Character *Heroes:* Refers to that which advocates for humans to refrain from altering nature. *Villain:* Refers to that which promotes ideas related to nature as a controllable commodity. *Setting:* Describes the situation as one where issues concerning nature will impose negative consequences on others because little can be done to avoid or reduce potential harm *Moral:* Describes solutions based on the idea that we should avoid altering science
Policy stance	Describes whether or not the narrative states that the policy actor is for or against the policy (i.e. winning or losing). Winning = 1; losing = 0
Relevance 0 = no relevance 1= relevant	Comment references policy objective (control)

Results

To address the first research question concerning narrativity in public comments, a composite index of narrativity was constructed, see Table 3.3. The purpose of the index is to illustrate the use of narrative elements and strategies that are used in public comments as a means of promoting a specific understanding of an issue, which is referred to as narrativity (see Crow & Berggren, 2014). The narrativity index is comprised of the nine narrative elements: use of characters, morals (solution), setting (problem defined), plot, construction of risk, benefits, costs, policy surrogate, and condensation symbol. The index ranges from 0 (no elements or strategies) to 8 (almost all of the elements or strategies) because there were no public comments using all of the nine elements. The scale was found to have an adequate level of reliability (Cronbach's alpha 0.833). As expected, some of the comments exhibit low levels of narrativity, however, the largest distribution of narrativity centers mostly between four and six components. This illustrates the use of narrative elements and strategies within public comments by policy actors.

Table 3.3

Narrativity Index

Number of Narrative Elements/Strategies Used	Frequency (*n*)	Percent
0	288	24
1 (low narrativity)	1	0
2	3	0
3	20	2
4	201	17
5 (moderate narrativity)	308	27
6	226	20
7	87	8
8 (high narrativity)	20	2
Total	1154	100

Note. The narrativity index is comprised of 9 possible components indicating the number of narrative components used (elements and strategies): use of characters, morals (solution), setting (problem defined), plot, construction of risk, benefits, costs, policy surrogate, and condensation symbol. The index ranges from 0 to 8, with 0 = no narrative components and 8 = using almost all of the components; Cronbach's alpha = 0.833.

The second research question examines the way that losing and winning narratives contain or expand the issue. As seen in Table 4, there is a statistically significant relationship between construction of risk and winners and losers (pro versus anti-BE) (X^2(1, N =815) = 520.98 p < 0.000) with a Cramér's V measure of association of 0.799 ($p < 0.044$). Winning narratives (pro-BE) construct risk as "science only" 74% of the time, whereas losing narratives use "science only" reasons 0.6% of the time. On the other hand, winning narratives construct risk as "science plus" 26% of the time and losing narratives construct risk as "science plus" 99% of the time. Losing narratives were more likely to use science plus narratives (OR = 50.02) than winning narratives. This confirmed our hypothesis based on previous work that winning groups would seek to constrain the issues and narrow the scope of the risk issues considered (McBeth et. al, 2007).

There is also a statistically significant relationship between the use of a policy surrogate and winning and losing groups ($X^2(1, N = 1{,}125) = 34.09$ $p < 0.000$) with a Cramér's V measure of association of 0.174 ($p < 0.045$). In this case losing narratives used a policy surrogate 10% of the time, while winning narratives used a policy surrogate 35% of the time. In this case, winning narratives were more likely to use a policy surrogate (OR=5.00). This was an interesting finding in relation to previous work which found that losing narratives were more likely to expand the issue in relation to a broader policy issue. In this data, policy surrogate arguments were used more frequently by winning narratives. As one narrative stated, "The United States today imports 91 percent of the seafood consumed creating a $14 billion trade deficit in seafood products".

There was no statistical relationship between the winning or losing narratives and the use of benefits, costs, and condensation symbol. This was likely attributed to limited variance among these narrative strategies. However in examining the data qualitatively, it is interesting to note that the data supported previous work, all of the winning narratives portrayed the benefits as diffuse and 86% of them portrayed the costs as concentrated whereas all of the losing narratives portrayed the benefits as concentrated and 99% portrayed the costs as diffuse. This is what we expected based on NPF studies in the past.

Table 3.4

Chi-Square results for Narrative Strategies by narrative construction (i.e. winning or losing)

		Losing Narratives	Winning Narratives	Total
Construction of risk	Science Only	5 (0.6)	40 (74)	45 (6)
	Science Plus	756 (99)	14 (26)	770 (94)
	Total	761	54	
		X^2(1, N =815) = 520.98 p < 0.000; Cramér's V = 0.799, p < 0.044; OR = 0.002		
Benefits	Concentrated	269 (100)	0	269 (100)
	Diffuse	0	9 (100)	9 (100)
	Total	269	9	
		X^2(1, N =278) = 278.00, *ns*		
Costs	Concentrated	2 (0.7)	6 (86)	8 (3)
	Diffuse	269 (99)	1 (14)	270 (97)
	Total	271	7	
		X^2(1, N =278) = 176.30, *ns*		
Policy surrogate	Not used	968 (90)	36 (65)	1,004 (89)
	used	102 (10)	19 (35)	121 (11)
	Total	1070	121	
		X^2(1, N =1,125) = 34.09 p < 0.000; Cramér's V = 0.174, p < 0.045; OR = 5.00		
Condensation Symbol	Not used	1,052 (98)	54 (98)	1,106 (98)
	used	18 (2)	1 (2)	19 (2)
	Total	1,070	55	
		X^2(1, N =1,125) = 0.005 p < 0.939; Cramér's V = 0.005, *ns*		

The third research question examined the relationship between cultural story types (based on morals of hierarchical, egalitarian, individualistic, and fatalistic) and losing and winning narratives. As revealed in Table 5, there is a statistically significant relationship between hierarchical cultural narratives and winning (pro-BE) narratives (X^2 (1, N = 1,125) = 934.15, p <.000) with a Cramér's V association of 0.911 (p < 0.029). Hierarchical cultural stories were found to be associated with winning narratives 87% of the time but only associated with 0.2% of the losing narratives. (OR = 36.71). On the other hand, a statistical relationship was found between egalitarian cultural stories and losing (anti-BE) narratives (X^2 (1, N = 1,125) = 16.67, p <.000) with a Cramér's V association of -0.122 (p < 0.021). Egalitarian cultural stories were associated with losing narratives 38% of the time but only associated with 11% of winning narratives. (OR = 1.182). There was no statistical relationship found between individualist cultural stories and winning and losing narratives. Not many of the narratives used an individualist cultural story structure. However, there was a statistical relationship between fatalist cultural stories and winning and losing narratives (X^2 (1, N = 1,125) = 16.52, p <.000) with a Cramér's V association of -0.154 (p < 0.014). Fatalist cultural stories were associated with losing narratives 36% of the time, but only associated with winning cultural narratives 2% of the time. Thus, fatalist stories were more likely to be associated with losing stories (OR = 0.412).

Table 3.5

Cultural stories by winning and losing narratives

		Winning Narratives	Losing Narratives	Total
Hierarchical	Used	48 (83)	2 (0.2)	50 (4)
	Not used	7 (17)	1068 (99)	1075 (96)
X^2 (1, N = 1,125) = 934.15, p <.000; Cramér's V = 0.911, p < 0.029; OR = 36.71				
Egalitarian	Used	6 (10)	408 (52)	414 (37)
	Not used	49 (90)	662 (48)	711 (63)
X^2 (1, N = 1,125) = 16.67, p <.000; Cramér's V = -0.122, p < 0.021; OR = 1.182				
Individualist	Used	3 (5)	0 (0)	3 (0.3)
	Not used	52 (95)	1070 (100)	1,122 (99)
X^2 (1, N = 1,125) = 18.27, p <.000; Cramér's V = 0.228, *ns*				
Fatalist	Used	1 (2)	380 (48)	381 (34)
	Not used	54 (98)	690 (52)	744 (66)
X^2 (1, N = 1,125) = 16.52, p <.000; Cramér's V = -0.154, p < 0.014; OR = 2.427				

Discussion

These findings inform the narrative policy framework literature, as well as, provide a greater understanding of the narratives and cultural world views that are presented within the regulatory review process for BE salmon.

