


# Policy Mythology

## A Case Study

Connor McMullen

*Two things that are ubiquitous in our modern life.  
Stories and plastics.  
Can one save us from the other?*



Where did I come from?  
When will I finally die?  
The surf brought me here.  
Dumped me at the high tide.  
Among empty shells I tried to hide.  
What was I?  
Some piece of a toy?  
Was it I that brought laughter and joy?  
Or was I from a boat?  
Perhaps a fisher or a tug?  
Before I ended up here in the suds.  
My true form long hidden.  
Such is the lot I've been given.  
Now I'm just a big chunk of plastic.  
No history, no home.



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by

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# Acknowledgements

I cannot begin to acknowledge the storytellers and friends who have influenced my work. They span three continents, and their number never ceases growing. They occupy every walk of life and never cease to amaze me with their ability to see clearly what I cannot, each in their own way.

Academically, the last two years have been filled with inspiration and a wealth of knowledge pouring from the front of the room. They have not always made it easy, or fun. But the special group of students I have shared this experience have pulled me through my toughest times, just as I helped them through theirs. When these people, on either side of the lecture hall, leave the 5th floor, things will be a little less bright.

A confidant. A muse. A tether. Really what I need, she's there. She doesn't always listen, but she always lets me talk. She probably won't like it that she's in here, but she's too important not to mention.

And my parents. My first storytellers. Some of the best. They showed me my future, it just took me some time to realize it.

*Connor McMullen  
Den Haag, August 2019*



# Executive Summary

What if we treated our policy advice like myths? Wound them into a stories instead of binding it in a report? How can storytelling contribute to policy analysis?

This thesis takes an new take on an old approach to policy communication by analyzing these and other related questions. This works builds on the Extended Imagery Transportation Model and the Narrative Policy Framework to explore the world of stories from a scientific perspective. This academic literature cleaves the process down the middle, separating the story that is told from the narrative that is heard. This transfer is governed by the transportation a story induces, our minds carry us to far-away places while our bodies lose focus of the world around us.

Using a structuralist approach to literature, this research reveals that stories consist of five components. The characters who inhabit them, the ones that the audiences shares the experiences of as they travel through the plot from beginning to end. These plots are categorized using two different frameworks, but the essentials happen inside the character, not around them. This internal experience can be seen as one of transformation and growth, one that brings the hero closer to achieving a perfect balance between intuition and order, strength and feeling. This process of catharsis, atonement and apotheosis is central to any story, but central to a myth.

The stories, and myths, that we experience serve four functions. They awe us with their transportative powers, show us an image of the universe, challenge and reinforce social order, and teach us how to overcome the inevitable struggles of being human. In this thesis, we take these ideas of stories and mythology and apply them to the world of policy, specifically to the problems posed by plastics in society.

However, this work does not stop with theory. It sets the ideas to practice through experimentation. Four forms of communication were designed, the best of storytelling and traditional policy briefs; text and data visualizations. These designs were the subject of a three part experiment, where experiment subjects were asked to view one of the forms and answer surveys about their experiences. This experiment covers much new ground, and both serves as a pilot study for future development, as well as a research effort in its own right.

Even with a small sample size of 44 participants, the results are still promising for the use of storytelling in policy communication. The Policy Fable performed exceptionally well considering it is a newly developed form. One that showed promise in conveying information, engaging the audience in an emotionally positive experience and producing a decidedly different message than the other forms tested.

These results are taken back into the larger world of policy analysis, where an exploration of potential new applications of plot and characters are formulated based on Cultural Theory and the aforementioned plot structures. Allegorical storytelling is as broad as it is deep, and the future promises an interesting time for those willing to stretch out and combine policy and mythology. Given the problems posed by plastics and other grand challenges, new types of approaches are needed now more than ever.





# Contents

<b>Prologue</b>	<b>1</b>
<b>1 Literature Review: Science of Myth and Science as Myth</b>	<b>5</b>
1.1 Research Approach . . . . .	6
1.2 Science Communication Models. . . . .	7
1.3 Extended Imagery Transportation Model . . . . .	7
1.4 Narrative Policy Framework . . . . .	10
1.5 The Function of Myth. . . . .	12
1.6 Risk and Culture . . . . .	14
<b>2 Literature Review: What's in a Story?</b>	<b>17</b>
2.1 Allegorical Stories: From Fairy Tales to Anecdotes. . . . .	17
2.2 Analysis: The Seven Basic Plots . . . . .	19
2.2.1 Meta-Plot of Stories . . . . .	19
2.2.2 The Seven Basic Plots . . . . .	20
2.2.3 Connecting the Plots . . . . .	24
2.3 Analysis: The Hero's Journey . . . . .	25
2.3.1 What makes stories work? . . . . .	29
<b>3 Literature Synthesis: When Stories Become Narrative</b>	<b>31</b>
3.1 Five Parts to a Story . . . . .	31
3.1.1 Setting. . . . .	31
3.1.2 Characters . . . . .	32
3.1.3 Plot . . . . .	33
3.1.4 Message . . . . .	34
3.1.5 Forms of Communication . . . . .	35
3.2 Updating The Model . . . . .	37
<b>4 Case Study: Plastics and Society</b>	<b>39</b>
4.1 Methodology - Case Study and Experiment. . . . .	39
4.1.1 Case Study . . . . .	39
4.2 Examples of Policy Artifacts . . . . .	40
4.2.1 UN Report on Single Use Plastics. . . . .	40
4.2.2 Ellen MacArthur Foundation - The New Plastics Economy. . . . .	41
4.2.3 Plastics - The Facts 2017 . . . . .	42
4.3 Comparing Policies. . . . .	45
4.3.1 Global Plastics Model . . . . .	45
4.3.2 Model Analysis . . . . .	45
4.4 Designing the Communication Artifacts . . . . .	46
4.4.1 Commonalities of Design. . . . .	47
4.4.2 Executive Summary . . . . .	48
4.4.3 Infographic . . . . .	49
4.4.4 Policy Fable. . . . .	50
4.4.5 Metagraphic. . . . .	52
4.4.6 Four Forms, One Booklet . . . . .	54
<b>5 Policy Artifacts</b>	<b>55</b>
<b>6 Case Study: Experiment</b>	<b>99</b>
6.1 Experiment Structure. . . . .	99
6.2 Question Selection . . . . .	100

6.3	Experiment and Survey Design . . . . .	106
6.3.1	Experiment Setup . . . . .	107
<b>7</b>	<b>Empirical Results: What Happened</b>	<b>109</b>
7.1	Experiment Data and Data Cleaning . . . . .	109
7.2	Participant Antecedents and Controls . . . . .	111
7.2.1	Transportation as an Antecedent . . . . .	114
7.3	Form as an Experiment Effect . . . . .	114
7.3.1	Emotions and Mood . . . . .	114
7.3.2	Cultural Shift . . . . .	117
7.3.3	Information Transfer . . . . .	118
7.3.4	User Experience Questionnaire . . . . .	120
7.3.5	Message Outcome . . . . .	122
<b>8</b>	<b>Discussion to Reflection: What Happened?</b>	<b>125</b>
8.1	Discussion . . . . .	125
8.1.1	Experiment Validity . . . . .	125
8.1.2	Controls . . . . .	126
8.1.3	Hypothesis Testing . . . . .	127
8.1.4	Policy Analysis . . . . .	129
8.1.5	The Wonderfully Complex World of Color . . . . .	129
8.2	Extrapolation . . . . .	130
8.2.1	Policy Analysis Mindsets . . . . .	130
8.2.2	Policy Analysis Settings . . . . .	132
8.2.3	Storytellers . . . . .	133
8.3	Speculation . . . . .	134
8.4	Reflection . . . . .	135
8.4.1	Critical Reflection . . . . .	135
8.4.2	Personal Reflection . . . . .	136
8.5	Coming Full Circle . . . . .	137
	<b>Epilogue</b>	<b>141</b>
	<b>A Read, Watch, Listen</b>	<b>143</b>
	<b>B Experiment Tools</b>	<b>145</b>
	<b>References</b>	<b>187</b>

# Prologue

## Why Stories Matter

All analysis is meaningless. That is to say, all the work completed by a policy analysis is by itself, without a use. Whether it be a model, a framework or a strategic plan; none of them have meaning to anyone but the analyst. It is only when we communicate our work to others, do we begin to prescribe meaning. Policy analysts, more than almost any other profession, rely on successful communication of their work for it to be accepted and implemented by other actors. A hammer is a hammer, in the hands of both a craftsman and a layman, but analysis is almost useless to all except the analyst without effective communication.

This communication of ideas can take on many forms: from paper reports to serious games and a myriad of options in between. Regardless of form, each of these tools attempts to transmit a specific message from sender to receiver. This message is one of hundreds (if not thousands) that an audience may receive on any given day. Policy communication has traditionally employed a rhetorical approach to communication, reflecting the academic and scientific origins of the field. But what happens if policy analysts try an older approach? One that has been used throughout human history to inspire awe, move emotions and teach lessons. What happens when policy analysts become storytellers?

## On the Nature of These Questions

Policy analysts are not entertainers. However, this does not exclude the possibility of using stories for other purposes. Some of the oldest stories known to us today are not intended only to entertain, but to teach as well. Today we often find these fables and folk tales, stories that once used to be central to cultural teaching, relegated to the children's section of the library or bookshop.

Houses of worship are another place where stories have endured as a method of teaching and communication. Religious leaders have long leveraged the power of stories as a communication tool. Jesus of Nazareth spoke largely in parables, and when asked about why he did this, his reply was:

The knowledge of the secrets of the kingdom of heaven has been given to you, but not to them. (Matthew<sup>1</sup> 13:11-3)

In this context he was speaking to one of his disciples, those who have already received these "secrets". While the average layperson, has not, and may struggle to comprehend the complexities of spirituality that are alluded to in these stories. Policy analysts engage in a similar search for enlightenment, not spiritual, but scientific.

## On the Words We Use

This study uses a number of words that are not commonly found in policy analysis circles. Furthermore, many of the words used in this study have changed significantly from their original meanings and have flexible uses in modern language. The concepts defined below are specifically defined for clarity, and reflect a classical approach to storytelling and literature at large. Two dictionaries are used for these definitions: the Oxford English Dictionary for primary definitions and guidance, and Wiktionary for the extensive etymological resources (Oxford English Dictionary, 2019; Wiktionary, 2019).

Myth is a word that somewhat recently has obtained a negative connotation, though the Oxford English Dictionary retains the positive definition of the word as the first entry (Oxford English Dictionary, 2019, "myth"):

a traditional or legendary story, usually concerning some being or hero or event, with or without a determinable basis of fact or a natural explanation, especially one that is concerned with deities or demigods and explains some practice, rite, or phenomenon of nature.

---

<sup>1</sup>This study uses the King James Version of the Bible.

This thesis takes a larger conception of this idea, extended beyond deities and demigods to any explanation of practices, rituals or nature. Allan Watts uses a definition that provided the original inspiration for this study. Watts spoke of a complex of stories, any story taken from this complex would be a myth that exists in that larger *mythology* or *mythos* (1968, p.7) .

Myth is to be defined as a complex of stories - some no doubt fact, and some fantasy-which for various reasons, human beings regard as demonstrations of the inner meaning of the universe and of human life. Myth is quite different from philosophy in the sense of abstract concepts, for the form of myth is always concrete consisting of vivid, sensually intelligible, narrative, images, rites, ceremonies, and symbols.

Joseph Campbell often recited the following sets of definitions in his lectures (1967; 1969):

Mythology is other people's religion...religion is a popular misunderstanding of mythology.<sup>2</sup>

While it is a lighthearted snippet, it begins to expose the relationship between beliefs and mythology. In the same lecture, he provides a more concrete explanation (Campbell, 1969):

Mythology is a system of images that gives the mind, and gives the sentiments, a sense of participating in a field of meanings. Different mythologies will differently define possible meanings, in terms of the knowledge of the period, in the sociology of the period, and in the results in...this curious phenomena of the human psychosomatic system.

With these ideas in mind, a simple definition of this concept is used for this study that attempts to capture this meaning-making experience of mythology:

A **myth** is a story that prescribe meaning to the existence of some thing.

Myth comes from the Greek word *mythos*, which itself means "story". Story is an incredibly ambiguous term, one that has only recently emerged as separate from "history", in fact the word "story" comes from the Latin word *istoria* which is also the root of our word "history" (Wiktionary, 2019, "story"). The ancient origins of this word help to guide the definition for this thesis, as the proto-Hellinic roots point towards words that mean 'wise one' or 'witness' (Wiktionary, 2019, "history"). It is clear that since the beginning of language, stories have been linked with the storyteller, and this same connection is made for this study.

A **story** is a set of characters and events as envisioned by a storyteller.

The second half of that process, the hearing of the story, begins when the audience takes in the storytellers words (Jones, 2010).<sup>3</sup> It is in this process that the story changes, each audience member applying their own perceptions and experiences to what is transpiring in the story. This process transforms the story, as told, into a narrative, a heard.

A **narrative** is a set of characters and events as interpreted by an individual in the audience.

These characters are known by many names, though almost all definitions start with the hero. The Proto-Indo-European roots of that word point to the elevated status afforded this character, the original form 'ser'<sup>4</sup> translates as 'to watch over' or 'to protect' (Wiktionary, 2019, "hero"). This question of who or what they are protecting shall be set aside for now. The character of a hero is certainly fundamental to the story, and the function of this character is to grow or develop in some way to better fulfill this title.

A **hero** is the character in a point in a story that has the most opportunity for growth.

In modern storytelling and narrative analysis, a hero is often contrasted with a villain. This is the one term in this list that does not have ancient origins directly linked to storytelling. This word emerged from the Latin term, *villanus*, which refers to a "country-worker", rustic and close to the earth (Wiktionary, 2019, "villain").

an unprincipled or depraved scoundrel; a man naturally disposed to base or criminal actions, or deeply involved in the commission of disgraceful crimes.

<sup>2</sup>Occasionally he will use a slightly different joke, that religion is a popular misinterpretation of poetry.

<sup>3</sup>Full credit for this clarification goes entirely to Jones and McBeth, who appear to be unique in this separation. Their work will be revisited in the following chapter.

<sup>4</sup>Both the Italian greeting *ciao* and the Bavarian greeting *servus* share origins with this word.

This word emerges from a complex set of shifts that only recently came to be dominated by the negative connotation and denotation over time (Oxford English Dictionary, 2019, "villain"). Regardless of the actual timing, moral implications of this definition are complex, it is clear already that this term is culturally loaded, and preferentially avoided in the analysis.

Instead, this study uses the word enemy to represent characters we view as opposite the hero. The root of this word offers a most insightful definition: enemy is an evolution of the Latin word *in-amicus* which means "not-friend" (Wiktionary, 2019, "enemy"). Implications abound.

An **enemy** is a character whose goals and actions conflict with the hero at a point in a story.

Those implications stretch into the definition of the opposite of an enemy: an ally. This word comes from Latin *ad-ligare* for "to bind together". An equally simple definition is used for this study (Wiktionary, 2019, "ally"):

An **ally** is a character whose goals and actions align with the hero at a point in a story.

The final word defined for this thesis does not relate specifically to storytelling, but rather with the forms of communication that are used to convey a story to an audience. These tools will be referred to as artifacts, whether they are psychical or digital, static or dynamic. The original definition of this word comes from the Latin *arte-factum*, which means "something made by or using art", the last word especially we should in mind as we progress through this analysis (Wiktionary, 2019, "artifact").

An **artifact** is a single, self-contained piece of policy communication media, regardless of form.

## On the Things Read for This Thesis

This research is built upon a wide-ranging examination of the fields of literature, psychology, sociology, cultural anthropology and communication studies. Because of this breadth, brevity is preferred to over depth, and several sections include extensive referencing and recommendations for future reading.<sup>5</sup> Due to the unique nature of this study, a variety of sources have been used: ranging from traditional academic research papers, books and essays, recorded lectures and interviews to non-traditional sources: lectures transformed into song, YouTube videos, Wikis, blogs and an uncountable multitude of stories along the way.

The material reviewed for this work covers a broad scope of perspectives on storytelling and language. The primary sources for the analysis of storytelling are the works of Joseph Campbell and Christopher Booker. The Joseph Campbell Foundation has made available many of his lectures in audio format, these are primary source for this research. As well as *The Hero with 1000 Faces* and *The Power of Myth* a six-hour interview series that was recorded and broadcast in the mid-1980s. Christopher Vogler's *The Writer's Journey* is a modern application of Joseph Campbell's work, and provides a simplified guide through the complexities of the Hero's Journey.

Christopher Booker provides a more secular perspective, focusing his analysis of *The Seven Basic Plots* on stories from entertainment, while Campbell's focus is on cultural and religious stories. These two views of storytelling, focused on the plot of stories, form the backbone of this research. This study of stories blends into the final item of this list, the cultural analysis in *Risk and Culture* by Mary Douglas and Aaron Wildavsky. This essay is a story itself, laying out the history and argumentation that will be used to better understand the audience.

A complete review of these works are not part of this research, but they will be referenced in the design portion of this work. These include works on communication and design: Aristotle's *Rhetoric* and Massimo Vignelli's *Vignelli Canon*, the latter being a near constant source of guidance. Cole Nussbaumer Knaffic's *Storytelling with Data* also inspired many of the graphics used in this project, and will be referenced throughout. Lackhoff and Johnson's *Metaphors We Live By* is mentioned far less often, but has had profound impact on the concepts and language in this report.

<sup>5</sup>The references are a complete list of sources that I have explicitly used for this research, while Appendix A contains a list of artifacts I recommend experiencing for themselves. I think it is interesting that even for such a thesis, there is limited overlap between the two.



# Literature Review: Science of Myth and Science as Myth

Before diving completely into the world of storytelling, it is wise to look at where we are headed, and how to get there. This work begins with the central question:

How can allegorical storytelling contribute to policy analysis?

Naturally, this questions lead to a more basic one. Why should policy analysts use stories to communicate? A first advantage of stories over other types of communication is their *autotelic*<sup>1</sup> nature (by Mihaly Csikszentmihalyi, 2000). That is to say, stories are themselves inherently purposive, we tell and consume stories often purely because we enjoy them. Stories not only offer entertainment, they create an opportunity for the audience to experience the world through the characters of a story, allowing them to experience emotions, events and places that may otherwise be impossible.

Recent studies have examined how stories work, and have found that using stories to communicate information can increase audience comprehension and improve retention rates (Norris, Guilbert, Smith, Hakimelahi, & Phillips, 2005; van Hulst & Yanow, 2016). This advantage, combined with the autotelic nature of stories, makes them intriguing vessels for communicating policy. The first element of this research is focused on investigating potential structures for story elements, and how these elements can influence the audience. The primary research into these questions currently lie outside of typical policy research in the fields of literature, philosophy and psychology. This research applies the insights from these domains to policy communication, exploring both theoretical and practical models for storytelling in policy arenas.

**Research gap:** What are the effects of storytelling elements on communication?

These stories we tell are not independent ideas, rather, they are inextricably linked to the form in which they are told. Anyone who has been to the movies to watch a screenplay based on their favorite book can attest: form and message are very much intertwined. This poses an added dimension of complicatedness for policy analysts. Not only must they decide *what* to communicate, but also *what shape* that communication should take. Policy has traditionally been communicated using written text and data visualizations, though the effectiveness of these traditional forms has recently been called into question (Gemayel, 2018). This analysis also investigates the effect of these forms of communication: textual and graphical have on the audience.

**Research gap:** What are the effects of form on communication?

This research is not entirely theoretical, it is grounded in a case study of policy communication. This experiential approaches allows for practical exploration of the application of narrative and graphical elements, and affords the opportunity for experimentation to test the effectiveness of these forms on an audience. The case for this study, the complex issue of plastic waste on a global scale, is a textbook example of a super-wicked problem. This analysis approaches the issue using system dynamics, a tool that is inherently complicated and foreign to most audiences, and serves as an exemplary case

<sup>1</sup>From Greek *auto* "self" and *telos* "goal".

for the study of the application of these communication tools in a simulated real-world setting. These gaps provide direction as this main question is sub-divided into several components, as they guide us through this exploration of stories and science.

### 1.1. Research Approach

Each sub-question guides a portion of this work towards a portion of this central idea. Some are direct, and relatively straightforward efforts. Others require more research, creative thought or analytic work.

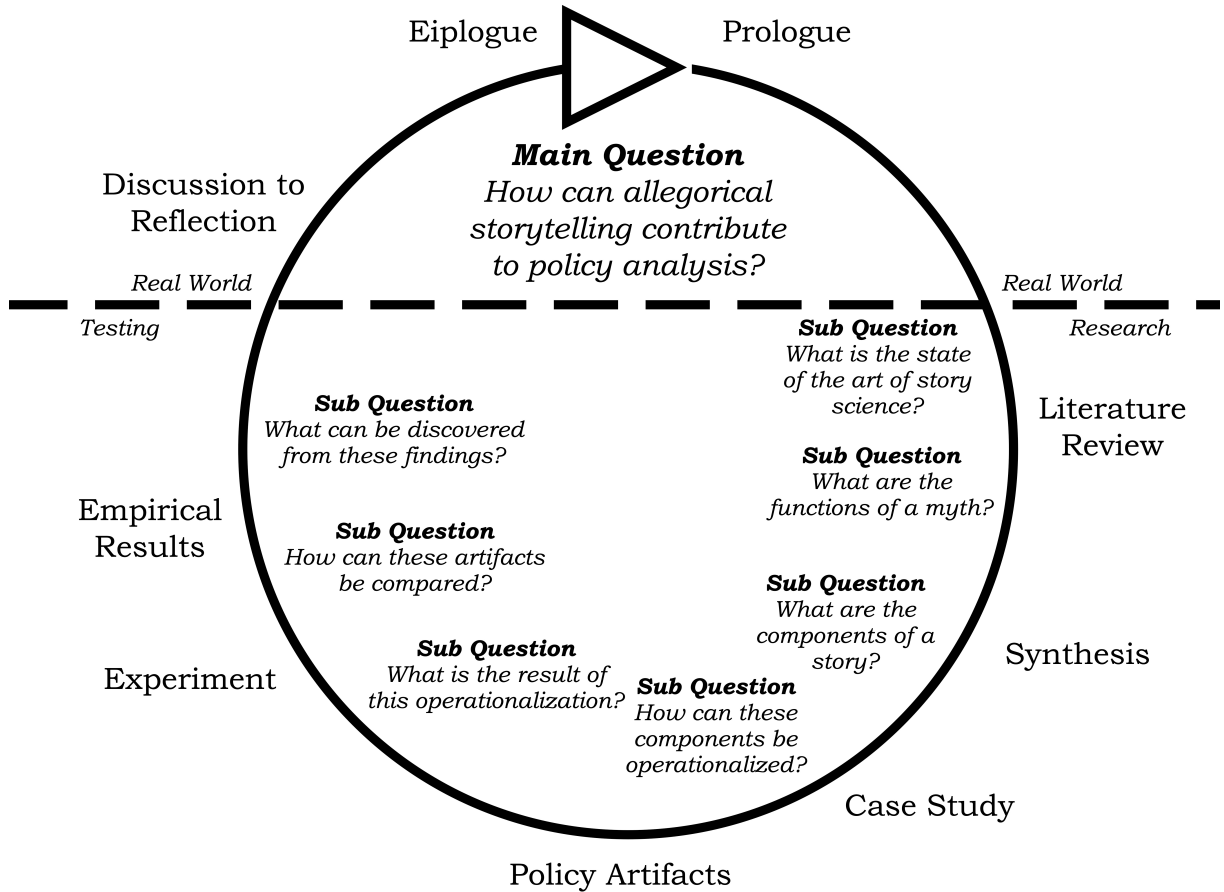


Figure 1.1: A journey through theory and practice

This research makes a series of assumptions that dictate the resulting conclusions. We will collect these assumptions in the table below, that will travel through the Literature Review, to return again in the Reflection.

The first assumption has already been made, implicitly. By even proposing this thesis, there is the assumption that a story has one underlying structure that can be identified. This is a structuralist perspective (McBeth & Jones, 2010). This type of research is in the minority compared to post-structuralist research. A post-structuralist would begin from the audience’s perspective, instead of the storyteller’s. Naturally, this focus on the narrative leads to a much different outcome.

Thesis Assumptions		
Literary Approach	✓ Structuralist	Post-Structuralist

It is from the storyteller’s perspective that we approach our first question:

*What is the state-of-the-art of story science?*



## 1.2. Science Communication Models

Science communication has gone through a series of shifts in the past 50 years. Some of which have precipitated from within the field of communication sciences, and others that have been driven by outside forces. In the 1980s, a model of the Public Understanding of Science (PUS) attempted to highlight the "information-deficit" in the public, and recommended a focus on creating a more informed public on the premise that a more informed public will make better decisions. This PUS approach focuses on one-way communication with the audience, placing the scientist above the public in an almost holy status (Davies & Horst, 2016).

A **Public Understanding of Science** approach focuses on delivering information in a clear and concise manner without emotion.

However this model was quickly criticized for leaving out the important role the public plays in not only informing and progressing science, but also the active role they have in interpreting communication artifacts and the messages they contain. In the early 1990's, the idea became even more complex with the introduction of the post normal-science model. This model introduced new complexities that were being studied for the first time: exploring areas of science where "facts" were now a luxury that was rarely afford (Funtowicz & Ravetz, 1993). This, combined with the earlier ideas of wicked problems introduced by Rittel and Webber in 1973, set the stage for a new kind of policy science (1973). Uncertainty, perspective and beliefs began to play larger roles in the interpretation of results, no longer could theories be concretely proven or disproven and prescribed meaning began to play a larger role in the traditionally stoic world of scientific knowledge.

Thesis Assumptions		
<i>Literary Approach</i>	✓ Structuralist	<i>Post-Structuralist</i>
Perspective on Science	Normal	✓ Post-Normal

These development, among others, began to show the need for a new model of science communication: one that both considered the perspectives and feedback of the audience, but also addressed these intangibles of emotions and observer dependence that are the norm in post normal science. By the early 2000s this idea began to emerge, the Public Engagement in Science (PES) model. This model takes a more liberal approach to communication, focusing on engaging the public in conversation instead of just producing information (Davies & Horst, 2016). This aligns with the multi-actor, post-normal situation that had become the norm, and continues to be the primary model used by policy analysts today.

A **Public Engagement of Science** approach focuses on fostering connections with the audience, often including emotional components and potential for feedback.

This is the context that most policy analysis takes place in, and this study follows this approach to science communication. One that extends beyond facts into beliefs, emotions and perspectives of both the analyst and the audience. It is here that the door opens for storytelling to emerge as an effective means of science communication.

Table 1.1: A Progressive List of Ideas

Thesis Assumptions		
<i>Literary Approach</i>	✓ Structuralist	Post-Structuralist
<i>Perspective on Science</i>	Normal	✓ Post-Normal
<i>Science Communication Model</i>	Public Understanding	✓ Public Engagement

## 1.3. Extended Imagery Transportation Model

How do we consume these stories? Psychology has produced a series of models over the years that examine this specific question, though no previous models have addressed specifically the unique qualities of stories. The *transportation of the mind's eye*, to use the original proposal's metaphor, is a unique one (Green & Brock, 2000). Stories keep us up at night, we read and watch without noticing the passage of time in the outside world as we become enthralled with what is playing out in front of us. This unique experience is called **transportation**.

Green and Brock do not explicitly define these concepts in their original paper, though they point towards several facets of a definition (Green & Brock, 2000, 701-702):

[Transportation is] a distinct mental process, an integrative melding of attention, imagery, and feelings.

[Transportation is] a convergent process, where all mental systems and capacities become focused on events occurring in the narrative.

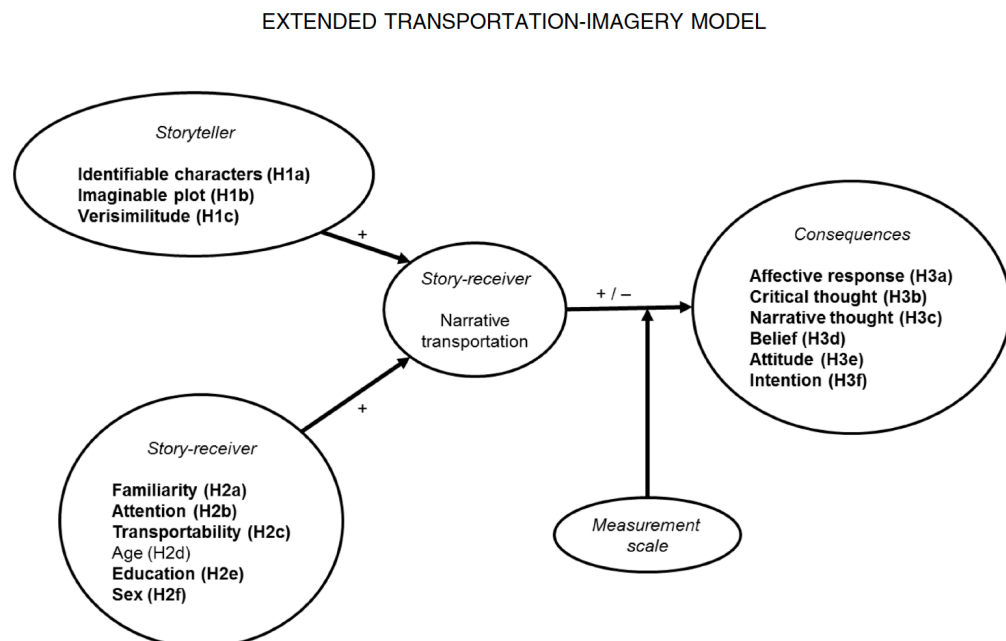
Gerrig, the first researcher to point towards a metaphor that has been used for some time to before to explain the unique experience of a story, uses a particularly simple definition (Gerrig, 1993, 10):

Someone ("the traveler") is transported, by some means of transportation, as a result of performing certain actions. The traveler goes some distance from his or her world of origin, which makes some aspects of the world of origin inaccessible. The traveler returns to the world of origin, somewhat changed by the journey.

For this research, we will use these concepts to formulate a succinct definition:

**Transportation** is a process wherein the audience participates in an imagined experience. This participation touches all aspects of human experience: including attention, imagery, and emotions.

Van Laer and associates developed the Extended Transportation Imagery Model, based in part on the research by Green and Brock in the field of Narrative Transportation. The original version is shown in below, developed from a meta-analysis of storytelling studies to attempt to better explain this curious phenomena (Van Laer, Visconti, & Wetzels, 2014).



NOTE.—Variables that tested significant in the meta-analysis appear in bold.

Figure 1.2: Extended Imagery Transportation Model, Van Laer et al. (2014)

This model identifies important characteristics of both a storyteller's product and the story receiver's individual characteristics key elements that determine the effect of artifact on the audience. The relation between an artifact and intentions, beliefs and actions are extremely unclear, and are not the primary focus of this study.

### Storyteller Characteristics

The first striking thing to notice about this model is the lack of distinction between the **storyteller** and the story. It is reasonable to assume that the storyteller will have the same measurable properties as the story-receiver and it is clear that plot, characters and verisimilitude are properties of the story and not the creator. Assuming this is the intention, these three characteristics can be analyzed from this perspective.

A **storyteller** is the creator of a specific version of a given artifact. They may be a writer, painter, data analyst, or policy advisor, among others.

The **Identifiable characters** in this model are "invented personas" through which the audience "vicariously experience characters' beliefs and emotions, empathize with them, and become engrossed in the story." (Van Laer et al., 2014, p.802) The characters of the majority of studies are human, as the research points towards the benefits and dangers of specific human characteristics. Stories with relatable healthy-eating characters have been shown to increase health-eating in the audience. Likewise, characters who smoke have been linked to audiences emulating this behaviour (Van Laer et al., 2014).

**Identifiable plots** are defined by Van Lear et. al as "temporal sequence of events that happen to the characters in a described setting." (Van Laer et al., 2014, p.802) This definition includes both time and place. This aligns with a fundamental requirement for interaction: two characters (or a character and an object) must be in the same place at the same time to interact. The use of time in stories will be addressed in a further section, as it will be seen, temporal sequencing can be used in a number of ways to create beauty and emotion in stories.

The final story characteristic is **verisimilitude**, defined as "the likelihood that story events may actually happen." (Van Laer et al., 2014, p.802) This concept is different than *truthfulness*, as almost any number of stories may be lacking a basis in "truth" but are nonetheless consistent within the rules set for by the story-world. Verisimilitude is a purely abstract measure, one akin to the "quality" of a given story. This topic was rarely, if ever, addressed in the structuralist literature reviewed for this study. Furthermore, measures of "quality" are notoriously observer dependent, and are extremely difficult to define.<sup>2</sup> Verisimilitude is an important characteristic of storytelling, but one that I believe is shaped as much by our individual life experiences as it is by anything we read in a book. For these reasons, discussions of verisimilitude are not included in this thesis.

### Story-Receiver

The original model consider receivers of the policy communication artifact the **story-receiver**. As we have already seen in the Definitions, the distinction between story and narrative is a key component of this study, and therefore this syntax is unsuitable for this research. Instead, these individuals will be referred to simply as the **audience**. The ETIM identifies several antecedents for the audience's acceptance of message. These antecedents are summarized in the following table, based on the extensive review of Van Laer and associates (2014).

The **audience** is anyone who experiences the process of transforming a story into a narrative.

<sup>2</sup>Robert M. Pirsig's *Zen and the Art of Motorcycle Maintenance* offers a unique account of the struggles one faces when attempting to define such concepts.

Table 1.2: Audience characteristics of the ETIM adapted from Appel, Gnambs, Richter, and Green (2015)

Characteristic	Correlation	Rationale
Attention	Positive	As the audience has fewer distractions, they are more likely to be transported.
Familiarity	Positive	As the audience is more familiar with the genre/topic of story, they are more likely to be transported.
Transportability	Positive	As the audience exhibits "chronic transportability" they are more likely to be transported.
Age	Negative	As the audience becomes older, they have more life experience and are less likely to be transported.
Education	Positive	As the audience is more educated, they are more likely to read and be better at making inferences, increasing transportation.
Sex	Binary	Female audiences are more likely to empathize and create emotional ties with characters, increasing transportation.

Each of these categories warrants extensive discussion, and some are especially contentious in the field of narrative study. Significant discussions surround the use of sex versus gender, and it is unclear which, if either, has a substantial effect on transportation. I believe that there may be significant biological differences in how various sexes engage with stories, however, untangling the purely biological influences from social and cultural ones is an impossible task. I also believe that the use of education as an antecedent may be a misapplication of biased assumptions about human behavior by researchers. While they cite that reading frequency increases with education level, this is another potentially cultural and circumstance laden antecedent. It is my experience that formal education has little impact on an audience member's ability to become transported by a story. I prefer to classify this measure as **Comprehension** instead of using the proxy of **Education** to avoid potential biases.

From this model: Age, Sex and Transportation will be considered as antecedents in this study. These characteristics are identified by authors of this model as areas for future study (Van Laer et al., 2014). Familiarity is largely uncontrolled due to the complexities of collecting baselines for this feature without introducing biases into the audience. The remaining characteristics: Education and Attention are controlled variables, either in the sample selection or experiment design.

Table 1.3: Audience characteristic of the ETIM as applied for this experiment

ETIM Characteristics	Experiment	Rationale
Attention	Controlled	Experiment design will control for variations in attention.
Familiarity	Uncontrolled	Experiment will not control any aspect of familiarity.
Transportability	Variable	Experiment will control for and test transportation.
Age	Controlled	Experiment will collect age data.
Comprehension	Controlled	Experiment will not control for audience comprehension as a prior, but will test for comprehension of the artifacts.
Sex	Variable	Experiment will test the difference of experiences between sexes.

## 1.4. Narrative Policy Framework

This Extended Transportation Imagery Model does not extend beyond the limitations of a single story, for this a different model is necessary. The Narrative Policy Framework (NPF) incorporates this distinction with a certain elegance. The first critical component of this model has already been introduced by way of the differentiation between story and a narrative. Jones and McBeth expand on the idea of a narrative, separating it into a micro- and a meso-narrative. The micro-narrative focuses on the interpretation of a single story by a single individual at a single point in time. The meso-narrative is therefore the collective interpretation of all stories simultaneously (Jones, 2010).

A **micro-narrative** is how a single myth is interpreted by a single audience member.

The focus of this study is on how micro-narratives impact the audience, though it would be remiss without inclusion of a definition for meso-narrative for completeness.

A **meso-narrative** is how an entire mythos is interpreted by an audience over time.

Jones and McBeth analyze the interpretation of each story along four axes: Breach, Transportation, Trust and Congruence. Each of these components is discussed briefly here.

#### Breach

Breach is about subverting audience expectations. A story consists not only of the actual plot, but also of every other potential plot that could be reasonably applied to that story Van Laer et al. (2014). Stories that provoke emotional responses in the audience are more likely to create a memorable experience, and therefore may influence future behavior. Breach is a matter of careful balance: a too clear plot path and the audience becomes complacent, able to predict every outcome. Repeated or overly-forceful *dues ex machinas*<sup>3</sup> can quickly frustrate an audience (Overly Sarcastic Productions, 2017, "Plot Twists"). A popular six-word story<sup>4</sup>, is an excellent example of how stories can breach our expectations (Haglund, 2013; Snopes, 2006).

For Sale. Baby Shoes. Never Worn.

The trio of word pairs trigger a series of thoughts, ending with a emotionally powerful "Why?" that shatters most reader's expectations. Jones and McBeth hypothesize that is factor is positively correlated to the audience accepting the message of a micro-narrative (Jones, 2010).

**Breach** is a measurement of how successfully the story subverts audience expectations; breach increases acceptance of a message.

#### Transportation

The transportation model used by Jones and McBeth shares origins with the model introduced in the previous subsection. Both models roughly describe transportation as the experience of a narrative receiver imagining the setting and events as described in a story, similar to the experience of flow described in sports and gaming or immersion in the arts (by Mihaly Csikszentmihalyi, 2000). This process may best be described by applying a simple version of flow theory: transportation is the balance between the skill of a reader and the level of interpretation required by the story. Again, there exists a trade-off: too much transportative material and the focus on the meaning is lost (Harteveld, 2011). Too little and the audience loses interest before the message can be fully delivered.

**Transportation** is a process wherein the audience participates in an imagined experience. This participation touches all aspects of human experience: including attention, imagery, and emotions.

#### Congruence

Congruence is the most difficult of the features to define, as it attempts to relate how well a story's message aligns with the audience's beliefs. This applies to the values embedded in a message, and the beliefs held by the audience: both common and individual. This not only impacts the reception of the message, but also the form it takes. This can be seen in how various prominent commentators and politicians from around the globe reacted to the IPCC's latest report on climate change. For those whose beliefs do not align with the report's 12-year warning, the remainder of the contents can be dismissed out of hand. For those who do, it becomes almost gospel.

**Congruence** is a measurement of how the message of the story aligns with the audience's world-view; acceptance increases with congruence.

#### Trust

Trust measures the relationship between the narrator and the audience. This feature is more nuanced than it first appears, though naturally it begins with the formal and informal relationship between the audience and the storyteller. As policy analysts, various settings and roles can shape very different types of interactions, and therefore demand very different types of stories. However, research has shown that the trust established within the communication artifact itself may be more important (de Vries, Terwel, Ellemers, & Daamen, 2015). Again framing plays a role in this establishment of trust,

<sup>3</sup>Literally "god from the machine" a reference to ancient plays where a last-minute appearance of a deity from above the stage via pulleys to resolve an plot.

