

Climate Narratives: What is Modern about Traditional Ecological Knowledge? ¹

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Abstract. The literature on traditional ecological knowledge has established the importance of community narratives for capturing and communicating complex environmental information and linking it to practice. We make the case that narratives are important not just to traditional communities but modern, cosmopolitan societies as well. Principles of narratology are employed to examine how “moderns” talk about climate change. As the analysis suggests, people make sense of complex issues by crafting coherent narratives about them. Rather than be seen as an inferior form of knowledge, these narratives instead display a rich integration of multiples ways of knowing – including scientific, normative, and cultural dimensions. In contrast, discourse emerging from institutions such as the IPCC (Intergovernmental Panel on Climate Change) do not display the same narrative properties. The analysis also suggests that, in order for issues such as climate change to become sufficiently salient to society and enough to spur more vigorous action, they need to be integrated into the everyday narratives that people tell about themselves and the world around them. If it is true that society has not sufficiently responded to the urgency of climate change, perhaps it is because this issue has not become “narrative truth” to them.

1. Introduction

1.1 Thesis

Modernity is characterized by the turn away from the traditional and onto scientifically rational ways of knowing. The first is often depicted as knowledge that is passed on culturally within a community as part of its larger store of tradition. These embody long-standing or eternal truths that the community has always cherished, legitimized by the authority of elders and the institution of culture. This knowledge is often captured in narratives or folk stories passed on from member to member (Preston, 2003).

In contrast, modern knowledge has been characterized as a more specialized epistemology founded on the positivist model. Such knowledge is characterized by empirical measurement, probabilistic testing of theory against observation, and employment of formal evidentiary rules. It takes on a recondite form, consisting in objective facts and generalist rules. As opposed to the traditional, which can be particular to one community’s tradition, modernity seeks universalist knowledge.

¹ This article, especially the focus on narrative, benefits from conversations between Raul Lejano and Helen Ingram and Mrill Ingram around a forthcoming book entitled “The Power of Narrative in Networks: Enabling New Ecologies” (MIT Press) and earlier work by Lejano and Anne Taufen Wessells in a piece entitled “Community and economic development: Seeking common ground in discourse and in practice” (Urban Studies).

Modernity involves rationalization, which is the separation of knowledge into different compartments –factual versus value-laden, empirical versus abstract, and scientific versus everyday knowledge (Weber, 1904 [1958]; also Brubaker, 1984). Rationalization also involves disassembling complex phenomena into analyzable parts and applying formal rules of scientific verification to each. For example, in the area of climate change, authorities such as the IPCC (Intergovernmental Panel on Climate Change) are accorded great legitimacy on the strength of their firm grounding in scientific discourse. Scientific knowledge within the IPCC exists as distinct and separate from other cognitive fields, such as the aesthetic, moral, and cultural.

In this article, we will use the term, modern, as emerging from the Weberian sociology of knowledge, in the restricted sense of being characteristic of modernity and its technical-positivist epistemology.

Lyotard (1979) drew the line between modern and traditional knowledge quite distinctly (and in absolutist terms that the authors do not share). Modern knowledge is an expert-driven discourse, in which a knowledge gap exists between speaker and listener (Fisher, 1987; Kinsella, 2000). Truth-claims are judged according to formal rules of logic and empirical testing. In contrast, traditional knowledge is found in narrative form which is precisely a type of knowing that is shared among members of a common community. With narratives, a community member becomes both speaker and hearer, and this knowledge becomes part of the larger store of culture and tradition (including the aesthetic, moral, and cultural). Scientific knowledge is analytical, that is, separated into different components such as soil science or atmospheric chemistry. In contrast, traditional knowledge seeks not to disassemble a phenomenon into separate compartments but, instead, to understand the whole.

Modernity is seen as a progression beyond the fallible wisdom of tradition to the objective type of knowing espoused by the scientific model. In this article, we take a different tack and argue that the “moderns” also understand complex phenomena by translating them into narrative knowledge. Unless we are able to craft stories about things like climate change that integrate this issue coherently with other aspects of our worlds, such as our identities, beliefs, and personal experiences, these issues are not salient enough to the public. When knowledge exists only in technical form, separate from our narrative ways of knowing, these issues do not compel us to personal commitment and action. The point is that narrative knowledge can be as modern and relevant to cosmopolitan society as it has been to traditional communities.

In this, we follow the argument that traditional and modern knowledge are both legitimate kinds of knowledge (e.g., Lyotard, 1979). Different types of knowledge are all integral to how we make sense of the world. This has been part of a postpositivist turn in the social sciences, in which the critique of modernity led to a heralding of traditional ways of knowing. The authors do not entirely take up the critical thread, where postpositivist ways of knowing displace the positivist, but see a vital complementarity between the two forms of knowledge (Berkes 2008). We are also influenced by sociologists of science and technology who argued that “moderns” are, in fact, not so categorically different from “traditional” people (Latour, 1983) and that science itself is a cultural practice (Latour, 1987; Woolgar, 1988). Modern-day societies do understand the hybridized, integrated nature of knowledge (Ellen et al. 2000) and the world around them –i.e., that there are no clear distinctions between science and culture, society and nature, fact and narrative.