Narrativity in Public Comments

In support of the first hypothesis, the findings indicate that public comments have a high level of narrativity (i.e. use of narrative elements and strategies). Narrative elements and narrative strategies are useful for promoting a specific understanding of an issue (M. D. Jones & McBeth, 2010). The public comments had the largest distribution of narrativity ranging between four and six narrative components. Although there were nine components in total, eight was the largest number of components utilized. Despite arguments stating that brevity of public comments makes it unlikely that they exhibit narrativity (Crow & Berggren, 2014; M. K. McBeth et al., 2012), these findings provide evidence to show that public comments are indeed comprised of narrative components.

Narrative strategies and winning and losing policy narratives

The results for use of narrative strategy by winning and losing policy stances (pro vs. anti BE) support most of the hypotheses previously derived from NPF studies. For example, the findings indicated that winning narratives were more likely to contain the scope of the issue by using “science only” construction of risk. As expected, losing narratives sought to expand the scope of the issue by using “science plus” to describe the construction of risk. This provides evidence for previous research that examines narrative strategy of scope contraction or expansion use based respectively on winning and losing narratives (Mcbeth et al. 2007).

The findings for the use of policy surrogate indicated that winning narratives were more likely to use a policy surrogate to shift the focus of the issue. Losing narratives used policy surrogate at a lower frequency than winning narratives. This finding differs slightly from previous research done by McBeth et al (2007). For example, McBeth et al (2007) found that policy surrogates were used more by losing groups advocating for environmental policies. The differences in these findings may be due to the BE food policy domain.

There was no statistical significance found for the other narrative strategies, but some qualitative patterns were present. For example, losing narratives consistently described benefits as concentrated and costs as diffuse and utilized condensation symbols more often than winning narratives. While winning narratives described benefits as diffuse and costs as concentrated. These findings confirmed the work of McBeth et al. (2007) within the environmental policy domain.

Cultural stories by winning and losing narratives

In support of the final hypothesis, the results indicated that hierarchical stories were more likely to be associated with winning (pro-BE) narratives. On the contrary, egalitarian and fatalist stories were more likely to be associated with losing (anti-BE) narratives. This result was expected because of some related research on risk perception. Scholars have found across multiple technology domains that people who have more egalitarian and communitarian views (according to cultural cognition) tend to perceive the risks of technologies as greater and are more precautious towards technology acceptance and use (Finucane 2007; Kahan 2012). These findings were considered in formulating our hypotheses that hierarchical narratives would be associated with those that are pro-BE and winning the policy debates. Furthermore, other studies have indicated that groups with strong pro-BE views, generally technology developers or government regulators, tend to want to stick to "sound-science" in regulation, thus marginalizing other concerns like social or economic harm that people with objections hold (e.g. Meghani and Kuzma 2011; etc etc.). Therefore, we also hypothesize that Hierarchical stories will tend to constrain the scope of the issues to "science-only". Public comments rarely utilized individualist cultural stories regardless of whether the narrative was losing or winning.

Implications

This research contributes to the literature on the NPF by extending it to a new policy domain and correlating narrative strategies with cultural story types. Previous finding within environmental policy domain have been consistent. However, this is the first time that the NPF has been used to examine the regulatory review process for emerging food biotechnology and some of the differences found may be due to the policy domain.

As hypothesized, a high narrativity index was identified in the data. This provides evidence to support the normative argument that influence exists within public comments. These findings also have the potential to inform agency officials of more effective approaches to increasing legitimacy in the public engagement process (Kahan et al., 2011) by providing evidence of narrativity within public comments. The presence of narrativity indicate some level of narrative cognition that may preference certain groups over others due to their ability to manipulate the scope of the issue through language.

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Chapter 4: Examining Uptake: A Deeper Look into the Policy Making. Black Box

It has been well established through the rulemaking literature that different factors function to influence uptake[8]. Much of the rulemaking literature has focused primarily on the *inputs* of the decision-making process. For instance, there have been a plethora of studies focused on the *influence* exerted by certain groups involved in the rulemaking process (West, 2005; J. W. Yackee & Yackee, 2006). Others have focused on the *type of information* used in public comments and found that agencies typically were more responsive to narratives that were similar to their own narratives (Eckerd, 2014). The *timing* (Naughton et al., 2009), *efficacy* (S. W. Yackee, 2015b) and *quality* (Kerwin & Furlong, 1992) have all been credited for exerting significant influence on the rule making process by certain groups. While there is no doubt that these studies have helped to explain the influential factors involved in the rule making process, the causal path between influence and policy outcomes have been challenged and are difficult to measure because of unseen influences in the rule-making process (Golden, 1998; Webb Yackee, 2019).

The Narrative Policy Framework offers systematic approaches for examining tools of influence used by policy actors. According to the NPF, policy narratives are socially constructed stories that contain consistent elements and strategies with a goal of influencing others to gain support for a particular policy decision (M. D. Jones & McBeth, 2010). As seen in previous chapters, socially constructed policy narratives are identified using narrative form (i.e. the structure of a story) and content (i.e. the narrative strategies and beliefs). Narrative form and content are the systematic tools necessary to shed light on the causal path between influence and policy outcomes, thereby defending against the argument of unmeasured circumstances (E. A.

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[8] Uptake refers to when an issue is brought to the attention of government officials and they respond to or "uptake" considerations into their final decisions (Panisset et al., 2012).

Shanahan, Jones, & McBeth, 2011; E. Shanahan, Jones, McBeth, & Radaelli, 2017; Steel, 2004). The suggested normative influence of these socially constructed narratives is the focus of this paper. Therefore, this research uses insight from cultural cognition theory and narrative policy framework in a comparative context to examine the types of influence being "taken up" in the rulemaking process. Uptake refers to when issues are brought to the attention of government officials and they respond to or "uptake" considerations towards the policy agenda (Panisset et al., 2012).

Cultural Cognition Theory

Cultural cognition theory explains how cultural worldviews function to shape attitudes and behavior about science and risks (Kahan, 2012). Cultural cognition theory posits that individuals are more likely to form biased perceptions based on underlying cause and effect relationships which contribute to a typology defined by four "ways of thinking" (Kahan et al., 2010). The typology was initially developed by Douglas (1982) to explain different perceptions of nature as a collective representation of risk. It was later expanded by Thompson (1990) to describe belief systems based on a group's preferred level of interaction and the degree to which these groups constrain beliefs and behavior. The typology includes four cultural archetypes that discuss how certain groups perceive (Thompson, 1990) and frame stories (Jones & Song, 2014) concerning risk, they include: egalitarians, hierarchs, individualist, and fatalists. The well-known archetypes are described in Table 4.1. Previous research used these cultural ways of thinking to examine the way that issues concerning risk are framed as narratives (i.e. stories) (Jones & Song, 2014).

Narrative Cognition and Narrative Policy Framework

Narratives play a central role in how individuals formulate beliefs, communicate, and reason (E. Shanahan et al., 2017). According to Kahan, Braman, Monahan, Callahan, & Peters (2010) beliefs concerning risks are substantiated by cultural cognitions. Considered in a comparative context, cultural worldviews and narrative strategies help to explain how actors respond to information using a preexisting template which emphasizes some perceived reality used to make sense of the world or promote a particular policy position, this is referred to as narrative cognition (Fischer, 2003; Kahan et al., 2011).