<sup>4</sup>This story is often attributed to Ernest Hemingway, though the evidence suggests otherwise.

as it dictates design choices regarding the emphasis and omission of various pieces of information. Consistency and reliability in narrators are predicted to have a positive impact on the acceptance of a message. However, this may not always be the case. Several famous characters have proven to be unreliable narrators, Huckleberry Finn (of his eponymous adventures) and Tyler Durden (Fight Club) are relatively poor (even entirely inaccurate) narrators, but both stories seem to have considerable impacts on the audience.

**Trust** is a measurement of the audience's willingness to rely on the narrator for information; acceptance increases with narrator trust.

It is difficult to untangle each of these story characteristics from another. For this study, Trust is not being varied. Each form is written by the same author and all are presented with the TU Delft logo present. Efforts are taken to ensure the narrator of each form is a trust-worthy and fair assessor of the data presented (this will be revisited when other reports about plastics are analyzed). Transportation is inherent to certain forms and less so to others, and therefore this component will be a significant factor of analysis. Breach is a feature that is difficult to measure, eye tracking and biometrics monitoring may best be able to measure the effect of expectations on the audience (Kruger, 2012). Congruence in this study will be measured by using Cultural Theory assumptions about view on relationships that govern the world. This exploration of characteristics will continue when the survey design is discussed.

Table 1.4: Characteristics of the story to narrative process of the NPF

Characteristic	Variable	Controlled
Breach	✓	
Transportation	✓	
Congruence	✓	
Trust		✓

## 1.5. The Function of Myth

We have seen two models: one that focuses on that mystical experience offered by stories, and one that attempts to provide context to both these micro-narratives as well as the larger meso-narratives that they help to make up. Now that we have seen how stories can be used to transport an individual, we turn our minds to what to do once the individual has become transported into a mythological world. One that has greater meaning than what is explicitly stated on the pages. This section focuses on the question:

*What are the functions of a mythology?*

We have already seen a definition of mythology, a basic idea of prescribing meaning to the world that surrounds us. A slightly more enlightened definition may say that a myth defines what we cannot understand, existing in the murky area between society and technology. But what happens when technology provides us with ill-defined stopping points, when our understanding becomes uncertain.

Funtowicz and Roberts define post-normal science as a decision-making process "where facts are uncertain, values in dispute, stakes high and decisions urgent." (1993, p. 744) Given this recent inclusion of emotion and perspective to the world of science, it is natural to assume that the message of scientific communication must adapt to include these elements. It is here that the fields of cultural anthropology and comparative mythology lends a guiding hand. By using this approach, communicating policy science becomes possible from a mythological perspective. If we take a look through this lens of mythology we begin to see an interesting set of parallels.

Mythology exists precisely because the largest facts are uncertain. Mythology addresses the biggest questions humans can ask. Where did we come from? What is our purpose? It is from the answers provided to these questions that values begin to emerge. In traditional mythology, the stakes could not be higher: in many traditional mythologies our actions in this life echo through eternity.<sup>5</sup> A cursory glance at even the most tame stories of the punishments in the afterlife reveals the highest stakes imaginable. In traditional mythologies we are faced with urgent decisions every single day about how to live our lives.

<sup>5</sup>This line is adapted from a line at the beginning of the film *Gladiator*, though the sentiments are found in every religious text.

But as for that day or hour, no one knows, not even the angels in heaven, nor the Son, but only the Father. Be on your guard and stay alert! For you do not know when the appointed time will come. (Matthew 24:36)

**Post-normal science is mythology.** Not in the sense that it is untrue. But in the fact that **we cannot prove it, we must believe it.**

At the beginning of each of his lecture series, Joseph Campbell speaks of the four functions of these mythologies: the Mystical, Cosmological, Sociological and Pedagogical.

#### Mystical

The first function of a myth is to inspire a "sense of awe and wonder" in the audience (Campbell, 1968). This desire to cause inspiration is traditionally an effort by storytellers to remove the individual from within their personal context, and place them within a grander scheme. This function not only begins this de-individualization process, but it also captures the attention of the audience. Historically and architecturally this can best be seen through the design of religious buildings. Cathedrals, mosques and temples, with vaulted ceilings, painted tiles and stained glass are tremendous works of human craftsmanship, even by modern standards. One does not have to look hard at the Gemeente building in Den Haag to see how these principles have been borrowed from places of worship and implemented in places of policy.

More simply, we can see this at the beginning many of our fairy tales: "Once upon a time in a far-away castle there lived..." This transporatitive opening ignites the imagination and signals that this story is going to be a grand tale that will likely have a specific message about morality, or at least mystical elements. Perhaps the most ambitious, and creative, use of this technique is in the opening crawl of Star Wars, which begins with the mystical phrase, "A long time ago, in a galaxy far, far away..."<sup>6</sup>

The **Mystical Function** of mythology is to inspire a sense of awe and wonder in the audience.

#### Cosmological

The second function of a myth is to create an image of the universe as we understand it (Campbell, 1961b). Mythological texts have always done this, though today it may seem silly to look back on these myths as sources of scientific enlightenment. It is important to remember while the scientific understanding makes these ancient cosmological images appear comical and superstitious, it is a given that someday in the future, the current scientific "facts" will themselves be replaced with new knowledge as humans continue to develop their understanding of the world works. A piece of wisdom from Carl Sagan makes precisely this point (Saganist, 2008):

I urge you to bear in mind the imperfection of our current knowledge. Science is never finished. It proceeds by successive approximations, edging closer and closer to a complete and accurate understanding of nature, but it is never fully there...Science is always subject to debate, correction, refinement, agonizing reappraisal, and revolutionary insights.

As he alludes to, this image-building can be contentious in contemporary times. New cosmological images can be great disruptors: Copernicus's model of of the heliocentric solar system was such a monumental change to mathematics and astronomy, that today the term "Copernican Revolution" is used to describe any significant shift in a scientific paradigm (Wiktionary, 2019, "Copernican Revolution").

The **Cosmological Function** of mythology is to create an image of the world as we understand it.

#### Sociological

The third function of a myth is to promote and maintain a specific moral perspective (Campbell, 1967). In ancient myths, this often was tied directly to the cosmological view of the world, where social failings (or successes) would be blamed (or credited) for any number of cosmological events, and *vice versa*. Many of these traditional rules and customs still persist in parts of the world, while today many are seen as barbaric or primitive they still serve important purposes.

<sup>6</sup>I specifically remember being captured by this notion as a child, that these stories *could* be true, they just did not happen here.

These sociological orders, and the cosmological world-views they are built upon, have been the drivers of centuries of policies that dictate everything from what we wear to how we interact. They set the context for every action undertaken as part of official, and unofficial, policy.

The **Sociological Function** of mythology is to establish, maintain or reinforce a given social order.

#### Pedagogical

The fourth function of a myth is to guide the audience through the inevitable thresholds of life (Campbell, 1967). In ancient myths, this function focused primarily on the stages of life: birth, childhood, adolescence, adulthood, old age, and finally, death. As society grew more complex, these stories grew with it, addressing how we should interact with ourselves, each other and our environment. It is here where most fables we know today originate, as teaching tools to help guide our actions.

We have already seen several examples throughout this text of these pedagogical stories. But these are only one form that these stories take. Symbols, rituals, performances, and designs are just some of the methods that traditional mythologies have used to teach people how to embody their teachings.

The **Pedagogical Function** of mythology is guide individuals through the inevitable decisions they will be faced with in their life.

#### Emotions of Mythology

Each of these functions are nestled together, one cannot tell a pedagogical myth without first assigning causality and morality. And without that sense of awe and separation, a myth will fall upon uninterested ears; failing to accomplish it's purpose of aligning the beliefs and values of the audience with the messages of the story. Fostering an emotional connection through transportation is essential to creating the conditions for this alignment, Voltaire writes of this in reference to the arts (Voltaire, 1794, "Taste"):

...it is not sufficient to see and to know the beauty of a work. We must feel and be affected by it.

That emotional component is essential to mythology, and is one of the reasons why traditional mythologies have used transportative stories as a tool for communicating their messages. We have seen how myths use stories to convey a sense of the mystical, while also building a concrete cosmological image to reinforce a specific social order and offer teachings on how best to live our lives.

## 1.6. Risk and Culture

Both Joseph Campbell and Alan Watts speak of eras and how they relate to the imagery and symbolism of mythologies of the time. The realities of the world in which these people lived shaped how they told these common stories, and the values that resonated most strongly through their works. Watts points out that it is entirely logical that cultures that developed in arid deserts of the Middle East will have entirely different perspectives on life than those that develop in the jungles of central India (the Don & Watts, 2018). Joseph Campbell also highlights these differences, exemplifying the shift from hunting culture to agriculture as a key point in time where the stories begin to shift in message (Campbell, 1961a). He points out that religious texts have lost their true meaning as the metaphors and examples that provide them structure and context have been lost to time.

A key distinction to be made here is change in perspective from these thinkers to those in policy analysis. Traditional mythologies operate on a single-actor perspective, one of ultimate truths and absolutes. This stems from their origins in local communities, ones bound not only by common traditions but also by common circumstances and environment. Today's world is exceedingly more diverse than previous eras, one that offers unparalleled in how we chose to live our lives.<sup>7</sup> For each of these actors, a different approach may be required.

<sup>7</sup>There are sadly places where this is not the case, on both an individual and societal level.



Thesis Assumptions		
Perspective on Science	Normal	✓ Post-Normal
<i>Literary Approach</i>	✓ Structuralist	Post-Structuralist
<i>Science Communication Model</i>	Public Understanding	✓ Public Engagement
<i>Narrative Scope</i>	✓ Micro-narrative	Meso-narrative
<i>Number of Perspectives</i>	Single	✓ Multiple

This multi-actor approaches then necessitates a method for understanding what messages various audiences are looking for. While regional differences are indeed essential components to understanding both culture and stories, these sorts of analysis leave a far too fractured world with which to build mythological symbols from. Instead, a different approach to defining culture has been taken, that of Cultural Theory first proposed by Mary Douglas and Aaron Wildavsky (1982). Cultural Theory, unlike other types of cultural studies, examines the culture people choose, instead of those they are born into.<sup>8</sup> These researchers lay out a new path for understanding a culture, one rooted in the origins of the national mythology. One shaped by history and geography.

Cultural Theory measures individuals along two axes: Group and Grid. These axes are practical measurements of how individuals interact in society. Grid measures how individuals view choices, a high Grid individuals believes that their choices are determined by their place in the universe. The other axis, Group, measures how closely tied these individuals are to the rest of society. High Grid individuals form strong bonds with their communities.

In Cultural Theory, **Grid** measures how much an individual's decisions are relevant in comparison to the overall system. Lack of autonomy or individual's ability to influence outcomes is represented by a higher grid rating. M. Thompson, Ellis, and Wildavsky (1990)

In Cultural Theory, **Group** measures an individual's ties to their community. Closer and stronger ties are represented by a higher group rating. M. Thompson et al. (1990)

Alan Watts tells a wonderful anecdotal story about how society forms, that I will loosely retell here (the Don & Watts, 2018).

Towns historically were always formed at a crossroads. This basic design, two intersecting lines, helps to shape how the society formed. You end up with four distinct districts<sup>9</sup> We have the Lords Spirituals, the Lords Temporal, the Commons and the Serfs<sup>10</sup>. And once you've gone and built your city, what do you do? Well, you go and build a wall around it. And those that live outside the wall? They have nothing to do with the society.

It is not clear if Douglas and her students works were in any way inspired or related to these ideas, but the parallels are remarkable. The original focuses only on the border and the center, but eventually a formal definition emerges with five distinct group (Douglas & Wildavsky, 1982). These five sections can be paralleled by the five groups that are created by this Group-Grid (M. Thompson et al., 1990). The **Hierarchical** group, The Lords Common, represent those that have both high Group and high Grid. These individuals believe that everyone has a part to play in their society, and their actions should be dictated by this society. Similarly, the **Fatalist** believes that their role is dictated by their universe. Namely that all actions are meaningless and there is nothing one individual or group can do to change the circumstances. This leads to an unlikeliness to form strong Group ties. On the other hand, there are the **Individualists** who also eschew group structure in favor of individual choices, ones they view can change how the world works. Lastly, within the original theory at least, are the **Egalitarians**, who form strong Group bonds but view these groups and their actions as individual choices instead of societal compulsions (Douglas & Wildavsky, 1982; M. Thompson et al., 1990).

But what about the fifth group? Those that do not fit into this Group-Grid dynamic at all? Douglas's students put these hermit at the center of their model, but this does not fit with the metaphorical structure we have taken up from Alan Watts. Instead, it seems to make more sense that these **Hermits** would live outside of the city walls, cutting themselves off entirely from society. These cultures dictate how well

<sup>8</sup>There is grand discussion to be had about path-dependency, nature vs. nurture and fate/destiny. Unfortunately one that we do not have time to explore here.

<sup>9</sup>In many languages we still call them "quarters" even though most cities have dozens, not four.

<sup>10</sup>In India these are the four castes: Brahmins, Kshatriyas, Vaishyas and Shudras.

specific types of stories may congrue with different types of stories. We will return to this Discussion, for now we shall leave it here for now.

While these ideas provide guidance for *what* policy communicators need to do to create an artifact that can effectively convey, capture, and convince, we still need to understand *how* to tell a story, which is what we will explore in the next two chapters.

# 2

## Literature Review: What's in a Story?

As we have already seen through references and allusions, stories have innumerable forms and styles, one that continues to evolve along with society and technology. The chapter begins with a brief taxonomy of various story types. This is followed by an analyzes the underlying structure of these forms through the lens of two different lines of research into plot structure and potential applications for policy analysts. This chapter closes with look at the characters that populate the stories, and how their experiences create emotional connections with the audience. This is try to answer the question:

*What are the components of a story?*

### 2.1. Allegorical Stories: From Fairy Tales to Anecdotes

Some stories are merely that, stories. They are told for their own enjoyment, an end themselves. However, many authors and other creators often use this ends as a means. This is where literature begins to shift from purely autotelic productions towards work that attempts to satisfy both autotelic requirements and fulfill allegorical function. While these stories may employ certain literary devices and plot structures, they convey a specific moral lesson underneath that entertainment. An example, retold from Aesop's Fables, is included below (Pinkney, 2000):

One winter there was a farmer who was tilling his field and happened across a viper, freezing in the cold. Feeling pity for the animal, he took it into his coat to warm it up. Upon feeling the warmth of the farmer, the snake became invigorated and lively, immediately uncoiling to bite the man. As the farmer lay dying on the ground, he cursed himself for pitying a scoundrel.

The primary purpose of this allegory is to convey a morale lesson, namely not to "pity a scoundrel" or in modern language, to be careful who you choose to help. These stories are embedded with moral, cultural and societal assumptions that shape the message that the storyteller intends to send, as well as the one that the audience receives.

An **allegory** is a story that is used both as a means of communicating a specific message for the storyteller and the ends of both enjoyment and learning for the audience.

Allegorical stories have taken on many different shapes throughout the ages. Taxonomizing or classifying such stories have taken on many forms throughout literature's history, ranging from structures based on plot to genre and theme.<sup>1</sup> For the purpose of this research, a simple approach to story classification has been taken, based on the characters and characteristics of the world in which stories take place. These categories are defined as sub-types of allegorical stories, and include: anecdotes, fables and parables.

<sup>1</sup>The Aarne–Thompson–Uther Index, and the somewhat related Motif-Index of Folk Literature are two such works. The scope of this collected knowledge is truly awe-inspiring, and we will revisit theses resource again in the Discussion.

### Anecdotes

Anecdotes are literally "things unpublished" stories and tales that people have told but ones that often are not included in traditional literature for various reasons (Wiktionary, 2019). These stories have high levels of verisimilitude, and they are often conveyed as being entirely factual and experiential. This experiential aspect is essential to anecdotes, they are commonly relayed by word of mouth from a single person's experiences, and travel across society through repetition. As with all oral communication, this form of knowledge transfer lends itself to an evolutionary process, by which the story may change or lose key components as it moves through society. A common example in modern life is the anecdote involving McDonald's and a cup of coffee. The anecdote proceeds as follows, heard during casual conversation with fellow students:

Once there was a woman in America who sued McDonald's because the coffee was too hot!  
Americans will sue over anything!

The details of the case, *Liebeck v. McDonald's Restaurants*, are naturally more complex, and the sequence as presented omits critical details that are essential to a true historical account. Interestingly, this anecdote is still so common, that a plethora of articles and webpages have been dedicated to debunking it (Consumer Attorneys of California, 2018). However the anecdote survives, perhaps because of its amusing nature as well as its reinforcement of a commonly held viewpoint regarding the American legal system.

An **anecdote** is a story that conveys a plausible sequence of events, that are used as an example to communicate a typically cosmological or sociological message.

A common refrain in data analytic circles is that "the plural of anecdote is not data" highlighting a few of the concerns with using anecdotes in policy communication. It is important to note that though anecdotes are a form of myth, they are probably not appropriate for most scientific myths, for the reason laid out in the quote above.

### Fables

Fables<sup>2</sup> are autotelic literary artifacts first, and built around basic mythological images. They almost always contain magical elements, fantastic beasts or anthropomorphised characters. They have been the subject of numerous interpretations, iterations and transformations over the centuries. These are often popularized as folktales, like anecdotes but with low levels of real-world verisimilitude and no implication of truth<sup>3</sup>.

As one can see, this differs significantly from the modern definition found in the dictionary and colloquial speech: "A short story, typically with animals as characters, conveying a moral."

An **fable** is a story that uses high levels of transportation along with symbolic imagery to convey a mythological message.

### Parables

The word parables comes from the Greek *parabola* (Wiktionary, 2019). A parabola is symmetrical across a central plane. In this sense, parables also attempts to present a mirrored story: one layer, the literal component, focusing on the specific actions of the characters involved. The mirrored layer focuses on a metaphorical messaging, applying a symbolic lesson to a larger moral viewpoint. A key distinction between parables and fables, is that parables have high levels of real-world verisimilitude, in that they could actually have happened, and do not include stories with anthropomorphised characters or supernatural events.

The applicability of parables is demonstrated in a multitude of places throughout the Bible, exemplified the Parable of the Ten Bridesmaids.

Ten bridesmaids took their lamps and went to meet the bridegroom. Five of them were foolish, and five were wise. When the foolish took their lamps, they took no oil with them; but the wise took flasks of oil with their lamps. As the bridegroom was delayed, all of them became drowsy and slept. But at midnight there was a shout, 'Look! Here is the bridegroom! Come out to meet him.' Then all those bridesmaids got up and trimmed their lamps. The

<sup>2</sup>The distinction between an *apologue* and a **fable** is subtle, but for this text apologies are considered a subset of fables.

<sup>3</sup>*Legends* lie somewhere between anecdotes and fables.

foolish said to the wise, 'Give us some of your oil, for our lamps are going out.' But the wise replied, 'No! there will not be enough for you and for us; you had better go to the dealers and buy some for yourselves.' And while they went to buy it, the bridegroom came, and those who were ready went with him into the wedding banquet; and the door was shut. Later the other bridesmaids came also, saying, 'Lord, lord, open to us.' But he replied, 'Truly I tell you, I do not know you.' Keep awake therefore, for you know neither the day nor the hour. (Matthew 25:1-13)

While the story is ostensibly about a group unprepared bridesmaids, the parable connects to much larger ideas of death and the afterlife promised by Christianity. Depending on the cultural and experimental background of the reader, a number of specific parallels can be made to this story.

An **parable** is a realistic story that uses plot and characters to parallel a larger, more abstract message.

These categories are neither discrete nor all encompassing. This classification is biased towards shorter forms of stories, though longer stories can fit in this taxonomy as well. All of these stories are components of the mythological macro-narratives that guide human life, even if that is not their explicit intention. With this basic idea of what a myth can be, we are now prepared to look at how these individual stories take shape.

## 2.2. Analysis: The Seven Basic Plots

At 736 pages, Christopher Booker's *Seven Basic Plots* leaves no stone unturned in his analysis of stories. This book is divided into four sections. The first section details the basic structure of each plot, through a series of in-depth examples ranging from classic literature, modern film, theater and even opera. The second section explores the characters that experience these plots in depth. Booker's analysis hinges largely on Jungian psychoanalysis themes, something that I found both useful and somewhat constraining at times.

The cultural analysis, primarily the focus of the third section of the book, is interesting, though in my opinion both cynical and closed-minded. Booker argues that a shift in culture starting somewhere in the early 1800's has left us with incomplete modern stories, and in his view, today's landscape is full of largely nothing but ego-fueled fantasies that are incomplete stories. While I do not disagree with the critiques he offers of modern storytelling the causal mechanisms assigned are speculative at best. The development of this sort of macro-narrative is outside of the scope of this thesis, but there is one interesting note that I would like to draw attention to before moving on.

Booker rightly notes that modern entertainment has becoming increasingly more obscene in the past two centuries.<sup>4</sup> I typically agree with his displeasure at such a phenomena, a key role of the storyteller lies in what goes unsaid and is merely nodded at instead. I think a critical question is what is the future of obscenity in media, and what roles does it play in creating emotion within the micro-narrative. I believe that this in some ways marks a move away from allegorical storytelling, as these elements are included often for shock value or to one-up previous works. For this thesis, this problem and the future are set aside, with merely the notion that I hope popular media returns to a slightly more nuanced handling of such scenes in the future.

The fourth section of the book explores the subtitle of the book, "why we tell stories". It is an interesting section, again heavy on Jungian ideas, without the depth or clarity that can be provided by Watts or Campbell in these regards. I believe here Booker's focus almost entirely on Western research betrays him, many areas of Eastern philosophy and certainly their stories could reinforce his argument but he has chosen not to include these ideas here.

While an unique book, one that is remarkably easy to read given the length, it requires a certain discerning eye when reviewing. The final two sections, that deal as much with modern history and politics as the stories themselves, will be left for another time. Rather, this analysis focuses on the primary subject of the book: The Seven Basic Plots, and what drives the characters along these experiences.

### 2.2.1. Meta-Plot of Stories

Booker's analysis begins by breaking the story model into five components: Anticipation, Dream, Frustration, Nightmare and Resolution (Booker, 2005). While an extremely simple model, it can be quite

<sup>4</sup>He attributes this to Latin *ob scena* for "off stage"...a very nice anecdote...that I was not able to verify...

useful when analyzing the structure of any story without relying on traditional structures of a given form, i.e. Five-/Three-act plays.

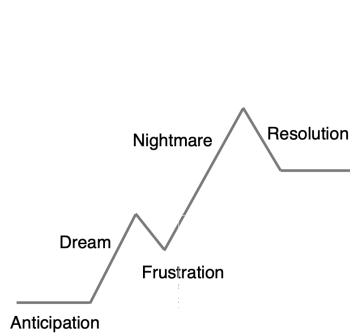


Figure 2.1: Metaplot Structure

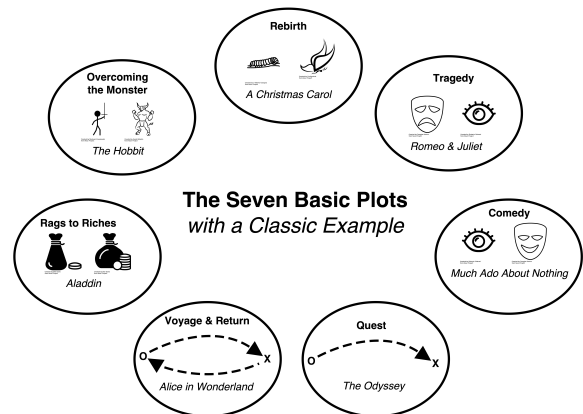


Figure 2.2: A few of my favorite stories

Booker's story structure opens with the **Anticipation** phase, which sets the stage for the audience, typically introducing the main characters and establishing the stakes of the adventure. This is followed by the **Dream** state, where the Hero embarks on their adventure. As the name implies, things typically go very well for the hero in these first moments. They may even gain a small victory or achievement, and become satisfied by their early success. However, this success belies the true nature of their journey, for usually the dream phase slowly begins to crumble as the hero faces new challenges and setbacks. **Frustration** sets in; the hero and companions face difficulties they did not anticipate and challenges that are no longer easily solved. This leads (quickly or eventually, depending on the story) to the **Nightmare** phase, where everything completely falls apart for the hero. Their enemy has the upper hand and they are typically left to face this final nightmare alone. One way, or another, the plot finally comes to a **Resolution** with all of the treads having winding back together, with the hero riding valiantly off into the sunset. Or not.

### 2.2.2. The Seven Basic Plots

Atop this metaplot structure, Booker identifies seven basic plot types, show above. Each of these plot types is easily identified, and subverted, by dozens of examples, classic and modern. They are not intended to be fixed categories. In fact many of the most famous stories include elements of almost every archetype, but they can provide a basis for better understanding of how and why stories work.

Each plot archetype is introduced in a unique subsection below, though only six detailed analyses are provided, for reasons that will quickly become clear.

#### Overcoming the Monster - *The Hobbit*

Monsters exist to be defeated. As we will see however, the true form of that monster is often not as clear as it would first appear. To look at the first story archetype we will explore the monsters of J.R.R. Tolkien's *The Hobbit*, an archetypal Overcoming the Monster story (1937).

Smaug, the dragon from *The Hobbit*, fulfills each of these three roles of the monster perfectly. Prior to the events of the story, Smaug acts as the **predator**, searching out the Lonely Mountain and taking its horde of gold for himself. Once the treasure is seized, Smaug transitions the **holdfast** role, hoarding it for himself and guarding it from any potential thieves. Here the focus consumes the character, Smaug originally awakens after Bilbo swipes a single cup from his massive treasure. Once Bilbo has stolen the prize of the hoard, Smaug snaps into **avenger** role, racing out to burn Laketown to take back his lost treasure.

Monsters play one of three roles: predator, holdfast and avenger. Often in that order.

The story itself follows the pattern as described by Booker. It begins in **Anticipation**, with the holdfast Smaug bringing together a strange wizard and a dozen rowdy dwarfs to to the home of an unsuspecting Hobbit. From there they begin a long Dreamy journey towards the Lonely Mountain.

The key to defeating the monster lies within the hero themselves. Smaug has a single weakness, a missing scale in an otherwise impenetrable armor. Our hero for this portion of the story is The Bard, the only character that has the balance to exploit it. Smaug, the greedy monster whose use his strength to control his world, is struck down by an equally strong hero who also accepts his place in the world, putting a cap in the **Frustrating** first battle for control of the mountain's treasure. Bard chose to live the life he had been destined, even though it is clear he could have achieved much more. This growth towards balance is the key to the success of the hero.

By looking at the larger, more symbolic story of *The Hobbit*, we can see how monsters can be applied on a more philosophical level. Once Smaug is defeated, the new King Under the Mountain falls under the spell of the treasure, succumbing to a literal "dragon sickness" as the story turns into a **Nightmare**. It becomes at this point clear that Smaug was not the true monster. Rather it was the greed that consumed him, and now threatens to consume Thorin, the new King Under the Mountain, as well. The story is finally **Resolved** by the only character who did not want some part of the treasure for himself: Bilbo. The monster of greed is defeated only by a hero who laid no claim to the gold.<sup>5</sup>

The monster's downfall is their blindness to a weak spot that is exploited by the hero who has achieved balance in such a way as they can exploit it.

It is essential to understand that the hero who defeats the monster is not properly equipped to do so at the beginning of the story. They are lacking some key, tool or weapon that they must acquire along the way, a "token" (Norris et al., 2005). But these tokens are only half of what a hero needs to overcome the monster. These tokens are symbolic, and secondary, to the transformation required by the hero to achieve their final goal. This transformation is required to achieve the final goal, and the nearer the center of the story this process is, the more powerful it becomes.

#### Rags to Riches - *Aladdin*

As the name implies, this is also a story centered around transformation. These stories typically cover the entire life's journey of the hero, from the orphanage to the mansion. They are typically stories of two halves, where first a hero has an aide in their initial success in their new life, before confronting a central crisis. It is here where the transformation must take place, the hero must grow into their role of independence and overcome a final set of struggles without outside help to attain fulfillment.

*Aladdin*,<sup>6</sup> one of the traditional folk tales from the One Thousand and One Nights, is a classical Rags to Riches story (Clements & Musker, 1992). *Aladdin* story begins in **Anticipation** as we see an orphan living on the streets of a grand Arabian city. It is there he is recruited by a shadowy figure to obtain a magic lamp from a faraway cave. After some initial chaos, *Aladdin* seizes the lamp for himself, and with the Genie at his bidding immediately becomes a wealthy prince. This **Dream** lasts only as long as he is under the protection of his mentor, the Genie bound to him by the magical oath of three wishes. *Aladdin* promises to use his third wish to free the genie.

However, when the temptation of the rich life (and the princess's heart) overcome *Aladdin*, he reneges on his promise. This incites the central crisis, leading up to the theft of the lamp from his possession. When this bond is broken, the hero's reliance on it is exposed, and *Aladdin* is banished to exile with his last remaining ally. It is this moment that the hero is truly independent again, **Frustrated** that he must face his final struggle against the genie's new master, Jafar (the shadowy figure who set all of the events in motion). *Aladdin* now understands the limitations of this magic and the pull of the temptation, as Jafar uses his power in a **Nightmare** scenario. *Aladdin* wins the day by tricking Jafar into succumbing to his own temptation and trapping him forever in a lamp of his own. *Aladdin* can then enjoy his new found (internal) riches of balance and understanding, and this is reflected in the real-world riches he attains at the **Resolution** of the story when he is allowed to marry the princess after all.

#### The Quest - *The Odyssey*

The Quest is the story archetype that typically relies most on the physical world to structure the story. It simultaneously might also be the archetype that lies closest to the heart. Love. And hate. *Odyssey* and *Ahab*. Questing captains both.

A quest is driven by a need inside of the hero, it is race through space against time. The period and the place may be anywhere, but these stories all share common three threads: *Odyssey's* story, which

<sup>5</sup>A truly tragic hero, Bilbo's focus may already be in an even more dangerous place, a slowly growing lust for a certain ring.

<sup>6</sup>A number of editions of this story exist, with older versions being much darker and bloody than modern retellings.

is now synonymous with this type of journey, displays all of three of these traits (Homer, n.d.). The first feature has already been mentioned, the separation from a goal. The second is the existence of a band of allies, if not at the outset, then very quickly along the way. These allies often represent some piece of the hero, serving as metaphorical extensions of themselves (Booker, 2005) (Overly Sarcastic Productions, 2017, "Five Man Band").

A quest is a race through space against time.

Odysseus's eponymous journey begins far from home shortly after the resolution of the Trojan War, as detailed in the Iliad. The quest quickly turns through a short **Anticipation** phase where Odysseus blinds a cyclops and obtains from a helpful king a bag of the winds. Letting out only the one that is to blow them home, Odysseus sleeps. Just as the **Dream** of Ithaca is in sight, a jealous sailor opens the bag, presuming it to contain gold, and the now released winds blow the ship far off course. The story has entered the **Frustration** phase, where slowly Odysseus loses more and more of his crew as he struggles against various gods, deities and monsters along the way. Finally, he reaches home, completely alone and facing an army of suitors who have come calling on his presumed widowed wife, Penelope. That very day she has finally capitulated to the demands of the men, and holds a contest where the winner shall win her hand in marriage. Truly a **Nightmare** state.

Naturally, Odysseus overcomes these final challenges, and after much bloodshed, he is reunited with his family in the **Resolution**<sup>7</sup>. The key here is that merely reaching the destination was not sufficient, the greatest challenge of the quest often lies at that destination. The journey to the destination is not without purpose, Odysseus's shortcomings as a leader and man are exposed along the journey, and this growth is an essential factor that decides the outcome of his final challenge. The key to his journey was to return home as a more complete man, and part of that process involved shedding the spoils and fame of war, to the point where the only thing sustaining him is his love of his wife. His fellow captain, Ahab, has a similar journey, sacrificing his crew, his ship, and eventually his life, to complete his quest.

#### Voyage and Return - *Alice and Wonderland*

Stories of Voyage and Return are similar in many ways to questing stories. Both rely again on time and space, though often Voyage and Return stories are more liberal with these interpretations. The key difference is the linear versus circular route. This Voyage and Return may be a literal one, with concrete places and paths, such as Frodo and Sam's journey in the Lord of the Rings. However, it very easily can be a voyage of a mystical kind, such as Dorothy's voyage to and return from the land of Oz or Alice's famous trip down the rabbit hole. It is there the anticipation ends, and the dream begins as she here enters into the "special world" (PBS, 1988).

Alice is bored,<sup>8</sup> she **Anticipated** something more exciting. When she chases a rabbit down a hole, she slips into a strange, **Dreamy** world that slowly becomes more **Frustrating** as she meets (and eats) her way through an enchanted forest. She so disrupts this strange place that eventually she is put on a show trial in front of all who live there.

Alice's **Nightmare** in that special world comes to the apex when the Queen turns her ire towards Alice, and shouts her famous "Off with her head!" at the girl. Alice's external growth, this time not fueled by a mushroom or potion, is now a reflection of her internal growth and just as she finally tires of the mock court she rebukes the Queen and demands fair treatment. Uncoincidentally, it is just this moment when her sister wakes her from her "dream" and Alice is suddenly jerked back into the real world.

Booker writes of two types of transformation associated with Voyage and Return stories. He identifies complete transformations as ones where the hero returns from their journey completely accepting what they have learned and immediately exploiting their new gains. The second type of transformation he identifies as "open-ended" stories, one that end with the hero safely back in the real world saying "It was all just a dream" (Booker, 2005). Here Booker is critical of these types stories as being somehow incomplete, though this is a very narrow definition of the story archetype and it leaves out the possibility of subtle transformations or giving the hero time to adjust to what they have experienced.

<sup>7</sup>Nearly half of the story takes place in the Nightmare stage, though this is often forgotten due to the epic nature of the lead-up portion of the quest

<sup>8</sup>Any story that starts this way is sure to become less boring very quickly



### Comedy - Too Complex to Analyze Here

Contrary to what the name may imply, comedy does not have to be funny, though often in modern storytelling they are focused entirely on these sorts of stories. Booker offers a lengthy analysis of why this is so, and though certainly interesting, probably should not be applied as literally as it has been. Comedy is traditionally lighthearted because of the structure of the plot, just as tragic endings are driven by the same device. Both of these stories begin with the hero in ignorance, unable to see the truth that is directly in front of them (and usually readily apparent to the audience). Just at the last moment, when things are seconds from falling apart entirely, the hero manages to throw off ignorance and finally see what has been hidden, ending in a typically resoundingly happy resolution.

A **comedy** reveals the ignorance of the heroes just in time.

Comedies lend themselves easily to very complex plot structures, often with a multitude characters and each with their own version of misunderstandings. Shakespeare leveraged this plot to great success across an number of very complex<sup>9</sup> plays, building off of the ignorance and weaving into many simultaneously interactions. Due to this inherent complexity, we shall leave analysis of comedies aside for now, and turn to a plot with very similar structure, albeit a very different ending.

### Tragedy - *Romeo and Juliet*

As we have already heard, Shakespeare worked extensively with this idea of ignorance as relates to comedies, though most famously he applied the same idea with a slightly different order of events, to his tragedies. Perhaps no tragic pair is as famous as the favored heir and heiress of the Montague and Capulet families: *Romeo and Juliet* (Shakespeare, 1597).

The story begins, *in medias res*,<sup>10</sup> already fully engaged in a street fight between the rival families. We find out that they are separated by a long-standing feud, and the local authority finally imposes a sanction on further disputes between the two, establishing an **Anticipated**<sup>11</sup> showdown. Shortly thereafter, we meet Romeo, a depressed Montague who is hopelessly in love with Rosaline. In a desperate bid to win her affection, he attends a Capulet ball where instead he meets and instantly falls in love with Juliet. A **Dream** scenario for the both of them, the two "star-crossed lovers" immediately run off and get married, without their families' knowledge. Meanwhile, a portion of Romeo's deception has been revealed, and both a Capulet and a Montague are killed in the ensuing retribution. Romeo, for his part, is exiled from the city, **Frustrated**, while Juliet's hand is promised to another. She cannot bear the thought, and takes a potion to make it appear as if she has died. Romeo, finding out the news, rushes to her tomb where he promptly commits suicide. Just then Juliet awakens to see her dead lover at her graveside, a living **Nightmare**, and so she chooses to end her own life. The warring families finally realize the blindness caused by their ignorance, **Resolving** to change, albeit over the bodies of their children.

Here we can see how ignorance turns to knowledge as in comedy, but instead of being just in the nick of time, it is always just a moment too late. The focus of the families had been entirely on the temptation of their own power and reputation, instead of on a more virtuous or peaceful life (Booker, 2005). After their temptation has been revealed to be all-consuming do they realize their mistake. They vow to change, but only after something truly awful has transpired.

A **tragedy** reveals the ignorance of the heroes a moment too late.

### Rebirth

Each of the previous stories is in a way about being reborn in some way, but Rebirth stories take this idea to the fullest. They are often stories of complete transformation, where the hero has a totally new perspective after undergoing a sort of trial or dramatic revelation. Ebenezer Scrooge, the hero of *A Christmas Carol*, is one such character who goes through a complete transformation (Dickens, 1843).

The story begins on Christmas Eve, a cultural time of **Anticipation**, where Mr. Scrooge three times chooses to be cold-hearted: denying charity and consideration at every turn. While home alone, he

<sup>9</sup>I tried, and failed, to succinctly summarize both *Much Ado About Nothing*, and *A Midsummer Night's Dream* without success. A trip to the theater would reveal why, and would be well worth the time.

<sup>10</sup>"In the middle of things" (Wiktionary, 2019, "in medias res")

<sup>11</sup>Chekov's Gun: if you show a gun in the first act, you must fire it in the second. In stories, we often recognize a rule that is bound to be broken.

is visited by three<sup>12</sup> ghosts in a literal **Dream**: Christmas Past, Present and Future. Each of these apparitions examine a piece of Scrooge's life starting in his childhood home. Scrooge quickly becomes **Frustrated** with the ghost and demands to leave, when he is transported to the home of his downtrodden employee. There he sees the man's crippled son, Tiny Tim, who is nearing death. Then the Ghost of Christmas Future takes Scrooge to the scene of his own passing, where he witnesses a lonely grave with no mourners. Faced with a **Nightmare** own impending morality, and implications of his legacy, Scrooge completely collapses.

He awakens the next morning completely transformed by his experience, and immediately **Resolves** to right his wrongs. He returns to the three choices of the day before, correcting them each in turn: giving money for the poor, spending the day with his family and granting his employee a raise and day off. He even takes an interest in Tiny Tim, the story implying that Mr. Scrooge's intervention saves the boy's life.

### 2.2.3. Connecting the Plots

Each of these specific structures revolves around a unifying idea that ties all of these stories together. Each of the heroes: Alice, Aladdin, the warring families and grumpy shopkeeper must go through a transformation to complete the story. Moreover, each of them must transform in a way that at first appears entirely foreign to them. Odysseus must shed the spoils and fame of war, returning home destitute and unrecognized. Mr. Scrooge must become exactly that what he hates. Bilbo must transform from a scared Hobbit to an actual thief, one brave enough to steal from both a dragon and a king.

Each of these transformations are essential to the resolution of the story, and without them, the heroes and the audience would be left wanting. These stories use the external plot to parallel the internal developments of the hero. Booker uses Jungian language to describe a balance between order versus intuition on one axis, and strength versus feeling on another (Booker, 2005).