This article proposes a new conceptual approach to understanding the salience and efficacy of environmental discourse, which is to utilize methods from narratology, to examine the latter. We examine how nonscientists take up the climate change issue and work through complex dimensions of knowledge, including science, experience, popular culture, and others. Using a narratological approach, we will show how this type of cognition exhibits properties of effective narratives. To illustrate our points, we focus on climate change. Examination of various narrative elements allows direct comparison of the public's understanding of climate change with the more technical language displayed in IPCC discourse. To understand how the public views and experiences global and local environmental change, the narratives that people tell about these phenomena can inform policy-makers and policy.

In the following section, the literature on traditional environmental knowledge is discussed, as well the significance of narrative as the vehicle for communicating such knowledge. Cultural values as well as information can be embedded in narratives. Research on traditional environmental knowledge provides rich evidence concerning differences between this type of knowing and technical-scientific knowledge. From this literature, we learn how complex environmental information can be captured in narrative forms and how, in turn, these forms facilitate their effective communication within a community and sharing across generations and cultures.

This article then takes up narrative analytic approaches, discussing how basic elements of narratology can be used to examine the structure of modern-day discourse about complex environmental phenomena. These narratological methods are then used to evaluate present-day talk about climate change and illustrate its close parallels to ways of knowing found in TEK. Using concepts such as focalization and emplotment, we see how such talk exhibits narrative properties not found in formal communication (e.g., by the IPCC) about climate change. Our contention is that narratively rich modes of communicating climate change issues need to be deliberately employed to improve discourse and action on this issue. This research provides new impetus for examining how both traditional and cosmopolitan communities used narrative methods to convey complex environmental information in language-based systems that are related to personal experience and community practice instead of specialized expertise.

The issue has strong policy implications. Surveys have shown that in most of the world, including the US, the public is overwhelmingly aware of the climate change issue (Kim 2011; Leiserowitz 2007; Lorenzoni & Pidgeon 2006; Semenza et al. 2008; Spence et al. 2010). However, research has also shown that most citizens (e.g., in the US) do not judge climate change to be personally worrisome or associate the consequences of climate change with significant harm to themselves (Leiserowitz et al. 2010; Newport 2008; Stamm et al. 2000). Some argue that climate change communication needs to be couched in the familiar or iconic (McDaniel, Axelrod, and Slovic, 1996; O'Neill and Hulme, 2009). In this article, we advance the argument further and maintain that such communication needs to be integrated into people's everyday narratives. Furthermore, the use of narrative analysis will afford new insights into the lack of salience of climate change and other pressing issues.

1.2 Background: Narratives and Traditional Ecological Knowledge

We begin by re-examining the role of narrative in traditional knowledge. Traditional environmental knowledge (indigenous knowledge) had often been treated in the past as if it were a static archive to

be accessed for various kinds of environmental management. Current views regard it as dynamic and adaptive, constantly changing while retaining cultural continuity. If it were static, what could traditional knowledge possibly have to say about climate change, given that indigenous elders have not previously experienced climate change, and that the changes being observed now are beyond the range of experience of traditional groups? Traditional knowledge should be seen as a process, rather than a static body of knowledge. Traditional ways of knowing, that is, observing, understanding and making sense of environmental change, is what makes traditional knowledge holders such good observers of climate change (Armitage et al., 2011).

Traditional knowledge can be seen as a knowledge-practice-belief complex (Berkes 2008); the anthropologist Ingold (2000) would go further and say that practice is the essence of indigenous knowledge; practice is ultimately how knowledge is transmitted and learned. Narratives play a significant role in this. It is the stories people tell that connect them and others, including non-human parts of the environment, into a coherent whole, and provide meaning. Through these stories, people make sense of the whole and discover how the world fits together. Hence, narratives have been used extensively by social scientists, especially anthropologists, to understand the personal meanings of events, cultural values and worldviews.

Preston (2002) collected Cree stories from the James Bay area, and treated them as an expression of the personal meaning of events, and ultimately to understand how the Cree make sense of the world. Some stories may recent. For example, to emphasize the importance of humility for hunting success, a Cree fisher told a personal story of himself and how he once boasted about his fishing abilities and ended up returning home empty-handed from an area where others were catching lots of fish (Berkes 2008). Use of narratives is diverse. Hunn and Selam (1990), an ethnobotanist and an indigenous expert working together as a team, examined the use of narratives through annual, cyclical repetition, to transfer knowledge, values, and identity to succeeding generations. In the area of St. Elias Mountains, a glacier field that straddles Alaska, Yukon, and British Columbia, Cruikshank (2005) worked with Tlingit and Tagish storytellers. She found that these people attributed human-like characteristics to glaciers and considered them to be sentient and responsive. Narratives about periodic surges of glaciers (a geophysical fact) were mixed with stories of sentient glaciers responding to human disrespect.