Narratives allow policy actors to transport an argument with a goal of establishing influence based on certain ways of thinking. The literature on Narrative Policy Framework (NPF) posits that narratives can help to explain strategies used to influence uptake (M. D. Jones & McBeth, 2010; M. K. McBeth et al., 2013; M. McBeth et al., 2007). Policy actors leverage influence through the use of narratives to persuade and inform (M. Jones, Shanahan, & McBeth, 2014; Stone, 2012). Narratives have two structural components that allow them to be systematically analyzed: narrative element and narrative content. This systematic approach allows scholars to measure socially constructed realities (M. McBeth, Jones, and Shanahan 2014a) such as those based on based on cultural cognition. The structural components of a story are analogous to the elements of a typical story: setting, characters, plot, and moral (M. D. Jones & McBeth, 2010).The setting describes the context of the policy situation, which may include factors relating to the legal and constitutional parameters, demographics, geography, and scientific evidence such as rules and guidelines established by agencies for definitions of risks. Characters are policy actors (i.e. individuals or groups) seeking to influence policy outcomes. NPF studies typically describe characters as heroes (protagonist or saviors), villains (antagonist or harmers), and victims (those that are harmed and receive help from heroes) (M. McBeth et al., 2014b). The plot functions to situate the different components within the context of the story by establishing relationships between characters (i.e. policy actors). Lastly, the moral refers to the policy solution that is being promoted. While it is important for the reader to gather an understanding of what is meant by the structure of a narrative, only the moral and the setting is pertinent to this research.

These narratives consist of political strategies that seek to manipulate the scope of the issue based on the power position of the group (Baumgartner & Jones, 2009). This concept was originally introduced by Schattschneider (1975) to understand the behavior of groups that use power dynamics to manipulate policy outcomes. Previous NPF studies indicate that groups will employ specific strategies based on whether they are winning or losing on an issue (M. D. Jones & McBeth, 2010; M. K. McBeth et al., 2013; M. McBeth et al., 2007). For example, winning groups (i.e. policy actors) will utilize narrative strategies that serve to narrow the conflict (e.g. limit the definition of risk) and losing groups will seek to expand the scope of the conflict. The narrative strategy appeals are described in Table 4.2.

Given that previous research has found that cultural stories aid with understanding how individuals interpret information while using stories to influence decisions, this research examines the prominent arguments (i.e. referred to as appeals) present in policy response documents (either final reports in Canadian GE Salmon case or FDA response to comments on draft EA GE salmon case) to help to explain how different cultural cognitive stories and narrative strategies influence the final policy (as indicated by uptake of those arguments in final policy documents). Specifically, this research posits that by examining policy response documents for evidence of cognitive and strategic appeals which correspond to those that have been found to occur during the rulemaking or policy process (as seen in Chapters 2 and 3), it will be possible to shed light on the causal mechanisms that are assumed to exist in the rulemaking process. Therefore, this research uses insight from narrative policy framework and cultural cognition theory to ask, what cultural and narrative appeals appear more prominently in policy response documents as evidence of potential influence? Although the arguments made in this paper do not claim causation with certainty, the hypotheses are based on the previous research that support the normative argument: if narrative strategies and cultural cognitive stories appear in the process of rulemaking and the policy response document, there is the possibility that the policy narratives were indeed influential (McBeth, Jones, & Shanahan, 2014).

Politics and Stages of Rule Making: Canada vs. United States

Industrialized countries have different approaches for regulation of emerging technologies. This research uses the case of AquAdvantage salmon (AAS) to examine the rulemaking process in Canada and the United States (US). The case of AAS is significant because this is the first time that a bioengineered food has been approved for human consumption and it will influence the way that other emerging technologies will be defined and regulated.

In the US, the Administrative Procedure Act (APA) of 1946 grants agencies with lawmaking powers to draft federal rules (Schmidt, 2013). The legal capacity of these rules are equivalent to that of judicial decisions (Kerwin & Furlong, 1992). To incorporate public input, the APA mandates that agencies publish a Notice of Proposed Rulemaking (NPRM) in the Federal Register to allow interested parties affected by the rule to submit written data, views, or arguments (Administrative Procedure Act of 1946, 1946). This type of informal rulemaking was initially intended to incorporate democratic values, gather additional information to further legitimate the process, and reduce litigation issues (Eckerd, 2014; Kerwin, 2002) as a means of balancing the administrative lawmaking powers. The process takes place in three stages: a pre-proposal stage allowing for informal communication between agencies and interested parties; a second stage which involves a public comment or public hearing period; followed by a public notice of the final rule. This research focuses on examining the second phase during which agencies respond to public comments and public hearings.

In Canada, the administrative rulemaking process is slightly different. Canadian administrative agencies are not afforded the same judicial powers and so they are not held to the same requirements as those outlined in the APA (Blue, 1989). Individual protections are afforded through public hearings and representation by elected officials (Miliken & Hays, 2002). Instead, bioengineered foods like AAS must undergo the New Substances Notification Regulations (NSNR) which involves an assessment process that is undertaken by the Government of Canada. In the case of AAS, Environment Canada (EC) conducted an environmental and indirect human health risk assessment to make recommendations the Minister of the Environment about any necessary risk management measures for the AAS. However, the public was not directly solicited for input on the decision-making process for the approval of AAS production under the NSNR process. The process also does not allow for external peer review. In contrast, in the U.S., one can obtain the risk assessment documents for biotech products online in most cases, and thus see how the data is interpreted (Meghani & Kuzma, 2018).

Soon after CFIA and HC made their decisions on feed and novel food approval for AAS, Parliament's House of Commons Committee on Agriculture and Agri-food was asked by the Minister of Agriculture and Agri-Food to examine the legal and regulatory framework around BE animals and their increasing availability for human consumption. On 1 June 2016, the Committee agreed to “study genetically modified animals for human consumption, including any changes which may be needed to adequately address the full range of potential issues around the approval of products involving genetically modified animals beyond health and safety, the challenges and opportunities this presents to Canada, and what steps should be taken to best inform the public about new products planned for introduction to the market; and that the Committee report its findings to the House no later than Thursday, December 8, 2016” The Committee held four public hearings in September and October 2016, hearing from representatives of the agriculture and agri-food sector, regulatory authorities and civil society about the issues raised by the arrival of BE (or GE) animals for human consumption. In October 2016, stakeholders were invited to present their viewpoints at a committee hearing. In Dec 2016, the summary report was released, and it is available online along with full transcripts of the meetings (House of Commons 2016). In April 2017, government agencies responded to the report. These reports and transcripts of the meetings provide a window of participation and transparency into regulatory policy setting for all GE animals. Although it occurred after the decision to approve AAS, given the lack of other venues for public comment, the House of Commons Ag and Agrifood transcripts and reports will be used to examine frames associated with stakeholders and their attitudes towards governance policy for GE animals and future gene-edited animals.

Politics of the Process

Despite differences in the regulatory process, both countries have a process to incorporate some level of public input and this inherently introduces politics into the process. Agency officials must interact with members of multiple branches of government and different versions of the public (i.e. interest groups, citizens, industry members, academics etc.) to make decisions regarding rulemaking, so it is clear that the conditions for influence exist. Still, agencies maintain a certain level of discretion that may inadvertently insulate the regulatory review process from the public, creating somewhat of a “black box” (R. Cobb et al., 1976; Sharp, 1994). There is no systematic approach for understanding the objective measurement and analysis for how public comments are used given the discretion allotted to agencies for decision making (Shkabatur, 2012; Shulman, 2005; Wood & Vedlitz, 2007; Yang & Callahan, 2007). However, these policy response documents (in which we are searching for evidence of uptake of policy narratives provide a window into understanding what types of attitudes (i.e. cultural cognitive stories) and behaviors (i.e. narrative strategies) potentially influence policy outcomes.