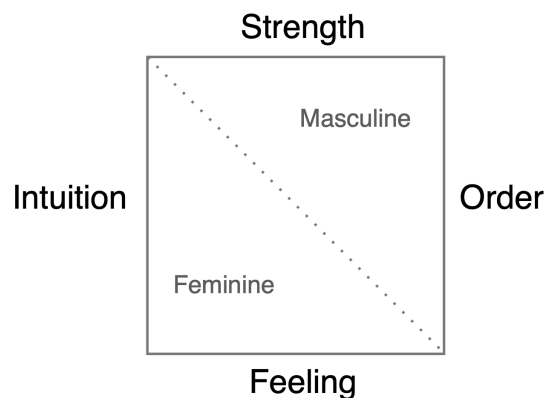


Figure 2.3: Booker's Ego-Self Square

These four emotional states, Booker positions as central to the human experience. Each action take by a character can be decomposed into a trade-off between these two pairs. **Strength** refers to an ability to make rational decisions, and to exert one's will to achieve their goals. **Feeling** is therefore the opposite of this, where empathy and emotional connections guide actions. **Order** refers to a reinforcement of the "natural" state of the system within which the character operates: whether that be political, social, or economic. **Intuition** is again the opposite, where a character chooses to follow some internal, personal guiding force against the "natural" state.

Booker associates extreme manifestations of each of these emotions with the Ego, a powerful force that can corrupt a person by blinding them to other perspectives. A hero attempts to release their

<sup>12</sup>Numerology often appears in storytelling literature. Sometimes as a mystical force, but more often as an observation of an emergent pattern. Certain numbers appear in stories with surprising frequency, and quests are one of the story types that learn heavy on these patterns. The number 3 is especially common. Three bears, three musketeers, three days in the desert, etc. Four is often used a symbol of wholeness, possible because of certain simple geometric patterns. Alan Watts has a particularly nuanced perspective on the cultural importance of this number, and Overly Sarcastic Productions has an excellent studies of the appearance of both 3 and 5 in storytelling.

desires for these personal ties by balancing the four forces against each other. A perfect balance results in a loss of Ego and a connection with *The Self*.<sup>13</sup>

#### Balance versus Ego - *Star Wars: The Return of the Jedi*

We can use the final, powerful scene of *Star Wars: Return of the Jedi* to examine how this model can be applied. Luke Skywalker is portrayed as a character guided by **intuition** (The Force) and the **feelings** for his father, Darth Vader. Vader, and his master, Emperor Palpatine, are epitomes of **strength** and **order**. During Luke's internal battle, and external struggle with Darth Vader, he must move from the feminine towards the center to succeed. This is seen in the final moments when he overcomes Darth Vader and cuts off his hand, the first time he imposed his true **strength**. The Emperor tempts him to allow his **strength** to become dominant and join the Imperial **Order**, appealing to his Ego. In his final moment of need, Darth Vader shifts from the iron-fisted **order** that has dominated his adult life, following his **feelings** and saving his son. In this way they both become true heroes by finding **balance** between these four emotions, shedding his egotistical desires and ultimately becoming one with The Force (*The Self*).

Booker identifies these as masculine or feminine traits, and makes a bold case that they are rigidly inherent to the sexes. I would never go so far, I do think that the tool may be useful for understanding emotion and developing characters, but I do not believe it is appropriate to assign natural states to human based on sex alone. It may play an important role in our lives, but individual experiences can greatly change how we view such emotions.

The plot is a journey between the various points as the hero attempts to find this central balance. Stray too far towards one of these four core emotions and they risk being consumed by ego or focus on a specific goal. The complete hero, one who has succeeded in their journey through the plot structure, will achieve true balance. This transformation process is the focus of the next section of our own heroic journey.

## 2.3. Analysis: The Hero's Journey

A complete analysis of The stages of the The Hero's Journey can easily (and has) filled many volumes of text. The original model is extremely complicated, with 18 stages, as outlined in "The Hero with 1000 Faces" (Campbell, 1949). While this text is truly inspiring, it is impractical and at times extremely abstract. Here is just a small quote, one that captures the depth of this abstraction, and how it relates to transportation and storytelling (Campbell, 1949, p. 35).

The one who is entering the temple compound and proceeds to the sanctuary is imitating the deed of the original hero. His aim is to rehearse the universal pattern as a means of evoking within himself the recollection of the life-centering, life-renewing force.

To this end, "The Writer's Journey" is used as guide to The Hero's Journey model, to help understand the basic structure of Joseph Campbell's original work.

#### The Simplified Model

Vogler's interpretation of the model is shown in below, eliminating or combining some of the steps to create a 12-stage cycle. Before we begin our journey through this model, it is helpful to remember that this plot-structure emerged from a cross-cultural analysis of the world's folk tales, myths and legends, and therefore leans heavily of mystical symbolism and structures. This framework is not limited to such stories however, it is flexible and broad enough to have been applied to film-making (maybe most famously by George Lucas for the original Star Wars trilogy), business setting, and even scientific papers (Vogler, 2007).

<sup>13</sup>We will return shortly to this concept for a slightly more detailed look.

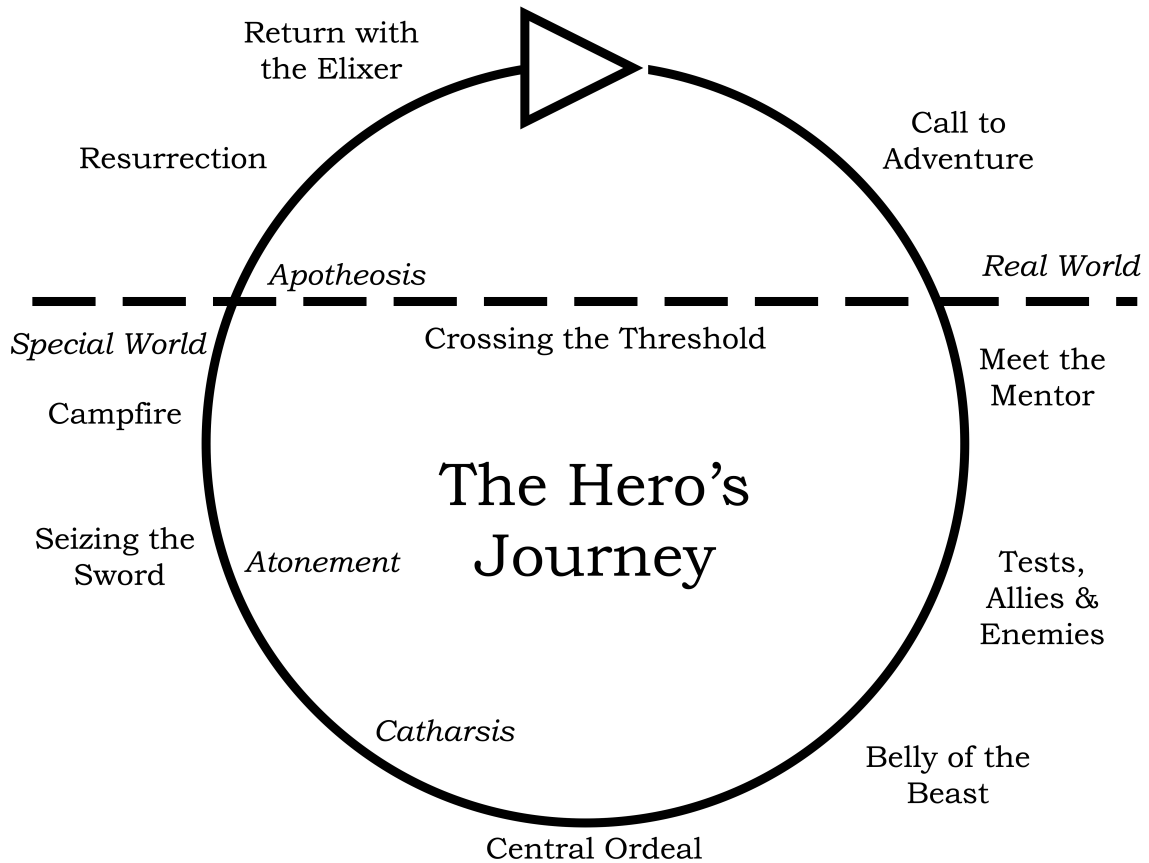


Figure 2.4: A simplified model of Campbell's work (Campbell, 1949; PBS, 1988; Vogler, 2007)

### The Hero's Journey - *The Lord of the Rings Trilogy*

To analyze how the Hero's Journey works, we shall take an extremely abbreviated look at possibly the most popular epics our time, one we have already been introduced to in the previous section: *The Lord of the Rings* (Tolkien, 1954, 1955a, 1955b).

When Mr. Bilbo Baggins of Bag End announced that he would shortly be celebrating his eleventy-first birthday with a party of special magnificence, there was much talk and excitement in Hobbiton. (Tolkien, 1954, p.1)

The *Lord of the Rings* opens on the preparations of Bilbo Baggin's 111th birthday in The Shire. To our hero Frodo, this is a very **Ordinary World**, one that is comfortable and familiar, and will not challenge his perceptions too much. It is not long though before he receives his first inkling that things are about to change forever...

In *The Lord of the Rings* much time passes in the ordinary world as Gandalf investigates the nature of Biblo's mysterious ring, but eventually he returns to Bag End, directing Frodo to carry the ring Rivendale. Frodo readily accepts the **Call to Adventure** as given by the Herald. His ease-dropping gardener, Samwise Gamgee, is more resistant to the call at first, but eventually the two of them are hurried out of Bag-End by Gandalf, soon assumed dead by neighbors and family as they take the first steps out into the **Special World** beyond the boundaries of The Shire.

In *Lord of the Rings*, Frodo is at times a reluctant, but willing, hero. But if we look back at the history of the ring, we can find a hero who suffers greatly by **Refusing the Call to Adventure**: Isildur. He refuses the call to an internal adventure by choosing to keep The Ring instead of destroying it. This path eventually leads to his brutal and anonymous death at the hands of evil forces. As we learn much later in the story, had he chosen to destroy The Ring he would have been granted passage to the Undying Lands as a Ringbearer, where he would have been able to enjoy the reward of his choices for eternity.

The Hero who refuses the Call to Adventure faces increasingly severe punishments for doing so <sup>14</sup>

The mentor has many shapes and faces, if we skip far ahead in the story past the original mentors of the Fellowship, we can **Meet the Mentor** to Frodo on the final portion of his journey, when the role is taken up by Smeagol (and not by his shadow trickster alter ego, Gollum). Smeagol guides Frodo and Sam on their final approach to Mordor, showing them the way through the Dead Marshes and leading them to the Shelob's Pass, where he loses his internal battle with Gollum and throws off the Mentor mask for good. Nevertheless, for a time he was the provider for the group and was enthused to teach Frodo what he had learned about the special world outside of the Shire.

The Lord of the Rings is chock full of magical thresholds, <sup>15</sup> but in sticking with our story progress, we see Frodo and Sam literally **Crossing a Threshold** as they manage to individually pass Shelob and finally enter Mordor. Here the rules are different, they are stripped of their hobbit clothes and don Orcish costumes, and even manage to pass as Orcs for a time as they learn to adapt and fit into the new rules of this world.

Frodo and Sam face a key test just as they cross the threshold into the special world of Mordor. Sam, having saved The Ring from certain discovery, now holds it in his possession. Frodo sees him as an enemy, one who intends to keep the ring for himself, and both of their resolves are tested by the temptation the ring offers. Eventually, Sam decides to return the ring to Frodo and becomes his ally again. Both have passed an important test in the **Belly of the Beast**, one that was required to finish the journey. Frodo's burden as the Ringbearer is now clear for the both of them, and Sam can focus on helping Frodo on getting to Mount Doom while Frodo focuses on carrying the ring. The test has provided them with clarity and focus for the rest of the journey, as they reconcile they undergo a **catharsis**, and shed their emotional burdens.

**Catharsis** is the process of releasing of emotion and escaping from ego, a realization of a higher form of consciousness within. This is an inherently emotional and often painful process.

**The Innermost Cave** exists in two places at once as the Lord of the Rings reaches its climax. The first is quite literal, the halls of Mount Doom, filled with fire and flame are an imposing cave which Frodo and Sam must safely navigate on their final steps of the journey. Yet the true innermost cave, that of Frodo's heart and mind, may be even more treacherous. Here he must finally part with the ring, a truly great ordeal...

Frodo's internal **Ordeal** is manifested in his confrontation with Gollum. Much can be (and has been) written about the symbolism of this conflict, but needless to say, it is a great struggle that alters both of their futures significantly. Frodo must literally lose part of himself to give up The Ring, and he unwillingly sacrifices a finger to achieve his goal. Gollum, having finally overcome Smeagol's noble influences, is ultimately consumed by his desire for The Ring, as both end their days in the fires of Mount Doom. It is in this moment that their **atonement** is complete, they have transcended beyond their previous shortcomings.

**Atonement** is the process of becoming one with a higher consciousness.

Frodo and Sam have little time to rest immediately after the crisis in the cave. Frodo has passed a great test, but it will not prove to be his last. He has learned much but will still be challenged on **The Road Back** to the ordinary world. They do have time to heal in Minas Tirith, where they are finally able to **Seize the Reward**: joining the rest of their friends for many nights of healing and celebrations before embarking on the road back. This moment of **Campfire Stories** is an important one, it provides the heroes a respite from their adventure, and offers them a first chance to reflect on their experiences.

It is here where Frodo's journey is abruptly cut-short by the films, and our example continues where they leave off.<sup>16</sup> In the book, Frodo and company retrace their steps, visiting old friends and places, seeing how their actions have changed the world *but also* how their new knowledge changes their perceptions of the world itself. As they approach The Shire, and their mentors and allies leave the four hobbits at the same place where they started on the journey. Long since dead to their kin, their moment of **Resurrection** and **apotheosis** and final test is at hand.

<sup>15</sup>The River Bree, The Door of Durin, The Bridge of Kazhad Dum, The Black Gate, The River Bruinen, etc. Tolkien enjoyed to use thresholds in his work.

<sup>16</sup>It is my opinion that the failure to include this final chapter, *The Scourging of the Shire*, is a tragic injustice that the film adaptation leaves out the most important symbolic and mythical elements of the story.

**Apotheosis** is the process of being recognized as having become one with a higher form of consciousness through catharsis and atonement.

As Frodo and company approach The Shire, they know something is wrong. Sauruman has retreated to this once idyllic land and brought with him industrialization and conflict, turning their once ordinary world into a surprise final test for our heroes. Their mentors are gone and they stand truly alone for the first time, quite literally resurrected in the eyes of their fellow hobbits, returned from certain death hardened and capable warriors. They pass their final test with relative ease, using their new-found skills and knowledge to quickly move to dispatch the evil minions that have hold of their lands.

Once Frodo and company overtake Sauruman and their minions, they set to work replanting The Shire. This effort is aided greatly by the rewards and knowledge the seized along the way, they have **Returned with an Elixer**, using magic to speed along the growth of the rest of the forest (Tolkien, 1955b). Their knowledge and experiences in the special world give them long fruitful lives in the healing Shire, showing that they have returned to the ordinary world more mature and stronger for having endured the trials of the special world beyond. Frodo (and Sam and Bilbo) are especially reward for overcoming the crisis of bearing The Ring, and are granted eternal life on the final ship leaving for the Undying Lands.<sup>17</sup>

## Characters

Joseph Campbell stresses the importance of rebirth in his analysis of mythical stories. These are intended to be stories of transformation, ones that provide guidance on how and why a certain culture demanded a specific type of behaviour from their audience. To achieve this, the mythology must first separate the individual from themselves: they must die so they can be reborn (Campbell, 1949). So too is it in the stories, Frodo dies so that he and Sam (whose hope had died with Frodo) can be reborn. Without this process of catharsis, atonement and apotheosis, the emotional transformation is incomplete. This is why that final chapter: The Scouring of the Shire, is so important. It demonstrates the full transformation of the Hobbits as a result of their journey.

This process is aided, and challenged, by any number of characters along the way. Vogler points out several archetypical "masks" that a character may change at any time (Vogler, 2007). As we can see in the example above. Smeagol (and Gollum) primarily wears the mask of a Shapeshifter, but he also plays the roles of Mentor and Shadow at various times along the journey. The figure includes a summary of these roles in slight detail.

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<sup>17</sup>Tolkein himself commented on the nature of his story, stating that the true hero is Samwise Gamgee, and based on this literary analysis, I would make the same argument. He is the only character to ever hold The Ring and willingly give it up. It is also telling at the end of the story he returns to The Shire and marries Rosie Cotton, while Frodo, left incomplete and damaged by his long journey, remains a bachelor for his entire life.

## Character Masks

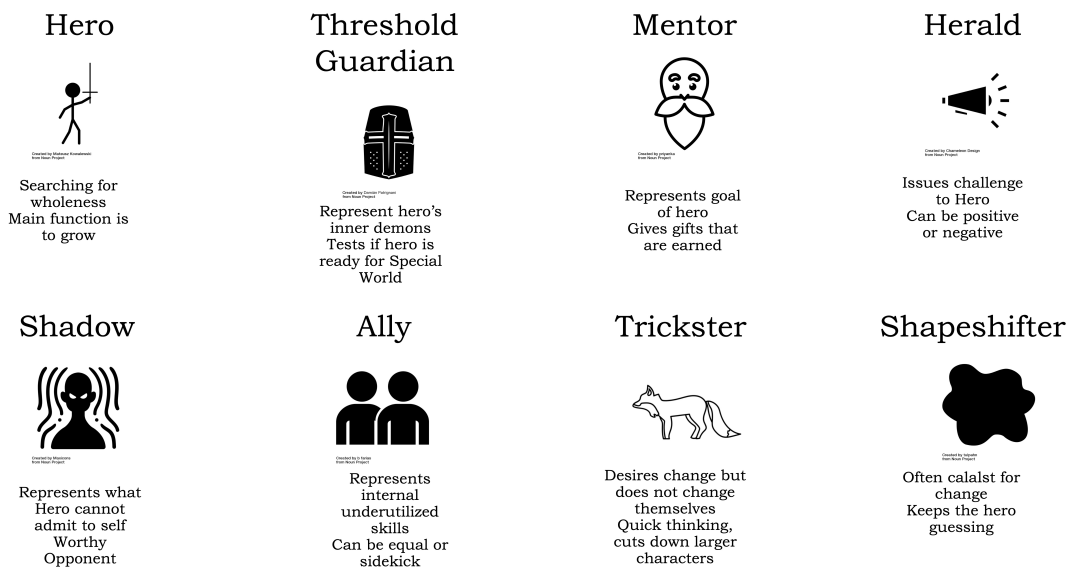


Figure 2.5: Archetypes adapted from *The Hero with 1000 Faces* and *The Writer's Journey* (Campbell, 1949; Vogler, 2007)

Throughout a story these masks are passed between characters, with the hero mask at the center of a plot. This hero's goal is a transformation from an incomplete state to a more complete one. Personal goals or the focus of their quest are merely an external catalyst for their inner development. We have already seen how the basic forms of catharsis, atonement and apotheosis transformed Frodo and Sam along their adventure, bringing them further from their ego and nearer to a higher state of consciousness.<sup>18</sup> Similar to what we have seen in Booker's analysis, the main point here is that the ultimate goal of the Hero's Journey is to undergo a transformation that brings the hero away from their worldly ego (desires, fears, hopes, etc.) and towards that indescribable higher state of consciousness.

The main function of the Hero's Journey is to transform the Hero away from their ego towards a higher state of consciousness through catharsis, atonement and apotheosis.

### 2.3.1. What makes stories work?

So far we have seen that **characters** and **plot** are certainly tangible components of any story, but especially of the allegorical ones. These two components cover the deeper **message** of a story, one that is based on the storyteller's vision of the cosmological and sociological view of the world. These stories teach us how to be heroes in our right by way of transportative example. They offer a special way of sharing in the internal experiences of transformation on a path towards a higher consciousness. We have seen some of the common forms they can take from two different perspectives. But these components only tell half of the story, as it were. To fully answer this question, we must step back and look at how the story itself comes to life as a narrative.

<sup>18</sup>I struggle here to find exactly the appropriate word. Hindus may call it *Brahman*, Buddhists *Zen*. Some in the West may say *god*, while others could say it is closer to the word *soul* or *The Self*. Still others may say it is *God*, and many in that same crowd may denounce you for implying that such a relationship with the higher power is even possible. We shall just leave it at "a higher state of consciousness".





# 3

## Literature Synthesis: When Stories Become Narrative

This storyteller's perspective only captures a fraction of that transportative experience. What happens when that story leaves the page, or the screen or the speaker, and enters the mind of the audience. What happens when they experience a totally foreign world for the first time?

In this chapter, we look finish answering the question:

*What are the components of a story? [continued]*

### 3.1. Five Parts to a Story

Using the Extended Imagery-Transportation Model as a guide, we have seen how plots and characters matters But there is more to a story than just what is happening, isn't there? This chapter looks to complete the search for the components of a story, starting with when and where exactly that story happens.

#### 3.1.1. Setting

Setting is simply put, a time and place. Both play important roles in how a story communicates a message and how an audience interprets that message into a narrative. A chosen setting builds off of other stories that share similar settings by leveraging audience expectations about the significance of the time and place in which the story takes place. We have already seen in specific plot structure, especially Quest, Voyage and Return and Hero's Journey stories, that changing settings can have significant impact on the progress of a story. However there are also more a subtle way in which the setting can be used to influence the messaging of a story.

The setting provides the context for the plot, characters and by extension, the mythological messages they act out. We have seen examples of the two basic types of settings several times already on this journey.

First, we have stories with a **real-world setting**. They take place in our world, on the planet Earth in places like Italy or London, and exist within our social context. These stories are typically required to fit within the societal perceptions of the period. Without this, it is likely they will not pass the smell test of the audience. Real-world settings do not always have to have real-world rules. Harry Potter and his friends are certainly anything but ordinary, however they are still proper *British* children and their world is still in *England*. The exact same plot played out in a Congolese or Chilean setting would result in much different characters and symbolic imagery.

Real-world storytelling requires intimate knowledge of the setting. **Write where you know.**

This prerequisite knowledge, is not only a restrictive force, it also empowers the storyteller in a way the second type of setting cannot. A particularly sharp tool for social critique, a story in a place can address the issues directly, instead of metaphorically. These stories are still dependant on the audience

to prescribe a specific narrative, but authors throughout time have placed stories in the real-world as a means of pointing to flaws in their respective systems.

Joseph Campbell is highly critical of most modern interpretations of Abrahamic texts, arguing that the current meso-narrative does not provide sufficient context to interpret the pedagogical messages written by and for nomadic desert dwellers. Indeed, these settings do not always withstand the tests of time, it is a skill to write in such a way that enough context is provided without overly long exposition. This is not a problem unique to real-world stories.

**Fictional-world settings** demand exposition. They can be fantastical, the space battles of Star Wars, or merely an image of place, like we will see in a few chapters. The important thread that connects these disparate settings is their fictional construction. From the ground-up, they exist entirely as creation of the author. This provides a freedom to create any number of places, rules and anything else your imagination can provide. The creative license comes at a price, these stories often require additional time to provide the structure<sup>1</sup> to the audience, and requires a certain attention towards consistency. It is also a time-consuming effort, one that I find incredibly enjoyable...and distracting.

Fictional-world storytelling offer freedom to create any system or structure, but requires time, attention to detail and a dollop of creativity.

These structures can be purposed to fit a specific system, but often are used to address large moral issues. The works of Gene Roddenberry and later other creators, Star Trek, exemplifies best how this can be done. The characters and the settings are all entirely fictional, but often the plots, and the underlying messages address real-world issues.

This is the shallowest possible take on setting, one that ignores genre as well as certain stylistic choices. In actuality, outside of the most pure forms of journalism, any transportative story is fictionalized to a degree. Some stories, such as Alice and Wonderland, exist in a fictional world, nested inside a more real one. Others, like Harry Potter, mix the two, while lightsabers and Orcs exist in entirely fictional ones. Each of these settings provides a different context within which the characters act.

### 3.1.2. Characters

Characters are the central component of storytelling. As we have already seen, the personal development of a character throughout a story is often paralleled by their external journey as they progress through the plot.

We have already seen human characters, as well as various animals, deities and apparitions in this work. Divergent as they may be, they all share a few key aspects. First, character have a consciousness. The audience experiences this through either the actions and descriptions, as in third-person writing, or is offered direct access in first-person experiences. This consciousness is slowly created as more and more information is revealed about the character. To this end, small pieces of foreshadowing can be applied to highlight certain aspects of a consciousness and by extension a personality. This can be accomplished in a number of practical ways: how a character sits in a seat, avoids a puddle, or interacts in public can be used to indirectly reveal a part of a character that will become relevant later.

A character is an consciousness in a story that exhibits agency of thought.

#### Anthropomorphism

As already noted, characters are not strictly limited to human form. A consciousness can be assigned to anything in the context of a given story. A favored fable among policy analysts has two primary characters: the North Wind and the Sun. The story is presented in brief form as follows (Pinkney, 2000):

One day the Sun and North Wind were arguing over who was more powerful. Just then, a man in a coat was walking alone through a forest. The North Wind said to the Sun, "Let us see which of us can force this man to remove his jacket. Surely the one who can do that is the most powerful between us." The Sun agreed, and the North Wind quickly offered to go first. So the North Wind blew and blew, whipping trees and breaking branches. But for every breath the man clung to his coat tighter and tighter. Soon exasperated, the North Wind

<sup>1</sup>Flatland dedicates the entire first half of the story to building a two-dimensional universe...and then spends the better part of the second half deconstructing it.

resigned and gave the Sun his turn. The Sun shone gently on the man, a steady afternoon beam following him through the trees. It was not long before the man found himself enjoying the day, and even perspiring. Finding a small grove where the sun shone continuously, he took off his jacket and laid down for a nap.

Anthropomorphisation can take place in any story, but certain story types rely specifically on the technique to highlight certain components of characteristics or create situations to highlight a given message. Here the characters of the Sun and North Wind are clearly anthropomorphised characters, this not only helps to establish a conflict between the characters, but it also limits their potential actions: each character essentially has one tool to use in the competition, and it is their use of this tool that creates the message. Persuasion is often more useful than power, especially when trying to get humans to do as you wish.

As discussed, fables often use these types of characters. This must be done with careful consideration on three fronts: within the context of the culture of the audience, according to larger linguistic patterns that may apply across cultures and societal implications of assigning traditionally human values and behaviors to a non-human character.

The first consideration can be seen in how various cultures have represented spiders. Their prevalence in American depictions of Halloween and horror films reinforces a negative connotation of the animal. On the contrary, in West African folk legend, Ansansi is a favored deity, often taking the form of a spider. As a trickster god responsible for among other things, bringing stories to the world, Ansansi has a well respected role in these cultures (Stewart & Heale, 2016). These cultural considerations will obviously have an impact on the view of the audience on characters and need to be planned for accordingly.

Anthropomorphism choices can have positive and negative connotations (implied meanings) in different cultures.

A second consideration is the linguistic denotations of a given language and culture. An example in English is the word *weasel*. The dictionary lists two definitions of this word, the first being the colloquial name of the animal. The second definition is in a figurative sense, "a deceitful or treacherous person." (Oxford English Dictionary, 2019, "weasel") This is what Lakhoff and Johnson terms a "dead metaphor" one that has lost meaning through repeated use (Lakoff & Johnson, 2003). While tempting, this type of association should be avoided in all but the most simple or satirical works, as it leads to flat, single-dimensional characters that do not breach the reader's expectations.

Anthropomorphism choices can have positive and negative denotations (literal meanings) in different cultures.

The third and final consideration when considering anthropomorphism is social in nature. Anthropomorphism is not far removed process of dehumanization, where certain human traits are stripped from a group, often by associating the target with certain animal characteristics. In ancient Greek, *andrapoda*, was a term used to refer to slaves performing intense manual labor (Wiktionary, 2019, "andrapoda"). Literally they were, "man-footed" beneath even other types of slaves.

This is not merely an ancient phenomena. In the early 1990s, Radio Télévision Libre des Mille Collines began broadcasting a stream of stories, commentary and songs that labeled the Tutsi as *inyenzi*. "Cockroaches." (Ndahiro, 2014) This dehumanization, in a way, inverse anthropomorphism, helped to fuel the genocide in Rwanda months later.

Anthropomorphism choices are dependant on local cultural, linguistic and societal interpretations. Each of these elements should be considered individually prior to use.

### 3.1.3. Plot

As we have seen, several various structures for understanding plots exist. As with all models, these models are wrong, though I believe that the plot structures examined here are useful to both novice and expert storytellers. However, the key feature of these plots is not their structure per say, rather the internal transformation process that is fostered by the sequence that makes up the plot.

This process: catharsis to atonement to apotheosis is an inherently emotional one. The best stories, use any number of literary techniques to transport the audience into this emotional experience. The importance of the successful conveyance of this experience from the story to the narrative cannot be understated. Both Campbell and Booker identify frameworks that can be used to help shape this message.

However, this is not what separate stories from other forms of communication, for the above is true of rhetorical policy communication, marketing and art as well. What a story has, that these other methods lack, is the ability to give the audience a unique perspective. One that allows them to live a world of experiences and emotions from an entirely different perspective. Stories allow the audience to *become* someone else. This is at the heart of the **Mystical** function of mythology, to so awe an individual they are no longer entirely themselves. They are active participants in this transportative experience, as their perspective is essential to transforming the story into a narrative.

Storytelling's feature of allowing the audience to share in an emotional experience is at the heart of what makes it a unique style of communication.

I believe much of modern creative culture (Hollywood, pulp fiction, and news media) is especially guilty in misunderstanding this concept. Many modern artifacts step through traditional or typical plot structures without triggering significant internal conflict or growth within their characters. This creates a hollowed-out story, one that hits all of the notes while falling flat at every turn or one that steps so clearly on the path laid out by previous plots that all suspense is removed. The best storytellers know when, and how, to break with plot conventions to create a new story that still captures the essence of their message.

### 3.1.4. Message

That message is crucial to any communication artifact. But how does this message work? Here we turn back to Joseph Campbell, and apply the Four Functions of Mythology, as laid out in previously.

#### Mystical Function

As we have already learned, the mystical function is intended to "inspire a sense of awe at the mystery of being" in the audience (Campbell, 1961a). This wow factor is a critical feature of storytelling, and can appear in many different forms. It can be with dramatic final reveal, like the six word story, or with a twist of expectations, as the Monster's changing face in *The Hobbit*. Breach and transportation play key roles in relation to this function.

Engineers and policy analysts are in a unique position to exploit this function, and often do employ it without even realizing that they are doing so. A complicated systems diagram, network map or model visualization is often designed to inspire awe in the audience. The purpose of these images is often not to convey knowledge but also to convey emotions about the size, scope or complexity of a given issue.

#### Cosmological Function

The cosmological function, "how the world works" according to the storyteller, is often the most rewarding part of both modeling and storytelling. Especially in science-fiction and fantasy settings, world-building is a entire genre in itself. All stories, regardless of fantastical elements, require some level of construction, whether it involves playing with the rules of physics and logic (such as in the *Lord of the Rings*) or if it is only to create a fictionalized historical setting for a story to play out it (such as in the Shakespeare we have analyzed).

This world-building is one that is most familiar to policy analysts, and similar issues are faced by both analysts and storytellers. Deciding what to include and what to exclude when creating a story (or policy communication artifact) can have a drastic impact on how the cosmological function is interpreted by the audience. They may hang their interpretation on a single, superficial detail or be struck more by what was left out, as opposed to what was kept in. Trust and congruence an essential factor to this function, the audience must trust and agree with the world-view presented by the storyteller for the message to have a lasting impact.

#### Sociological Function

The sociological function, that "reinforces or maintains a given social order" builds off of the previous function by assigning morality to the built-world (Campbell, 1961a). Here consistency of design returns in full force, allegorical stories must be consistent in terms of morality and prescribed meaning. This reasoning is two-fold. First, an inconsistent allegorical story may leave itself open for a large number of interpretations outside of the intended one. Secondly, an inconsistent morality may dampen the message even if the audience has made the proper interpretation. It seems logical to identify congruence as a key factor in the effect of the sociological function.

### Pedagogical Function

Each of these functions leads to this final message of "how" to live our lives. This message may be very specific, or very general, but the prescribed actions are always concrete. For these stories to succeed as teaching moments, they must breach expectations of the audience in ways which they were not expecting. Joseph Campbell recites a samurai-era story from Japan that I think demonstrates this wonderfully (1961b).

There was once a samurai and his student (**Anticipation/Ordinary World**). One night, the samurai was murdered, and the student swore upon his honor he would avenge his master (**Dream/Call to Adventure**). He spent 20 years training and searching for the murderer, before finally cornering the guilty man one night in a dark alley (**Frustration/Entering the Belly of the Beast**). There the murderer, trapped and fearing for his life, spit in the face of the vengeful student (**Nightmare/Catharsis**). It was then that the student sheathed his sword and walked away (**Resolution/Atonement**).<sup>2</sup>

This very short story still manages to fulfill all of the stages of Booker's metaplot and much of Campbell's Hero's Journey. It includes a powerful moment of transformation as our hero steps away from his ego-fueled quest for revenge by acknowledging his larger role to play (in society). But obviously, it is an allegorical story with deeper implications.

This story breaches our expectations, and teaches at the same time how to handle a situation where we may desire retribution. The student's mission was one of honor, of fulfilling the prescribed sociological order. But when he is finally about to achieve his justice, the man angers him, and justice cannot be achieved with emotion. The message of this story is one how to live according to the established social order, and along the way it reinforces each function. The Mystical function removes the audience from their person by placing honor and fate above personal desires. The Cosmological function establishes the cause-effect nature of the world: murder-retribution and insult-anger. The Sociological function is reinforced by the actions of the hero not once, but twice. And as we have seen, the Pedagogical function teaches about justice and personal choice through the hero's actions.

### 3.1.5. Forms of Communication

These components are central to what makes up a story, but there is a final piece that is required to transform it from a story into a narrative. This is the shape of the story in the eyes of the audience, be it movie, music, text or something else entirely. What form should it take?

<sup>2</sup>This is a classic example of high-context cultural stories, where the message is inferred, not stated. The man did not kill the murderer because by spitting in his face he had made him angry, and killing out of anger is a matter of *ego*, and not of higher consciousness, *duty*.

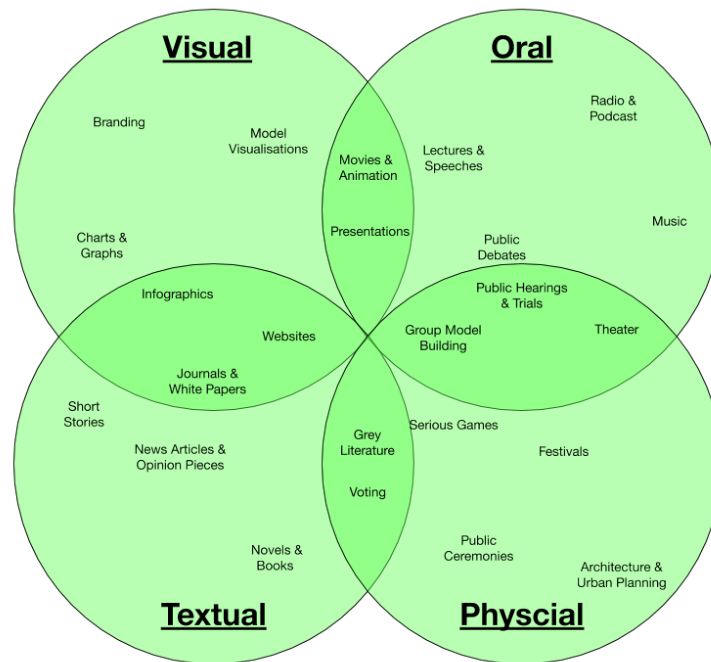


Figure 3.1: Four Forms of Policy Communication

When considering mythological storytelling in the public policy sphere, the means of communication can be a sort of short-handed method for determining what method of communication can serve best for a given message. The human senses and mind provide us with surprisingly few means of taking in our world around us. Commonly, these are referred to as the five senses, though scientifically this is not considered an accurate characterization, it does provide a suitable starting point for analyzing how a certain policy message may be communicated.

The most common form of communication used in policy analysis is the written form of communication, supplemented by a growing focus on using visualizations and animations to enhance or in some cases, entirely replace, written texts. Still, **textual** artifacts remains the preferred means of policy communication. Written information has several advantages: it allows an author to create a single message that can be read by consumers at any point after the initial creation. Aristotle's *Rhetoric*, read alongside this study, was written 2000 years ago, and is still being consumed to this day. The power of text lies within its ability to maintain the tests of time, surviving format changes, technological advancements and shifting social structures better than most other forms of communication.

That text, *Rhetoric*, deals with **oral** communication, a pillar of political structures since the first settlements became governed by citizens. Policy analysts are typically not as often called to speak on behalf of their proposed policies as politicians may be, but oratory skills are still prized among analysts. Oral skills are valuable for both inter-personal settings as well as communicating with larger groups of individuals, up to and including potential communication in broadcast media.

As mentioned above, **visual** communication is a growing trend in the policy analysis community. As technology has again lowered the barrier to new and novel means of communicating large collections of data, the need for new visualization tools has emerged. The visualizations are often data-driven, though visual communication in general does not require such a starting point. This example was created as part of a larger policy discussion about treatment of minorities in the US, and uses a visual metaphor to clearly communicate a difficult nuance in the difference between "equity" and "equality". This graphic uses minimal text only to show the name of each metaphor. This demonstrates both the power of visual design: these are extremely abstract topics that have been successfully transformed to a visual, but still require text to prescribe the very specific meanings.

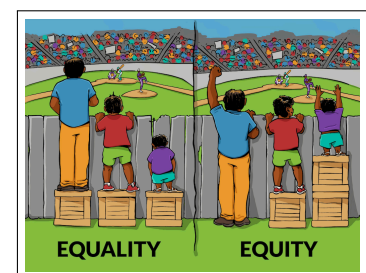


Figure 3.2: A basic visual communication artifact. (Maguire, n.d.)

Often, discussion of communication continues with further variations of combinations of visual, oral and textual means. However, a fourth form of communication exists that is essential to the how humans interact with social structures: the **physical** sense. This form of communication creates a sense of place or experience for the user. This can be as small and concrete as the ritualistic settings created during a serious gaming session or entering into voting booth, or as large and abstract as architecture and urban planning. These are also policy stories, ones that help shape and guide the experience of citizens in a myriad of small ways.

### 3.2. Updating The Model

With these discoveries in hand, it is now time to conclude the theoretical section of this research. Before we leave, let us take one last look at the first model we visited, the Extended Imagery Transportation Model to answer the question posed at the beginning of the previous chapter:

*What are the components of a story?*

This model has now updated to include the findings of this literature study, with a much needed redesign to improve readability for good measure. It also offers us a sneak-peak at the features tested in the next phase of this research: the experiment.