Narratives are no doubt best appreciated by people who are intimate with the culture that produced them, and there has been a modest revival of interest in traditional stories in these societies. Preston has commented that there was little local interest in the 1975 edition of his book, *Cree Narrative*. But when the second edition came out in 2002, the Cree School Board bought out most of the print run, the stories having become not only relevant but positively valued. Some narratives do not fit scientific understandings very well; for example, geology and geophysics to not speak of “sentient glaciers”. Trosper and Parrotta (2011) examined some common themes in traditional knowledge, and suggested that they fit some kinds of science better than they do others, along a continuum. But given that narratives are used to make sense of the world, whether a particular narrative is believable or not is not the point; narratives can be taken metaphorically. In fact, many narratives in traditional societies are probably meant to be taken metaphorically because they are designed to convey cultural values and are used in the education of the young, as in the coyote stories of the Columbia Plateau (Hunn and Selam 1990).

Narratives from indigenous people are of great interest in the area of climate change. Consider the following narrative (Fast et al. 2011) from the Inuit people of Eastern Baffin Island in the Arctic Ocean:

Ice breaks off earlier than in past years, and then as soon as ice leaves bowhead [whales] come in. Ice forms later than before, around mid November, and it seems to have difficulty forming or freezing on the shores. From the 1960s to the 1990s it used to form without any difficulty in middle of October – a month earlier than it does now. The sea ice is less predictable so hunters need to be more careful when they are travelling.

The number of icebergs has decreased a lot in the last couple of decades. They have decreased dramatically even in my own lifetime. Inlets used to be full of old ice but this never happens anymore. Even our travel used to be restricted by icebergs, but now only wind restricts us. The biggest change seen is that this area used to have ice all the time but now ice breaks up a lot. That didn't used to happen. Even people from Qikiqtarjuaq [a remote village on the north side of Baffin Island] can't travel there anymore. Only the inlets freeze over now, and there are no more transit routes on the sea ice. We have noticed when we go caribou hunting that some rivers that get their water from glaciers never freeze over.

Ice is so strange nowadays. It is more like lake ice than salt water ice. Freshwater is getting in there. The sea here has less salt than before. Last year my father noticed this. My father cooks his seal meat with sea water and noticed there was not enough salt in the water... Another example of changes happened last summer (2009) when I stayed outside all day with my daughter. After it became dark we went back in and we both got really sick from the sun. It is too warm here now – especially last summer. Even though I like the warm weather it was unbearable because it was too warm.

A number of features of the above narrative should be noted. The Inuit are communicating a blend of local knowledge and practice with the use of short stories (anecdotes), such as caribou hunters observing that some glacier-fed rivers no longer freeze over; the elder noticing that there was not enough salt in the water (he knows because he has always cooked seal with sea-water); and the narrator and his daughter becoming sick from the sun after staying out all day. These anecdotes help connect climate change observations with everyday life, putting a human face on climate change. References to spiritual values and trusted authority, both traditional and scientific, are implicit and subtle. There is reference to sea-ice which “used to form [in the past] without any difficulty” establishes that sea-ice has agency, reminiscent of the sentient glaciers in Cruikshank (2005). Traditional authority is established by making sure that the listener knows that the narrator goes out on the land and has been observing the environment over several decades. References to the narrator's father and to Qikiqtarjuaq (where sea-ice should really be firm but is no longer firm enough to travel) help further establish the veracity of the narrative.

There is no direct reference to the science of climate change. But the narrator is talking to Canadian government scientists and they share the knowledge that the Inuit in some villages have been using satellite images to help read sea-ice conditions. The Inuit have access via internet to remote sensing images that provide periodic snapshots of sea-ice at a scale that Inuit hunters can use (Berkes and Armitage 2010). The use of technology responds to the observation that “the biggest change is that ... now ice breaks up a lot”, and is therefore “less predictable so hunters need to be more careful

when they are travelling.” Thus, hunters use remote sensing images, in combination with their own knowledge, to reduce the risk of travel over unpredictable, broken sea-ice.