The existing literature on the rulemaking process has revealed that some groups exert influence on the process more than others (Crawford, 2011; Eckerd, 2014; Naughton et al., 2009; S. W. Yackee, 2015a). A longitudinal examination of various agency rules by J. W. Yackee & Yackee (2006) found that business groups were involved more than any other groups and were able to impact outcomes significantly. Fritschler (1975) examined the rulemaking process for labeling cigarettes and found that business organizations had the ability to influence the language found in the final rule. Golden (1998) found that business groups strategically intended to influence the language of final rules by hiring consultants to write comments on their behalf to ensure that the comments conformed to the language of the agency proposing the rule.

Overall, the research that has been amassed on the rulemaking process have all called for a greater need to understand influence (Ferguson 2007; Naughton 2009; West 2009; Yackee, 2019). Broadening the perspective to include other policy products such as policy response documents (Yackee, 2019) that represent a form of member checking could provide greater insight into the frames that are being used to influence the final rule. More recently, scholars have used frames to examine the language being used in public comments and rulemaking.

Frames

Previous studies that examine the influence of policy outcomes have described these socially constructed narratives in terms of "framing" (Gray, 2003; Rinfret, 2011). Identifying the arguments presented in narrative strategies and cultural cognitive story types are built on the concept of framing. The concept of frames is used in social science research to understand how groups communicate and interpret societal issues (Chong & Druckman, 2007). The phenomenon of interests is referred to as a "framing effect": differences in the presentation or perception of an issue with the goal of changing another's perception (Chong & Druckman, 2007). Frames are useful in social science research because they help to identify patterns of social norms and practices which can help to establish a causal path for understanding influence.

Gray (2003) proposed a discourse analytic model to evaluate disputes between stakeholders focused on environmental policy decisions. She utilized three frames as an interpretive approach: identity frames which focused on how individuals responded to questions; characterization frames which referred to statements about how individuals characterized others; and, conflict management frames which refer to statements that offer solutions for managing the conflict.

Rinfret (2011) proposed a similar approach which focused on the pre-proposal stage of rulemaking. The goal of the research was to understand the relationship between how stakeholders frame an issue during the process of rule development and the language of a subsequent NPRM. She utilized three frames that were developed inductively based on the data collected. The three frames included inductive frames (factors involved in defining the problem at hand), expertise frames (based on facts or evidence), and fiscal feasibility frames (the weighted benefits and costs of an issue). Her findings indicated that certain groups were more apt to use certain frames.

These approaches are informative because they provide further evidence to show that frames are used by commenters seeking to influence the rulemaking process. However, Rinfret (2011) affirms that this approach to understanding frames may not be enough to understand *how* groups systematically seek to influence language used in the final rule. Previous scholars have asserted that framing studies that lack a cognition theory have a reduced ability to capture cognitive organization of ideas and concepts (Berinsky & Kinder, 2006; M. D. Jones & Song, 2014b). This research builds upon these approaches by using the theoretical framework of cognition theory and narrative policy framework for examining the appeals (manifested through cultural story types and narrative strategies) that appear more prominently in policy response documents; the appearance of these appeals in the final policy documents are evidence of potential uptake which inform the final rule.

Cultural cognitive story appeals and Narrative strategy appeals

Cultural cognitive story frames have been used to examine influence within the environmental policy context (Berinsky & Kinder, 2006; M. D. Jones & Song, 2014b). Jones & Song (2014) found that cultural cognitive story frames can be used to influence how individuals cognitively organize concepts and information. Taken together, cultural worldviews and narrative strategies can be used to explain how policy actors utilize information based on preexisting templates which emphasize some perceived reality used to promote a particular policy position (Fischer, 2003; Kahan et al., 2011).

It is expected that distinct language embedded within public comments and public hearings is likely to resonate with agency officials such that only certain appeals are apparent. In fact, previous research indicated that agency officials were more likely to respond to narratives that were more similar to their own (Eckerd, 2014). Given that policy response documents may reflect certain appeals, examining these documents for dominant cultural cognitive story appeals and narrative strategy appeals will provide insight into understanding to what extent and in what way these appeals manifest in uptake based on the final rule. It is expected that hierarchical cultural cognitive appeals and "science only" narrative strategy appeals will be more dominant than others.

The following research questions are examined:

1. What cultural cognitive story appeals are being "taken up" in policy response documents?
2. What narrative strategy appeals are being echoed in policy response documents?

Methodology

This study utilized a systematic analysis of the response documents produced from the public engagement process established for examining AAS in Canada and the US. These reports were examined independently to examine the prominence cultural cognitive appeals and narrative appeals. To accomplish this goal this study used qualitative content analysis informed by insight from narrative policy framework and cultural theory. According to Krippendorff (2012), content analysis should be informed by an explicit theory when being used for the identification of phenomena that is not directly observable. Qualitative content analysis involves coding data for emerging patterns based on predetermined categories (Krippendorff 2012). Qualitative content analysis is a method that can be used to identify dominant themes which provide a rich and detailed account of data (Braun & Clarke, 2006). This method was chosen because much of the literature that uses cultural theory to examine influence suggests using methods that provide rich details (Tansey and Riordan, 1999; Lodge, 2011; Ripberger et al. 2014).

Data were collected from the Canadian parliamentary sub-committee report and the US Federal Drug Administration (FDA) response to public comments (Center for Veterinary Medicine, 2016). These documents were produced at the conclusion of the public engagement process that took place in both countries by the respective parties. In the US, public comments were submitted in response to the "Draft environmental Assessment and Preliminary Finding of No Significant Impact Concerning AAS"(US FDA, 2012). The purpose of this comment period was to review the proposed conditions for approval[9]. The comment period remained open from December 26, 2012 through April 26, 2013. A total of 1,217 comments were received with 15,914 write-in campaigns. In Canada, there were four parliamentary hearings conducted by the Standing Committee on Agricultural food between October and December 2016. The specified purpose of the hearings were to discuss any issues raised by the decision to approve genetically engineered animals to be used for human consumption; to address any possible inadequacies in the regulatory system; and to identify what steps should to be taken to inform the public about new products prior to introducing them to the market.

A code book was developed using a deductive approach based on predetermined theories. In qualitative research, the codebook is used to reduce the subjective nature of coding. It provides a systematic approach to coding based on theory (Morgan, 1993). Tables 4.1 and 4.2 provide a brief description of how the variables were operationalized. Data was coded for presence or absence using MaxQDA. MaxQDA is a software package that is useful for collecting

[9] The FDA assesses genetically engineered animals under the specification for a new animal drug application (NADA) because the assessment is focused on the rDNA construct: not the AAS fish as a whole (US FDA, 2009).

data meant to be used for qualitative and quantitative analysis (VERBI GmbH, 2019). It was chosen because it is useful for helping to collect, organize, analyze, and visualize qualitative data in an efficient manner (VERBI GmbH, 2019). Each document was coded by the paragraph level because sentences did not contribute to the full argument.

To improve coding reliability, the data were analyzed by a second independent coder with no knowledge of the research questions. As a test of reliability, a Cohen's K was run to determine if there was agreement between coders. Fifty-four child codes were identified. All of the kappa coefficients were calculated using MaxQDA and then evaluated using the guideline outlined by Landis and Koch (1977), where the strength of the kappa coefficients = 0.01-0.20 slight; 0.21-0.40 fair; 0.41-0.60 moderate; 0.61-0.80 substantial; 0.81-1.00 almost perfect, according to Landis & Koch (1977). Of the fifty-four child codes, 11 had fair agreement, 21 had substantial agreement, and 22 had almost perfect agreement. Published research using similar Narrative Policy Framework consider substantial agreement or better acceptable (M. McBeth et al., 2014b). The main nine parent codes exhibited almost perfect agreement (k = 0.96).

Coding instrument for cultural cognitive story appeals

In order to examine the data for cultural cognitive story appeals, an adapted code book was developed based on previous studies focused on identifying cultural theory typology (M. D. Jones, 2014; P. M. Linsley & Shrives, 2014; P. Linsley, Mcmurray, & Shrives, 2016; Lodge, 2011). A cultural cognitive story appeal refers to sentences or phrases which are indicative of the issues presented in public comments or public hearings that correspond to the four cultural types.