### Micro-Narrative Transportation Model

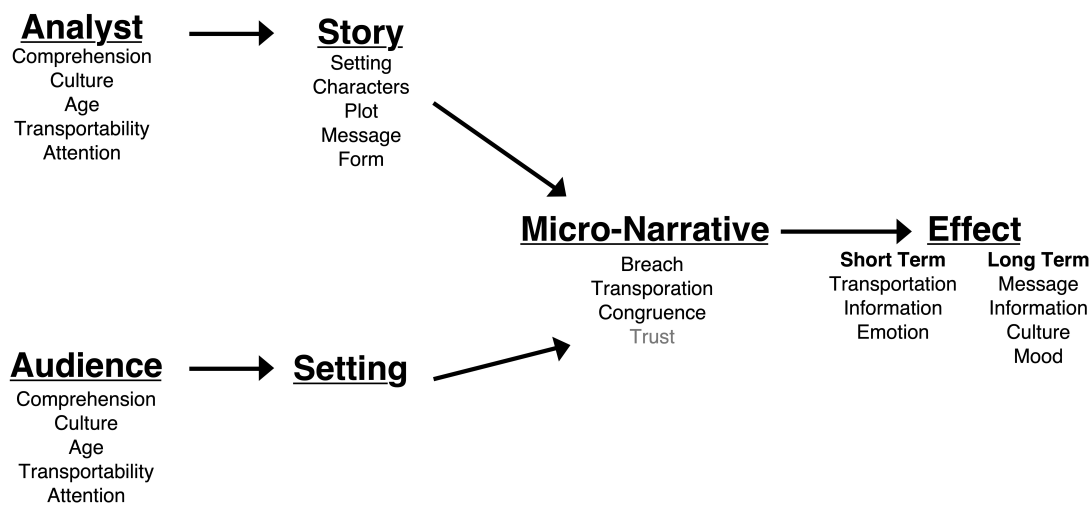
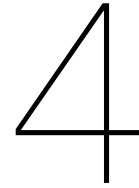


Figure 3.3: This model is incomplete, further research is needed to explore the effects of the setting of the audience. It would be presumptuous to include here.







# Case Study: Plastics and Society

To better understand the models and ideas laid out in the previous sections, a practical test of the power of stories is necessary. To this end, a case study has been analyzed to serve as the topic for a case study experiment as a way to explore the question:

*How can the story components be used to create a mythological policy artifact?*

This chapter contains a brief summary of methodology, the chosen case, reviews three examples of current practices in plastics policy communication, and then describes the approach to creating four new policy communication artifacts.

## 4.1. Methodology - Case Study and Experiment

The choice of a case study for this research is an effort to ground the theory in practical application. Yin offers guidance on defining various types of case studies, and for this research a two-part approach is taken (Yin, 1994). The hypotheses developed based on the literature review will be tested on the case study materials developed for an experiment. This experiment design is based in part on an experiment conducted by Green and Brock, which was originally designed to test the effect of transportation (2000). Chattoo and Feldman conducted a similar experiment using a different form, they investigated the impact that two different documentary films on the audience, which serves as a second guide in the development of this experiment (2017).

Due to practical limitations, unfamiliarity with this type of research, as well as limited monetary resources and a short time-frame with which to conduct this study, a pilot experiment has been developed in lieu of a larger study. The main participants for this study consist of students from the TPM Faculty at TU Delft, with a minority of the experiment group from other networks in Den Haag.

This method allows for practical application and testing of the policy artifacts, a necessary step to test the hypotheses, with the understanding that sample size and collected data may be limited. Other methods of feedback solicitation, such as focus groups, were considered, however policy artifacts are typically viewed on an individual level, and therefore an individual method of testing and feedback is preferred.

### 4.1.1. Case Study

Naturally, a study demands a case. For this project, a case other than climate change was desired. If there is such a thing as a saturated meso-narrative, it is the current state of local, national, and global conversation surrounding climate change. However, a global challenge was still desired, one that would prove a useful exercise in both policy analysis and development of a communication artifacts. Finally, initial discussions surrounding the pilot experiment included the idea to conduct a behavioural science study. The idea was to offer the participants a choice following their exposure to the story. It soon became clear this would be impractical for a number of reasons, but the best ideas centered around plastic packaging. It was in this way that a case was selected, one focusing on plastics and society. As well as the very practical one of having a pre-existing global plastics system dynamics model in place (courtesy of Erik Pruyt), this case was selected.

## 4.2. Examples of Policy Artifacts

To develop these policy communication artifacts, and the policy they would promote, an understanding of the current state of plastics science and policy communication industrial standards are required. Three policy reports on plastics are used in two ways for this analysis. They serve as the primary sources of information regarding current policy perspectives, as they each represent a key stakeholder in the plastics system. Second, they shall serve as examples of state-of-the-art policy communication artifacts. We will look at how the new transportation model can be used to examine these stories using the antecedents proposed in the previous section.

### 4.2.1. UN Report on Single Use Plastics

The United Nations report does not include a specific described setting or identifiable characters, so these characteristics are not included in this analysis. This report offers a governmental perspective, focusing on legislation and highlighting successes and failures of various global programs.

#### Form

The United Nations Report on Single-Use Plastics is a 104 page document reviewing a large number national policies from around the globe that attempt to reduce this specific use of plastics (UNEP, 2018). The executive summary of this document is 5 pages long, divided into 6 sections. A short table of the structure and topic are shown below.

Table 4.1: A Executive Summary with a Soft Ending

UN Report on Single Use Plastics	
Section	Length
(Untitled Introduction)	1 Paragraph
The Age of Plastic – why we need to change	1.5 Pages
Key findings and recommendations	2.5 Pages
Target Audience	1 Paragraph
Structure	1 Paragraph

The bulk of the summary is centered around the Key Findings, structured in a ten-step process. The process itself is extremely broad and reflects a general approach to policy: the ten steps could easily be applied to almost any policy. The summary highlights bans and levies as a key tool to reducing plastic consumption, reflecting their governmental perspective on the issue, with financial incentives and innovation as additional recommendations.

The UN Report uses several modernist design techniques to achieve a clean, polished look. This is accomplished through the use of a off-center text column and ample white space on the left-hand side of the page. The alternating water-mark logos are applied throughout the entire document, though they appear to have no specific meaning, the shape and colors are more "natural" ones and may be an attempt to prime the audience to think of the environmental concerns the report focuses on.

The design utilizes three fonts: one for the body of text, one for the headings and the third for the page numbers and footnotes. The use of the "handwritten" font on the headers is inline with the stylistic choices on the entire document (the same font is used on the cover page for the report title) is one that may garner some disdain from certain circles, though in the case it feels appropriate. Key words are highlighted using bold text, though the pattern is unclear. It may be that these are "buzz-words" that are intended to catch the eye of policy makers as they scan the document. Overall, a clean and professional document that one would expect from the United Nations.

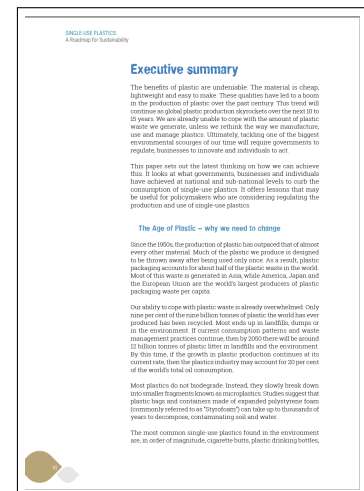


Figure 4.1: Good use of modern design principles (UNEP, 2018)

### Plot

Few discernible story elements can be found in this executive summary. The first paragraph sets up plastics as both an ally and an enemy, though some of the word choice for the benefits of plastics: "cheap" and "easy to make" are significantly weaker than the negative adjectives used, specifically "one of the biggest environmental scourges of our time" (UNEP, 2018, p. 8). This choice may already alienate certain members of the audience as it lacks the balance necessary to successfully engage readers who assess the opportunities and risks of plastics differently.

By the second page, any pretense of viewing plastics in a positive light are lost, as the reasons to change includes a "plethora of problems" that highlight the risks associated with several different types of plastic waste. This section concludes with a summary of economic damages without presenting any economic benefits. Again this lack of balance risks excluding a significant portion of the reading audience. Furthermore, there is no closing statement, resolution or even a call to action to compel the reader to either read further or immediately engage in action.

### Message

The resultant message leaves even more to be desired. The summary ends in a fizzle, transitioning unceremoniously from the ten step process into the Target Audience and Structure sections. This message is vaguely **pedagogical**, though the suggestions so broad they could be applied to any problem.

For this report, this is a case of missed opportunities and not of missing elements. The story of Versova Beach in India is an especially moving one, that is unfortunately buried on page 68 of the report. Afroz Shah began to clean the beaches of Mumbai by himself in 2015, and after several weeks of solo-work he slowly inspired a movement that has since swept the beach of waste UNEP (n.d.). Two years after the cleanup project began, Oliver Ridley Turtles returned in number to the beach for the first time in a generation. Many other real-life success and struggle stories are encapsulated in the report. Any one of them could have inspired re-purposing to provide emotional weight to the executive summary. Anecdotes are typically not recommended but their inclusion in the main report leads to the suggestion here.

## 4.2.2. Ellen MacArthur Foundation - The New Plastics Economy

The New Plastics Economy represents the long-term views of industries and communities, focusing much of their content on innovation and potential technologies. The New Circular Economy: Rethinking the Future of Plastics is a report sponsored by The Ellen MacArthur Foundation and created in partnership with The World Economic Forum and McKinsey & Company (2016).

### Form

The report is 120 pages long, with a 6 page Executive Summary following several pages of testimonials, acknowledgements and disclaimers.

Table 4.2: A Typical Example of an Executive Summary

The New Plastics Economy	
Section	Length
Executive Summary	0.5 Pages
Background to This Work	1 Page
The Case for Rethinking Plastics, Starting with Packaging	1 Page
The New Plastics Economy: Capturing the Opportunity	1.5 Pages
The New Plastics Economy Demands a New Approach	1.5 Pages

This document uses a number of font modifiers throughout the portion reviewed. At least five different types of the body font are used, cluttering the document and distracting the reader from the text itself. The use of 2 columns of text is questionable in this application, as the advantage of using columns to naturally include photos or graphics is not leveraged. Various shades of blue are used for the headings and titles, though curiously the sub-headings are darker than the main headings. This is a matter of inconsistent mapping, and is a subtle mistake that readers make not notice but may affect their perception of the document. Darker text draws the eye, and convention would state that the sub-sections are less important than the sections themselves, suggesting these titles should be darker.

The largest issue with the form lies on the first page, shown in entirety below. The entire first section of the Executive Summary are three paragraphs of blue, bold,<sup>1</sup> sans serif text. The added width of the all the letters distorts the spacing between both the characters and the lines, making distinguishing individual sets of shapes difficult to distinguish.

Use **bold font** sparingly in designs to enhance readability and draw focus only to particular words.

#### Plot

The structure of the New Plastic Economy's Executive Summary follows a rhetorical and academic approach. An entire page is dedicated to the background of the work, a missed opportunity to use a plot structure, such as The Hero's Journey, to detail the path taken by the research team in a more engaging fashion.

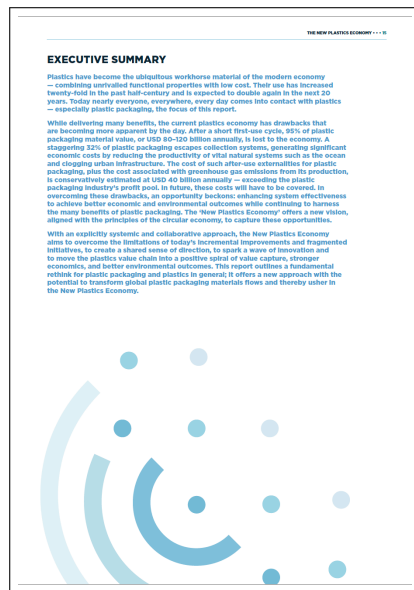


Figure 4.2: How not to use bold font and graphic design. The Ellen MacArthur Foundation et al. (2016)

The Case for Rethinking Plastics does employ a few literary devices, placing plastics first as a hero of the story before quickly listing a series of drawbacks the material offers. This section finishes with a Call to Adventure (The Ellen MacArthur Foundation et al., 2016, p.17):

In overcoming these drawbacks, an opportunity beckons: using the plastics innovation engine to move the industry into a positive spiral of value capture, stronger economics, and better environmental outcomes.

Now the role of herald is taken up by the author and the audience is challenged to become a hero of the story. The remainder of the summary is dedicated to detailing potential solutions to the problem. Each of these points are divided into sub-sections, each sub-point can itself be the topic of several research projects, reflecting the broad scope and ambitious goals of the analysts. The final section describes a litany of actors and emphasizes that new forms of collaborative initiatives are required, as well as additional actions that are needed to be taken. It is here that the lack of a concrete plot exposes the weakness of this form. Without a guiding structure, the executive summary dissolves into merely a list of recommended action. Taken cynically, these actions cover almost every possible approach to the problem as defined, which in a way dilutes the impact of the re-

port.

#### Message

This artifact focuses heavy on a **pedagogical** message, one of transformation. The approach is primarily rhetorical, with a large effort is espousing the **cosmological** and **societal** benefits of the circular approach to the plastics economy. This is an example of a consistent message grounded in research, a clear product of a consultancy with a strong history of scientific work.

However, this message is diluted by the many streams of thought contained in such a short document. This dilution creates a watery message, one that seems to focus on a discussion of circular versus linear economies. Again, a local story of how this transformation can change a person or a place offers a chance for the audience to share in an experience, instead of merely collecting facts from a list.

#### 4.2.3. Plastics - The Facts 2017

The PlasticsEurope Association of Plastics Manufacturers publishes an annual report titled "Plastics - The Facts" (PlasticsEurope, 2017). This report differs significantly from the other reports in terms of content, message and form, and provides an interesting contrast to the more traditional forms of messaging already investigated. This report consists of 44 pages and does not include more than a cursory summary at the beginning.

<sup>1</sup>The IEEE style guide also, for reasons I cannot understand, dictates that the entire abstract should be in the bold font.

### Plot

The entire report is completely devoid of structure, almost each page is simultaneously a self-contained infographic as well as a part of a topical section report. Each page is relatively data-intensive, but without a binding element the audience can quickly lose focus of the message. I found navigating and referencing the document without a structured guide me difficult. This report too fizzles at the end, providing a series of predictive graphics before suddenly shifting to the glossary, author bios, and back cover.

### Form

The first item to notice is the orientation: this report is in landscape format, a unique choice for a policy communication artifact. This decision allows for the inclusion of large graphics nested around the text, along with large photos separating sections. The form is clearly designed by a graphic design professional and not a policy analyst: using a wide ranging color palette, professional photos and complicated, layered layouts. It is worth to investigate two graphics to analyze the pros and cons of such an approach.

There are not rules that state an artifact must conform to a given convention.

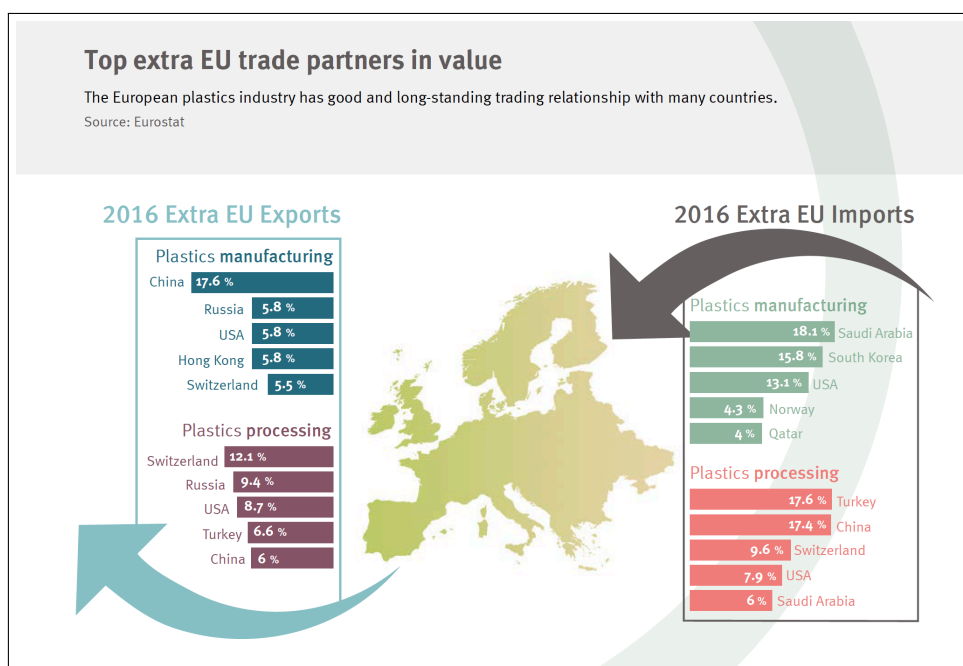


Figure 4.3: Deceptive design practices (PlasticsEurope, 2017)

On first glance, this graphic appears excellent. It uses a mix of symbols (map and arrows) along with text and graphs to show the difference between imports and exports. The use of horizontal bar charts is in line with modern expert recommendations for displaying data in this format (Knaflic, 2015). However, upon closer inspection, a problem rises to the surface with these charts. The bars are not proportional to the data! Either the short bars are too long, or the long bars are too short. This creates a graphic that is misleading about the relative size of imports and exports.

Data should always be presented proportionally.

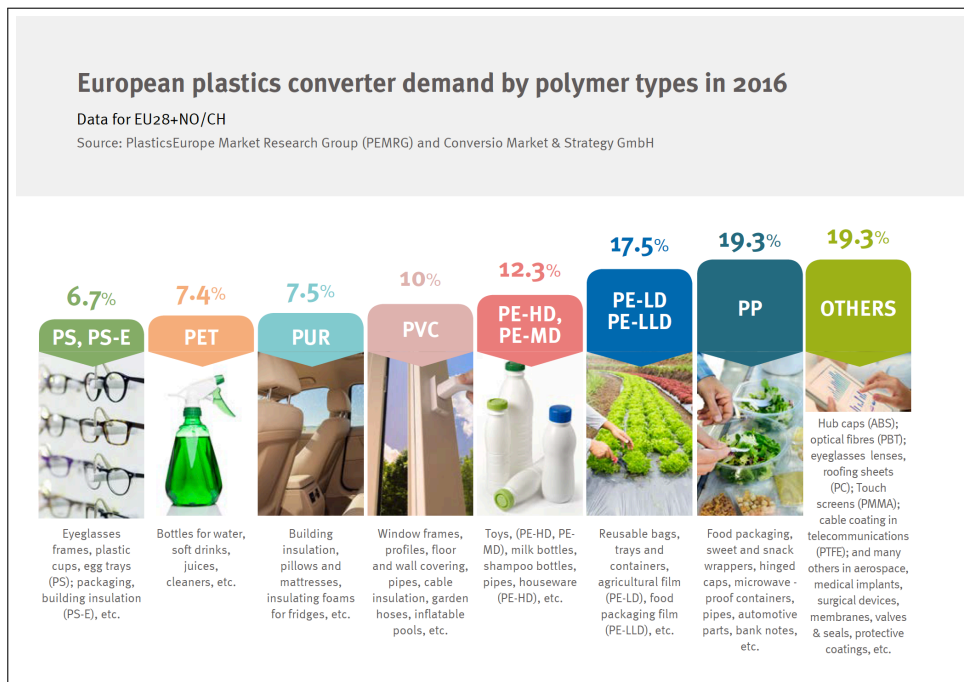


Figure 4.4: Good artifact design PlasticsEurope (2017)

This graphic does not suffer from the same issue, though it may take some seconds to digest, the proportionality of the data becomes clear once you see it. The inclusion of both a representative image and a description of the type is excellent<sup>2</sup>, it provides additional levels of depth that are easy for the audience to ignore. This graphic illustrates how shading, font size and font weight (bold, regular and thin) can be used to denote various levels of data. The most important information is in bold (title, numbers and types of plastics), the subtitle and source are in regular, and examples of various types of plastic are grey, thin font.

Use font type, size, color, and weight to layer information in the same graphic.

### Message

The message of the document is built around a **sociological** concept of efficiency.<sup>3</sup> At several points in the first pages, the benefits of plastic are highlighted. Unlike the other two reports, the outlook of this report is very limited, it makes few predictions beyond the next year, and includes limited data from previous years' production. The message is highlighted on the fifth page of the report: (PlasticsEurope, 2017, p.5):

Plastics materials and the plastics industry can definitively make a significant contribution in this overarching goal (competitiveness and efficiency).

What may be most telling about this report however, is not what is included, but what is left out. The 44 pages include the word environment once, and then in a reference to automobile pollution, and include zero instances of pollution or related terms. This report uses the term "non-collected waste" in one visualization but provides no information about the collection rates or other data that is included in the other reports. This one-sided story creates low levels of breach and high levels of incongruence for most environmentally-inclined audiences. It reinforces the preconceptions that they may have about the industry and appears to do little to incorporate a multi-actor perspective.

<sup>2</sup>Personally, I would have preferred to reduce the number of examples used for the "Other" category in exchange for a consistent layout of image size, though this is minor.

<sup>3</sup>We're going to come back to this concept later.

## 4.3. Comparing Policies

Each of these reports contains a large amount of information about their prescribed policies for future plastics, but each of them also use a vastly different time-frame, set of assumptions and methods to select these policies. To better compare the impacts of each type of policy lever, a single model is desired. One that captures these various options and potential effects. This section details that tool, a system dynamics model, and its application to this case study.

### 4.3.1. Global Plastics Model

This model is based on a system dynamics model constructed in Vensim by Erik Pruyt. The original model has been modified to estimate potential futures by using simple linear trend-lines to approximate the growth to various 2050 targets for recycling, reduction of plastics consumption, and other policy levers. The population subsystem of the model has been updated to include historical population data (in line with the rest of the model's use of historical plastics data) as well as allowing for future projections. This data is based on the WorldBank population growth data, and is in line with most modern population projects (The World Bank, 2017).

These proposed policies are separated into one of four categories: Reduce, Reuse, Recycle<sup>4</sup> or Replace. These categories have been selected due to the familiarity of these terms both alone and combined as a slogan. The exact phrase is even included in the UN's Sustainability Development Goals regarding production and consumption (United Nations, 2018). This review is very abbreviated, mostly due to the fact that the next chapter contains four different summaries of the model analysis in various forms.

**Reduce** policies are difficult to model on a global scale, as each country or even community may take a different approach to what and how they regulate. However, the net result of successful local reduction policies is a global reduction as well. These policies are modeled as an effect on the plastic demand per-consumer.

**Reuse** policies are the most theoretical of all the policies in this analysis, and those furthest from implementation. The main context for reusing plastics in a single lifetime is in business to business operations. These shipments account for a large amount of the plastic used for freight and packaging. The business to consumer market is complicated by the burdens placed on consumers to collect, store and return the packaging for subsequent uses, however an emerging markets does exist facilitating these opportunities. The gains from this type of packaging in terms of this model are primarily in terms of extending the average lifetime of in-use plastics before they flow to a subsequent destination. There are some potential add-on benefits to recycling and reduction of leakage, however these are not considered in this model.

**Recycling** is the most complicated of these types of policies. Only certain types of plastics (and then only certain products) can be recycled, though in this model plastics are a homogeneous category and no distinction is made between recyclable and non-recyclable products. Currently 9-14% of all potential plastics are collected for recycling, and only a fraction of those are actually recycled .

**Replace** policies examine the effect of changing plastic feedstocks from oil and natural gas to bio-based materials. This may be traditional plant material or algae-based production that is current in exploration. However, investments in only changing feedstocks are not the only required by this type of policy. The second investment requires investment in biomass energy facilities, where the waste bio-plastics can be converted into both energy and organic materials.

These four policies are grossly over-simplified, each of them contain numerous technical and social challenges that do not align with the paradigm and scope of this analysis. However for the purposes of comparing and evaluating potential global impacts of one type of policy against the other, this resolution is adequate.

### 4.3.2. Model Analysis

To analyze these proposed policies, a rudimentary approach to open exploration has been chosen for both simplicity and scope of potential outcomes. This exploration is conducted using a deep uncertainty approach is used to estimate probably futures. To accomplish this, model simulations are

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<sup>4</sup>The exact origins of this term are unknown, it originated in the early 1970s as one of the first nation-wide environmental campaigns in the US.

repeated using the Exploratory Modeling and Analysis (EMA) Workbench (Kwakkel, n.d.). The uncertainty parameters assigned for these runs are shown in the following table.

Table 4.3: Each Uncertainty is based on the best available science

Variable	Minimum	Maximum	Nominal	Units
ENERGY REQUIRED FOR BIODEGRADABLE PLASTICS PRODUCTION	3.6E+07	5.4E+07		J / KG
ENERGY REQUIRED FOR NON-BIODEGRADABLE PLASTICS PRODUCTION	3.6E+07	5.4E+07		J / KG
FEEDSTOCK ENERGY REQUIRED FOR NONBIODEGRADABLE PLASTICS PRODUCTION	1E+07	5E+07	1.8E+07	J / KG
LAND AREA REQUIRED FOR BIODEGRADABLE PLASTICS PRODUCTION	70000	1375000	200000	m2/mtonne
BIO-FEEDSTOCK EFFICIENCY	1	4		Kg / kg
WATER REQUIRED FOR NON-BIODEGRADABLE PLASTICS PRODUCTION	5	20	12.81	L / kg
TIME BEFORE LANDFILLING AND BURNING	0.1	1	0.1	Year
WATER FOR GROWING PER M2	200	1600	800	L / m2
BIRTH RATE VALUE	0.015	0.025	0.0188	Births / year
DEATH RATE VALUE	0.004	0.01	0.00764863	Deaths / year
DEVELOPMENT GROWTH RATE	0	0.001	0.0005	Persons / year
ENERGY REQUIRED FOR PLASTICS RECYCLING	1E+08	5E+08	1.36E+08	J/KG
FRACTION LANDFILLED OF LAND-FILLED OR BURNED	0.5	0.9		Dmnl
FRACTION ACTUALLY BIODEGRADED OF BIODEGRADABLE PLASTICS	0	0.5		Dmnl
POST 2016 PLASTIC CONSUMPTION PER UC	40	120	71.6715	kg / person
UC DEMAND GROWTH RATE	0.01	0.05	0.05	kg / kg / person
BIOMASS ENERGY	15	20		MJ / kg

Each model is run 500 times. The primary purpose of these runs is generate realistic potential futures for visualization, and not for optimization or additional solution space exploration, therefore number of simulations is somewhat artificial. The baseline and policy scenarios are all run using a fixed seed for the uncertainty sampling, to provide consistency of results.

#### 4.4. Designing the Communication Artifacts

Once the analysis is completed, the task of myth making begins. This experiment is designed specifically to test the effect of storytelling techniques on the communication of plastic policies, but as we have seen, there are many different forms that could be chosen from. Therefore, the first decision to be made when creating policy communication artifacts is to choose a form. However, this is not a choice that happens in a vacuum Form and message are inextricably intertwined, and one cannot shape one without in a way shaping the other. This is a key challenge this experiment, as the goal is



produce forms with nearly equivalent messages in various forms.

Form effects message. Message effects form.

The parameters of the experiment do help to narrow the possible choices, as the experiment takes place over multiple locations, a static display form is required. This is in opposition to a dynamic form such as an interactive website or application. Furthermore, the potential additional distractions of digital devices is a problem that was desired to be avoided.

The requirement of a static and flexible format for testing also eliminates the possibility of most **physical**<sup>5</sup> and **oral** methods of communication. This leaves only **visual** and **textual** forms to consider.

The second consideration that shapes the experiment design is the desire to compare storytelling techniques against more traditional policy communication techniques. Here, Aristotle, and Bill Brichard provide us with collective guidance on how to separate these ideas (Aristotle & Waterfield, 2018; Brichard, 2008).

Aristotle offers two works on communication: Rhetoric and Poetics, which Brichard compares to "push" versus "pulling". This metaphor entails that either experience can be transportative, but direction of the applied force dictates the experience.

Poetics pull us closer together, Rhetoric pushes us apart.

If we look at our communication artifacts through this lens, a test matrix begins to emerge. These four different designs, shown in the figure below, each reflecting the "best" of their respective forms. The two forms on the bottom are representative of traditional policy communication artifacts: a text-based Executive Summary and a visual-based Infographic. The two forms along the top are the storytelling-based forms: the text-based Policy Fable, and the comic-inspired Metagraphic<sup>6</sup>. **Purely visual** forms were not considered, due to the complexity of the information text is required to ensure that a similar message is being communicated.

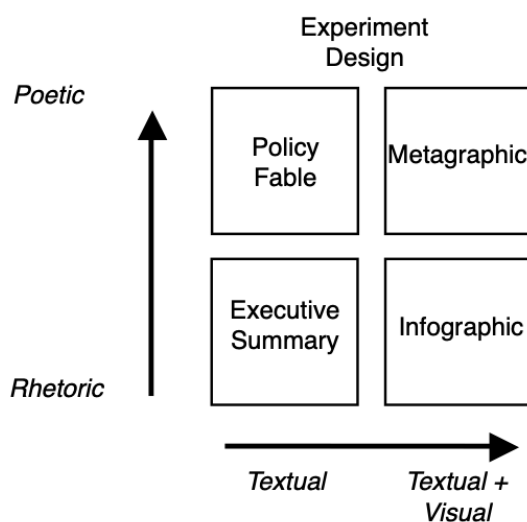


Figure 4.5: Artifact Design for Experimentation

#### 4.4.1. Commonalities of Design

A few common components were selected for communicating this information across all forms. The first is the choice is the continuation of the "Reduce, Reuse and Recycle" language, along with the additional "Replace", as the primary means of identifying potential policies. Also, where possible, similar colors and text styles were used to unify the designs. The four designs were compiled into a single booklet to ensure that they were as physically indistinguishable as possible.

<sup>5</sup>I think that rituals are an extremely interesting tool that is all but forgotten in modern society, and spent several hours daydreaming what a plastic-renouncing ritual may look like. Maybe someday.

<sup>6</sup>This is a made-up word, combining *meta* "beyond" and *graphic*. Unrelated to an art movement of the 1950s with the same name.

Each of these four policies are represented by a single metric: *plastics in nature and landfills*, that is included in terms of today's numbers. The numbers presented are small and relate-able to a diverse audience in a way that 11000 mTonnes of plastic may not be. The choice to present this information is a pragmatic one, these are some of the most tangible results of the model, and each reader likely has a personal image of what plastics in the environment means. This is also set up by the introduction, which acknowledges the benefits of plastics while also focuses on the final destination as the key metric for this comparison.

Ensure that any data presented is relatable for the given audience.

#### 4.4.2. Executive Summary

The Executive Summary designed for this communication experiment is based on a series of sources that follow similar approaches to this form of policy communication. A key consideration of this form is that it is almost always linked to a longer, more detailed report that it draws from. In this case, a larger report does not actually exist. No characters or explicit setting are used in this form, and therefore these components are excluded from this analysis.

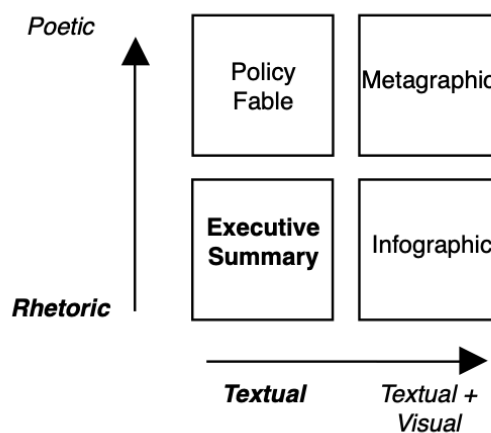


Figure 4.6: A traditional form of policy communication

An **Executive Summary** is typically a short ( 4 pages or less) text-based document that summarizes a larger report using rhetorical language.

#### Form

This form is designed to be a minimalist and professional as possible, and limits the amount of stylistic elements used to allow the reader to focus on the information presented. This is in line with the example of the UN Report on Single-Use Plastics, which used similar styling to great effect. A single flourish-like feature is used, the leading bars that draw reader's eyes to specific words in the text and act as headers and sub-headers.

Short documents can quickly balloon in length if a number of traditional headers are used. This also introduces the likelihood of clutter, as seen in The New Plastics Economy report. However, without headers or other identifying structural components, the audience may be off-put, confused, or distracted. To address both of these issues simultaneously, this report utilizes in-line headers and sub-headers, a design feature adapted from the recommendations of The Vignelli Canon (Vignelli, 2010). The headers are bold-text, with a font size double that of the body text. This proportionality is intentional, and is repeated each of the forms where applicable.

Proportioning text size (2:1, 3:1, etc.) allows for clean nesting of various sizes of text on the page.

#### Plot

Without graphics, a clear and comparable wording is needed for the reader to easily review and compare separate policies. Unfortunately, there is not a clear standard for what exactly an executive sum-

mary should contain. The best guidelines recommend only a clear message, a focusing on problem-analysis-solution structure and often an emotional or catchy introduction (Clayton, n.d.; Protein Research Foundation, n.d.; Texas A&M University Writing Center, 2019). The other consistent recommendations are to finish as fast as possible, most suggest no more than 4 pages, some much shorter than that. This drives the focus onto highlighting the facts and delivering a short, weighty message.

#### Message

The choice to present plastics in landfill and nature as a performance indicator is an inherently loaded **Mystical** one. It is intended to inspire awe in the audience's own imagination by providing a simple measure to which can provide their own imagery. The form itself lacks the transportative elements that generally assist this function. The underlying **Sociological** assumption is this destination for plastics is a negative outcome, and while this link is not explicitly stated, this is assumed to be a global norm that is reinforced by this message. Namely that plastics are not desired in the environment. The information itself is entirely **Cosmological** in nature, exploring the cause and effect relationship within the model, with a **Pedagogical** undertone that surfaces in the final section. There the message is about how to go about solving the problem, in clear and direct language.

#### 4.4.3. Infographic

The Infographic form is a rhetorical form of communication that employs visuals and textual components to communicate. No characters or explicit setting are used in this form, and therefore these components are excluded from this analysis.

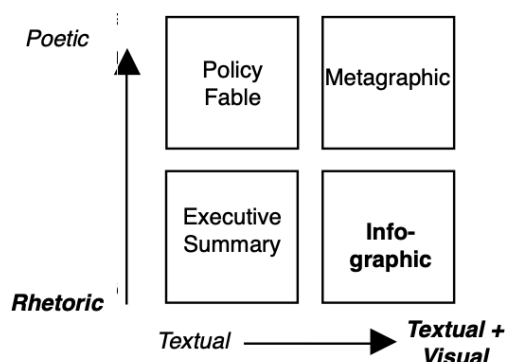


Figure 4.7: A Prominent Form of Policy Communication

An **Infographic** is a data visualization artifact that combines visual and textual elements. Due to their flexible design, and relatively compact nature, this form is often found online and in other non-traditional settings.

#### Form

This form design draws largely on The Vignelli Canon. The primary influence of this manual is in the application of the "THE GRID" to the layout of the information on the pages (Vignelli, 2010). Each page employs the same grid and layout is repeated as much as possible to provide consistency for the reader. This layout is designed assuming the reader's eyes follow a "Z-pattern" across the page (Knaflic, 2015).

This form makes extensive use of color and font to create a hierarchy of information. Sub-headers are accented with a colored font (based on the TU Delft color palette), and body text is black. Graphs and associated texts are drawn in grey. Bold and light font are used to accentuate certain items; early drafts of the design used bold fonts almost exclusively while the final version uses almost exclusively light fonts to accentuate the white space. This white space is essential to the design: a cluttered or full page can be intimidating or confusing to the audience (Knaflic, 2015; Vignelli, 2010).

By adjusting font width and using hierarchical color schemes, the white space of the design can be used more effectively.

#### Plot

The structure of this form is based partially on the references used for the Executive Summary, with some adaptation for the layout. This form, along with the Metagraphic, employs what Vignelli calls the “cinematic experience of turning the page” and therefore can be divided into three sections as it covers three spreads of the experiment booklet Vignelli (2010). The first section, “Today’s Plastic” serves as an introduction to the problem and introduces the model alongside with some information regarding current plastic numbers. The second section, “Tomorrow’s Problem” introduces quantitative details, and outlines the scope of the problem as well as the KPI that will be used to judge the model. Due to the complicatedness of the model results, a significant portion of the space of this section is dedicated to explaining how the model works and how to read the results. The final section can be divided into two halves. The upper half, “Testing Policies”, focuses on the analysis of each policy, while with the lower half, “RETHINK” serves as a conclusion.

#### Message

The messaging of this form is the most analytic of the forms tested, due to the focus on presenting the Cosmological results of the model study. Each result is present in the same manner, and the conclusion is brief in comparison to the other forms of communication. However, the layout of this form and the inclusion of graphics afford the audience the best opportunity to compare each policy on a single page. This form is almost devoid of any direct Sociological functions (aside from the KPI selection as discussed) due to the nature, with only a small section dedicated to the Pedagogical mission of teaching specific policy advice. A significant amount of space is dedicated to the Mystical Function, with the graphical representation and presentation of the scale of the issue in the first spread.

Infographics excel at providing at-a-glance information to the audience.

#### 4.4.4. Policy Fable

The Policy Fable went through the most significant changes during the development of the designs. After several attempts to produce a self-contained fable with no follow-on analysis proved difficult to interpret for test audiences and reviewers, a short expositional section was added at the end of the fable, linking the events of the story to the large context. This analysis will focus on the Policy Fable itself. This analysis is extremely brief, and does not include all of the intentional design choices made during the writing of this story, only the most important components have been highlighted.

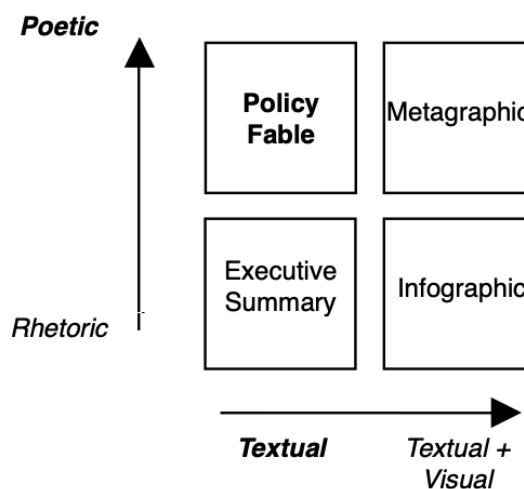


Figure 4.8: A new twist on an old form of policy communication

An **Policy Fable** is a short textual allegory that contains a message about a specific policy. The story may be stand-alone, or supplemented with a short analysis before or after the main story.

#### Plot

The plot for this story is based on a Voyage and Return structure, with a significant element of Rebirth themes as well. Naturally these are the structures that also share the most with The Hero's Journey, which is clearly reflected in the plot as well. This structure was chosen due to the positive nature of the story outcome, as well as for how the nature of the plot aligns with the prescribed solution for the problem. The solution is driven by the characters and plot, while the conflict is largely generated from the setting (archetypal of this plot structure).

The story opens sometime before Red is born, providing necessary context for the plot. The **Anticipation** phase begins with Red's birth, and the old bird acts as a **Herald**, predicting trouble. The **Dream** stage is abbreviated in Red's case, as she is battered to the sea by the **Threshold Guardian**, entering a gentle **special world**. The Turtle serves as her **Mentor** into the **Belly of the Beast**, where she undergoes a **catharsis**. The **Nightmare** stage kicks off with her discovering the shells and finally climaxes with her **apotheosis**. When she discovers the song she transforms internally, but only finally completes her external transformation at the **Resolution** of her journey.