2. The Rationale and Methodology of Narrative Analysis

In the process of learning, people do not just add new information to a loose accumulation of facts in their heads. Rather, they construct mental models that make sense of what they see (Kempton et al. 1995). Some of this thinking has been applied to how traditional environmental knowledge is constructed (Berkes and Berkes 2009). According to cognitive psychologists, mental models are simplified representations of the world that allow one to interpret observations, generate novel inferences, and solve problems (Gentner & Stevens 1983; Johnson-Laird 1980). Anthropologists have expanded the concept into what is called a cultural model, and defined it as mental models that are shared within the cultural or social group (Holland & Quinn 1987). These ideas have been widely accepted and incorporated into modern environmental perception and communication theory (Bostrom & Lashof 2007; Bostrom et al. 1994; Kempton et al. 1995; Leiserowitz 2007; Lorenzoni & Pidgeon 2006; Ungar 2000). Kempton et al (1995), for example, used this framework to explain that people understand global warming by reference to prior experience with natural temperature fluctuations.

Bruner (1986) among others has recognized that these mental models in fact exhibit storylike properties. According to Bruner, our minds make sense of reality using mediation through “cultural products, like language and other symbolic systems” and “we organize our experience and our memory of human happenings mainly in the form of narrative-stories, excuses, myths, reasons for doing and not doing, and so on” (Bruner, 1996). Or, as others have described it: “Given the amount of uncertainty about the world, people create cause-and-effect stories to fill in the blanks. Frames—also known as mental models, schemas—are essentially such stories” (Wesselink and Warner, 2010).

Thus, individual and group narratives play a crucial role in creating and transforming environmental cultural models and vice-versa. According to this framework, upon being presented with new evidence related to climate change, people will automatically try to fit the new information into an existing personal narrative which has been partially derived from elements acquired from the cultural model. As explained by Bruner (1991) the course of narrative construction and reconstruction involves a number of processes that scrutinize the new information as a potential narrative element. Does this new information fit with this person’s sense of identity? Does it offer an appropriate sense of time, genre, context, particularity, and so on? Finally, and at the heart of the matter, it follows that the chances of success or failure in passing through these mental filters are dependent on the quality of the incoming narrative element itself. In this sense, the narratological presentation of a piece of hard evidence may determine its rejection or incorporation into individuals’ mental models and consequently society’ cultural models.

By specifically focusing on the narratives people tell about climate change, and studying the structure and essential narrative elements found herein, we might better understand how people comprehend complex information that includes not just science, but morality, culture, ideology, and belief. A useful introduction to narrative analysis comes from Bremond, for whom narratives display the rules, predispositions, and cognitive factors that influence human thought and behavior. “A narrative consists of a language act by which a succession of events having human interest are integrated into the unity of this same act” (Bremond, 1973 [1980], p. 186). That is, a narrative is not simply a list or

catalogue of facts or truth claims, but a progression of events that give the story movement. It is not simply a collection of disparate things, facts, or actors but a coherent unity. This unity is understood as the story's plot, and the means of writing a coherent unity is what we refer to as *emplotment*.

Narratives may expound upon a basic, coherent storyline, or they can be told in many rich ways by different narrators. This basic storyline, which narratologists refer to as the *fabula*, is a descriptive layout of the progression of the story, evolution of characters, and general thematic truth of the narrative. Fabulas can be analyzed any number of ways; one useful schema, from Bremond, posits that any fabula can be understood as a grouping of at least three kinds of events: possibility (of an event or conflict or discovery), the event (realization of a possibility), and the result (or consequence of the event). This logical sequence is one way by which a narrative creates a unitary whole. Fabulas can consist of one or more of these groupings, possibly intertwined into the overall plot. This is a useful tool for analyzing a narrative for structure and richness of emplotment.

Good narratives are understood to display certain characteristics, as discussed below. We will discuss basic methodological approaches from narratology that allow evaluation of these characteristics, and we will use them to analyze climate change narratives.

2.1 Analyzing Emplotment: Sequence, Character, and Integration

Methodologies for narrative analysis can be found in texts on narratology such as Bal (2009). Narrative analysis involves identifying and evaluating the plot. Plots are meaningful sequences of events, as opposed to lists or sets of facts and truth claims. Each individual event is understood in terms of the whole story, and vice-versa. Sequence implies a progression, whether it is a temporal or logical one. The main idea of the story is not provided whole at once –rather, the story evolves. Good narratives should have a storyline, or *fabula*, that is compelling. *Fabulas* can be analyzed any number of ways. One useful schema, from Bremond (1980), posits that any *fabula* can be understood as a grouping of at least three kinds of events: possibility (of an event or conflict or discovery), the event (realization of a possibility), and the result (or consequence of the event). This elementary (ternary) sequence is one way by which a narrative creates a unitary and compelling whole. Traditional ecological narratives, such as the Cree story about the boastful fisher returning with no catch, can be shown to follow these elementary sequences. In our analysis, we will seek out progression, along with these elementary sequences.