The coding scheme for identifying appeals was developed using previous scholarship based on Douglas' typology (Douglas, 1997) (i.e. Hierarchical, Egalitarian, Individualistic, and Fatalist) within the context of food policy (see Table 4.1). This approach provides an alignment between the cultural cognitive stories being told in public comments and public hearings because the stories were also coded using the cultural theory typology. Data were coded for presence or absence.

Table 4.1

Indicative characteristics of cultural cognitive story appeals.

Cultural Cognitive Story Appeals	Description
Hierarchical	Indicated by concepts related to: tradition, authority, policing access, respect for rules, concerns over boundaries, loyalty *Food policy specific context:* impartiality, skilled experts, government regulation is necessary
Individualist	Indicated by concepts related to: entrepreneurial activity, gain or success, group activity relevant if there exists opportunity for trade or exchange, negotiation *Food policy specific context:* nature is resilient, minimal government interference, markets regulate, minimal regulation
Egalitarian	Indicated by concepts related to: idealism, justice/legal, fairness, acting ethically, consideration of wider constituencies *Food policy specific context:* nature is fragile; human intervention should be cautious, or nature will be destroyed, transparency
Fatalist	Indicated by concepts related to: drastic change is arbitrary and capricious, resignation to fate *Food policy specific context:* nature should not be altered; regulations will not prevent harm

Source. Adapted from P. Linsley et al. (2016)

Coding instrument for narrative strategy appeals

In addition to coding for cultural cognitive story appeals, this research also codes for the narrative strategy appeals. A narrative strategy appeal refers to sentences or phrases which are indicative of narrative strategies that were presented in public comments or public hearings that correspond to issue scoping narrative strategies: construction of risk, benefits, costs, condensation symbols, and policy surrogate. The coding scheme was developed using previous research examining the use of narrative strategies (M. McBeth et al., 2007). Data were coded for presence or absence.

Table 4.2

Indicative characteristics of narrative strategy appeals

Narrative Strategy Appeals		Description
Construction of risk	Science PLUS	Indicated by arguments that establish a need to broaden definitions of risk to include socio-economic/cultural, economic, and ethical concerns; disputes scientific certainty; future concerns; social acceptance
	Science ONLY	Indicated by arguments that claim scientific certainty; direct health or environmental concerns
Benefits	Concentrated	Indicated by arguments claiming a limited benefit
	Diffuse	Indicated by arguments claiming a profuse benefit
Costs	Concentrated	Indicated by arguments claiming costs to be shared by a few
	Diffuse	Indicated by arguments claiming costs will be shared by all
Condensation symbol		Indicated by arguments depicting their position on the issue using terms that reduce the concept into memorable forms
Policy surrogate		Indicated by arguments that inject a larger policy issue that will benefit or suffer as a result of this approval

Results

The following section describes the results from the analysis of the policy response documents which includes the House of Common's sub-committee report and the FDA's response to the public comments.

House of Commons Subcommittee Report

The main research question assesses the prominence of appeals reflected in the response documents to qualitatively assess uptake from the Canadian GE animals hearing. Uptake refers to when issues are brought to the attention of government officials and they respond to or "uptake" considerations towards the policy agenda (Panisset et al., 2012). As revealed in Table 3, the sub-committee's recommendations to Health Canada mostly reflected hierarchical appeals.

Notably, the report included an addendum that was submitted by a subgroup[10] of members in parliament. The subgroup included an addendum because they believed that certain statements and perspectives were not included in the sub-committee report. To get a clearer understanding of the prominent perspectives, the addendum was analyzed separately.

The addendum introduced nine additional egalitarian appeals and three hierarchical appeals. Most interestingly and in direct relevance to the purposes of this research the group states "that the report…[and] recommendations do not fully reflect the testimony given." Consequently, the addendum was written to introduce additional appeals and to clarify certain arguments by providing additional information into the uptake process.

Table 4.3

Cultural cognitive story appeals appearing in the sub-committee report.

Frequency	Cultural cognitive story appeals	Examples
18 (40%)	Hierarchical	"… the industry stresses that there is no basic difference in nutritional value between GM animals and their conventional counterparts."
14 (31%)	Individualist	"… the market should be left to decide on the products that will or will not be brought to market in response to the demand."
13 (29%)	Egalitarian	"Witnesses indicated that there also has been no public consultation in Canada around the first GM animal for human consumption."
45 (100%)	Total	

The second research question focused on what narrative strategy appeals were most prominent in policy response documents. The results in table 4 reveal that issues related to the "science-only" narrative strategy were most prominent. As mentioned before, the addendum was

[10] The subgroup consisted of members of the New Democratic Party (NDP). NDP can be described as a social democratic federal political party in Canada. To ground it within the context of the Canadian political scene, the party sits to the left of the Liberal Party.

analyzed separately, and five additional appeals related to the “sciencePLUS” narrative strategy were identified. The appeals were related to expanding the scope of the risk to include the public’s right to know, it stated “several witnesses representing a large number of Canadian consumers recommended that the government require mandatory labeling of genetically modified foods. Another witness said that she would support the government's decision if it went ahead…” The issue of including other considerations beyond science, such as social acceptance was at the heart of most of the discussion.

Federal Drug Administration response to public comments

In regard to the summary response from the US FDA, the prominent appeals and the response was strikingly different. As seen in table 5, egalitarian cultural cognitive appeals were most prominent in the summary of the public comments. Unusually, fatalist cultural cognitive story appeals appeared in the summary, and clarifying responses were provided by the agency. Agency officials also, commented on the fact that although there were 38,000 comments submitted, many of them lacked relevance. The agency determined that 90 comments were responsive to the Federal Register notice and were considered substantive. According to the report, substantive comments “contained specific suggestions, criticisms, or positive substantiations of the agency’s analysis or conclusions”. However, the report acknowledged comments outside of the scope of the issue by providing additional information and clarification. In addition to including a wider breath of cultural cognitive appeals, the summary reflected responses to mostly “science PLUS” narrative strategies (see Table 6).

Table 4.4

Narrative strategy appeals appearing in the sub-committee report

Frequency	Narrative strategy appeals	Examples
18 (38%)	Science Only	"The production facilities are land-based and subject to biosecurity measures to prevent escapes…AquaBounty wants to locate its commercial production in Panama, a country with no native population of Atlantic salmon and where the waters form a natural biological barrier because their higher temperatures do not allow salmon to survive."
17 (36%)	Science PLUS	"…The proliferation of commercial facilities would automatically increase the possibilities of escape and, in the long term, even with a very high success rate for sterilization, there would be crosses with wild salmon."
6 (13%)	Policy Surrogate	"…genetic engineering is a tool that can be used in addressing the challenges of growing global demand, of market evolution and of reducing the environmental footprint of food production. The GM salmon, for example, is one of several ways to increase the supply of animal protein."
4 (9%)	Benefits	"…witnesses stressed the importance of science clusters in the development of innovation in Canada. They encourage collaboration and create a virtuous circle by attracting other companies that in turn bring more growth and innovation."
2 (4%)	Costs	"Canadian regulation does not include risk-benefit analyses of new products and that a market's rejection of a product can have major economic consequences. The example given was the 2009 contamination of shipments of flax by a GM variety not approved in the European Union. This cost Canadian flax producers more than $29 million."
47 (100%)	*Total*	

Table 4.5

Cultural cognitive story appeals appearing in the FDA response to public comments

Frequency	Cultural cognitive story appeals	Examples
42 (69%)	Egalitarian	"Several comments indicated that…two production facilities are located adjacent to bodies of water that can support GE salmon populations, and that the EA did not consider the effects of possible escapes.
10 (16%)	Hierarchical	"exposure of [AquAdvantage Salmon] to the Canadian environment is expected to be negligible with reasonable certainty."
9 (15%)	Fatalist	"Several comments questioned the adequacy of the physical containment at the PEI and Panama facilities, stating that land-based facilities are not without risk and that multiple levels of containment could still be subject to human error and deterioration."
61 (100%)	*Total*	