#### Setting

Significant effort went into developing a fictionalized setting that provided an appropriate parallel to the policy problem as analyzed. An isolated setting was desired to reduce the "end of the world" quality of the story. If the birds do not solve their problem, it may be the end of the island (their world) but not our planet. The cause of that problem, the shells, is designed as a metaphor for plastics. It is here where metaphorical simplification is required, previous versions attempted to capture the flexibility and many uses of plastics, however this shortened version focuses on single-use or food packaging associations. The island setting is intentionally nondescript to avoid cultural biases in the audience.

#### Form

This form relies heavily on rhyming patterns and alliteration to give it an oratory feel to the reader. This is done to emulate the style of folk tales and classic fables, a subtle signal to the audience that this story is designed to teach as well as entertain. The physical shape of the design is very simple, as the focus of this form is intended to be on the text. Different typefaces and line spacing are used to signify where the story ends and the analysis begins, but this is the only visual design elements used for this section.

#### Characters

There are two primary characters in this story, along with an unnamed supporting cast. Anthropomorphised birds were chosen as the main characters, to reinforce the fable-like qualities of the story and as a means to simply represent a diverse group through feather colors. Earlier versions of the story connected the various colors to groups identified by Cultural Theory, however this was dropped for brevity.

Red, the hero of the story, does retain her color choice from the original mapping, influenced by the Chinese five elements and Cultural Theory, though there is also a far more practical reason for using this color (Overly Sarcastic Productions, 2017, "Five Man Band"). "Red" is one of the two primary colors (the other being Blue) that has historical precedent as a name in English, and provides ample rhyming opportunities.

The Turtle, a **Mentor** to Red, was also chosen for primarily practical purposes, though notes of symbolism can also be found in this choice as well. A turtle offers a practical means of rescuing and conveying a flying animal across the ocean, something a fish could not have as easily done. Turtles are traditionally depicted as wise and knowledgeable in mythology, and this story reinforces this association. Turtles are also greatly impacted by plastic waste, and are often used as environmental symbols (Wikipedia, 2019).<sup>7</sup>

<sup>7</sup>I, among many others, was first moved to think about plastics in society by the awful footage of a sea turtle having a plastic straw pulled from its nose.

### Message

These choices of characters were driven by the mythological symbols chosen for this story. An island was chosen because of the "end of the world" nature of the model interpretation. That is to say, I wanted to tell a story about the end of the world, without it actually being the end of the world. The next choice was to select a proper subject for anthropomorphization. I wish I could say that I had a wonderful epiphany while walking on the beach or eating a mussel, but the bird-shell dynamic merely evolved from previous attempts at allegory.

Matching a metaphor's entailment's to the system is essential (Lakoff & Johnson, 2003): shells are a form of single-use packaging, and metaphorically, all plastics in general. The noise is symbolic of plastic's pollution, and this concept is more literally represented by the problems. This setting drives the plot, and parallels a representation of the plastics system. The story highlights some elements and hides others. However, these are just the second and first layers of the story.

The song is the symbolic manifestation this Red's transformation, literally a harmony of voices. The context of noise returns in the council scene, where Red harmonizes the group with her song. This interpretation extends onto all four mythological functions at once. The **Mystical** function touches on the power of music to separate us from ourselves, while the **Cosmological** function focuses on the noise created by the democratic and economic nature of the birds. The **Sociological** function confronts the idea that democracy is the best tool for governance, attempting to teach a lesson about collective action and leadership in the face of grand challenges. On an ever deeper **Pedagogical** level, this lesson is not only about *what* needs to be done: a change in governance structure, but also *how* to go about it. Namely through tools that harmonize and not divide.

One could look very deeply into this story and see it as an allegory arguing for the use of storytelling over rhetorical communication in general, and I would not have much to say against such a narrative. This development was not intended, though it seems difficult to call it coincidental.

Allegorical stories have many layers, and often the deepest layers reveal the essence of the author, sometimes unintentionally.

### 4.4.5. Metagraphic

The metagraphic was the most complicated and difficult artifact to design. The mixed media form reflects the design of the PlasticEconomy report, with the addition of characters and a plot structure to help tie the form together.

A **Metagraphic** is an artifact that combines textual and visual elements with storytelling techniques.

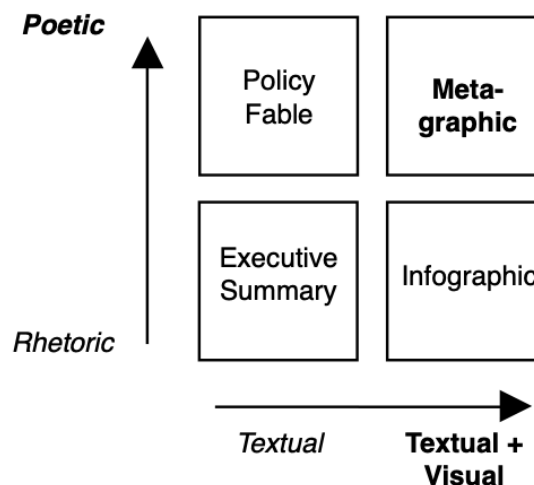


Figure 4.9: A modern approach to artifact design

### Plot

This plot, like the Policy Fable, is structured as a **Voyage and Return** and **Hero's Journey**. Unlike the Policy Fable, this story spends the large portion of the time in the **Special World**, and therefore leans

less on transformation motifs.

This story jumps directly into the **special world**, with an abbreviated **Call to Adventure** in the opening paragraph. We are quickly introduced to the **Mentor**, Hermes, who aside from being a hermit crab also happens to be an expert in system dynamics. Then the characters go through a set of four trials, representing each of the potential policies, each failing in its own way. As the Stickman leaves the **special world** and parts ways with Hermes he begins the process of **catharsis**, where he must confront the results of what he has just seen. The aim of this application of the plot structure is to compel the audience to continue thinking about the message after the story is finished.

Combining this plot and the form were especially challenging, as the form dictates that a number of trials follow one after another. The plot itself may be seen as somewhat unfinished, as the Stickman has not undergone an atonement or apotheosis, and may not have even completed his catharsis. In a way this journey is incomplete, something that we will revisit in the discussion of the experiment results.

### Setting

The Metagraphic exists largely in a setting that may best be described as *model-land* (E. L. Thompson & Smith, 2019). The characters exist on the page with the model and the graphics, the story is presented without a clear fourth wall. Sometimes the characters address the audience directly, showing that they know they are in story. This technique allows an author to provide social commentary in a voice that is not directly their own. The setting is a blend of fictional and real-world elements, the photos and standard text representing the real world, and the hand-drawn style representing the fictional one. This was also done to make the images more approachable for the audience.

### Form

This form is the most cinematic, and relies most heavily on that page-turning experience. Due to the complicated nature of this form, the most time was invested into this design. The original design leaned even heavier on the page-turning aspect than the final design. However, two points of feedback from a reviewer helped to shape this form into a final more polished finished product. The first was regarding the layout, as the original design placed the body text, photograph and story in a unique format on each page. It was noted that this format may be confusing to many in the audience, so a more consistent layout was chosen. The second recommendation that helped to solidify this form was the inclusion of the path that marks the progress of the story. The original design followed the Z-pattern of the Infographic, but by including a clear path from one scene to the next, a more consistent story can be presented to each audience member.

**Visual aides:** lines, text, arrows, etc. to help the reader follow the flow of information are essential in non-traditional layouts.

### Characters

There are three primary characters in this story, the Stickman, Hermes and the Narrator. Here the limitations of individual talents are on full display: Hermes is based on an image of a Hermit Crab wearing a bottle cap, however the representation fails to deliver a consistent message. Among other things, Hermes has been accused of carrying a cake and flying a kite, but never wearing a bottle cap.

Sometimes, it's better to leave the art to experts.

Hermes is a classic animal guide, or **Mentor**, that serves as a mentor through the special world. A Virgil to the Stickman's (the **Hero**) Danté, this archetypal duo allows for the contrast of a more objective voice against a clearly subjective one (Overly Sarcastic Productions, 2017, "Divine Comedy Series"). These characters contrast in attitude to amplify this difference, Stickman expresses a wide variety of emotions while Hermes is more even-keeled throughout the journey. The Narrator is itself a third character, having a unique voice and style that is largely separated from conversation on the rest of the page.



Figure 4.10: I'll let you judge for yourself Burgess (2016)

### Message

This form allows for a unique metaphor to deliver the message. Like the shell, institutions and governance structures exist to protect the systems that live inside of them. The metaphor of a growing system, and therefore a change in shells, was inspired by the incredible story

told by Rabbi Dr. Abraham Twerski that applies a similar metaphor to personal growth (JINSIDER, 2009). In the case of plastics, the metaphor shifts slightly. Governments and institutions can be seen in this case not as something that grows from within the system, but that are co-opted from the outside. Much like the Hermit Crab finding a shell to protect it, society can find new structures to protect and control the systems that provide us with means to live and work.

This metaphor amplifies the **Mystical** function of the message by breaching expectations about the crab's attitude towards and relationship with plastics. Like humans, the hermit crab has adapted to a "Plastic Life". Much of the rest of the artifact is dedicated to literally exploring the **Cosmological**, as well as **Sociological** functions of the message in a detailed manner. This includes many moments of **Pedagogical** exposition, as direct advice and motivation to the audience about how they can or should reduce plastics in their lives. The final metaphorical message also includes a strong teaching moment, where it prescribes a potential solution to the problem, in contrast with four previous examples which were not successful.

#### **4.4.6. Four Forms, One Booklet**

A small booklet was designed to contain these four forms for the experiment. This booklet also contains a short statement at the beginning and the end, as well as several spacing pages between the forms. As you will see in the subsequent pages, some design choices are dependant on the form of the final presentation, in this case, the printing.



# 5

## Policy Artifacts

The artifacts were designed as individual sections of a single booklet to ensure unity between the various forms and to facilitate experimentation. Because of cost considerations, this booklet was designed to be an A3 but was printed on A4 for the experiment. The version included here has not been formatted for this particular type of binding, and some pages may not appear exactly as they did for the experiment. The experiment books were trimmed after printing, so they did not have the white border at the edge of the page that this booklet does. If you are viewing this on a computer, switching to double-paged view is essentially required, as the Infographic and the Metagraphic span the entire spread.

This booklet is included here in entirety as a holistic answer to the question:

*What is the result of the operationalization of this policy mythology framework?*

# The Century of Plastics: A Systemic Study of Potential Futures

Connor McMullen  
June, 2019



Engineering &  
Policy Analysis

This booklet is dedicated to all the eyes and minds that contributed to the shaping of these documents. Without them, it would have melted into pseudo-artistic chaos.

This document was created by Connor McMullen as part of the requirements to complete a Master's Thesis in Engineering and Policy Analysis at TU Delft.

All materials in this book are produced and created by the author, excluding the icons used in system diagrams. These images are taken from Apple's Keynote.

## **The contents of this report** are

designed as part of an experiment to test the effect that form has on the presentation and reception of policy analysis. This experiment exposed each user to a single portion of this report, and measured their responses to the material. You are not part of the experiment group, so you will experience each of the forms at your leisure. Please consider that each section is an experience in of itself, and I hope you enjoy it as such.

## **The order of things:** there are no page

numbers, each component is designed to be viewed independently, each representing a different form of policy communication in the follow order:

**Executive Summary**

**Infographic**

**Policy Fable**

**Metagraphic**

I would like to again **acknowledge** all of the great researchers, programmers, designers and storytellers who has gone before me along these paths of knowledge. Without their great works, I would not have been able to put together this booklet. Plastics is poised to become a great challenge in the next decades, one I hope you have a few more thoughts about after today.

# **Executive Summary**

A short policy-  
communication  
document, focused on  
delivering a concise view  
of a larger analysis.

**Plastics** are not something that one typically thinks could lead to trade standoffs, diplomatic disputes and threats of war. Yet, this is where we find ourselves today. The miracle material, responsible for so many of humanity's gains: from the food in your fridge to the tools in the nearest operating room. Each of them is protected and made possible by plastics. Yet their useful life, a few years at best, a few moments at worst, is only part of the story. For once that plastic is used, it's life is just beginning, destined to live long beyond use. Within in the past year countries such as China, Malaysia and the Phillipines have stopped plastic imports, and enaged in a war of words with more developed nations about what to do with all of this plastic waste. These may seem empty threats, but with baseline projects predicting that plastics in the environment and landfills will grow by between 2-5 times by 2050, they may also be signs of a contentuous future. One that may still be avoidable. Combining this growth of production and consumption along with the complex international implications and an average decomposition time of 450 years for plastics in the environment, produces a problem that may linger for generations to come if solutions are not identified in the coming decade.

We developed a **System Dynamics Model** that looks at this plastics problem, and applies the well-known ideas of **Reduce**, **Reuse** and **Recycle**, as well as the newer **Replace**, to global plastics production. We applied a top-down methodology to the plastics life-cycle, from raw materials to end-of-life. Plastics have four potential final destinations: landfills, incineration, decomposition (if biodegradable) and the environment. The flows of plastic into these various stocks are determined by the associated global policies. These tested policies control the flow at several points in the plastics lifestyle. This all happens on the largest level possible, a grainy view of plastics on a global scale. And this model makes several assumptions and simplificaations to make predictions. Each policy test is run 500 times with random uncertainty values assinged to explore potential futures, and compared to a baseline that continues today's trends uninterrupted.

**The data** used in this model is collected from a variety of academic, non-profit and industry sources. The largest contributions are from three reports: The United Nations Report on Single-Use Plastics, the PlasticsEurope 2017 Report, and the McKinsey & Ellen MacArthur Foundation report: The New Plastics Economy. Each of these reports acknowledges forms of all four of the orginal policy levers: Reduce, Reuse, Recycle and Replace. The three reports offer detailed, and sometimes divergent, views of the plastics in society. Each acknowledges the key role plastics play in improving human life today, while also proposing a myriad of policies regarding the future of plastic production and use.

The UN Report on Single-Use Plastics focuses largely on regulations to reduce consumer plastics, primarily as a means of reducing litter in the environment. This report is the main source of the **REDUCE** policies. While difficult to estimate because of the patchwork of national regulations and various specific issues facing each local government, the UN Report estimates that a reduction of 36% is achievable by 2050. Our model projects that in the best case scenarios, *plastics in the environment and landfills will still grow by 2-4 times* from today's numbers.

The New Circular Economy report is the grandest outlook of the three, proposing vast changes to both the recycling network as well to how goods are packaged and shipped in the business world. It is here that the largest gains from **REUSE** policies could be found, while consumer plastic reuse (such as bottle crates common across Europe) are an interesting emerging market, business to business shipping is a far more significant consumer of plastics. This policy is hampered by the need for vast amounts of intra-business cooperation and significant cost associated with the implementation of these types of designs. Our model estimates that if Reuse policies could extend the average lifetime of plastics by 50% in 2050, *the result is a 2-3 times the plastic in the environment and landfills*.

The PlasticsEurope 2017 Report highlights the potential benefits of **RECYCLE** policies. Traditional recycling is currently limited to 9% of all plastics are recycled, due to complexities of material type, cleaning and sorting through the waste. Current estimates are that approximately 60% of all plastic used today actually could be recycled. By reaching this 60% recycling target in 2050, total *plastics in the environment and landfills will grow by 2-4 times*, with the full envelope of possible futures slightly better than merely reducing consumption.

By using biological sources to **REPLACE** the current fossil fuel feedstocks, and recycling these materials in special biomass energy facilities, plastics can be decoupled from oil production and simultaneously reducing the flow of plastics out of the system. The PlasticsEurope report focuses on the potential of bioplastics as an emerging market. However, these bioplastics are not biodegradable in the sense that they can be disposed of in nature. They require special biomass energy facilities to properly decompose into useful materials, and producing energy as a by-product. Today's estimates are that up to 60% of current plastics can be easily replaced with bioplastics. However, this material must come from somewhere: water and land use for plastic production would outpace all other requirements for these precious resources by 2050, in many scenarios reaching impossible demands. *Ultimately, this conversion to bioplastics will result in a 3-5 times increase of plastics in the environment and landfills*.



**Comparing** these policies separately, we can see that *plastics in the environment and landfills will at least double in the next 30 years*. Combining these policies is difficult, they each work in a different way, but many of them target on the same components of system, meaning that implementation becomes complicated. For example, **RECYCLE** policies rely on economies of scale, which conflict directly with the aims **REDUCE** policies. Similarly, several policy require significant investment, creating the potential to lock-in to specific solutions due to economic incentives. As we see with **REPLACE** policies, substituting bioplastics for traditional production methods alone will not reduce the plastics in the environment, this change needs to be supplemented with the construction of new biomass facilities to decompose waste plastics to produce energy. Naturally, once an energy source is in use it becomes difficult to rapidly switch to new sources, locking-in this technology for decades to come. **REUSE** policies are difficult to implement because they require vast cooperation between different nations, corporations and factories. The realities of implementation costs often limit their application.

This analysis is subject to a set of **Limitations**. It is deterministic, that is to say, it can only predict what is included in the model itself, and therefore exclude innovative technologies or emergent behaviors. Microbes that produce and eat plastic are a promising pursuit in their own right, and at some point may become viable policy options. Similarly, this model makes no consideration for large-scale societal changes in consumption and growth patterns. The model assumes that individual consumption will continue at current levels in developed countries, except under specific policies. The model also assumes moderate population growth, in line with modern projections. Plastics exist in innumerable variations, an area of policy that clearly requires exploration, but is not included in this model. Instead this analysis considers all plastics uniformly.

Several **Conclusions** can be drawn from this study:

- Plastics in the environment and landfills is likely to at least double in the next 30 years.
- No one policy significantly reduces the potential environmental and economic impacts by 2050 compared to the baseline.
- Many of these policies operate on the same system components, meaning that they compete for resources and cannot be implemented together.
- All of these policies are limited in their effectiveness due to the global nature of the problem. **New models of governance, regulation and cooperation are required to begin to address the potential implications of extensive uses of plastics in modern society. Individual and societal changes are needed to address the coming plastic problem.**

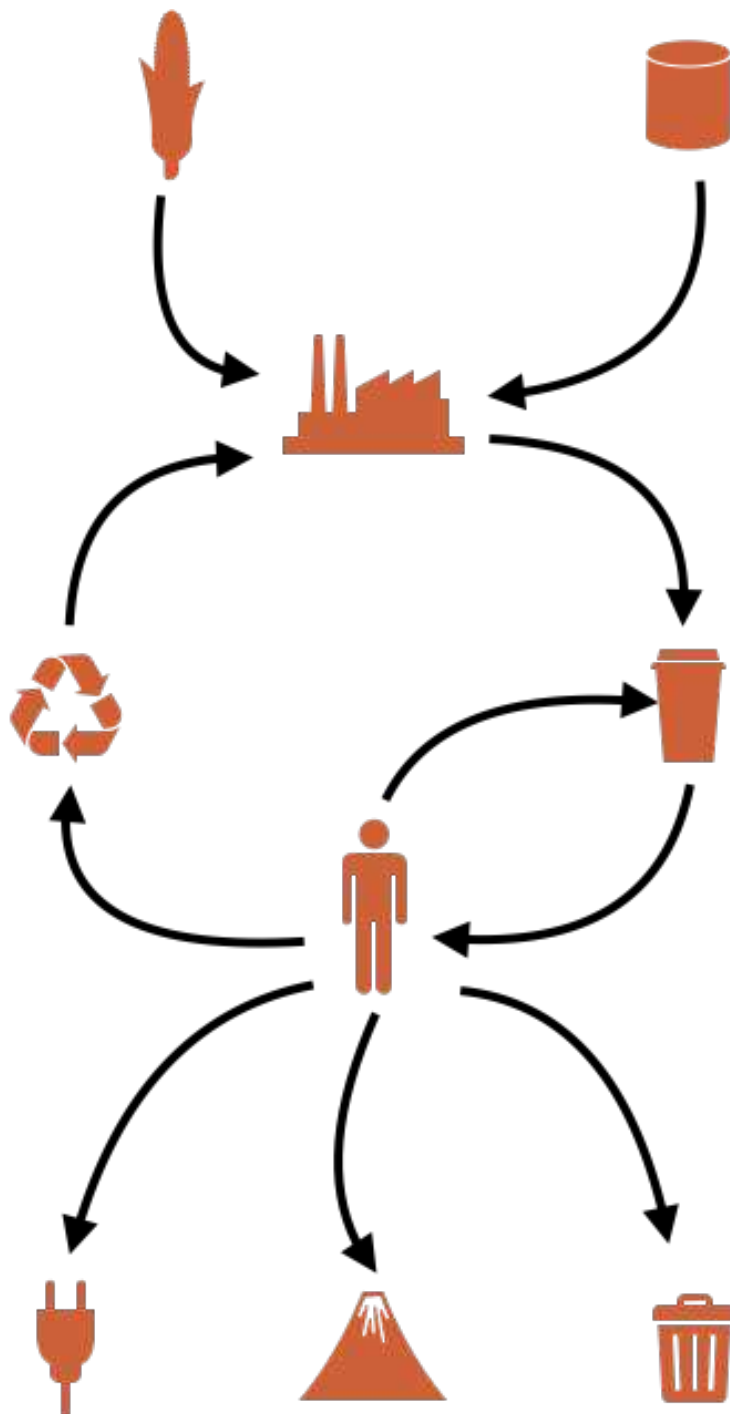


# Infographic

A mixture of data visualizations and text, often designed to be viewed in multiple formats.

# TODAY'S PLASTIC

Plastics are essential to modern life, they keep us healthy, our food fresh and our work life easy. Plastics are also starting to become a heated topic: just in the last year three Asian countries have closed their borders to plastic waste imports. As more people consume plastics on a daily basis, all of this material is going to need to go somewhere. Our model looks at the options we have to deal with the downsides of plastic. In this system dynamics model we look at the entire life of plastics: from resources, through production, consumption and finally their resting place.



**Plastics** account for **5%** of global fossil fuels consumption.

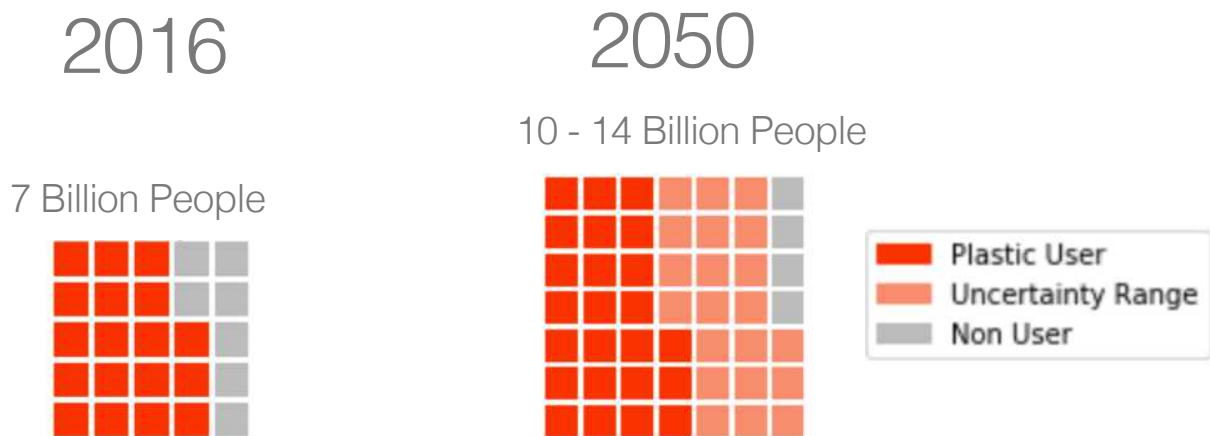
**335** mTonnes of **Plastics** were produced last year, equal to **13** million fully-loaded **Shipping Vessels.**

Global growth in **Plastics Demand** is about **~5%** per year.

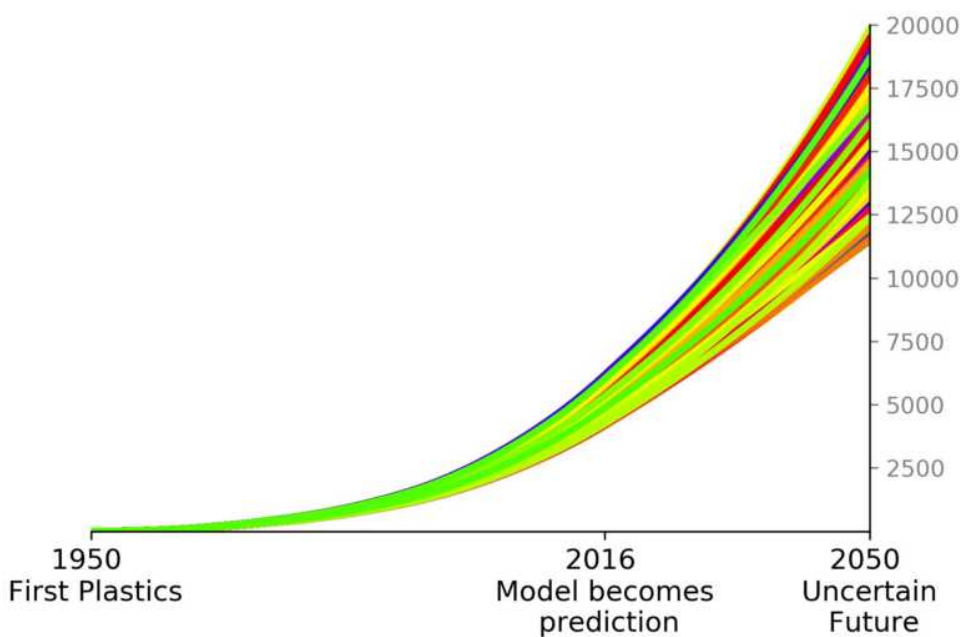
Plastics take about **450** **Years** to decompose.

# TOMORROW'S PRO

**CONSUMERS** drive plastic consumption, and the growth of people on the planet outpaces the choice of some who have already adopted reduced-plastic lives. Many of today's policies focus on consumer-level changes. However, given the current rate of industrialization in developing countries, where are adopting lifestyles that are more closely intertwined with plastics, these changes alone are not enough.



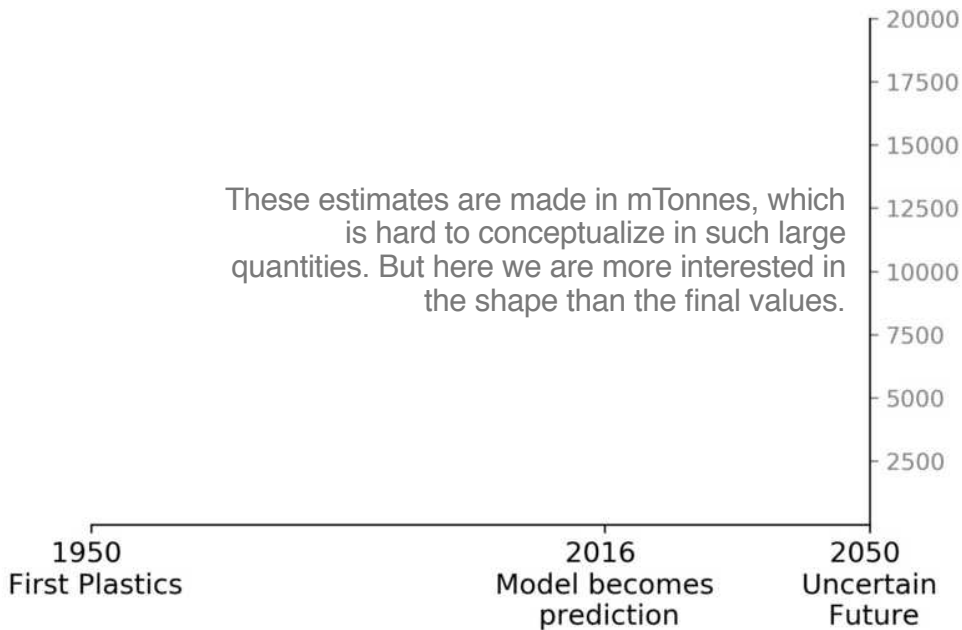
## Baseline Simulations



Each of these 500 lines represents a simulation using different assumptions about how the world is going to grow and change. This view of uncertainty allows for a more robust vision of what the future could possibly be. These are only assumptions, but are based in the latest data and are at least very probable given today's trends.

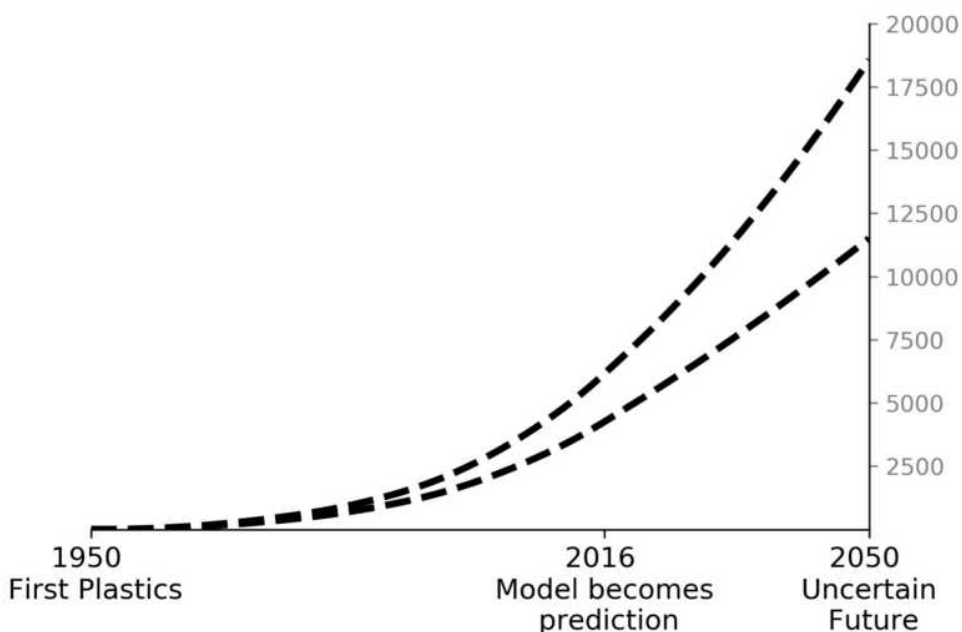
# PROBLEM

## Plastic in the Environment & Landfills



These model uses historical data of plastics production to generate scenarios beyond 2016. To evaluate policies, we estimate the results according to estimated plastics and the environment and landfills.

## Potential Futures



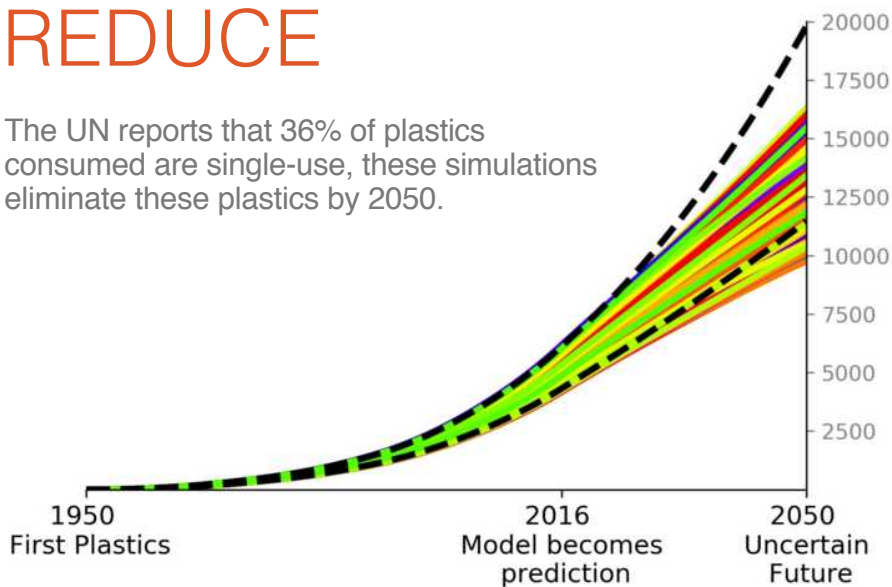
These lines represent the best, and worst of possible futures, if things continue at the current pace. They will serve as a guide for evaluating other policies aimed at controlling plastic consumption.



# TESTING POLICIES

## REDUCE

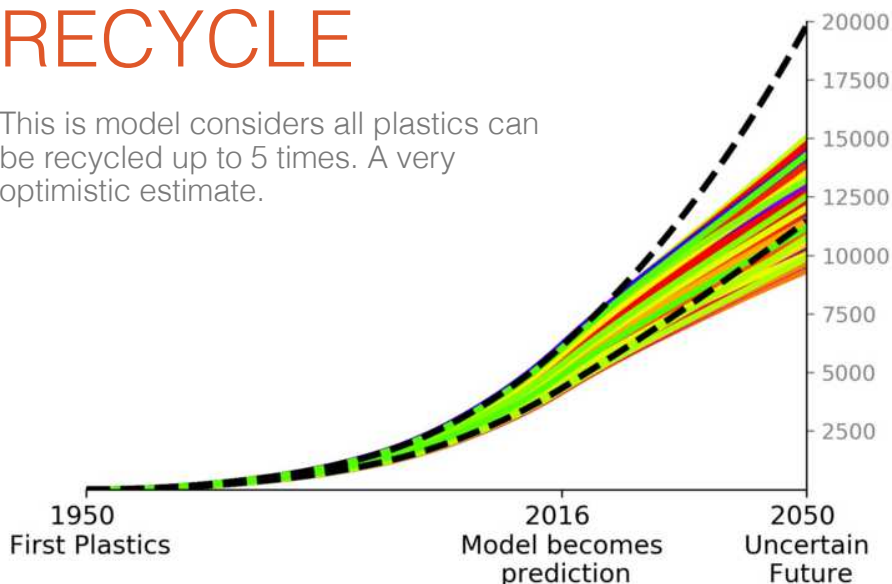
The UN reports that 36% of plastics consumed are single-use, these simulations eliminate these plastics by 2050.



With billions of people on the planet, regulations are the best way to implement this type of solution. Still, reduction is also the best policy lever for individuals to reach for, as it is the most sure way of address the problem.

## RECYCLE

This is model considers all plastics can be recycled up to 5 times. A very optimistic estimate.

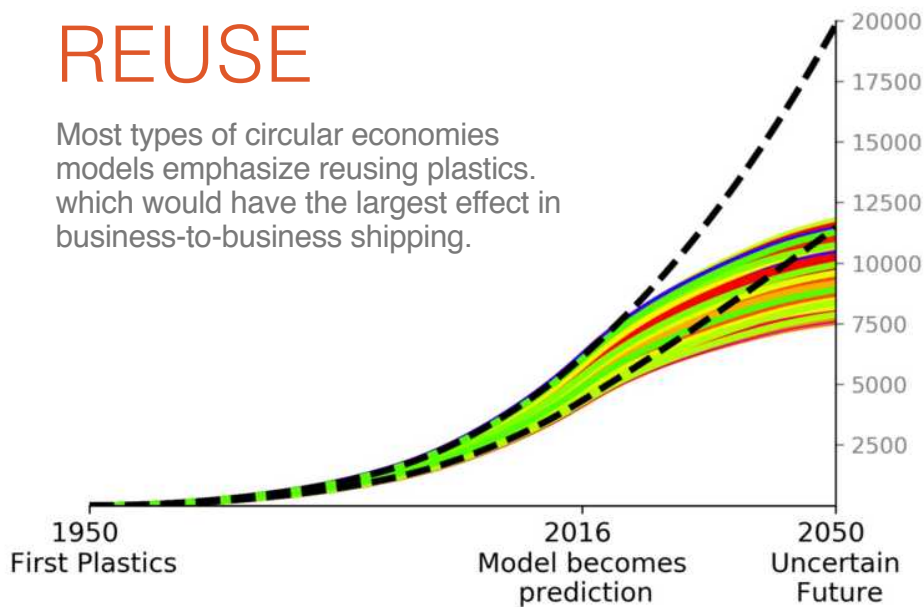


Today only 9% of all plastics are recycled, out of only 14% percent that make it into the bin. Estimates are that in actually, up to about 60% of plastics could be recycled, and these simulations reach this value by 2050.

# RETHINK

# REUSE

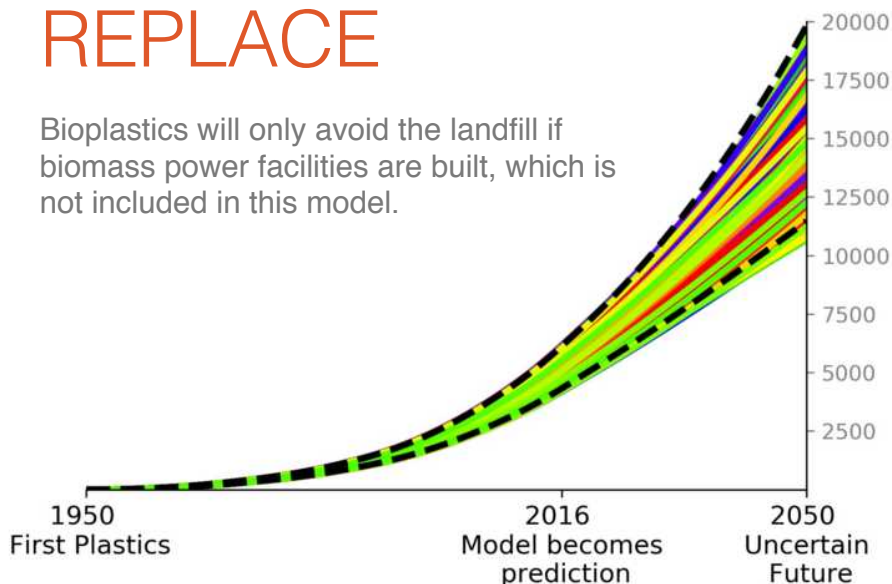
Most types of circular economies models emphasize reusing plastics, which would have the largest effect in business-to-business shipping.



This model looks at the effect of increasing the average lifetime of plastics by 50%. These policies are also limited practically by the high investment costs and level of standardization required. This model overestimates their effectiveness.

# REPLACE

Bioplastics will only avoid the landfill if biomass power facilities are built, which is not included in this model.



Biodegradable products could conceivably replace 60% of plastics used today. However, these plants will need water to grow. Water demand grows beyond any possible capacity by 2050 in these scenarios.

Each policy can provide a dose of relief; a complete solution requires rethinking. Plastic are a global, diverse, complicated engineering product that require new forms of regulation, cooperation and control than ever before, along with significant changes to individual choices we make every day.

# **Policy**

# **Fable**

A fictional short story designed to entertain and deliver a larger moral about a policy problem.

# The Silent Shell Bird

It was a small island. Not more than a few trees beyond the beach. Home only to a flock of birds: all sorts of yellows and blues and greens. They eked out a simple life on this tiny island, content to sing and search for food all day long.

That is until one day, the bravest of the birds was searching in the surf. There he found the most interesting thing. A clamshell, sucked up tight on both sides. He carried the it to the rocks, and gave the shell a heavy whack, splitting it in two. All the birds gathered around to peer inside. Food, fresh and no mess. They had no real need for the shells, so they kept the shiniest and dropped the rest. These were swept away with the the hide tide, out into the bay.

The brave birds went as far as they dared, past the bay and the corals, out in the deep waters of the talking rock. It would follow them around as they played in the waves, but none of them every slowed down enough to understand what it had to say. They would just splash and shout, and soon the talking rock was as much a legend as anything else.