We also examine richness and specificity of character. Narratives do not just focus on events but also particular actors. Even the most generic fable will have specific persons in the plot. Sequence pertains to character too, as good narratives show the progression of character over time. Analysis involves studying particularity and growth of character as the plot unfolds.

This brings us to another inherent feature of narrative, which is its intimate relationship to identity. When asked to explain who they are, persons will not go into a resume of facts and descriptive; rather, their impulse is to tell a story. People work out their identities through the construction of coherent narratives (Ricoeur, 1992; Bruner, 1993). So being, we find that, in many rich narratives, characters not only recount events in a coherent way, they also tell stories of themselves. They emplot themselves into their narrative, and they grow and progress within the narrative as well as the sequence of events. In an effective narrative, the narrator is not just telling a story, they are also talking about their own role in it. So then, the analysis will seek out

autobiographical elements in each narrative and assess the extent to which the larger narrative about climate is merged with the narrator's identity narrative.

Lastly, emplotment is a way of tying discrete events and objects into a coherent whole. As such, there is a strong sense and action of integration. In our analysis, we seek out how norms, affect, culture, and scientific knowledge are seamlessly integrated. Contrast narrative knowledge, which allows the integration of emotion, judgment, intellect, morality, and art into a coherent whole, to scientific knowledge where knowing is limited to factual and logical propositions. But a good narrative does not limit itself to some of the categories of experience and cognition. Rather, it employs them all.

2.2 Analyzing Narration: Focalization, Specificity, and Hermeneutic

Fabula refers to the basic storyline, involving the general sequence of events and cast of characters; by contrast, *sjuzet* is the mode by which the story is actually told (Bremond, 1973). In analyzing narratives, we are interested in how the story is told, from what perspective, from single or multiple points of view, using which dramatic devices, and in whose voice. Good narratives not only have strong, memorable plots, they also are able to tell the story well. We also analyze focalization, which means identifying the positioning of the narrator and contrasting particular perspective views found in the narration with other alternatives employing standard classification schemes (Bal, 2009).

Narrating requires a specific narrator. A story is being told by a specific person, and so, we look for who is telling a narrative –i.e., the voice. We are also keenly interested in narratives that allow plurivocality, which is the capacity to have multiple narrators tell their side of the story. A narration is not simply an account, it is some specific person saying, this is my account. Contrast this to scientific discourse, which presumes an omniscient point of view (e.g., the view from “nowhere”). A good narrative uses focalization and plurivocality to make its account more convincing, memorable, and authentic. Here is an important point: in narrative, as opposed to third-person or omniscient scientific accounts, often the most convincing and authentic point of view is the first person narrative. This is because narratives are shared, and because narration is almost always in part autobiographical, the narrator is also sharing some part of themselves.

3. Analysis: Narratives of Climate Change

In what follows, we will employ rudimentary narrative analysis to evaluate the stories told by two interviewees regarding climate change. The richness of these narratives, and the abundance of narrative elements in them, stand in contrast with the official discourse of IPCC and other authorities on climate change. We will analyze transcripts of interviews conducted with two urban residents concerning their thoughts and feeling about climate change. One is a thirty year old woman (whom we refer to as C), with a college degree in environmental sciences, and the other a sixty-three year old man (whom we refer to as J) who is a retired junior high school science teacher. The interviews were conducted separately by one of the authors. The unstructured interviews were conducted using open-ended non-leading questions, recorded, and later transcribed. We then analyzed the transcripts using the narrative analytical methods previously described.

3.1 Everyday Narratives: Emplotment, Character, Integration

We begin with the elements of character and identity. When both interviewees starting narrating, we observed a curious thing: they both started, not yet talking about climate change, but recounting their past. The following segments of both interviews underscore the inherent tendency of the narrative to be autobiographical, as also seen in the Inuit climate change narrative. In other words, in the task of emplotment, the narrators invariably emplot themselves into the story. Observe the way C launches into the discussion, followed by J.

“I grew up in the Valley, San Fernando Valley, and really had not really left California until I was 18 after which I travelled the US and I saw 39 states while I travelled; I wanted to see all 50, so there are few places I need to go but really travelling our country you learn a lot about the different climates you learn a lot about different types of people and you know what people think about places; like you just assume that Texas is hot but then you go to places like Austin and it can be very cold, so people don’t really think about elevation that way either and it’s really neat to travel the country and now I’m gonna be travelling the world and trying to learn other people’s points of views ... I will be studying abroad in Florence so I’m very excited about that But... growing up I was an avid reader but I didn’t read much about climate change I wasn’t really understanding what was going on other than I knew that I needed to recycle water. When you live in Southern CA water is key it’s always like “oh, no, you need to control your sprinklers, turn off the water when you brush your teeth, so that’s very much always been part of our instruction and teaching every since we are children. So, one of my earliest memories is learning to not only recycle... ‘cause that’s been more recent but also to just conserve water ‘cause I’ve been through major draughts here in Southern CA, particularly in the Valley.