Table 4.6

Narrative strategy appeals appearing in the FDA response to public comments

Frequency	Narrative strategy appeals	Examples
44 (92%)	Science PLUS	"Several comments stated that the [Environmental Analysis] should have considered economic, social, and cultural impacts of approval of the ABT NADA."
2 (4%)	Science Only	"Other comments expressed a favorable opinion about the AquAdvantage Salmon application noting the thoroughness of the scientific, risk-based review…"
2 (4%)	Policy Surrogate	"Some comments stated that under Section 7(a) of the Endangered Species Act FDA must consult with FWS or NMFS concerning potential impacts on Gulf of Maine Atlantic salmon, an endangered species."
48 (100%)	*Total*	

Discussion

Comparison and contextualization of appeals appearing in uptake

Before launching into a comparison of appeals in the policy response documents, it is important to understand how these appeals were being used in each case. Overall, the appeals naturally revealed two competing positions on the issue. In earlier chapters, an analysis of the public hearings and public comments revealed evidence of this dichotomy. Those involved in the providing comments were described based on their policy stance: “winners” (those in support of the approval of BE salmon) or “losers” (those against the approval of BE salmon). Although, losing and winning narratives are not apportioned based on the apparent cultural cognitive appeal, grouping them provides a useful structure for comparing and contrasting how cognitive ways of thinking (i.e. cultural cognition) and narrative strategies can influence and inform the rule making process. The following section will discuss the prominence of cultural cognitive story appeals and the co-occurrence of narrative strategy appeals.

Egalitarian cultural cognitive story appeals

While anti-BE are usually associated with egalitarian cultural cognitive stories, they were often supportive of the approval of BE salmon, given certain stipulations like if labeling was required. The egalitarian cultural cognitive story is based on strong beliefs about equality and thus the moral of the story appeals for human decisions concerning nature to be based on caution to avoid negative consequences (Lodge, 2011). True to the egalitarian perspective, most of the egalitarian appeals that appear in both documents (i.e. sub-committee report and the FDA response to public comments) discuss issues related to “cautious intervention”. For example, one of the summarized statements presented by the FDA stated, “Given that AquAdvantage Salmon could be raised in multiple locations that would not result in sales of edible products to the

United States, the only way in which to determine the potential environmental risks would be to conduct a comprehensive [environmental impact statement (EIS)]". Persistent requests related to an EIS were related to concerns of indirect environmental threats to the environment and native salmon populations.

Another major issue of concern presented within egalitarian appeals was directly related to the issue of transparency and labeling. The house of commons sub-committee addendum emphasized the following:

> "A recent study published by Health Canada concluded that nearly 80% of Canadians want to see mandatory labelling of GMOs, and that they did not consider voluntary labelling credible. The NDP believes that, to accurately reflect the evidence, the Committee should have suggested that the government collaborate with Canadian stakeholders and consumers to establish a GMO labeling plan. The Committee's current recommendation totally ignores the recommendations of three witnesses representing many Canadians.

In all, egalitarian cultural cognitive story appeals were more prominent in the FDA response to public comments than the House of Commons subcommittee report (see Figure 4.1 for a visual comparison).

Fatalist cultural cognitive story appeals

The fatalist cultural cognitive story is based on the belief that decisions concerning nature will result in negative consequences, therefore the moral of the story appeals for avoidance because little can be done to avoid or reduce potential harm (Lodge, 2011). For example, "Individual comments indicated that there is no guarantee that others who purchase or obtain AquAdvantage Salmon will take proper precautions to ensure no escapes". The response to the comment explained that the "FDAs approval…does not permit production and grow out of AquAdvantage Salmon in any facility other than those in Canada and Panama…", in addition, subsequent facilities would need to be approved by submitting supplemental requests.

Another fatalist appeal, presented the concern that future supplemental applications, would not reflect a full approval process that would include a notice and comment period. The summary of concerns stated that, "the supplemental [application] process is weaker than the original [application] process, and…[it would not be] subject to public comment in the event that the sponsor submits a supplemental [application] to cover changes made to any of the containment conditions that could affect the assessment of environmental risks". While it is true that the fatalist cultural cognitive story rejects altering science, addressing these concerns serves to legitimate additional perspectives that may be outside of the scope of the rulemaking purview.

Notably, the fatalist cultural cognitive story appeal is absent from the House of Commons sub-committee report. The FDA response differed because agency officials respond to the fatalist cultural cognitive story appeal (refer to tables 4.3 and 4.5; see Figure 4.1 for a visual comparison). While the final rule may not completely meet the desires of those presenting the fatalist cultural cognitive story type, it portends to legitimate those concerns by providing additional information.

Individualist cultural cognitive story appeals

The individualist cultural cognitive story states that government intervention is an intrusion and so the appeals posit that nature is resilient and markets should regulate decisions (Lodge, 2011). The individualist cultural cognitive story appeal was absent from the US FDA response to public comments. However, based on the results of the analysis, individualist cultural cognitive story appeals represented 31% of the appeals appearing in the House of Commons sub-committee report (refer to tables 4.3 and 4.5; see Figure 4.1 for a visual comparison). One of the more prominent individualist appeals was related to an overburdensome regulatory process. For example, “Witnesses explained that developing a GM animal takes a lot of time, particularly to satisfy regulatory requirements”. In general, the individualist cultural cognitive story appeals centered on the idea that regulatory checks were redundant. Another appeal stated that, “the agriculture and agri-food sector are of the view that the market should be left to decide on the products that will or will not be brought to market in response to the demand”.

Hierarchical cultural cognitive story appeals

On the other hand, hierarchical cultural cognitive stories revere the knowledge of higher authority and appeal for decisions concerning nature to be based on the perspectives of skilled experts and managers (Lodge, 2011). Hierarchical cultural cognitive story appeals were more apparent in the House of Commons subcommittee report than the FDA response to the public comments (refer to tables 4.3 and 4.5; see Figure 4.1 for a visual comparison). Given that the regulatory approach driven by both regulatory processes is one that is based on what is described as a “science-based” regulatory approach, it is not surprising that hierarchical cultural cognitive stories appear prominently. In fact, previous research found evidence to show that agency officials are more likely to respond to narratives that are more similar to their own (Eckerd, 2014).

As expected, hierarchical appeals that appear in both policy response documents mainly focused on the idea that the scientific assessment of direct risks should be the sole deciding factor. The differences in the prominence of cultural cognitive story appeals is, however, important for us to understand what types of influence is leveraged within the decision-making process. The appeals that appeared in the House of Commons sub-committee report were mainly centered on the idea that expert decisions were paramount. For example, one appeal stated that regulatory agencies “focus entirely on the safety and environmental protection of new products; it does not make value judgments…”. However, as stated in the addendum, the report did not reflect the testimony of all of the witnesses and the constituents. In comparison, the FDA response to public comments stated, “Although some of these comments…were not relevant to the request for public comments…and, therefore, are not addressed directly in our responses in this document…however, we have addressed these comments in the…Questions and Answers on the AquAdvantage Salmon Approval”.