The shells made everything easy, no more scratching about, the birds were free to do as they pleased. And so they did. And the flock grew and grew and grew.

But a funny things they were, the shells. They made an awful racket upon the rocks, and with a whole bunch of new beaks to feed, the birds were at it night and day. Pretty soon it was the only song on the island, the crack of shell against rock. It was almost like the other songs they all forgot. Not for a long time on this island did any bird sing.

One day, a new egg hatched, and the mother hen squawked at the sight. A brilliant red feathered bird! Not unheard of, the old ones said. But don't let that go to your head, she'll be trouble no doubt.

Red turned out to be more trouble than even they thought. From birth, she could not speak. She would open her beak and nothing would come out. She refused to eat and seemed hate the very air around her. But as soon as she could she tried to fly. Fluttering, tumbling, wing-bending crashes down the tree. But she was determined to fly. Day and night she slowly gathered the wind in her feathers. Soon her mother said. Soon she'd be able to fly on her own. Tonight Red thought. Tonight I will get out of this awful place.

It just so happened that night was windy one, a warm stream that carried Red far away from the island. Once up, she coasted on her young wings and enjoyed for the first time silence. It was the shells that shook her so. The constant sound whacking at her soul for reasons she did not yet know.

It was a foolish night to fly. A mistake any young bird would make. The warm breeze soon chilled, and shifted to a sharp wind. Needles of rain chopped at her wings, and she faltered. Thunder cracked as she struggled to stay up. She flew brave enough, but eventually the wind and rain drove her into the sea. She plunged head-first in the icy foam below, struggling for breath.

The sun rose red in the eastern sky, the sea finally calm after tropical gale. Red laid, bone soaked and near death, across a the back of a great leathery rock. She coughed as the rock turned and spoke.

"Well hello there. You're a lucky little bird."

Red blinked. The turtle blinked back. "Don't you worry little one. We'll get you home. Long way you've come, and you'd never make it back alone." Red slumped forward without a word, pulled back into her struggle from the previous night.

The turtle spoke softly as he floated along. Telling her about the things they saw along the way. Red lay there, soaking it in, wise words atop the quiet ocean.

A day passed. Maybe more. The turtle suddenly turned and shook Red.

"Come little bird. I've something for you to hear."

Without another word the turtle scooped her up and plopped her into the sea. She kicked and beat her wings momentarily, until her ear caught what the turtle wanted her to hear. A sound like never before, one with melody and harmony.

The turtle scooped her out of the water with a smile. "Whale songs."

And with that, Red burst out with a flurry of chatter. She shrieked in delight at the sound and asked a thousand questions. The turtle smiled and relaxed, she was going to make it after all.

He paddled as she talked. She told him about her flight and her feathers. And she shuddered when she told him about the shells. He sighed for this he knew about too.

"Come little one, there's one more thing you have to see before I take you back to your family."

Red looked up. The island was in sight! But the turtle slowed at the entrance to the bay. There he scooped up Red, once more plunging her down. She opened her eyes, it was clear what he wanted her to see. Empty shells, as far as the eye could see. Piled high and deep, little place for any of the other creatures of the sea. He pulled Red back up and this time she was silent. He told her about the shells, and the sea before.

“Soon there will be nothing left for me. Or much of anything else. And then there'll be nothing left for you.”

Red bowed her head unsure of what to do.

“Fly along now little one. It's best you go the rest of the way on your own.”

Red knew he was right, said her thanks and her goodbyes, and away she flew. By the time she landed the island was already in a fuss. They were sure she was dead, all the birds gathered, eager to see what she would do. They gasped when she started to speak, and at first they hung on every word. But then she told them of the talking rock, and all the things she saw. They started to doubt her, it's a strange story for such a bird. She flustered her words as she tried to think of what to say, but one by one they started to walk away. Another turned and cracked a shell upon the rock.

The sound snapped at her, shuttering her mind once more behind its endless roar. The shock reverberated through her bones, rekindling her fire. She shouted out about the shells, what she saw at the edge of the sea.



One bird shouted, "What do you want us to do!"

"We need to eat," another exclaimed!

Red stood, shocked that they'd all heard. "Well, we could eat the old ways. And I saw a many other things further out to sea."

Chaos erupted at the propositions.

"Ridiculous!"

Life's now the best it's ever been."

"You want to make it hard again!"

Red drowned in the shouts, her head heavy with sadness and doubt. She knew the cacaphony of voices here would soon be replaced with the clashing of the shells. She thought of the future, wondering how long it would be before what the turtle told her became true. As the thoughts grew, she slowly lost her will to speak. If it weren't for something else she had heard on her journey, she may have gone silent forever.

But then, she opened her beak, but she did not speak. She sang. The whales' song. Her song. The first song on the island in a long time. From a time before any of the other birds could remember. One by one they slipped into silence as they understood what they heard. Then again, one by one, the joined back in. This time in melody, following Red's transforming lead. None of them had heard anything like it, and they found themselves shocked at what came from their own beaks. The flock finished with a flourish, and melted together in the echos from the bay.

The flock stood there in silence, each slowly remembering what the shells had caused them to forget. They knew it to be true. All of it. The song, and the story and the words about the shells. For the first time in generations, the island again rang with harmony. They all vowed from that day to never again let the shells cause them to forget. A new way of life was needed, but they knew that was the way it had to be.

— — —

Thanks to Red's discovery, these birds managed to recognize the problem of the shell pollution before it was too late for their tiny island. Changes will need to be made to how they eat, how they work and how they live. Like the song, it requires a new way of working together, one based in leadership and harmony. In humanity's case, there is not a magical turtle or beautiful song that transform society, but a solution is needed if the problem of plastic pollution is to be addressed if it is too late.

Recent analysis of several reports on plastic policies using a system dynamics model of global plastics production reveals the limitations of several types of proposed policies achieved by 2050. The proposals tested in this model are:

**Reduce** policies, based on UN estimates of eliminating single-use plastics, lowering individual consumption by 36%.

**Reuse** policies, increasing average usage life by 50%.

**Recycle** policies, increasing recycling from the current 9% to 60% of all plastics.

**Replace** policies, using organic sources for 60% of plastics production.

Each policy tested will likely *result in at least 2.5 - 4 times the plastic in the environment and landfills compared to today's numbers.*

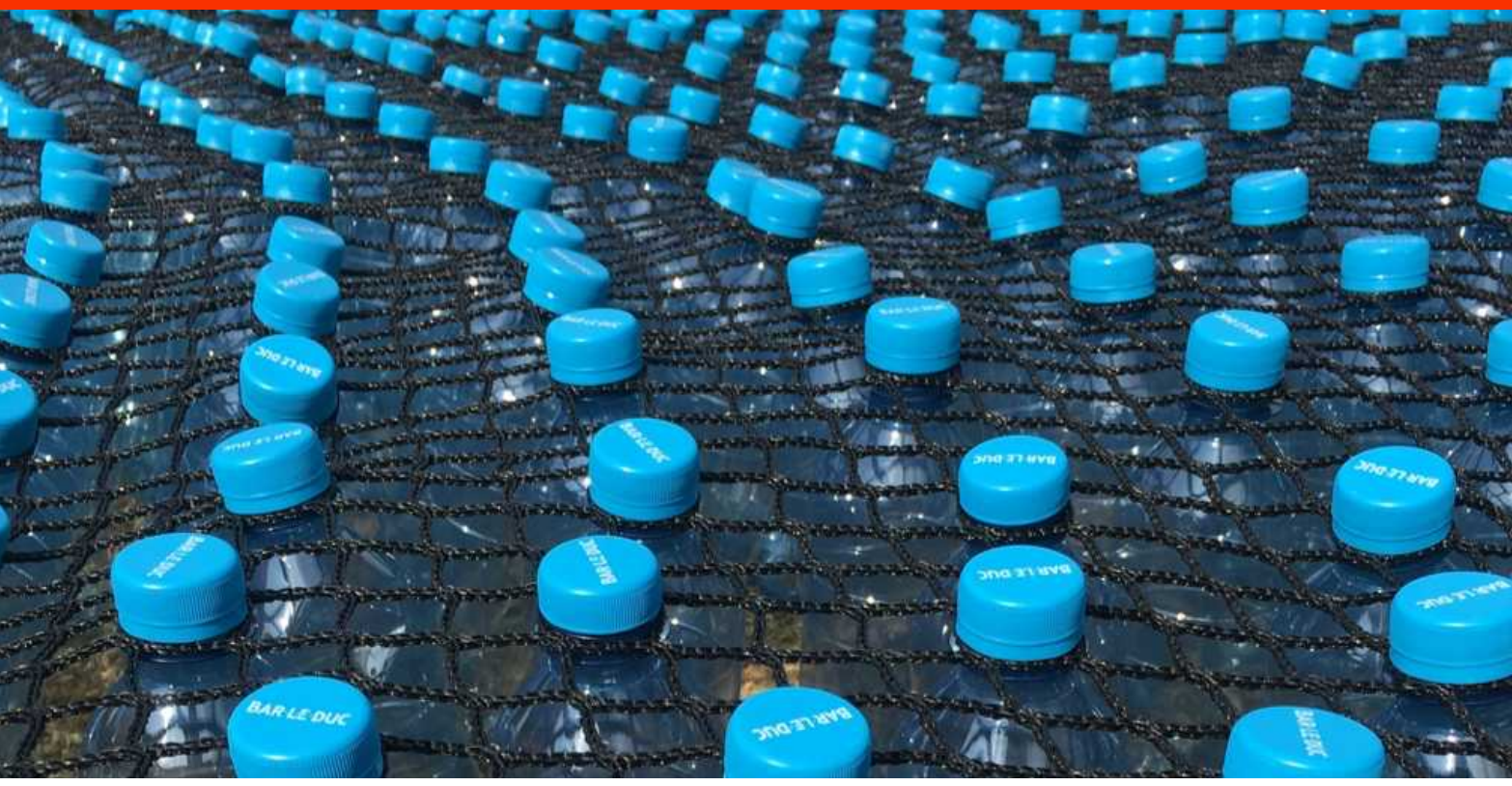
This policy problem is a complex one, given the decentralized and international nature of plastic production. Individual consumption is a key driver of plastic growth, each of us can make daily choices to limit our own production. But, just as Red's consumption choices alone couldn't have changed the island, so too our problem cannot be solved by only individuals. **New models of governance, regulation and cooperation are required to begin to address the potential implications of extensive uses of plastics in modern society. As we see also see by Red's example, individual choices can lead to societal changes, if we are brave and lucky enough.**

# Metagraphic

A mixed media, graphic-based story, designed to communicate large amounts of information through a story.



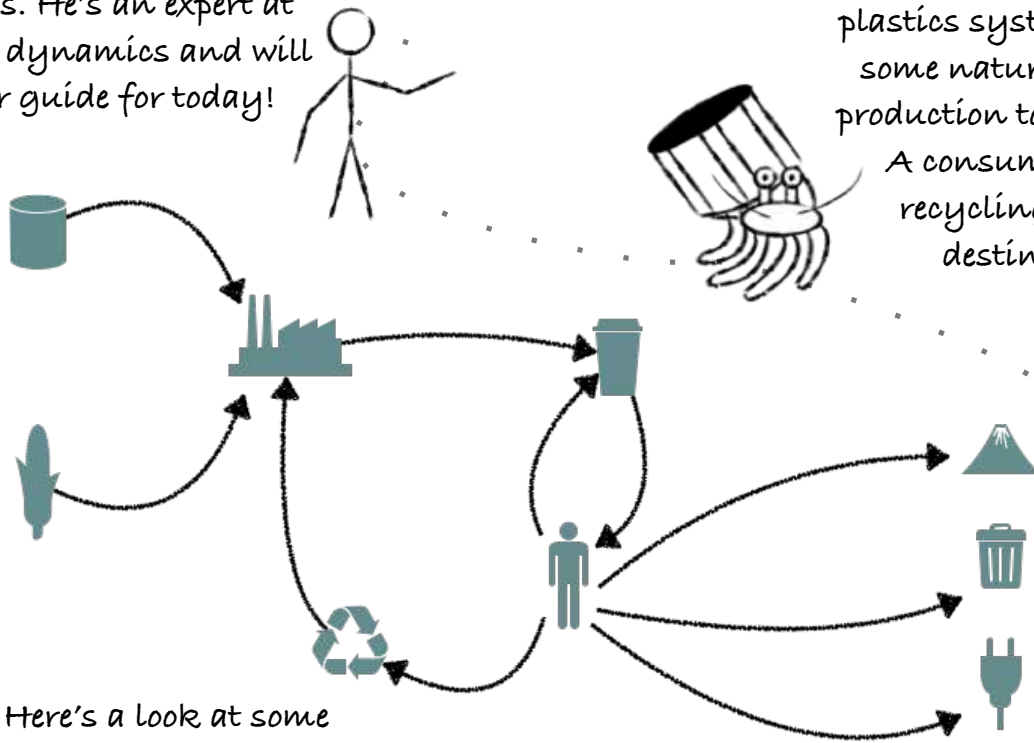
# PLASTIC LIFE



**A old phrase** is back in the newest ways. It's been about 70 years since plastics entered in modern society, and about 40 years since the first Reduce, Reuse & Recycle campaign. Plastic Life looks at what the experts are saying. We set out to understand how exactly this plastic system works, and what it means if we **Reduce, Reuse, Recycle or Replace** our plastics lives. To do this, we will dive into the **uncertain world of a model**, exploring it through the lens of **system dynamics**. We used this model to look at the globe's entire plastic production: past and future by taking a grainy look at this system from start to finish.

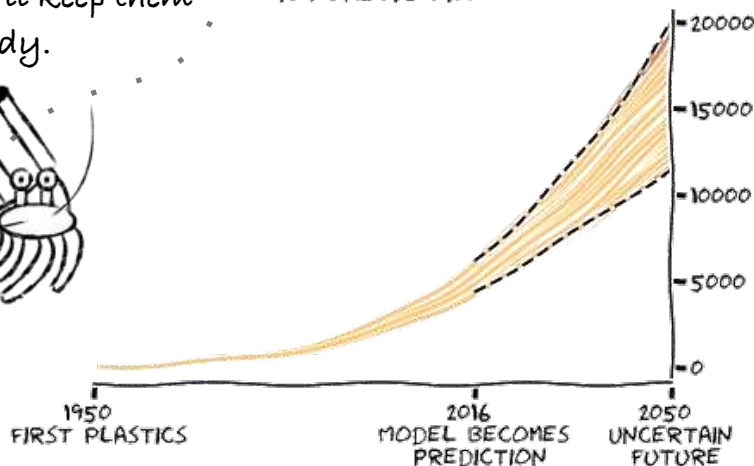
Hi! This is my friend, Hermes. He's an expert at system dynamics and will be our guide for today!

Hello there. This is the plastics system. We've got some natural resources, production to distribution. A consumer, a bit of recycling and end destinations.



Here's a look at some possible futures. Just keep an eye on the dotted lines, those are the best and worst baselines, we'll keep them handy.

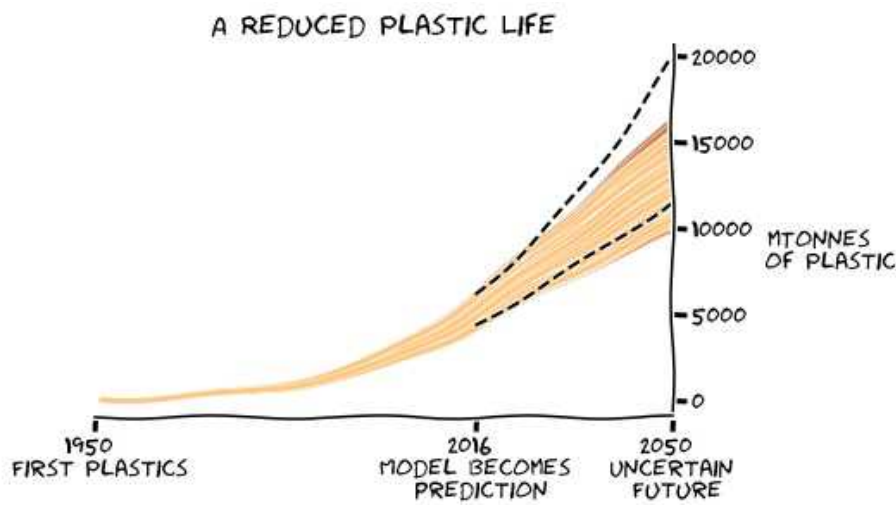
A PLASTIC LIFE



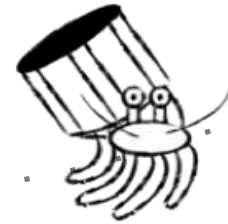
wait, how did you do that!?!



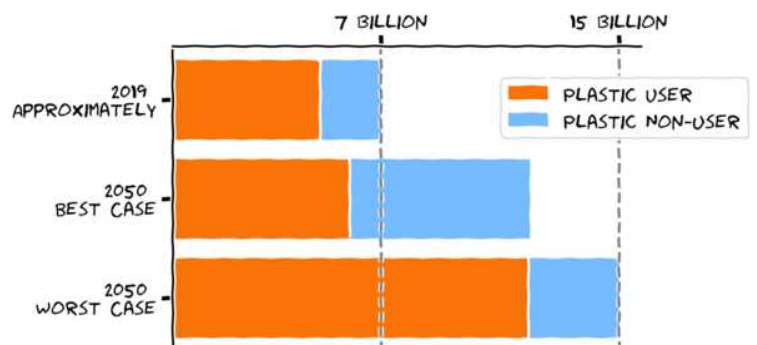
**Reduce** is about using less. Changing how we buy our food and how we carry it home. One would struggle to find a common household good that is not at least partially plastic, and most certainly everything we touch is made using a number of plastics along the way. Whether it is driven by consumers, industry or government, reduction only starts to have an impact once developing countries catch up to the rest of the world.



Let's run some more simulations, 500 to be exact, of reduce policies.



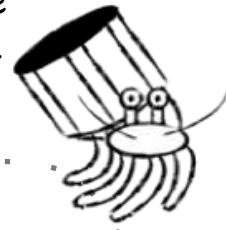
Reducing plastic only slows plastic growth for a time. The world grows faster than humans stop using, and plastics are a key component of industrialization and economic development.



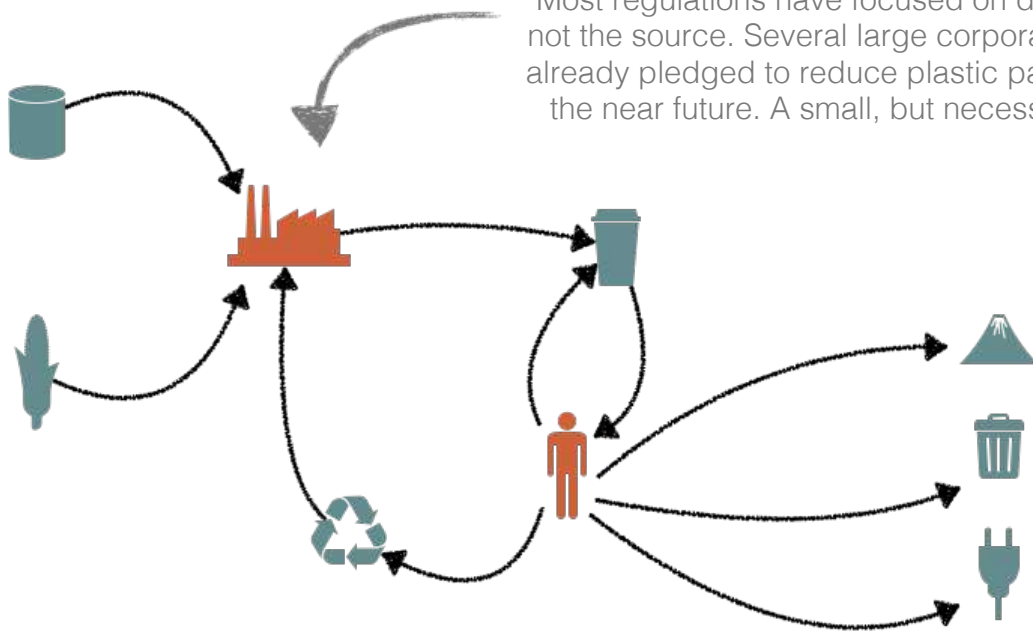
This is about more than just single-use plastics, like these forgotten lunchboxes, cheap plastics are so common in our lives we easily discard them.



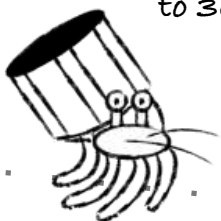
You're right! But the focus today is on single-use plastics in this model.



Most regulations have focused on distribution, not the source. Several large corporations have already pledged to reduce plastic packaging in the near future. A small, but necessary step.



Eliminating single-use plastics can still reduce overall consumption by up to 36 percent.



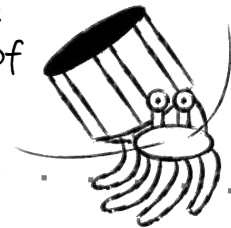
The consumer plays a big part in any of the policies, and each of us can make choices that help reduce the probably. Bigger changes are also necessary.



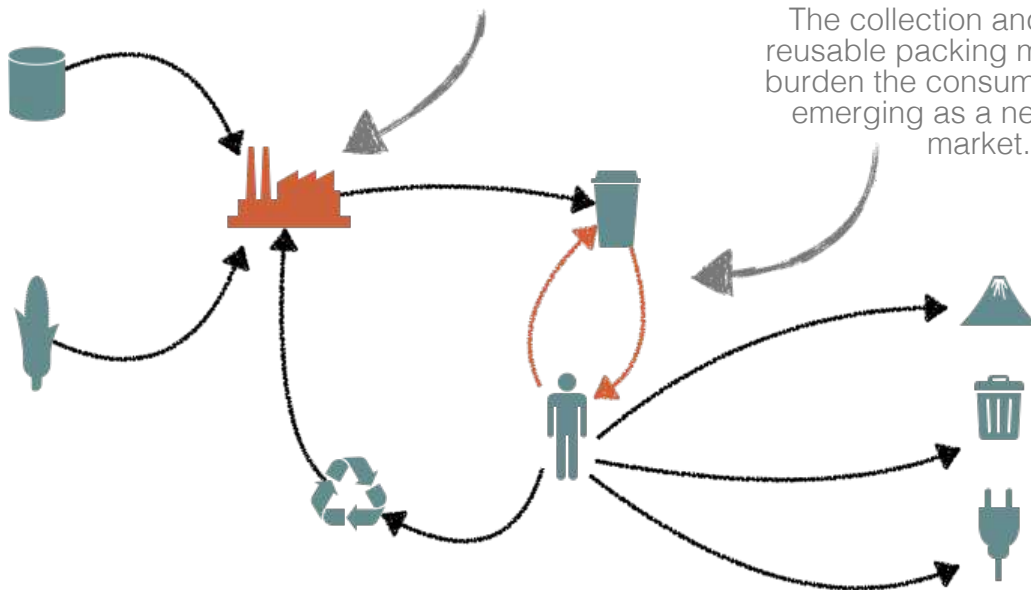


**Reuse** means making plastics that last longer, like this beer crate. That means making more of everything the same, not a easy feat in a growing global world. And it still means more plastic production to set up circular economy practices across a myriad of industries.

Bottle crates are a basic example of a circular concept. The package is used and returned to the supplier for another load of product!



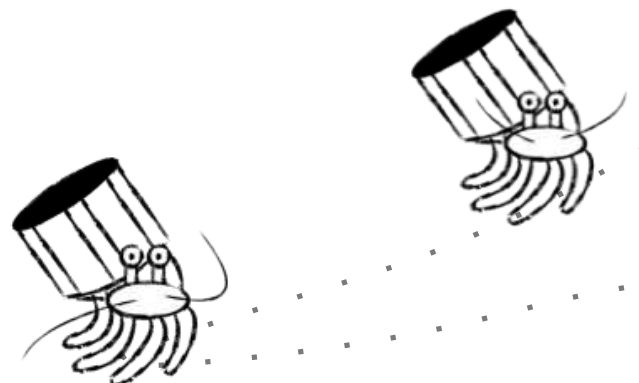
According to The New Plastic Economy the largest effect would be in the industrial sector.



The collection and return of reusable packing may at times burden the consumer; it is also emerging as a new service market.

Not so fast my friend. This is a model, so it has many limitations...

In this case, we are looking at all plastics. So the average lifetime is very difficult to estimate. We used 1 year for the baseline and the policy above extends that to 1.5 years for all plastics.



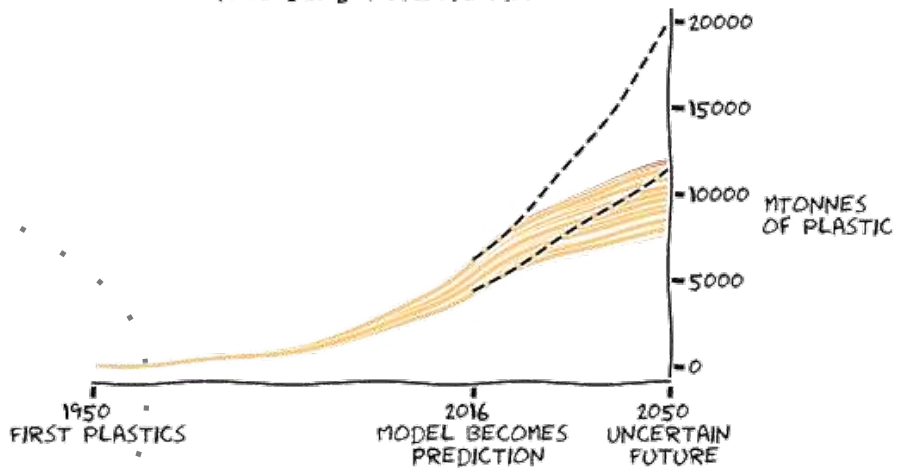
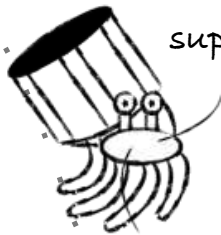
Even I know the bottles have dozens of different cases and sizes. So it seems to be expensive, or at least everyone needs to agree.



Only a small fraction of plastics can be reused for even a year as they exist now, and extending that lifetime requires lots of changes at your supermarket, your house, and beyond.

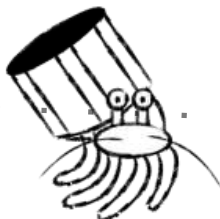
#### A REUSED PLASTIC LIFE

But wow it looks like it really would be an improvement.



I would say these are probably over-optimistic projections.

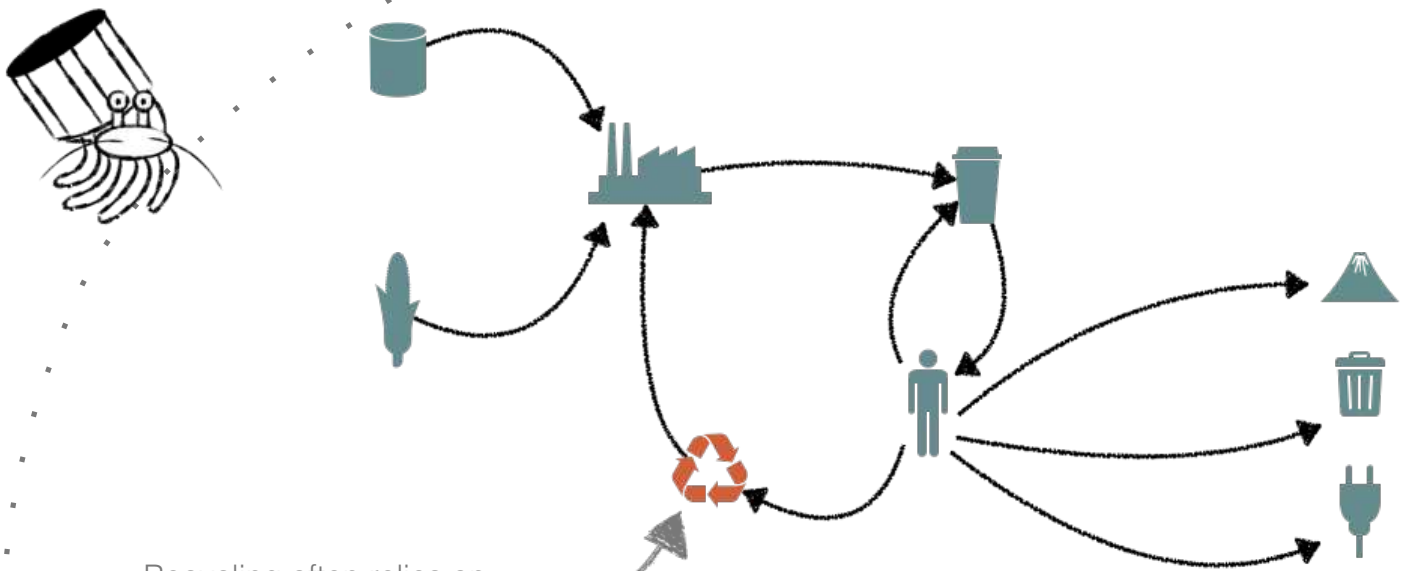
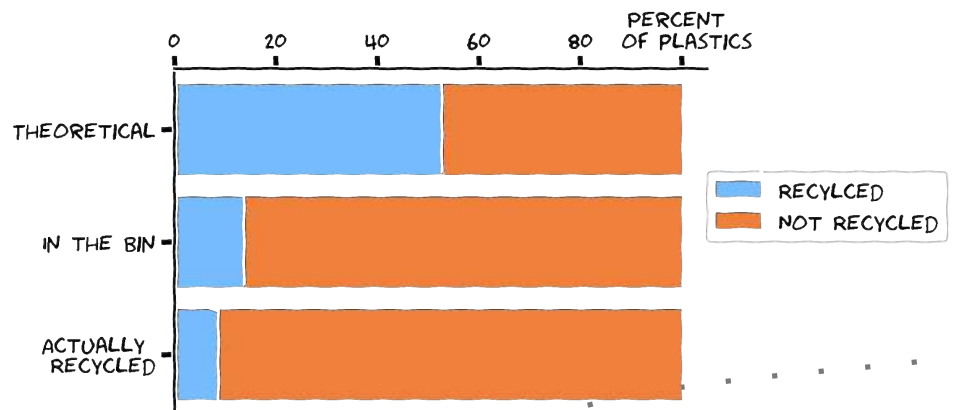
This is not so easy like I hoped!



**Recycle:** more than just putting your waste in the right bin. Now most that can be recycled isn't. Either it's dirty, or mixed up with something else. Some parts of the solutions are addressing that. This model assumes that these problems are fixed, and more, as it recycles all types of plastics 5 times before disposal. But there is another way of changing the function of a material. Many bioplastics can be broken down in special facilities, recycling them into materials that can be used in new ways.

As we can see, right now recycling is better in theory than in practice. The many types of plastics, inks, and contamination limit the amount of material that can actually be recycled.

TODAY'S RECYCLING TRUTH



Recycling often relies on economies of scale to function economically. This means reducing total plastic consumption can hamper recycling programs.

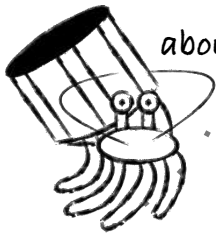
9% Actually Recycled! We can all do our part by cleaning the recycling before putting it in the bin and removing any stickers or labels.



We haven't talked about recycling. What's up with that?



Let's talk about recycling!



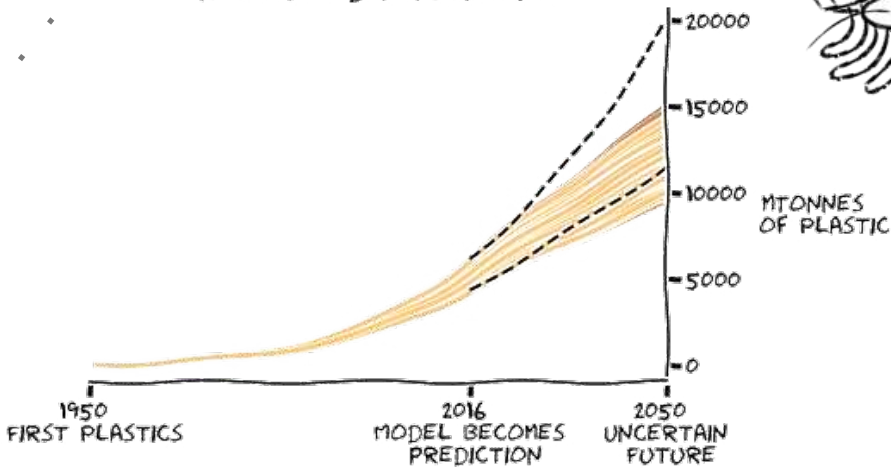
Recycling is usually a degrading process, so bottles rarely turn into new bottles. This model ignore that, and the complications of identifying, cleaning and sorting plastics.



Even if we consider that all plastics that can be recycled are by 2050 (this is about 60%) we see that it has little effect on the results.



A RECYCLED PLASTIC LIFE



Hmm...what else is there?

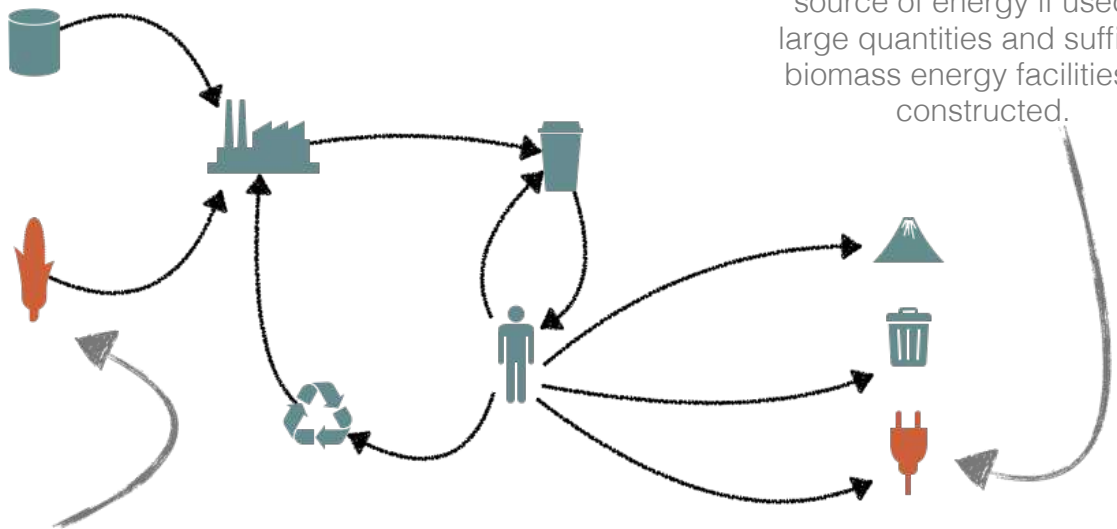


**Replace:** is about the source of the material. This is newest policy lever, one that was almost unthinkable when plastics first entered the world. Today a significant push is being made by some to replace oil and natural gas with other sources. Usually this means plant material, different plants are used in different climates but the process is more or less the same.

Unfortunately not my friend. Bioplastics could reduce fossil fuel consumption, but at the expense of other resources.



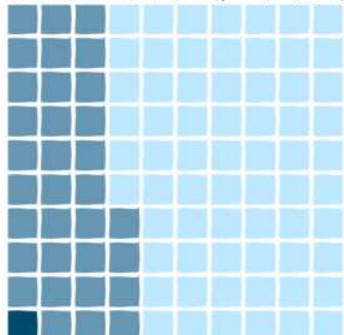
Bioplastics can be a key source of energy if used in large quantities and sufficient biomass energy facilities are constructed.



New technology may reduce these requirements but that's still a lot of water either way.

These 2050 numbers are literally off the scale. The largest estimates are roughly equal to all the fresh water in the world. Plus or minus a few zeros.

WATER FOR GROWING PLASTIC



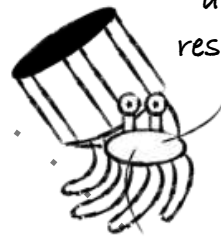
2019 ESTIMATE  
2050 LOW  
2050 HIGH



I get the feeling you're not going to have good news for us here either.

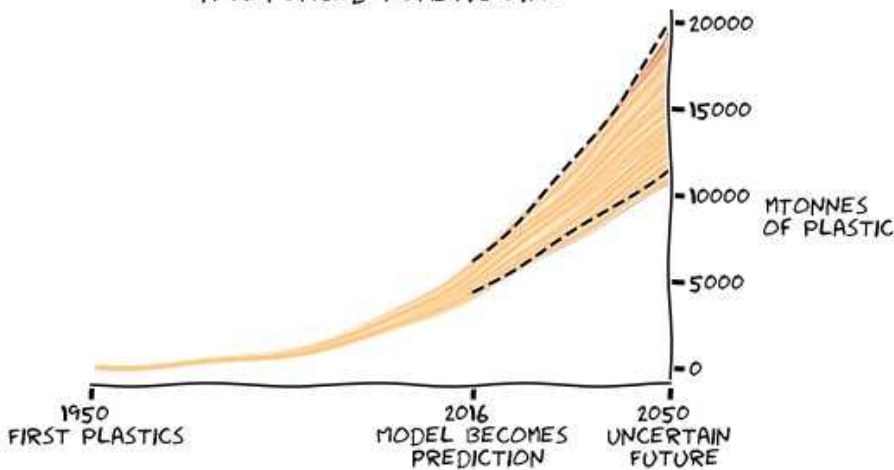


using biomass energy creates a potential for lock-in. These plants are expensive to construct, and would create incentives to keep them running for as long as possible. Like your old coal plants today.



These investments are not considered in this model, and we can see the final result is the very similar to our baseline.

A REPLACED PLASTIC LIFE



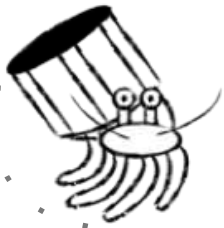
So these ideas are pretty disappointing as well.