Michael Keeton wrote a book about it (climate change), I think, you know, maybe John Gresham, had (too), so I read a couple of different books that kind of used it into the plot line, and then you started seeing movies like *The Day After Tomorrow*, you started seeing things like ... *Twister*, I think was one of the first ones (movies), that really started looking into weather conditions and, you know, creating these huge spectacular movies, you know.

...I do remember (hearing about) “Saving the Rainforest” when I was a kid. That was a big thing. And there was like, you know, a Disney movie about it. I remember that there was a fairy named Christa... So, it was all about “Saving the Rainforest” actually. You didn’t really hear anything about global warming or climate change, but it was “not cutting down the trees”. So, that is how they put into references that we would understand as children. So, we clear cut our rain forests, we’ve added things into the atmosphere, and changed the balance of things, as well as pollution. So, is there climate change? Absolutely! Have humans changed it? Absolutely! I’ve always been of the point of view though- and maybe it is because I don’t get caught up in fear mongering or the excitement of certain things, and I’ve always tried to pull back and see the large picture- I’d think about what I learned about the dinosaurs as a child and how our atmosphere was completely different then. You know, there were different levels of nitrogen and oxygen and we could not have survived at that time when the dinosaurs existed. So now, we have the certain balance that we live in and climate change is not gonna ruin the earth. It’s just gonna ruin our balance that we can live in. So, I think that we are only hurting ourselves and I’m not afraid that the earth is going to explode, or that life is going to cease to exist. That’s just not gonna happen. But what may happen is that it may get inhospitable for us.

The second interviewee (J) displays the same autobiographical tendency, as in the following:

I was very fortunate being a teacher that would get summers off and I would get to go to the Canadian Rockies which I just fell in love with and I remember visiting glaciers and then some of the glaciers, especially those that are next to a big route that would be a sign saying in 1968 the glacier was here and in 1954 the glacier was here and it really hit me that these glaciers are receding- I probably read that before hand- but to me the physical presence of a glacier and to visibly see how much they are drifting back, or they are melting back- well, why are they melting down?- because the climate is getting warmer, and then, I don't know if I made the connection about how much human cause there was at that point, but I still remember seeing the receding glaciers every time I would come back- I would take a picture, and then come back the same place 5 years later and be amazed that all this was covered by ice and now it's just bullrings, with rock and gravel.

Some things about the environment have improved. The smog for instance, I used to drive to the LA area in the 60s and 70s and I remember my eyes burning, and even coming back from summer vacation, coming from fresh air into the smog and my eyes used to burn, and that in my opinion has improved, there aren't those days in which I can't take a full breath or that my eyes burn. Ah, now that I'm getting into birding, I notice that some bird numbers are declining again, it's not for reasons- we are here in Bolsa Chica, and there is a variety of development issues- but oh, I now... but, but, for other reasons, one of my favorite animals is the pika, and I used to love seeing the pika in the Canadian Rockies, it's an animal that is now threatened with extinction in California, I think it's remaining habitat is fairly up on high in Mount Lassen and Mount Shasta. And this is an animal that climate change... unless it's able to adapt, but it can only go up so high, and I guess now that you asked... it's coming to me too. ..that in the Yellowstone there are black bears eat whitebark pine, and as the species are dying out and having to move up higher, again, the trees can only go up to a certain elevation and once they reach that elevation, if they die out, the majority of the black bears die and in the Yellowstone it is whitebark pine ... so these animals have to adapt which could be that they eat more garbage or human food, or human interactions so...

In so doing, the two narrators display the inherent capacity of the narrative form for integration of diverse kinds of knowledge. In the above, we see science undoubtedly expressed by both (e.g., C's knowledge of atmospheric balances or J's knowledge of smog), but this is integrated with the element of experience. For these narrators, science, popular media, and experience are all valid and equal sources of knowledge. There is not one account for scientific fact, another for emotion, another for art, in C's and J's narratives, they all fit together. Through emplotment, everything – atmosphere, the water cycle, trees, dinosaurs, fictional characters, and the narrator herself, everything has its place. A narrative is a systems model, and emplotment is its principle of construction.

Both transcripts convey strong elementary sequences, as described by Bremond (1973). One ternary sequence common to both might be described as first, the question and prospect of climate change being a problem, then the narrator going out of her/his way to seek some kind of clarity vis-à-vis the issue, and ending with a resolution. This strong drive towards progression to resolution also displays the capacity of narrative knowledge not just to convey information but to engender personal commitment and action. Observe the resolution achieved in the following segments:

C: We should act! I think that we use way too much stuff and we're filling out the landfill's which is a huge problem! Its polluting our water supplies and we're starting to learn that now...