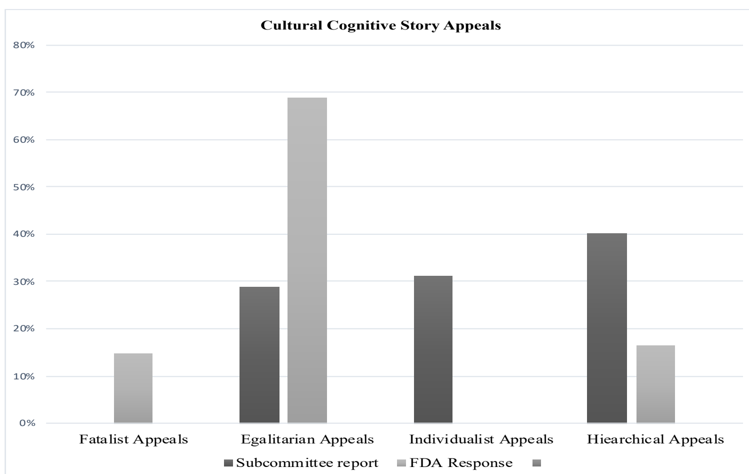

Figure 4.1: Comparison of cultural cognitive story appeals appearing in the FDA response to public comments vs. the House of Commons sub-committee report

Narrative strategy appeals

In addition to the differences in cultural cognitive story appeals, there were interesting differences in the prominence of narrative strategy appeals (see Figure 4.2). Narrative strategies are political strategies told in the form of a story with a goal of influencing the decisions of others. For the purposes of this research, manipulation of the scope of the issue is the specific type of narrative strategies that is of interest. Manipulation of the scope of the issue refers to strategies that are employed by certain groups based on whether they perceive themselves as winning or losing on the policy issue to either increase or decrease attention to the issue (M. D. Jones & McBeth, 2010; M. K. McBeth et al., 2013; M. McBeth et al., 2007). The focus here is not the winning or losing narratives, but instead the research focuses on narrative strategy appeals that appear most prominently in policy response documents. These narrative strategies include the *policy surrogate* (injects a larger policy issue), *costs* (argues that costs will be diffuse or concentrated), *benefits* (argues that benefits will be diffuse or concentrated), *science plus* (argues for a broader definition of risk), and *science only* (argues for only direct health or environmental concerns). As revealed in figure 4.2, the FDA response to public comments exhibited “science plus” narrative strategy appeals most prominently. On the other hand, the House of Commons subcommittee report consisted of narrative strategy appeals related to “science only”, “science plus”, policy surrogate, benefits, and costs.

As revealed in figure 4.2, narrative strategy appeals were mostly related to “science plus” appeals most prominent in the FDA response to public comments. The more prominent narrative strategy appeals in the House of Commons were related to “science only”, policy surrogate, benefits, and costs, respectively.

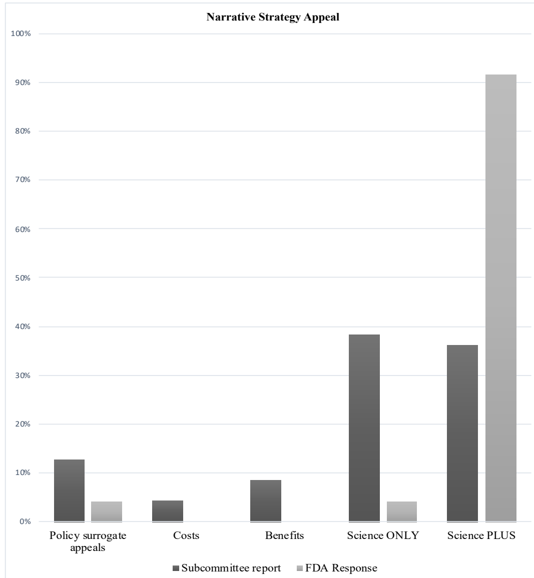

Figure 4.2: Comparison of cultural cognitive story appeals appearing in the FDA response to public comments and the Sub-committee report.

Overall, the results provide insight into the final decisions for BE salmon. More importantly, the imbalance in the presence of cultural cognitive story appeals and narrative strategy appeals indicate that cognitive bias needs to be actively acknowledged within the rulemaking process. While this approach is limited by not being able to account for all other inputs into the process, identifying the frames that can be aligned with uptake, makes it possible to illustrate what type of influence was leveraged within the process.

In summary, by examining the rule making process through the use of cultural cognitive frames and narrative strategy frames contributes to our understanding of how and why certain policy actors are able to influence decisions in the regulatory review process more so than others. It can also serve to inform ways to improve legitimacy in regulatory review processes by exposing bias and power struggles over scope (as expressed through narratives). By bringing these to light, agencies and other actors in positions of power can now identify ways to overcome the tendency to disenfranchise outsiders and in general, people and stakeholders whose world views about risk and science do not match with their own.

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Chapter 5: Conclusions to Address Influence in the Regulatory Review Process

The purpose of this dissertation was to examine the opportunities for policy actors to influence policy outcomes and to understand how policy narratives affect the regulatory review process. The outlined goals of the study were to (1) to explore the ways that certain values are leveraged to influence risk governance of foods and those values that do not, (2) to examine how certain world views functions to reinforce and shape the regulatory guidelines for food biotechnology now and in the future, and (3) to examine narrative strategies that are used to influence the regulatory review process to develop regulations for food biotechnology. To accomplish this goal, the study employed content analyses guided Narrative Policy Framework (NPF) and Cultural Cognition Theory in combination with other statistical analyses.

NPF and cultural cognition theory were used to examine the points in the regulatory review processes that invited participation from the public or stakeholder groups (e.g. public comments and public hearings) and the resulting outcomes that were produced (e.g. policy response documents). The following section provides an overview of the key findings, followed by how this research contributes to the literature.

Article 1 – Key Findings

The purpose of this article was to use insight from the Narrative policy framework (NPF) and cultural cognition theory to analyze parliamentary hearings in Canada. It is acknowledged that public data were sparse in the public domain, as there are few “windows” to participate in the Canadian risk governance system for GE animal foods. This made it difficult to determine how different groups and their motivations affect decision making. The research examined public hearings focused on the regulation of GE animals as an opportunity to understand narrative use within the AAS risk governance system in Canada to influence uptake[11].

The key findings indicated that policy actors that used both hierarchical and individualistic cultural story narratives were more likely to expand the definition of risk by using “science plus”. Theoretically, those exhibiting narratives most in favor of the policy are least likely to seek to expand the scope of the issue (Baumgartner & Jones, 2009; M. McBeth et al., 2007). However, because hierarchical cultural narratives were more likely to use “science plus” arguments in support of the policy. This explained why hierarchical and individualist cultural narratives were found to be more likely to expand the definition of risk to “science plus”. These findings are interesting because McBeth et al. (2007) posited that discussions of science are inherently associated with core policy beliefs and so therefore cannot be a dynamic narrative political strategy. However, based on the way that the construction of risk is being used within these hearings, indicates that the construction of risk is being used as a dynamic narrative strategy to contain the scope of the issue. Ultimately, these findings underscore the historical bias in the oversight system to only incorporate “expert only” arguments, thereby negating the concerns of constituents and limiting the public input.

Article 2 – Key Findings

The purpose of this research was to integrate concepts from Narrative Policy Framework (NPF) (M. D. Jones & McBeth, 2010) and insight from the cultural theory (Douglas, 1982; Thompson, 1990) to examine influence is leveraged within public comments. The first finding addressed the issue of narrativity. Establishing narrativity has been a contentious issue in the

[11] Uptake refers to when an issue is brought to the attention of government officials and they respond to or “uptake” considerations into their final decisions (Panisset et al., 2012).

literature (Crow & Berggren, 2014; M. K. McBeth et al., 2012). This research examined the extent to which policy components were used in public comments by establishing an index of narrativity (as seen in (Crow & Berggren, 2014; M. K. McBeth et al., 2012). The purpose of the index was to illustrate that narrative elements and strategies were being used in public comments as a means of promoting a specific understanding of an issue. The narrativity index were comprised of the nine narrative elements: use of characters, morals (solution), setting (problem defined), plot, construction of risk, benefits, costs, policy surrogate, and condensation symbol. The index ranges from 0 (no elements or strategies) to 8 (almost all of the elements or strategies) because there were no public comments using all of the nine elements. The findings illustrated the use of narrative elements and strategies within public comments by policy actors. These findings are significant because this is one of the first studies to examine the use of narrative components in public comments.