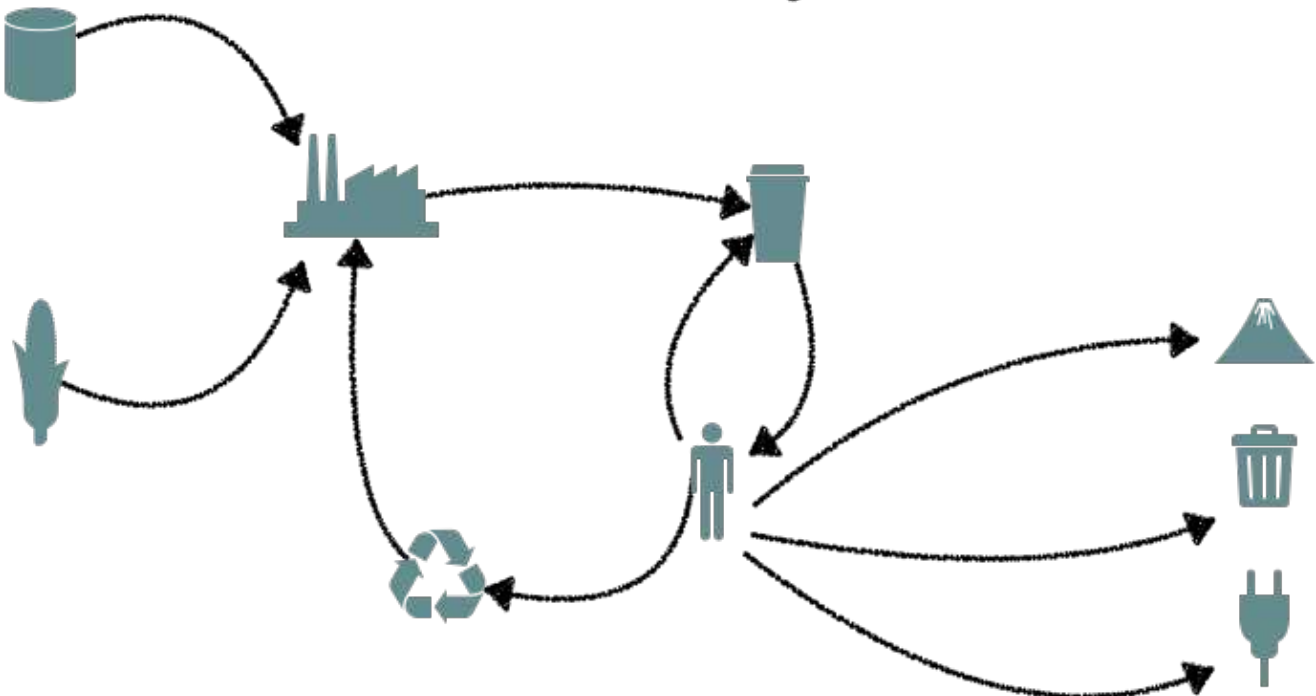
# Solutions

are difficult to come by, especially when the problem is not owned by a single government, corporation or individual. This is the planet's problem, one that may take off before we've even had a chance to think address it. So, what can be done now?

It's a tough question my friend, and I'm afraid this system might not have an answer. But here's something to think about. We hermit crabs don't spend a lot of time trying to fit into our old shells as we grow. When one starts to get a bit tight, we move onto to something new.



Plastics are pushing the limits of what current regulations can manage, maybe it's time to think about a change. Good luck with your growing plastic system. Speaking of growing, seems this detergent cap is getting a bit tight around the edges. I'm going to see if I can find something better.





It's not as much a problem we can solve, but it

is one we should **Rethink**. Radical new forms of regulation, governance and cooperation are going to be required if we are going to keep the plastic life to ourselves, and not spread it to the rest of the planet. Until these new systems are in place, it will be up to individuals to make the big changes.

well...



...that is something...



...to think about.





The **References** used in this report bear mentioning one more time:

**United Nations Report on Single Use Plastics**

**Ellen MacArthur & Mckinnsey Report on The New Plastics Economy**

**PlasticsEurope 2017 - The Facts**

A number of other sources were used to verify and validate the data found in these reports.

The **Visualizations** used in this book are created using Python, special thanks to Mikhail Sirenko for his patient help with their creation. The data used for visualizations comes largely from the system dynamics model first created by Erik Pruyt.

All of the **Photographs** are taken from the author's daily life in the past two years, none were specifically taken for this project. All are from The Netherlands with the exception of the lonely oil well which is from near the author's hometown in Kansas.

Each of these forms went through several changes along the way, and especially the Policy Fable has gone through significant transformations from the first inception. Two other stories, much longer and more detailed, were written before this final plot was found in the sea of stories. A small snippet of this first attempt at a fable is included on the back cover. The rest of that story? Well, that's much more interesting, and may someday find its way into a book of its own.

*A cool breeze awakens her in the darkness of the night. She shivers for a moment, checking the moon and realizing it is several hours yet until morning. She rolls towards the city and settles back into sleep, as she closes her eyes she imagines for a minute the silhouette of a dragon outlined in the pale moonlight. In the last moment of clarity between sleep and awake, her minds puts the pieces together.  
The hilltop. The breeze. The dragon. The city.*



Engineering &  
Policy Analysis



# 6

## Case Study: Experiment

To test the effectiveness of these artifacts an experiment has been designed and implemented to gauge the audience's responses to various stimuli. The experiment design consists of the selection of questions, the design of the various surveys and the experiment session itself. This section proceeds in this order, though in reality the entire process was conducted in parallel, along with General Data Privacy Requirement (GDPR) compliance paperwork and logistical setup. This effort is the answer the question:

*How can policy communication artifacts be evaluated?*

### 6.1. Experiment Structure

This experiment strives to analyze both the short and long-term impacts of policy communication artifacts on the audience. The short-term information can be collected directly following the exposure, but to test the long-term effect a second survey is needed. The selection of time between the initial exposure and this follow-up survey is a key factor in determining the effectiveness of policy communication. This time may work in favor of certain factors of retention and against other.

Naturally, time increases the likelihood of not recalling specific information. You can likely remember what you had for breakfast, but not what socks you wore last week. One of the key metrics to evaluating policy communication is how well it can convey specific facts and mythological images, a key in a post-normal science where they may be many conflicting messages regarding a specific topic. For stories this may not be the case, plot structure, characters and the cause-effect nature of the narrative experience may have a sleeper effect, where the passage of time actually reinforces certain concepts of events of a story. The **sleeper-effect**. It is not clear how this affects specific information related to story, and is an interesting point consider, as well as the impacts on culture and mood.

The sleeper effect of a story may increase the magnitude of a story's impact on the audience's beliefs over time. (Van Laer et al., 2014)

Many of the aspects of this survey also rely on establishing baselines and comparing them to results of a the experience. A pre-experiment survey was desired to reduce the potential for introducing biases, specifically priming effects, into the experiment groups. This pre-survey was distributed to the participants several days before their experiment date, as the hope was that in this time they would have forgotten the specific details of the questions (particularly about transportation and mood) when they arrived at the experiment.

In this way, a three-component experiment was developed. A pre- and post-survey bracketing the main experiment and associated survey, as shown in the figure below.

Table 6.1: Post-Survey always sent following the weekend

Component	Pre-Survey	Experiment	Post-Survey
Timing	+1 Week	-	+4-6 Days
Location	Online	In-Person	Online

## 6.2. Question Selection

This section details the selection of each set of questions by group: Demographics, Culture, Emotions and Mood, Information, User Experience, and Messaging.

### Demographics

Limited demographic data was collected from the participants due to concerns about GDPR compliance.<sup>1</sup> The model used for this study includes both age and sex as antecedents, and were included in Demographic question set. While local culture are not considered as part of this study, data was collected on a global scale regarding the regional origins of each participant, to complement the analysis of the cultural survey responses. The World Bank's definition of global regions was used for this section of the survey The World Bank (2017).<sup>2</sup>

Table 6.2: Basic demographic questions were not mandatory

Survey	Question	Answer Type
Pre-Survey	What is your gender?	Selection (M/F/NA)
Pre-Survey	What is your age?	Number
Post-Survey	What is your region of origin?	List

Table 6.3: Experiment Survey Sections

Section	Pre-Test Survey	Experiment Survey	Post-Survey
Demographics	✓		✓

Control 1: Female respondents will have higher levels of transportation, in both pre-survey and experiment-survey. (Van Laer et al., 2014)

Control 2: Transportation will decrease as age of the participant increases. (Van Laer et al., 2014)

### Defining Emotions and Moods

A critical tenant of the storytelling frameworks explored in the previous chapters is the idea that the internal processes and emotions of characters are central to the progress of a story and therefore to the successful conveyance of a specific message. The emotional components of a story help to draw the audience into the special world of the story, and to create opportunities for shared experiences.

Emotions are an inherently difficult topic to study, as an observer-dependant phenomena, the experience of each individual and their manifestation of any given emotion may vary greatly. In common language, the distinction between emotions, feelings and mood is not always clear. In research, **emotions** are often considered the most basic of processes that occur in the human brain. These are triggered by a specific event or thought, releasing chemicals that induce a vast array of physical responses in the body: changing heart rate, dilation of pupils and activation of various sweat glands. (University of Wisconsin, 2006) These internal emotional responses are basic anatomical processes that are essentially uncontrollable in human animals.

**Emotions** are neurochemical responses to stimuli that occur inside the human body.

In contrast to emotions, moods are not instance-specific. Rather, **mood** is an emotional state that exists over time, whether that be over a few hours, weeks or even longer (P. M. T. D. Desmet, Fokkinga, Ozkaramanli, & Yoon, 2010). For the purpose of this study, both emotions and moods are of interest, though in different places for varying reasons.

**Moods** are emotional states that exist over longer periods of time.

Emotions are a key consideration in the short-term exposure. Moods are also of significant interest, as only activating a given emotion at the time of exposure is of little interest in the realm of public policy. Feelings are excluded from this study as they are heavily dependent on individual culture and

<sup>1</sup>I was very concerned initially about passing the GDPR board, but in the end my proposal passed without comment.

<sup>2</sup>Due to the late addition of this demographic question, it was included in the post-experiment survey, as questions cannot be added to an active LimeSurvey questionnaire.

expression. The longer-term effect that mood has on an individual makes them more consequential when designing tools for policy communication. To this end, the mood of the participant will be measured in the pre- and post- experiment surveys, and the specific emotions will be measured immediately following the exposure to the artifact.

Table 6.4: Experiment Survey Sections

Section	Pre-Test Survey	Experiment Survey	Post-Survey
Emotion		✓	
Mood	✓		✓

Measuring Emotions and Moods

There are essentially two methods for measuring the emotions or moods of an individual: via an observation or through self-reporting (P. M. Desmet, Romero, & Vastenburg, 2016; P. M. T. D. Desmet et al., 2010). Observations can further be divided into autonomous and manual. Autonomous recordings are a recent development, current research on eye-tracking measurements appears especially promising, but is well outside of the scope of this project.<sup>3</sup> Due to GDPR compliance concerns, other forms of observational measurements were avoided.

The second method, self-reporting, is itself a complex endeavor. With any self-reported behavior, there is an inherent bias introduced when asking subjects to judge themselves. However, self-reporting is a very common technique for measuring mood and emotions, and when properly presented, can be a valid technique for determine the affect of a given stimuli on the receiver’s mental state (P. M. Desmet et al., 2016).

An interesting method for self-reporting of mood and emotions are the large number of pictorial representations. Pictorial representations eliminate many of the cultural and linguistic challenges related to self-expressions (P. M. Desmet et al., 2016). The words that are used to explain emotions and moods are often nuanced and may not be well understood by non-native speakers. Pictorial representations allow for a quick, intuitive method that has been validate across cultures. Both measurements of mood and emotion will use these methods in this experiment.

Desmet, Vastenburg and Romero outline a number of techniques that are used to measure moods, emotions and a combination of both. Currently, the only identified visual self-reporting technique found in this research for measuring mood is the Pick-a-Mood scale developed by this research team at TU Delft (2016). This scale uses nine images to represent the range of moods: four positive, four negative, and one neutral. This scale is published under creative commons license and therefore is free to use on any platform for non-commercial research.

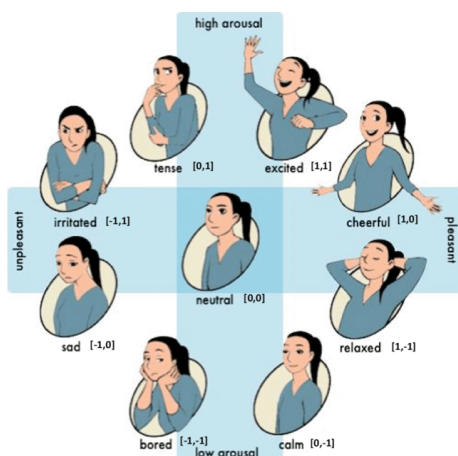


Figure 6.1: Pick-a-Mood with Labels (P. M. Desmet et al., 2016)

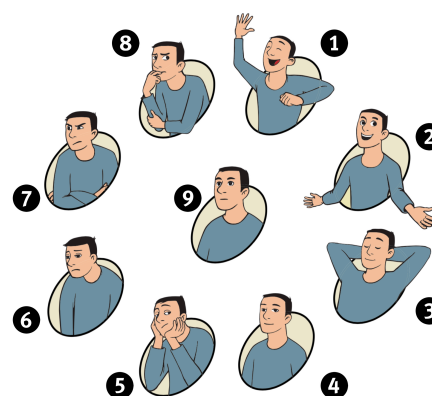


Figure 6.2: Pick-a-Mood without Labels adapted from P. M. Desmet et al. (2016)

<sup>3</sup>While these recordings may be autonomous, many of these techniques still require coding by trained experts, which is similar in many ways to traditional observational measurements.

As recommended by Desmet and associates, this image is presented without labels to the experiment group, a technique that has been verified across cultures in other studies of this tool P. M. Desmet et al. (2016).

Table 6.5: A prompt was used in addition to the Pick-A-Mood Graphic

Survey	Question	Answer Type
Pre-Survey	When I think about the future of plastics in society my mood is best represented by:	1 - 9 (Pick-a-Mood)
Post-Survey	When I think about the future of plastics in society my mood is best represented by:	1 - 9 (Pick-a-Mood)

A much larger number of emotion-specific and emotion or mood measurement tools are available, though a number of them are proprietary or copyrighted, and not available on independent platforms. Many of these tools also rely on animated figures, which is obviously not suitable for a paper-based experiment. Ruuskman developed an emoticon-based array of 27 emotions each represented by 3 emoticons in increasing displays of the labeled emotion (P. M. Desmet et al., 2016). While the familiarity of emoticons with the test audience is a positive factor in the consideration of this method, the magnitude of displaying 81 emoticons for the subjects to choose from seems excessive.

A much simpler visual method for self-reporting of emotional engagement with a communication artifact (or any experience) is the Affect Grid (Russell, Weiss, & Mendelsohn, 1989). The Affect Grid is a method recommended in the review by Desmet et. al, and has the advantage of being visually dissimilar from other measurement methods, include the character-based visuals of the Pick-A-Mood used in this experiment (2016). The Affect Grid asks the respondent to rate their experience on two axes simultaneously: pleasure-displeasure and arousal-sleepiness. Both these dimensions are relevant for this study. Policy documentation has somewhat of a reputation for being sleep-inducing, in contrast to most well-written stories. The pleasure-displeasure scale is also useful for determining the effect of form on the message, as it helps to gain insight into the valence of the respondent's attitude towards the experience. Each artifact has the same message, but certain forms may create a more or less pleasant experience.

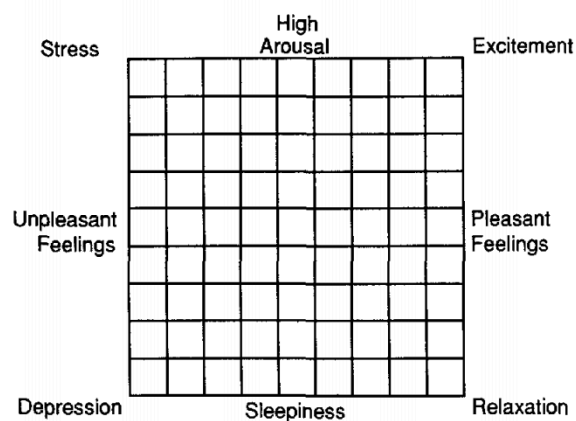


Figure 6.3: The Affect Grid (Russell et al., 1989)

Hypothesis 1: The poetic forms will have be a more pleasant experience.

Hypothesis 2: The poetic forms will have a more positive impact on mood.

### Defining Culture

Cultural measurement is another topic that has been subject of countless studies across academic disciplines. For this study the recommendations of the Narrative Policy Framework are applied, namely the use of Cultural Theory to measure the cultural views of an individual (Mamadouh, 1999). This



form of cultural perspective focuses on the respondent's chosen cultural viewpoint, rather than the perspectives of the current society they currently inhabit. This choice is made for several reasons, the first being it offers a practical baseline for analyzing a group of potentially disparate experiment subjects. Cultural theories bounded by geographical-contexts will quickly become over-complicated by attempting to measure regional differences between even Northern European and Mediterranean attitudes.

Cultural Theory also employs a relatively simple scale of measuring culture, one that employs only two dimensions: Group and Grid. Most other measures of cultures use at least four, often more categories. Focusing on the relationships, goals, organization structures, and means chosen by individuals as they form or join groups.

Table 6.6: Experiment Survey Sections

Section	Pre-Test Survey	Experiment Survey	Post-Survey
Culture	✓		✓

### Measuring Culture

A review of various methods to measure culture and cultural change using this framework by Ripeberger and associates recommends several different scales for different perspectives on cultural. From this list, the shortest question group was selected: one that focuses on relational view of cultural theory (2015). These six questions are used in two ways. First they are used to understand how an individual relates to their family, their teams and colleagues, and government and society and will be combined with Demographic information to infer cultural categories for analysis. Additionally, there is the possibility that the more emotional forms may actually be able to change the cultural views of the audiences. It is again here that the expected effect is presumed to be larger for the artifacts that contain plot and character elements, especially regarding the sixth question, as it asks about the relation between individuals and governance.

Table 6.7: Relational Cultural Theory

Survey	Question	Answer Type
Pre-Survey	In my family, we try to advance family goals rather than the goals of individual family members.	1 (Totally Disagree) - 7 (Totally Agree)
Pre-Survey	In teams, individuals pursue their own aspirations rather than the aspirations of the group as a whole.	1 (Totally Disagree) - 7 (Totally Agree)
Pre-Survey	Governmental officials and other powerful people try to serve the common good rather than the interests of a few.	1 (Totally Disagree) - 7 (Totally Agree)
Pre-Survey	In my family, the people in charge decide what we do and how and when we do it; everyone else follows along.	1 (Totally Disagree) - 7 (Totally Agree)
Pre-Survey	In teams, leaders encourage members to make their own rules, schedules, and decisions.	1 (Totally Disagree) - 7 (Totally Agree)
Pre-Survey	Residents have little influence on governmental action; instead, governmental officials or other powerful people decide what government does.	1 (Totally Disagree) - 7 (Totally Agree)
Post-Survey	<i>The same set of questions are repeated on the post-survey without variation.</i>	1 (Totally Disagree) - 7 (Totally Agree)

**Hypothesis 3:** Poetic forms are more likely to shift audience perspective towards the message of the story.

### Measuring Transportability

As we have already seen a thorough definition of transportability in the literature review, there is no need to review again in detail here. Transportability is another metric that requires a baseline for evaluating

the effect of the form, and therefore needs to be included in the pre-survey as well as the experiment itself.

Table 6.8: Experiment Survey Sections

Section	Pre-Test Survey	Experiment Survey	Post-Survey
Transportation	✓	✓	

The original experiment that serves as inspiration for this experiment resulted in the development of a 12-item questionnaire to measure the transportation of an individual during an experience. Further work by Appel et. al, examined the validity of this questionnaire and developed the Short-Form Transportability Scale, an equivalent measurement technique that reduces the required questions by one-half that is used in this experiment (Appel et al., 2015). This metric exists both as an antecedent feature of the audience group, and a effect of exposure to an experiment group.

Control 3: Audience members with higher transportation antecedents will express higher levels of transportation regardless of form. Van Laer et al. (2014)

Hypothesis 4: Poetic forms will have higher reported transportation.

Table 6.9: Transportation uses two slightly different set of questions, as well as one unique question for the Experiment Survey

Survey	Question	Answer Type
Pre-Survey	I can easily envision myself in the events described in a story.	1 (Not At All) - 7 (Very Much)
Pre-Survey	I get mentally involved in the story.	1 (Not At All) - 7 (Very Much)
Pre-Survey	I am often impatient to find out how the story ends.	1 (Not At All) - 7 (Very Much)
Pre-Survey	I am often emotionally affected by what I've read.	1 (Not At All) - 7 (Very Much)
Pre-Survey	I have vivid images of the characters.	1 (Not At All) - 7 (Very Much)
Experiment Survey	I could picture myself in the scene of the events described in the presented material.	1 (Not At All) - 7 (Very Much)
Experiment Survey	I was mentally involved in the presented material while reading it.	1 (Not At All) - 7 (Very Much)
Experiment Survey	I wanted to learn how the presented material ended.	1 (Not At All) - 7 (Very Much)
Experiment Survey	The presented material effected me emotionally.	1 (Not At All) - 7 (Very Much)
Experiment Survey	While reading the presented material I had a vivid image of <i>a form specific character</i> . <i>For the rhetorical forms, this question pertains to the narrator..</i>	1 (Not At All) - 7 (Very Much)
Experiment Survey	While reading the presented material I had a vivid image of the setting described.	1 (Not At All) - 7 (Very Much)

### Defining Information

An important aspect of any policy communication artifact is how well it can transmit basic information. Given that each of these participants is engaging with the artifact as an individual, there will naturally be varying levels of comprehension and retention within the group.

Table 6.10: Experiment Survey Sections

Section	Pre-Test Survey	Experiment Survey	Post-Survey
Information		✓	✓

### Measuring Information

To test this, a 12-question True/False section will test the effectiveness of each form during the experiment, and a five-question section in the post-survey. These questions are designed to be easily answered after engaging with the artifact. Due to the nature of each form, some validity questions must be tailored to each form's specific content, five standard questions are asked regardless of form, and seven questions are form-specific. Five new standard questions are also used in the follow-up. No questions to judge the familiarity of the audience with the topic of plastics in society were asked in the pre-survey to prevent potentially biasing the audience. As there are almost 40 individual questions, only an example has been included here, the complete surveys are in Appendix C.

Table 6.11: An example of the Information questions

Survey	Question	Answer Type
Experiment	This model uses system dynamics to estimate global plastic production.	True/False

For this section, two separate hypotheses are proposed. The standard questions all apply to the policies, and it is expected here that the visual forms will excel due to their form on information transfer. For the form-specific queries, the Policy Fable is expected to out-perform other forms, due to the cause-effect sequence nature of stories.

Hypothesis 5: The visual forms will out perform textual forms in the standard question set.

Hypothesis 6: The Policy Fable will outperform other forms in the form-specific section.

Hypothesis 7: The Policy Fable will outperform other forms in the long-term information retention section.

### User Experience Questionnaire

After evaluating the responses from the first experiment session it was clear that some additional feedback from the audience was desired to better understand the reasons for their rating on the Affect Grid. A short search of potential relevant surveys revealed the User Experience Questionnaire. This survey was originally designed to measure the user experience with interactive products, but has been applied to a number of types of studies (Hinderks, Schrepp, & Thomas, n.d.). This questionnaire measures both the pragmatic functions of an interaction as well as the hedonistic. This dichotomy is extremely useful for this survey as the experiment groups are split roughly along the same line. Again this survey exists in a Long-Form and Short-Form. The research team prefers the Long-Form, but with 27 questions this was considered far too long for the follow-up survey. The Short-Form, naturally, was included in the post-experiment survey.

Table 6.12: UEQ Short Form Questions (Hinderks et al., n.d.)

Survey	Question	Answer Type
Post-Survey	Obstructive or Supportive	1 - 7
Post-Survey	Complicated or Easy	1 - 7
Post-Survey	Inefficient or Efficient	1 - 7
Post-Survey	Clear or Confusing	1 - 7
Post-Survey	Boring or Exciting	1 - 7
Post-Survey	Not Interesting or Interesting	1 - 7
Post-Survey	Conventional or Inventive	1 - 7

While this abbreviated format does not fully explore the audience's experience, it may nonetheless offer useful insights. No hypothesis has been developed for this section, it is purely to support evaluation of the forms and the rest of the survey results.

Table 6.13: Experiment Survey Sections

Section	Pre-Test Survey	Experiment Survey	Post-Survey
UEQ			✓

### Messaging

Naturally, the narrative envisioned by the audience is an important part of the experiment. The most interesting message seems to be not the one they have in the mind directly after reading, but after they have forgotten the details of the experience over the course of time. What remains, is the result of story to narrative process. This section consists of a single question:

”What was the main message(s) you took from this policy artifact?”

This is the only non-multiple choice question included in the survey, as the goal of this section is to understand the audience’s recall and interpretation of the form that they have read. Unlike the other quantitative data collected, this section will represent the audience’s own interpretation of the work. With this final section, the survey is now complete.

Table 6.14: Final Experiment Survey Sections

Section	Pre-Test Survey	Experiment Survey	Post-Survey
Demographics	✓		✓
Emotion		✓	
Mood	✓		✓
Culture	✓		✓
Transportation	✓	✓	
Information		✓	✓
UEQ			✓
Messaging			✓

## 6.3. Experiment and Survey Design

With these selected survey questions and three phases, a design is still needed to present the questions to the audience. A major feature of this element of the research is the GDPR, which drove the decisions at several points.

The first item of concern is to protect the contact information of the participants and to organize it separately from personal or other academic information. To accomplish this, a functional mailbox was created ([narrativepolicy@tudelft.nl](mailto:narrativepolicy@tudelft.nl)),<sup>4</sup> through which all official communications regarding the experiment were conducted. This offers a secure, separate digital archive of the communication and the participants.

However, these participants also need to engage with two online surveys, and the typical choices of SurveyMonkey and Google Survey are at this time not GDPR compliant. The pre- and post-test surveys were implemented using the online service, LimeSurvey. This platform was recommended by the TU Delft Data Steward as one of the platforms that allows for control of data on the level required by the GDPR.

This platform also offers a clever way anonymize respondents in an relatively efficient way. Limesurvey can generate a unique token for each survey, a string of random characters that is required to access that specific instance of the survey. To protect the identity of the participants, each was provided with a unique token after signing up for the experiment via email.

This token was used during all stages of the experiment by the participants. they were responsible for inputting their own code which they received by email on each survey, including the paper experiment. This method was validated by the experience, there were relatively few problems with the distribution and reliance on the participants for retaining their own tokens. This required a manual method of distributing tokens, not a large burden considering the benefits.

Assigning tokens to participants prior to the start of an experiment is feasible even over multiple stages.

<sup>4</sup>I cannot express how well this worked.

This also eliminated a certain amount of risk regarding data privacy. One of the main concerns was that the participant data could be lost, and the private responses of any individual could become public. Originally, the data management plan included the design for a two-part database, separating the list of users and tokens from their specific responses. However, it was noticed on the first day of solicitation that this list would be redundant, everything could be tracked from within the TU Delft Outlook portal by tracking each email thread. Because of this, a master list of all participants and their associated tokens was never created.

One must protect only the data they keep. By eliminating a redundant database in exchange for slightly more work, a primary GDPR concern was eliminated.

The GDPR was not the only concern at this phase of the experiment development. Another key consideration in the design is the order-effect bias of each survey. Certain questions may prime the individual to give a specific response on a following question, creating order-effect bias. This is a troublesome problem to address, as the questions must be asked in some order, and it is not always clear which questions will have an effect on the rest of the responses. For the pre-survey, this was addressed by including the only question regarding the case at the very end of the survey.<sup>5</sup> The rest of the questions are not related the case and not expected to have an effect on one another.

For the experiment and post-experiment survey, the most important questions to the research were asked first, to eliminate the potential for order-effects of these questions. Especially in the case of the post-survey, the only open-ended question is asked first to solicit as much detail in the response as possible.

#### The Pre-Experiment Survey

The Pre-Experiment Survey was sent to participants in daily batches, usually within 24 hours of their signing up. Once they had registered, they received an email reminder about the survey one week, three days and one day before their experiment session.

#### The Experiment Survey

This survey has multiple versions and needs to be implemented on the day of the experiment. No dedicated computer labs for these types of experiments are readily available for student use, and it was judged impractical to ask respondents to use their own device for data entry. Therefore this survey is implemented in paper form for the experiment.

Each booklet was closed to all but a single section using paper clips, and these booklets were colated with the corresponding survey. Each survey contained a single letter on the information page, discretely denoting which form it was associated with. Next to this was placed the GDPR Informed Consent Sheet. These surveys, booklets and sheets were placed in the room before participants arrived, thereby shielding both the participants and the auditor from knowing which seat was for which section of the booklet.

#### The Post-Experiment Survey

The final survey, initially sent to participants the week following the experiment,<sup>6</sup> was also implemented using LimeSurvey. The only written response collected from the participants, the Message question, is included at the beginning of this survey. Several reminder emails were sent to participants with the link and alarming statements like "Green light in 24 hours!"

### 6.3.1. Experiment Setup

Two experiment locations were initially chosen to maximize potential participation for this experiment, one on The Hague campus and a second on the Delft campus. These experiments were conducted on June 18th and 19th respectively. The script, and details of the experiment execution can be found in Appendix C. Participants were offered cookies<sup>7</sup> for their participation, which were distributed only after the participants had completed the test. Efforts to control for validity between the separate testing sites were taken, I used a script for the experiment execution, wore the same clothes and used only artificial light for these experiments.

<sup>5</sup>The demographics questions could have been moved to very end and not the beginning as they are not likely to influence, the results, though this is something I realized later.

<sup>6</sup>Each experiment was conducted on a different day of the week, the follow-up was sent on the Monday of the following week.

<sup>7</sup>Not a great incentive, I know.

### Solicitation

The primary means of solicitation were in face to face interactions. Posters were distributed to both campuses and elicited zero responses. The most effective solicitation efforts were at a barbecue event at the TB Café and on the 5th floor of Wijnhaven. It is estimated that approximately 350-400 individuals were pitched the experiment directly over the course of 3 weeks, with roughly a 10% success rate.

Experiment solicitation without a substantial incentive is a time-consuming effort with a low success rate.

### Experiment Operations

Standardized communications were used with all of the participants, occasional queries were received via personal social media channels and all but the simplest were answered through the official account. All replies were sent through the experiment account. The experiment was conducted on June 18th at 12:15 in the 5th Floor Labs of the Wijnhaven building, and on June 19th at 12:30 in Room B of the TPM Building. On the Monday following the initial experiment week, June 24th, the follow-up survey was sent to all participants.

Table 6.15: Additional tests were smaller and More polished based on previous experience

Location	Date	Registered	Attended
The Hague Labs	18.6.2019	18	15
Delft Room B	19.6.2019	22	14
The Hague Common Room	25.6.2019	4	3
Virtus Sword School	28.6.2019	6	9
Den Haag Writer's Club	29.6.2019	7	3
Total	-	57	44

### Re-solicitation and Additional Test Groups

Following the lower than hoped turnout, an additional round of experiments was set up to solicit more responses. A small experiment was conducted on June 24th in the common room for the student employees of the Leiden University Green Office. Further sessions were conducted with the members of the Virtus Sword School<sup>8</sup>, as well as at the first meeting of the Instille Writer's Club<sup>9</sup>, that was started by the author as both a means of soliciting participants and for further development of the community of writers in Den Haag.

### Experiment Observations

No formal records were made during the experiment, but several informal observations were made during the experiment. A minority of individuals showed up on time to the larger sessions. Some participants did not wait for the instructions and began immediately. Several participants attempted to remove the clips (against the instructions) to see the rest of the booklet. One participant wrote in an experiment booklet. One participant brought lunch and got food on the documents. A few participants marked the survey sheet where it was explicitly marked as an example. Several participants did not complete the online survey before coming to the experiment session. As we will see, many did not complete the follow-up survey.

I am grateful to everyone who participated, but the difficulties of managing large groups of students with no formal hierarchy in place became immediately clear. Given these challenges, I was still able to collect an interesting set of data.

<sup>8</sup>This sword school practices Historic European Martial Arts, and the hours spent drilling and sparring with two-handed longwords has been an excellent stress-relief exercise. I am ready to *defend* this thesis if necessary.

<sup>9</sup>My time in the Bangalore Writer's Club was a foundational experience for me as a writer, and I hope I can provide the same sort of environment in The Hague in the future.

# 7

## Empirical Results: What Happened

This analysis is separated into three components: first a review of the all of the data collected for this experiment, followed by a review of the control variables, and finally the effect of the forms themselves on the audience. This chapter, and the beginning of the next, address the penultimate question of this research:

*What can be discovered in these findings?*

### 7.1. Experiment Data and Data Cleaning

A short note about the data presented in the following chapter. All of the experiment group plots are presented in the same fashion: alphabetical, and colored coded, by Experiment Group. There is a single visualization that does not follow this rule as it is created using a specific line of code that does not play well with colors. Visualizations that do not consider Experiment Group typically use the secondary colors<sup>1</sup> to denote their difference in perspective.

At each experiment, an equal number of each artifact were prepared and randomly assigned to each participant. I was not aware of which artifacts were read until after the experiment. This format, combined with the uneven attendance, resulted in a slight imbalance in the number of participants by form, as shown in the figure below.

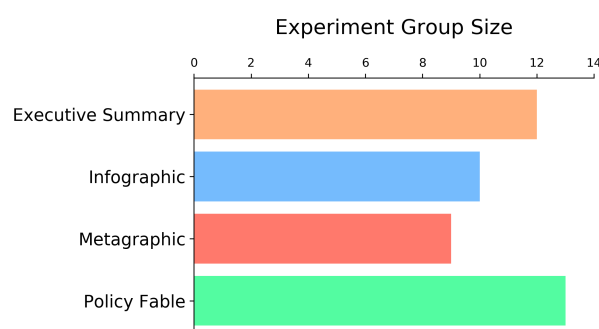


Figure 7.1: Participant Distribution

The follow-up survey was not as successful as the experiment regarding participation, even with four email reminders, as well as several during the experiment itself, responses are limited. The group-wise response is shown in the following figure and table.

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<sup>1</sup>Peach and Sea Green to be exact.

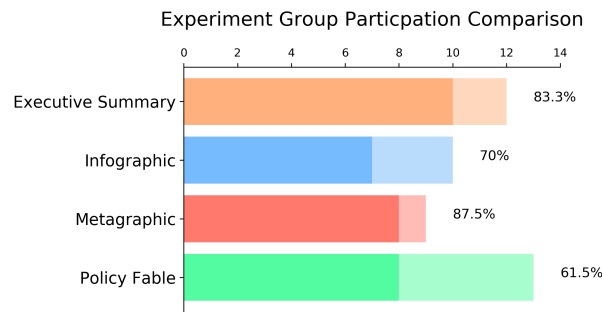


Figure 7.2: Distribution of Completion

Table 7.1: Not all participants completed the Post-Survey

Stage	Response
Pre-survey	50
Experiment	44
Post-Survey	35

Responses for the final post-survey were collected through the week of July 8th. A handful of participants filled out only the post-survey. A complete overview of all of the data collected for this experiment is shown in the figure below, with each row representing a single participant. The three distinct columns are the three phases of the experiment, as we can see there are very few missing data points for the pre-survey. The experiment survey was fully completed by all of the participants, those that did not attend are sorted to the bottom of the list. The right-most column is the post-experiment survey.

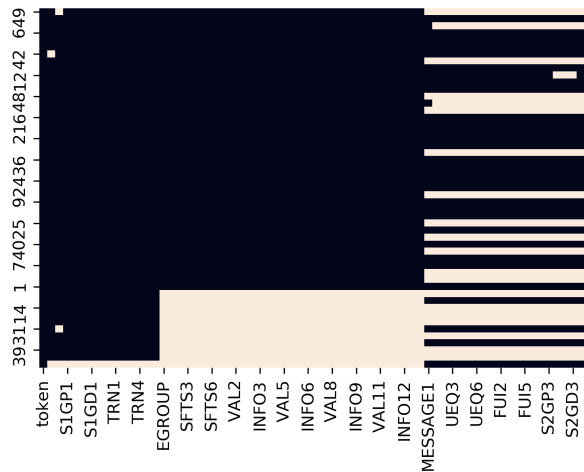


Figure 7.3: Pre-Imputation Experiment Groups

Incomplete responses are treated differently for each slice of the data. The missing pre-experiment data is all demographic information, and for these (three) data points mode imputation is used with the entire data-set as a reference. The respondents who did not participate in the experiment are dropped from the analysis group. The post-survey is a more complex imputation task, one that has not been attempted for this research. Due to the small sample size, imputations would make up nearly fifty percent of all of the data.



## 7.2. Participant Antecedents and Controls

Prior to testing the effect of each artifact it is necessary to understand the other factors that may impact the audience's experience. As outlined in the previous chapters, several antecedents have been identified as potential control variables, each of which is investigated in the following sections. This analysis uses several different statistical tests to evaluate the p-value when comparing various groups. The alpha for this study is 0.1, though I view both numbers as guideposts not finish lines. Because of the small sample size there are many factors that could influence this data, and the conclusion drawn will be conservative. This analysis is also limited to the most simple exploration of the data.

### Sex as an Antecedent

Sex as a antecedent is an interesting variable, one that showed a difference in both the pre- and experimental survey data. As expected based on the TU Delft population, the majority of the experiment group self-identified as males, though a substantial portion of the group identified themselves as female.

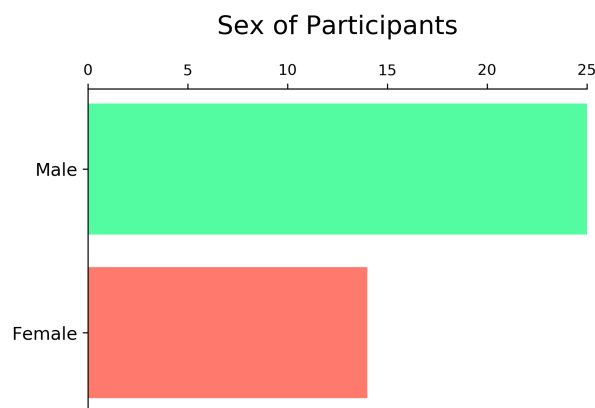


Figure 7.4: M/F Ratio Reflects Candidate Pool

The transportation results have been analyzed from the pre-experiment and experiment questions. The self-reported score is a result of averaging the responses from the five transportation questions of the pre-survey. It has been hypothesized that women will have a higher transportability than men.

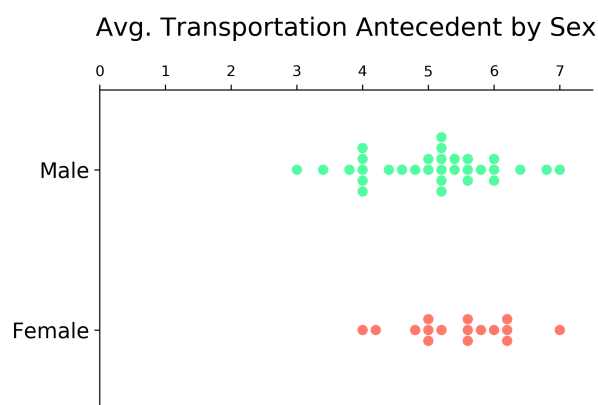


Figure 7.5: Both Sexes Self-Assess a High Proclivity for Transportation

To test these results, the Mann Whitney U-test is applied to generate p-values for these distributions. This results in a **p-value of 0.0861**, which represents a probably statistical significant finding. When we turn to the experiment-survey data, we can see a more even significant result.

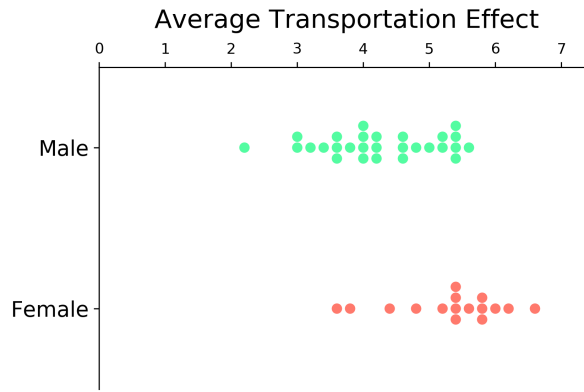


Figure 7.6: Females report markedly higher transportation after the experiment

Form	Trans. Prior		Trans. Effect		
	Avg.	Std. Dev.	Avg.	Std. Dev.	Difference
Male	5.05	0.964	4.26	0.882	-0.79
Female	5.46	0.789	5.32	0.819	-0.14

In the Mann Whitney U statistical testing, this comparison results in a **p-value of 0.000218**. The results reinforce the hypothesis as described by al (Van Laer et al., 2014). Sex was shown to be an adequate predictor of the antecedent variable, as well as a reliable predictor of the experiment results.