Each time we try to do a push on something, we have data 20 years later. I don't think that people thought about throwing away their medications in the landfill and that it would end up in our water supply. People don't think about necessarily those things and we're starting to find a data about that more, or like, you know... flushing medications... people used to do that all the time and now we are realizing that the more we use of those medications the more the people are throwing away and it's getting into our water supply...

I think that we need to try to restore some of what we changed and I would say that replanting forests is a big part; not using so much packaging of so much stuff is a big part; there are small ways that we can change things and there are things that would have a larger impact.

J: It's relevant to me because we are part of this food chain, and if parts of the food chain disappear you can't get them back again. And there is no telling what the consequences are when creation species become extinct. Plus, the fact that you know, this is our environment and some species will gonna become extinct because that's the way that has happen through history but when we have, when we're sure that humans have a definite impact that causes animals or plants to become extinct, I think we have an obligation to try to do whatever is in our ability financially as well to try to lessen our impact, whether that's through chemicals we use, or development that we use to try to lessen human impact on our environment, I guess.

3.2 Comparison with IPCC Discourse

The above accounts end not just with personal decisions, but something that might better be called narrative resolve. The ternary sequences conclude with commitment to action. In contrast, let us examine an excerpt from a recent climate change report from the IPCC. We selected this excerpt as representative of the rest of the report, but also a particularly important section of it where the "story" of climate change science needs to be most effectively told. Rather than contrast this against narrative, it is quite valid (and the position taken herein) to consider this, too, as narrative, a story being told by a storyteller, except that its narrative properties are very different from those seen above.

All models assessed here, for all the non-mitigation scenarios considered, project increases in global mean surface air temperature (SAT) continuing over the 21st century, driven mainly by increases in anthropogenic greenhouse gas concentrations, with the warming proportional to the associated radiative forcing. There is close agreement of globally averaged SAT multi-model mean warming for the early 21st century... Thus, this warming rate is affected little by different scenario assumptions or different model sensitivities, and is consistent with that observed for the past few decades.

...It is very likely that heat waves will be more intense, more frequent and longer lasting in a future warmer climate. Cold episodes are projected to decrease significantly in a future warmer climate. Almost everywhere, daily minimum temperatures are projected to increase

faster than daily maximum temperatures, leading to a decrease in diurnal temperature range. Decreases in frost days are projected to occur almost everywhere in the middle and high latitudes, with a comparable increase in growing season length.

...For a future warmer climate, the current generation of models indicates that precipitation generally increases in the areas of regional tropical precipitation maxima (such as the monsoon regimes) and over the tropical Pacific in particular, with general decreases in the subtropics, and increases at high latitudes as a consequence of a general intensification of the global hydrological cycle. Globally averaged mean water vapor, evaporation and precipitation are projected to increase (IPCC, 2007).

Taken at face value, the IPCC account is a running list of truth claims, which it is meant to be. There is other IPCC literature, some written in a different tone, but the above excerpt is taken from a key report that, as stated in the foreword, is meant to capture “the attention of both policymakers and the general public” and not just scientists (IPCC, 2007).

But let us compare this to C’s and J’s accounts from a narrative lens. Immediately, we see important narrative properties that one does not find in the IPCC account. First, there is the element of sequence, which is a causal chain of events that take on the semblance of a story. While C and J talk about the history of events and experiences that lead up to their present assessment of climate change, in the IPCC narrative, there is an assemblage of facts or truth claims. Moreover, in C’s and J’s narratives, the story is driven by actors –that is, characters with agency that move the story along. The IPCC narrative, too, has actors, but sublimated in the listing of truth claims. There is no character (even an inanimate character such as greenhouse gases, or non-personal characters such as industries) exhibiting agency in the IPCC account. In contrast to the two interviewees’ accounts, the IPCC language does not integrate scientific knowledge with other kinds of knowing (e.g., experience, emotion, morality). There is a story, but it is a flat rendering of facts and no progression of character, sequence of events, no emotion.

An even greater difference lies in the link between narrative and identity. Narrative is, according to Ricoeur (1992), the primary device humans have for establishing identity and, conversely, the most salient narratives are often linked to narrators’ autobiographical identity-narratives. When C and J give their accounts, they invariably work their own narratives into the climate change story. It is clear that there is no link to the identity of the narrator in the IPCC narrative and, moreover, the narrator is conspicuously absent from the account, as a closer analysis of focalization will reveal. Focalization, or narrative perspective, concerns the vantage point from which the account is being told. If we examine an excerpt from C’s account

I have a friend who picks up water bottles on campus and puts in the recycling bin and I completely respect that... And I think a lot of people think "I recycle, I do my part" but they are not looking at the large picture, just like the people who flew the electric car were not thinking of the large scale picture...

we realize that this is actually quite a complex feat of narration. It is clear that the narrative (“I”) is part of the fabula, the story that C is telling, and we have a character-based narrator (or CN). The narrator is not just talking about her own experience, but she also narrates others’ actions and perspectives. When she talks about her friend who recycles bottles, she does this as part of the scene –i.e., she actually sees the person doing the action and reports on it. A narrator of this type is also

known as a *witness*. That is, focalization in this account is character-based (CF), i.e., seen by a character in the fabula. And what does she see? First, she sees externally observable events and objects, which we label p (for perceptible), but also internal objects such as opinions and thoughts, np. Taking the whole excerpt and categorizing it, we might describe its focalization in this concise way: CN(p,np)[CF('I')] Bal, 2009, for details).