Other findings were as expected, losing policy narratives were more likely to be associated with narratives that constructed risk as “science plus” and winning narratives were more likely to be associated with narratives that constructed risk as science only. However, 26% of winning narratives were associated with a “science plus” construction of risk. More interestingly, the public comments there was more variation among narratives comprised of narrative strategies related to construction of risk and policy surrogate. The other narrative strategies did not show much variation and were mainly allocated based on whether the narrative was winning or losing. Losing narratives were mainly comprised of concentrated benefits, diffuse costs, use of policy surrogates, and condensation symbols. Winning narratives were mainly comprised of diffuse benefits and concentrated costs.

The findings also provided insight into relationship between cultural stories and winning narratives in public comments. As expected, winning narratives were mostly associated with hierarchical cultural stories. Losing narratives were mainly associated with egalitarian and fatalist cultural narratives. Interestingly, there were not many individualist cultural narratives found in public comments. However, this may be due to the fact that most of the commenters were individuals or representatives of advocacy groups. Individualist narratives are more likely to be associated with policy actors from business associations (Lodge, 2008).

These findings offer practical guidance for public communication by examining narratives that have greater or less influence on agenda setting and policy change. This analysis can also increase understanding of how groups can be more effective at influencing policy outcomes.

Article 3 – Key Findings

The purpose of this research was to use insight from cultural cognition theory and narrative policy framework in a comparative context to examine the types of influence being "taken up" in the rulemaking process and embedded within institutions. The main research goal was to assess the prominent appeals that were reflected in the response documents to qualitatively assess uptake. Uptake refers to when issues are brought to the attention of government officials and they respond to or "uptake" considerations towards the policy agenda (Panisset et al., 2012).

From a comparative standpoint, the results were rather interesting. The findings indicated that the sub-committee report only reflected certain perspectives. The sub-committee report mainly reflected hierarchical cultural appeals (40%), "science only" (38%) and "science plus" (36%) narrative strategy appeals (see Figure 5.1). However, the FDA response to public comments exhibited mainly egalitarian appeals (69%) and "science plus" (92%). Given the known policy outcomes and the differences in appeals appearing in policy response documents, these findings suggest that certain perspectives are preferred by decision-makers.

In summary, by examining the rule making process through the use of cultural cognitive frames and narrative strategy frames contributes to our understanding of how and why certain policy actors are able to influence decisions in the regulatory review process more so than others. It can also serve to inform ways to improve legitimacy in regulatory review processes by exposing bias and power struggles over scope (as expressed through narratives). By bringing the use of these policy narratives to light, agencies and other actors in positions of power can now identify ways to overcome the tendency to disenfranchise outsiders and in general, people and stakeholders whose world views about risk and science do not match with their own.

In addition, though the primary goal of this study was to understand the influences exerted within the regulatory review process, this research also contributed to the macro-level literature in NPF. Existing studies only inform possible approaches to using the NPF for macro-level analysis (Mcbeth & Shanahan, 2004). This research is unique as it provides insight on how policy narratives become embedded in cultures and institutions to shape public policy.

		Cultural cognitive stories	Narrative Strategies	Policy uptake
	**Winners (Pro-BE)**	**H - 56%** E - 14% I - 30%	Sci only – 25% **Sci plus – 31%** Benefits – 19% Costs – 6% **Policy surrogate – 17%**	**H – 40%** E - 29% I – 31% Sci only – 36% **Sci plus – 38%** Benefits – 9% Costs – 4% Policy surrogate – 13%
	Losers (Anti-BE)	H – 15% **E – 85%** I – 0%	Sci only – 1% **Sci plus – 76%** Benefits – 10% Costs – 4% Policy surrogate – 9%	
	**Winners (Pro-BE)**	**H – 83%** E – 10% I – 5%	**Sci only – 37%** Sci plus – 14% Benefits – 8% Costs – 7% **Policy surrogate – 18%**	H – 16% **E – 69%** I – 0% F – 15% Sci only – 4% **Sci plus – 92%** Benefits – 0% Costs – 0% Policy surrogate – 4%
	Losers (Anti-BE)	H – 0.2% **E – 52%** 0 – 0 % F – 48%	Sci only – 0.4% **Sci plus – 54%** Benefits - 19% Costs – 19% Policy surrogate – 7%	

Figure 5.1: Comparison of Cultural Cognitive Stories and Narrative Strategies

Overall, this research contributes to understanding how policy narratives develop among policy actors at the meso-level but then go on to influence narratives that become embedded within agencies and therefore continually shape public policy outcomes (macro-level). Thus, an important theoretical contribution of this study was to identify meso-level narratives that shape macro-level politics, and in turn, to create macro-level policy climates within regulatory agencies.

Discussion

In addition to building upon theory, this research also offers practical guidance for science communication and for understanding how groups can become engaged to reconfigure policy outcomes. This research explored the relationship between cultural cognition theory of risk, structural elements, and narrative strategies. The interaction between these relationships help to explain the mechanistic functions of influence at the core of narrative strategies (Raile et al., 2018). The research approach used to address the research questions addressed in this dissertation was unique. Previous narrative risk-based studies show that narratives influence risk perceptions and decision making (de Wit, Das, & Vet, 2008; Janssen, Osch, de Vries, & Lechner, 2013) and these findings highlight the mechanistic functions involved in narrative persuasion that were not clearly understood (Raile et al., 2018).

Furthermore, many scholars believe that democratic values such as meaningful participation should be integral to any legitimate regulatory process (deLeon & deLeon, 2002; Jennifer Kuzma & Besley, 2008a; Meghani, 2014) . This research investigates how the regulatory process for AAS involves different perspectives and seeks to understand whether or not certain worldviews are being privileged over others. Thus, it contributes to the literature on how to design effective public engagement as a tool for decision making in the regulatory review process (Kahan et al., 2011). It also offers practical guidance for public communication by examining narratives that have greater or less influence on institutional uptake and policy change. These findings, also, contributes to our understanding of how groups can be more effective at influencing policy outcomes.

This research will be one of very few studies to use NPF to examine public comments in regulatory rule-making. Farina et al. 2012 found that narratives are used in public comments in order to articulate and promote a specific understanding of an issue, whether or not a commenter exhibited the ability to provide sophisticated and detailed commentary (Farina et al. 2012). Prior studies also show that actors socially construct narratives to communicate information about policy problems with a goal of influencing the potential solutions (Pierce et al., 2014). From these studies, an appropriate role is suggested for use of the narrative policy framework (NPF) to systematically examine public comments during the regulatory review process.

However, previous research was limited in scope to understanding connections between the micro, meso, and macro levels of analysis of the NPF (Figure 1.1). In our analysis of GE salmon and regulatory review, we make a unique contribution to the application of NPF theory by using it as a lens to not only the individual and meso levels of policy but also the macro level (figure 1.1). Although the primary goal of this study is to understand the influences on the regulatory policy process that may be achieved through public participation, this research will also contribute to the macro-level literature in NPF. Thus far, existing studies only inform possible approaches to using the NPF for macro-level analysis (Mcbeth & Shanahan, 2004).

The research focuses on how policy narratives embedded in cultures and institutions shape public policy. Macro-level narratives will be examined through cross country comparison of agency official responses in public hearings and congressional hearings. Specifically, this research helps to explain how policy narratives develop among policy actors at the meso-level but then go on to influence narratives that become embedded within agencies and therefore continually shape public policy outcomes (macro-level). Therefore, an important theoretical goal of this study is to identify meso-level narratives that come to shape macro-level politics, that in turn, create macro-level policy climates within regulatory agencies. By identifying the connections between narratives within the different levels of the NPF, this study will make an important contribution to understanding the dynamics of narratives in the policy process (M. McBeth et al., 2014a).

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