In contrast, the IPCC account is consistently narrated from the point of view of an external narrator, EN. Of course, we know about the composition of the IPCC, but within the text, the EN does not identify her/himself and does not identify events as part of her/his experience or observations. This point of view is known as the omniscient third-person narrator. Not only is the narrator not a character in the fabula, this narrator is not even identifiable. The account is a “view from nowhere”. It is from the perspective of an all-knowing external (objective) narrator from whose perspective the events or objects are being viewed. The narrator is as objectified as the scientific facts being narrated. The perspective from where such objects or events is viewed is also removed from the fabula or the scene; focalization is external, or EF. Lastly, what sort of things are being reported? At first blush, we might say that directly observed objects are being reported, but upon closer inspection, this is not the case. In fact, what is being reported are not actual changes in temperature or precipitation that the reader might also experience if she were at the scene. Rather, all the truth claims are in fact generated from a model, which for all practical purposes, is removed from the ambit of experience of the reader –i.e., np. Only the model, and the omniscient narrator, sees. We might then characterize the IPCC account as: EN(np)[EF]. These differences have important implications.

4. Concluding Observations and Policy Implications

We provided climate change narratives from the Inuit, from informed southerners, and from the IPCC (2007) to argue that methods from narratology can be used to examine environmental discourse from a narrative lens. We illustrated this thesis with an analysis of transcripts from interviews with two urban residents about climate change, and we contrasted the narrative properties of each against excerpts from IPCC communication. Distinct and crucially important differences can be seen in the narrative properties of these sources.

From scholarship on traditional environmental knowledge, we see that narrative-based knowledge can effectively be communicated from person to person, across generations, and across cultures (in this case, the Inuit explaining their observations to government scientists). These narratives do not simply function to communicate, they also have the efficacy of engendering action on the part of the receiver –i.e., translation into everyday practice. They are able to, in many cases, become part of a community’s culture and an individual’s narrative identity.

Examining the transcripts of the two interviews, we have seen how this is so. These narratives allow the integration of multiple kinds of knowing –scientific and everyday observations, experience, values, aesthetics, and emotion, as can also be seen in the Inuit narratives of climate change. These multiple elements, in turn, serve to give a narrative the power to be internalized by the hearer into her or his narrative identity and everyday life. The transcripts from C and J had elements of rich, compelling narratives: interesting sequences of events, integration of multiple elements, rich and particular characters, and the integration of the narrative with their autobiographical selves. Such narratives have the power of witnessing; they are personal testimonies that facilitate the engendering

of trust (and belief) on the part of the hearer. The analysis of C's and J's narratives is significant in two ways. First, it helps us understand the power of narrative in knowledge sharing. Societies with a cultural tradition of narratives have an advantage in this regard. In traditional communities such as the Inuit, communicating complex observations via short stories is a much finer art than in California (note the difference in amount of specific climate change observation communicated by these two sets of narratives). Second, C's and J's narratives show the continuing relevance of nonscientific, narrative-bound knowledge in today's modern-day cosmopolitan context. Narrative knowledge is as modern and timely today as it always has been.

In contrast, what if we were to speculate on why it is, despite more than a decade of consistent and concerted scientific endeavour, the otherwise impressive narratives from the IPCC have not worked its way into people's everyday actions and modes of thinking. We do not contend that the narrative form presents a superior mode of knowing to that of science, nor that in emplotment it achieves a better representation of a system than systems models, only that narrative knowledge has a place alongside that of scientific knowledge. However, we submit that perhaps one important reason is to be found in the simpler, monotonic narrative form of IPCC communication. Compared to C's and J's talk and Inuit narratives, IPCC narratives are, though factually richer, narratively poor. The IPCC narrates as an external narrator, seeing objects and data that only it sees. This view from nowhere has the disadvantage of, first, being received by the public as paternalistic and imposed and, secondly, something that cannot be part of the receiver's shared experience. The public has no capacity or authority to access the models and inherit its knowledge into a form that they can then narrate to others. And we are reminded of Lyotard's (1979) point about narrative knowledge; its power and longevity resides in its property of being shared and allowing speaker and hearer alike to participate in narration.

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