Control 1: Female respondents will have higher levels of transportation, in both pre-survey and experiment-survey. (Van Laer et al., 2014) **Result:** Females exhibited a higher transportation antecedent and experiment effect. Both values were judged as statistically significant, though the magnitude of the difference is much higher after the experiment.

**Age as an Antecedent**

Previous studies have also identified age as a key indicator of transportability. In the case of this experiment, the age group represents a narrow band of the human population. The youngest participant was 18 at the time of the study, and the oldest participant was in their early 40s.

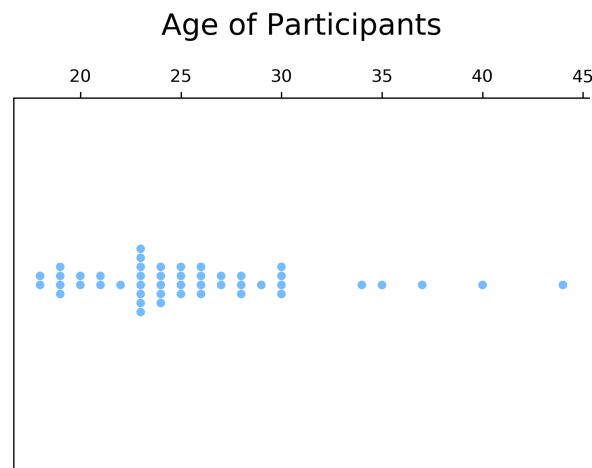


Figure 7.7: Most Participants are Younger than Typical Policy-Makers

Control 2: Transportation will decrease as age of the participant increases.(Van Laer et al., 2014) **Result:** Experiment group small sample size and relatively homogeneous provided insufficient data for a meaningful analysis.

Culture as an Antecedent

This study uses two metrics to evaluate the cultural antecedents of the audience. All participants completed the pre-survey cultural components, which have been combined to a two-dimensional Group-Grid score. As an antecedent, culture is an interesting factor that is difficult to study. The figure below shows the results of the Cultural Theory composites on the pre-survey response group.

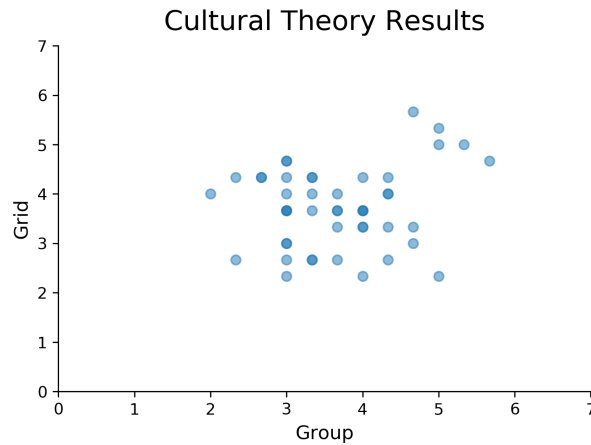


Figure 7.8: One Cluster Visually Stands Out

To analyze this data, K-means clustering is applied to the dataset over a varying number of clusters (from 2-6). The smallest N that produces a cluster of the isolated elements is five, as shown below. This clustering exercise is limited due to the nature of this set of cultural theory questions, they do not control for regional differences in world-view, as they are focused on the view on relationships of the respondents. This result shows the limitations of Cultural Theory, as with any two-axis measure there is the possibility of creating a single blob in the center.

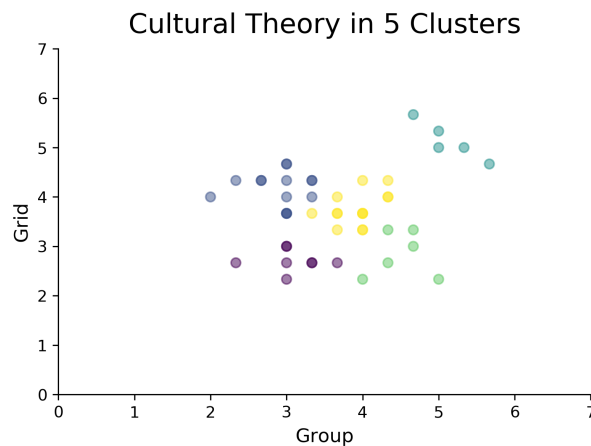


Figure 7.9: But It Takes a N of Five to Separate it Statistically

As we can see, there is one distinct group of heirarchists that stands out from the primary group in the center. This groups is an interesting subset for analysis. To better understand the cultural perspective of the respondents, a hierarchical clustering technique could be used to identify other unique groups of individuals. This clustering would consider sex, region, group and grip (separately) to create new slices of the data for analysis along these lines. With such a small sample, a complicated hierarchical clustering algorithm may not be beneficial, as it will likely produce a large number of single-person clusters.

The second metric used for evaluating the participant’s culture is a very broad look at their region of origin. This question was part of the post-survey data, so a large number of responses are missing

for this variable, but again this result reflects in general the population distribution of TU Delft students.

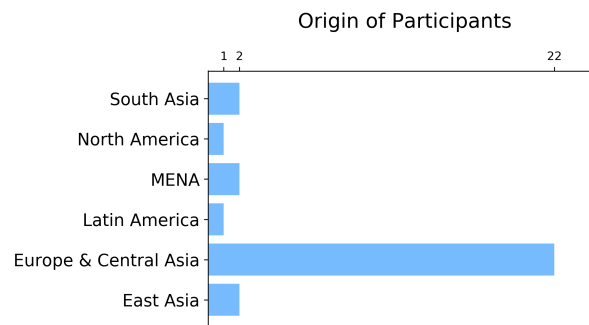


Figure 7.10: Regional Origin Reflects Candidate Pool

### 7.2.1. Transportation as an Antecedent

A correlation study was also made to investigate the relationship between the Transportability Anchors and the effect that was recording during the experiment. There is no clear correlation between transportation measured in the pre-survey to the transportation reported. This result also supports the hypothesis that these artifacts are contributing factor to transportation of the audience.

**Control 3:** Audience members with higher transportation antecedents will express higher levels of transportation regardless of form. **Result:** No correlation was found between transportation antecedents and reported transportation.

## 7.3. Form as an Experiment Effect

The primary purpose of this experiment is to test the impact the form has on the communication of policy. As a reminder, the four tested forms and their components are shown, now with color.

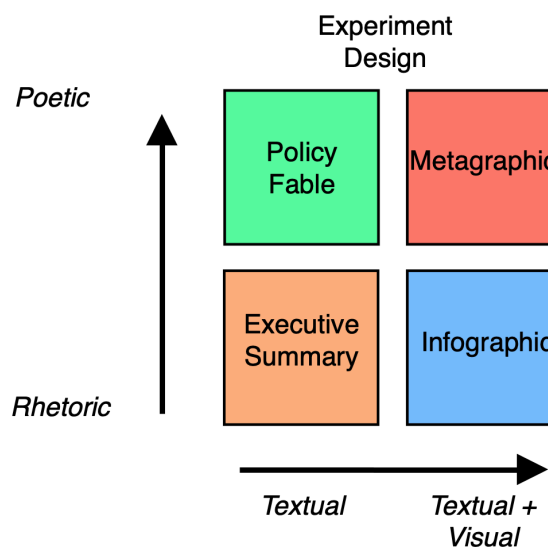


Figure 7.11: Four forms of policy communication artifacts, now with color

These four forms are evaluated for their ability to transport the audience, convey information and effect the mood of the audience. Each of these factors will be investigated separately in the follow subsections.

### 7.3.1. Emotions and Mood

To understand how effective the forms are at sharing an experience, the emotions and mood of the audience are measured at each stage of the experiment.

Emotion

Before examining the change in mood, it is interesting to examine how each form affected the experience of the audience, as measured by the Affect Grid, repeated here.

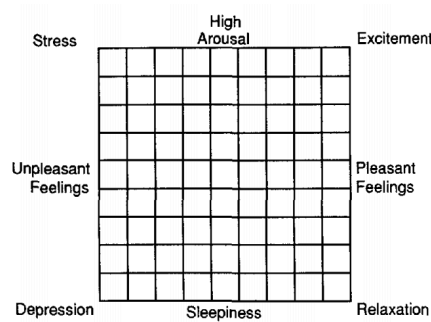


Figure 7.12: The Affect Grid as Seen by the Experiment Participants

The figure below contains the total responses for each form, the darker squares represent multiple responses with the same score. The second figure shows the average of each group.

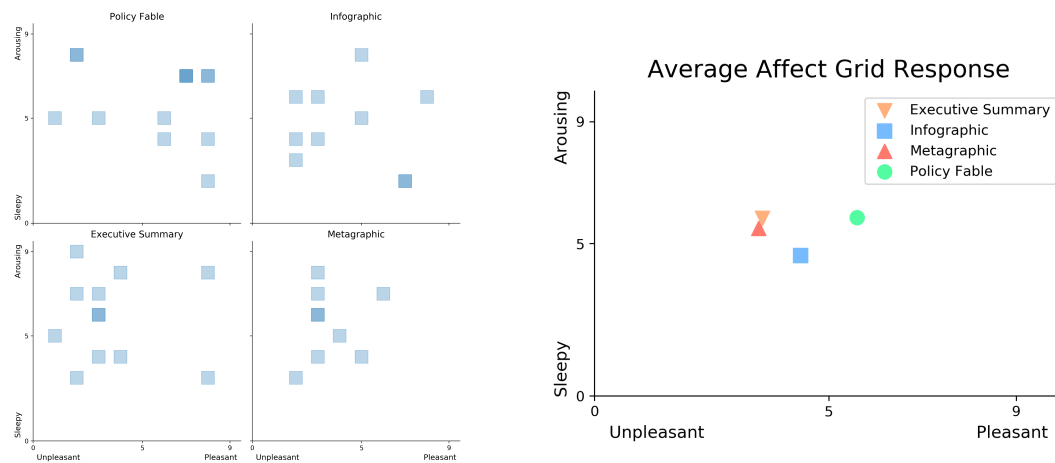


Figure 7.13: The Affect Grid as Seen by the Experiment Participants

Figure 7.14: Post-Exposure Changed Slightly

While the data is limited, there are some potential trends that are worth noting. These averages must be taken with a grain of salt, but they help to put the clusters in context. Roughly, Policy Fable was a slightly "Pleasant" experience, while the Executive Summary and Infographic tended to slightly unpleasant be "Unpleasant". The Infographic has the widest range of experiences associated with it, possibly due to the modern design principles that are more emotionally neutral than the other forms chosen.

Hypothesis 1: The poetic forms will have be a more pleasant experience. **Result:** No statistically significant effect found. Generally the Policy Fable is a more pleasant experience, and all of forms were equally arousing.

Mood

The audience's mood is shown in the following graphic. As The collective pre-experiment mood was very negative regarding plastics, with the majority of respondents indicating they felt "Tense" when prompted.<sup>2</sup> There is a reduction of the number of "tense" responses, though it is not clear if this is a result of the forms or merely an effect of the limited responses.

<sup>2</sup>A keen eye will notice these graphics only have 8 categories and Pick-a-Mood has nine. The category "relaxed" was never selected by the audience, and due to the automated nature of the plotting, was simpler to exclude than include.

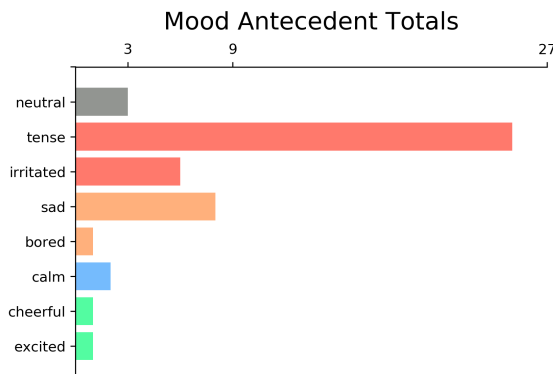


Figure 7.15: Pre-Survey Mood is Generally Tense

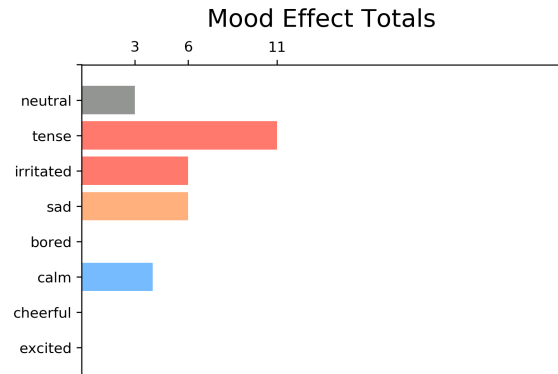


Figure 7.16: Post-Exposure Changed Slightly

These aggregate results are difficult to interpret, there are several missing responses, and this visualization does not account for experiment group or for when two participants may have changed mood in the opposite direction. Therefore, a different visualization is required. By creating a parallel plot for each Experiment Group, we can look at both the overall effect on each artifact, and the individual experience of each participant.

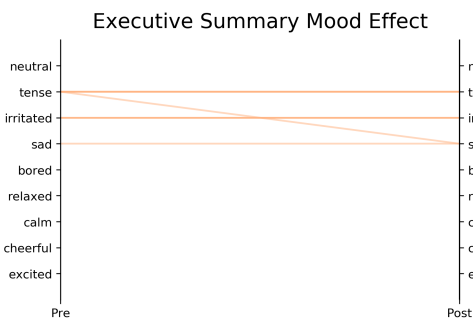


Figure 7.17: The most emotionally neutral artifact

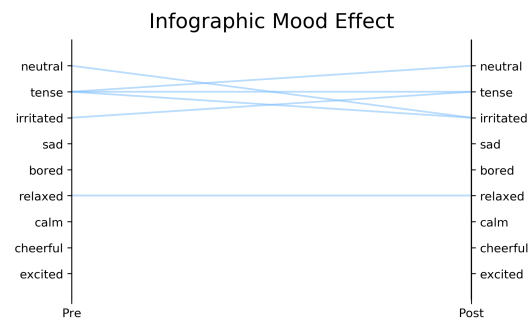


Figure 7.18: A slightly larger variation

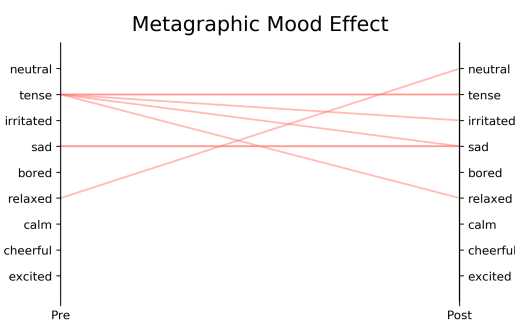


Figure 7.19: Variation increases

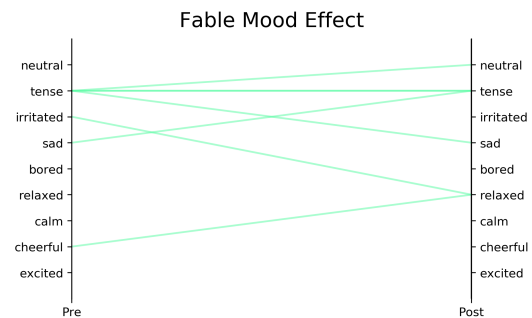


Figure 7.20: The most emotional artifact changes mood sporadically

Because of the complexity of these measurement scales and limited sample size due, statistical analysis is not conducted on this section of the data. However, a few conclusions can be drawn from this collected data, which will be examined in detail in the next chapter.

**Hypothesis 2:** The poetic forms will have a more positive impact on mood. **Results:** The poetic forms show a potential for a higher magnitude of affect, though the actual affect was shown to be unpredictable. The Executive Summary had almost no effect on mood.

### 7.3.2. Cultural Shift

The participants were asked the same cultural questions before and after the survey. This section is to better understand how micro-narratives can influence an individual’s cultural views, based on the relational components of cultural theory. The hypothesis is that three of the forms will display consistent results on this component, while the Policy Fable may increase that experiment group’s agreement with the sixth question of the subset:

Residents have little influence on governmental action; instead, governmental officials or other powerful people decide what government does.

Unfortunately, as we can see from the sample below, the data for this measurement is extremely noisy, and it is difficult to discern a meaningful pattern from the data, especially with the limited responses collected from the post-survey. This result, and potential future tools to address this issue will be discussed in the following chapter.

Figure 7.21: Cultural Theory Measurements are Inconsistent Over Time

Hypothesis 3: Poetic forms are more likely to shift audience perspective towards that of the story.  
**Results**: Inconclusive results due to limited sample size and high, disparate variance in the Cultural Theory survey responses.

#### Transportation Effect

We have already seen the difference in responses between men and women who read the stories, but now we are searching instead for the effect form has on the participants.

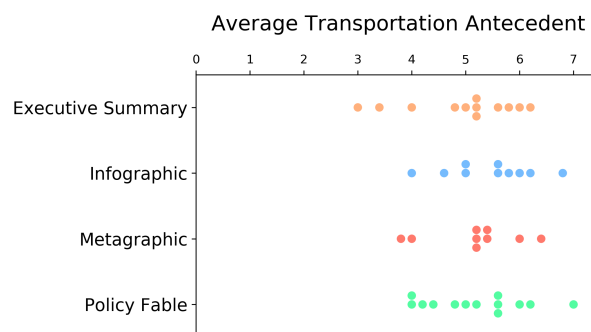


Figure 7.22: All Groups Have Roughly Equivalent Transportation

To test the all of the groups against each other, the Kruskal-Wallace test can be applied to generate a p-value. The result is a **p-value of 0.745**. This high p-value indicates it is likely that these groups are from the same population. These results can be compared to the resulting transportation of each form as reported during the experiment survey.

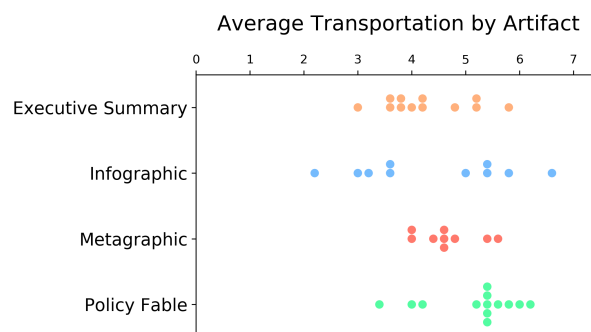


Figure 7.23: The Artifacts Have an Noticeable Effect on Transportation

The following table enumerates the average transportation effect of each artifact, considering the prior self-assessed transportability of each participant.

Table 7.2: Policy Fable Stands Out as a Transportative Experience

Form	Avg. Individual Transportation Effect	Standard Deviation
Executive Summary	-0.683	1.17
Infographic	-1.08	1.30
Metagraphic	-0.511	1.06
Policy Fable	-0.0153	0.777

It is interesting to note here that even the most transportative form, one designed specifically to elicit this sort of response, has negligible effect compared to the antecedent. In comparison to the other Experiment Groups, the Policy Fable is still relatively transportative, but that result itself is not a surprise.

Again we can use the Kruskal Wallace test to generate a p-value. This results in a **p-value of 0.0721**, signifying that it is possible that these groups are statistical unequal. However here the H-value, 6.99, is less than the chi-squared look up value for this group (approximately 40), so we cannot reject the null hypothesis outright based solely on this statistical test.

A second method to look at these results for statistical significance is to compare the transportation antecedents with the effects by group. To accomplish this, the Wilcoxon Paired test is used to compare the antecedent and resultant values, shown in the table below.

Table 7.3: P-Values of Wilcoxon Statistical Test

Form	Transportation Difference	p-value
Executive Summary	-0.683	0.0905
Infographic	-1.08	0.0526
Metagraphic	-0.511	0.121
Policy Fable	-0.0153	0.906

It is here that things can get a bit confusing. Three of the forms show a relatively significant p-value. However, the Policy Fable shows a statistically insignificant result. However, if we think about this for a moment, we can see that this is not actually the case. The other three forms showed an appreciable drop in transportation as a result of the experiment, while the Policy Fable showed almost no change. The statistical test does not consider this, and only compare the change over the experiment. If we look at all of the data we have collected, this single null hypothesis combined with the rest of the significantly different groups actually points to confirmation that the Policy Fable has a measurably different effect on the audience. It also gives credence to the possibility that the transportation antecedent ratings are not entirely accurate.

These results are only slightly effected by the third control, as 7 of the 13 participants in this group reported as female. Overall, female and male responses were evenly mixed, with half as many females in the bottom half of reporting as the top. The in-group average difference in transportation is very slight: the males had an effect of **-0.04**, and the females reported an effect of **+0.1**. This is significantly less than the results seen in the control.

Hypothesis 4: Poetic forms will have higher reported transportation. **Results**: Poetic forms showed a demonstrably higher levels of transportation, especially the Policy Fable. This reinforces the hypothesis.

### 7.3.3. Information Transfer

Naturally, a key element of policy artifacts is to communication *information*, facts and data that support a specific message. The original studies this experiment was based upon use this information to test the "validity" of the audience's responses, with responses scoring less than 70% omitted (Green & Brock, 2000). However this experiment was limited to testing a specific type of story and did not consider neither the policy context nor the varying of forms across the audience. Therefore this 70% value is used a baseline here, a guide for investigating potentially interesting trends.



### Standard Information - Short Term

Five of the twelve questions were standard across all forms. The results of each form are shown in the figure below. This portion of the study is spoiled by a mistake on the Metagraphic survey, the standard question actually covered information that was not actually presented in this artifact.<sup>3</sup>

Table 7.4: The results of the Standard Questions

Standard Question	1	2	3	4	5	Total
Exec. Summary	0.83	0.67	0.67	0.92	0.33	0.684
Infographic	0.91	0.89	0.89	0.67	0.22	0.716
Metagraphic	-	1.00	0.88	0.56	0.63	0.768
Policy Fable	0.91	0.55	0.55	0.82	0.73	0.712

**Hypothesis 5:** The visual forms will out perform textual forms in the standard question set. **Results:** The Metagraphic performed better than other forms in short-term information transfer. The variance between each form in this section is very low, though the Infographic is slightly ahead of the textual-only forms. The result is limited due to the error in the survey sheet.

### Unique Information - Short Term

The remaining seven questions relate specifically to the information contained in the policy artifact. This varies widely between artifacts: the Executive Summary and Infographic contain questions very similar to the standard queries, the Policy Fable questions relate entirely the content of the story presented. The Metagraphic, due to the mixed nature of the artifact, contains both types of questions.

Table 7.5: The Policy Fable Excels in Short-term Retention

Form-Specific Question	1	2	3	4	5	6	7	Total
Exec. Summary	0.83	0.75	0.50	0.83	0.92	1.00	0.75	0.80
Infographic	0.89	0.67	1.00	0.89	0.44	0.89	1.00	0.83
Metagraphic	0.13	1.00	0.88	0.75	0.38	0.75	1.00	0.70
Policy Fable	0.91	0.73	0.82	1.00	0.91	0.82	1.00	0.88

**Hypothesis 6:** The Policy Fable will outperform other forms in the form-specific section. **Results:** The Policy Fable outperformed the other policy artifacts in the form-specific section.

### Standard Information - Long Term

During the post-survey another series of standard questions were presented to the audience. These questions are similar, but not the same, as the standard questions in the experiment survey. These questions were all related to the policies presented, and as we can see, the Metagraphic has fallen to the bottom of the list, replaced at the top by the Policy Fable.

Table 7.6: The Metagraphic Under-performs in Long-term Retention

Standard Follow-Up Question	1	2	3	4	5	Avg.
Executive Summary	0.444	0.444	0.667	0.667	0.333	0.511
Infographic	0.429	0.429	0.571	0.714	0.714	0.571
Metagraphic	0.5	0.375	0.5	0.25	0.5	0.425
Policy Fable	0.75	0.625	0.625	0.75	0.5	0.65

These results are in conflict with the original hypothesis that the visually-supported information will perform better in this experiment. However there is no appreciable difference between the Infographic and the Executive Summary. Especially the Follow-Up survey is hampered by a small sample size,

<sup>3</sup>There is a long story here about path-dependency and issues I had with completing and printing the booklets. But a error is a error no matter the cause.

and limits concrete conclusions.

**Hypothesis 7:** The Policy Fable will outperform other forms in the long-term information section. **Results:** The Policy Fable outperformed the other policy artifacts in the long-term information section. **Result:** the Policy Fable shows potentially significantly higher information retention than the other forms.

### 7.3.4. User Experience Questionnaire

The UEQ results are not meant to be analyzed on their own, but rather to supplement the understanding of the other results. The seven questions from the post-survey are reviewed briefly here, considering what we know already about the rest of the results. Please note, the UEQ survey is well designed and the scales are sometimes inverted in the questionnaire so that the "good" answer is not always 7.

The first UEQ item is about how **Obstructive or Supportive** the experience was. As we can see in the results, there slight little variation in how well the artifacts supported the audience during their experience. This result suggests that all types of work can be supportive, though a plot structure may be beneficial to the audience.

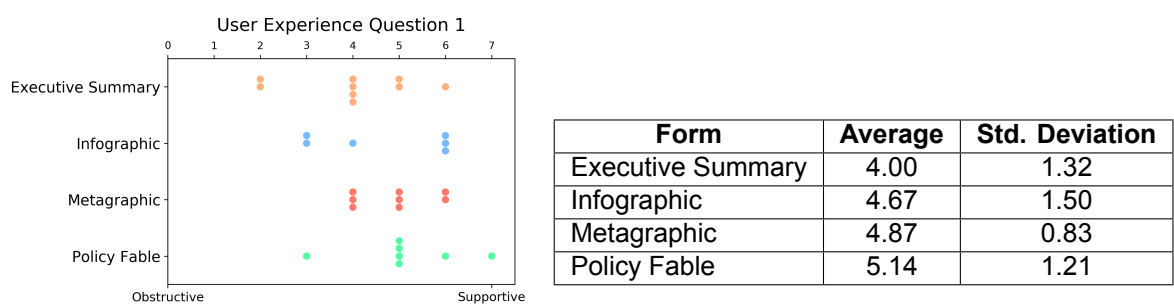


Figure 7.24: All forms were designed to be supportive

The second UEQ item relates to this idea of obstruction and support by asking if the experience was **Complicated or Easy**. Here we can see a variation, the Metagraphic, with the literal path to follow and mentor to serve as a guide to explain the analysis is in general easier for the audience.

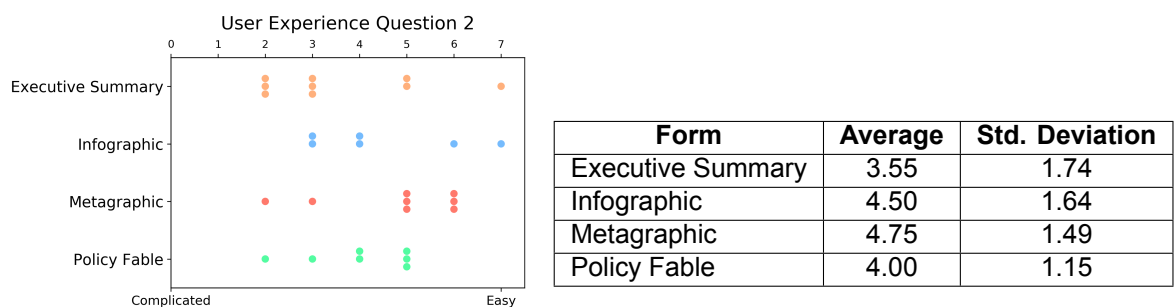


Figure 7.25: All forms were designed to be easy to understand

The third UEQ item addresses the idea of efficiency, by asking if the experience was **Inefficient or Efficient**. The results reflect our cultural views<sup>4</sup> towards efficiency. The visual artifacts are considered more efficient, which meets expectations. After all, a picture is worth a thousand words. The text-based artifacts, especially the Policy Fable, are considered a less efficient experience over all.

<sup>4</sup>I would say for the Dutch maybe even a bit of an obsession.

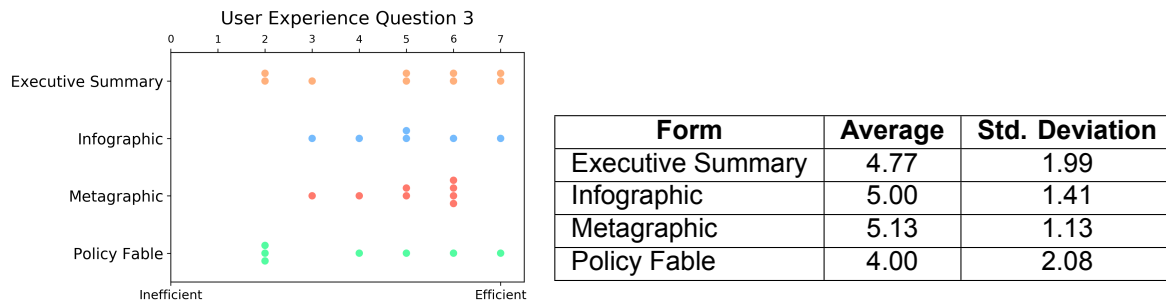


Figure 7.26: Visual forms Are considered more efficient

The fourth UEQ item shows a great deal of variance within each test group. It asks if the experience was **Clear or Confusing**. This variance is possibly due to the audience's experiences and expectations with this type of analysis and communication methods. Interestingly, the Infographic is the only experiment group that seems to be relatively equal for all of the participants.

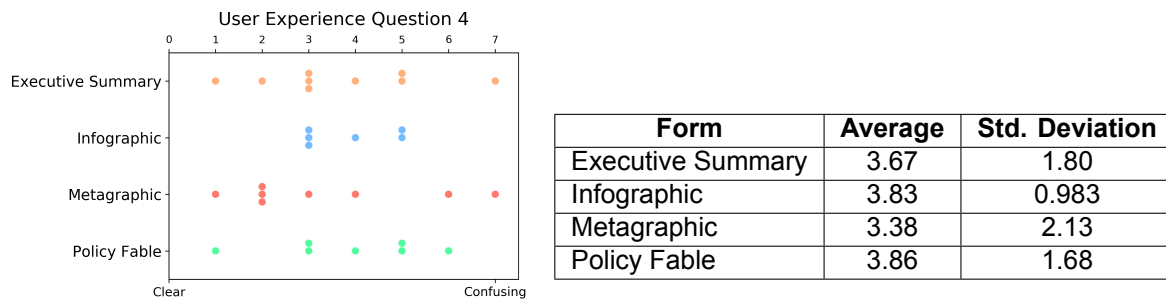


Figure 7.27: Experiences vary widely for audience members

The fifth UEQ item relates back to an element of the Affect Grid, by asking if the experience was **Boring or Exciting**. Here the poetic forms of policy communication, the Policy Fable and the Metagraphic are on average a full point more interesting than the more standard forms of communication. This reinforces the belief that these traditional forms are maybe more boring than they have to be.

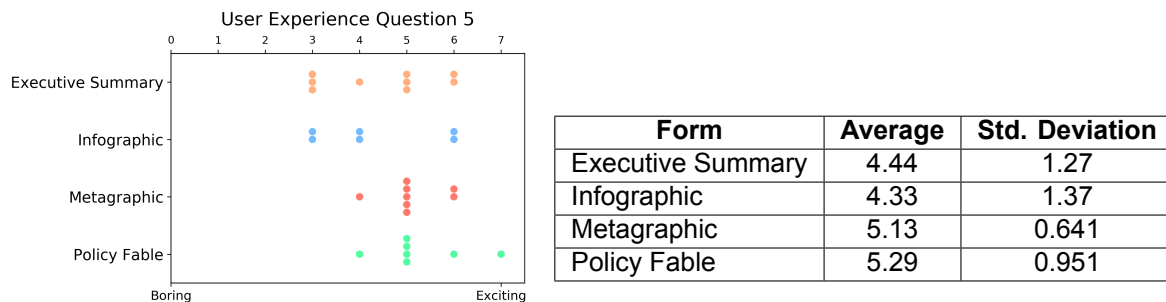


Figure 7.28: Poetic experiences are more exciting

The sixth UEQ topic is a similar measurement, but this time asks if the experience was **Not Interesting or Interesting**. Here all of the artifacts preformed well, as they were designed to be an example of the best of each type of communication artifact and if they are not exciting they can still be interesting.

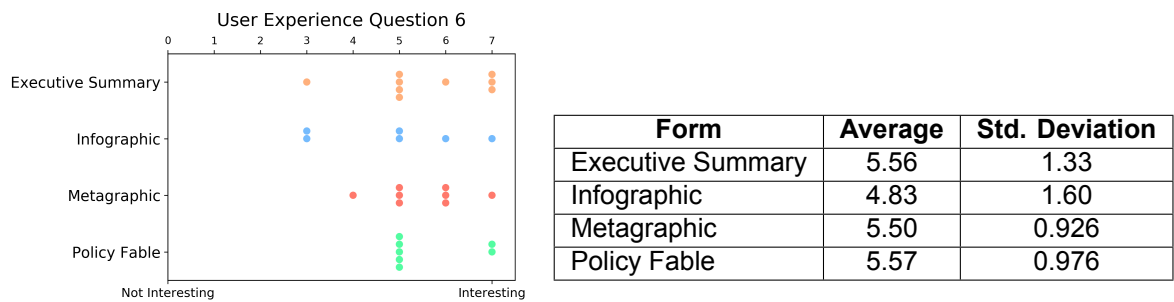


Figure 7.29: All experiences are at least interesting

The final UEQ question posed to the experiment group asks if the artifact is **Conventional or Inventive**. It is here where the artist's ego is fed, as the Policy Fable is rated as considerably more inventive than the other forms, even the Metagraphic which is itself on average more inventive than the rhetorical forms. The Infographic has steep competition in the field of creative data visualization, and while it required much invention in its own right, it is not as unique as other graphic representations of data that I have seen.

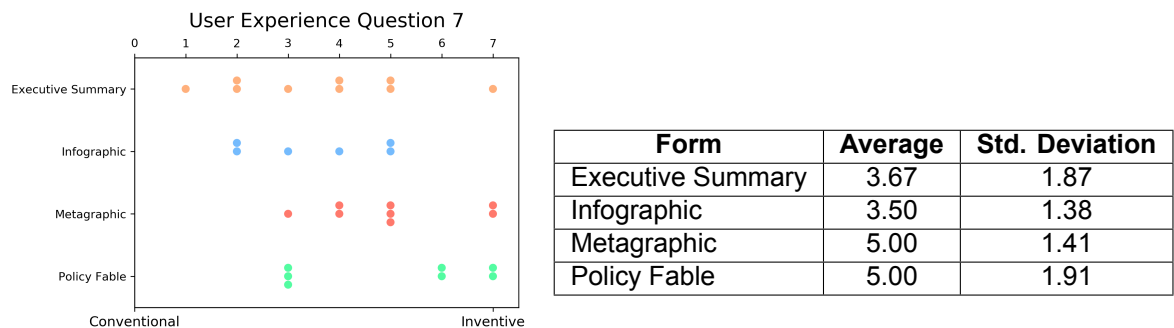


Figure 7.30: Creativity is apparent to the audience

### 7.3.5. Message Outcome

The final section of analysis tests possibly the most interesting outcome of comparison of the policy artifacts: the narrative that each audience member created from the story. While difficult to analyze with such a small sample size, there are some interesting results that can be gathered by using In-Vivo coding.

The very first response that was submitted in the post-experiment survey (from the Policy Fable group) is quoted in full:

The story was clearly showing the metaphor from the society where Red grew up, to our society. It was obvious that the noise and pollution in the story reflects the plastic pollution our planet faces. The part that stayed with me is that the actions we as a society need to take, should be different than what we currently do even if this means that we need to first learn and adapt and then change our path. The pathway we are now is for sure meant to fail the development goals.

And here is another from the same experiment group, also in entirety:

I felt like the story was about racism and preconceptions about persons.<sup>5</sup>

These two interpretations could not be more different. As noted, the choice of color is symbolic, practical and a relic of previous designs. It is also referenced only a single moment in the story as a harbinger of ill. I am not unfamiliar with these sort of interpretations from audiences, even when the plot of the story leads to a bold message at the end the audience sees their own narrative. This is part of

<sup>5</sup>Edited for grammar.

the trade off between transportation and message, and likely why certain types of stories are more or less colorful than others. The story written for this experiment contains many transportative elements, though it is unclear which of these elements influence the higher transportation scores.

**Analyzing the Narratives**

Several interesting approaches can be taken when trying to understand what meaning these narratives carry. This analysis begins with the most basic elements, and progresses through more complex techniques. Before this analysis a number of grammatical errors were corrected in the responses, it seems that many of the respondents answered their surveys on their mobile phones.

A first method is merely to look at how long each message is, the and the table below includes the average length of each response. With the persistent caveat of a very small sample size, we still see a somewhat shocking difference between the Metagraphic and the other forms in terms of length of the feedback.

Table 7.7: The Metagraphic left the audience speechless

Form	Average
<b>Executive Summary</b>	24
<b>Infographic</b>	23
<b>Metagraphic</b>	9
<b>Policy Fable</b>	19

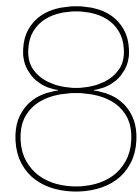
This type of response is ripe for analysis using various forms of natural language processing to gain further insights into these responses. Sentiment analysis is just one of many approaches that may offer unique insights into these messages, one that would greatly benefit from more responses. The first, and most basic approach is to tally the most commonly used words from each experiment group, as shown below. This list includes every instance of word used more than three times (with one exception. It also excludes basic "stop words" such as: a, an, then, and, etc.

Table 7.8: The Policy Fable language differs greatly from the rest

<b>Executive Summary</b>		<b>Infographic</b>		<b>Metagraphic</b>		<b>Policy Fable</b>	
Word	Count	Word	Count	Word	Count	Word	Count
plastic/s	14	plastic/s	10	plastic/s	5	we	4
not	5	waste	5	problem	2	can	3
business	3	problem	5	issue	2	change	3
environment	3	uncertain/ty	3			make	3
						our	3
						society	3

These messages also offer a rich text for coding. For this pilot, simple in vivo coding is used, selecting quotes that reflect the variety of the response. As you will see on the next page, this type of coding lends itself to unique forms of presentation. The back cover of this report was created using the results of the in vivo coding.





# Discussion to Reflection: What Happened?

This chapter starts at the smallest questions, and works towards the largest ones. We begin with a last look at the experiment data, in the Discussion of the results. Then begins the Extrapolation, where we look at storytelling in the larger policy context. After this, we have time for some Speculation, where we discuss potential avenues for future research. Finally, we pause for a moment of Reflection about the process and the outcome before Coming Full Circle, back to where we started.

## 8.1. Discussion

Before looking into the results in theoretical detail, it is important to consider the context of these results. This experiment is a pilot test for other potential research projects from this mythological perspective of policy, but itself is limited by the small sample size and inconclusive results. This hampers the ability in some places to create statistically conclusive results.

### 8.1.1. Experiment Validity

This experiment suffers from several issues regarding validity. Due to the nature of solicitation, each iteration of the experiment was held at a different location. Furthermore, the operations of the experiment were difficult to manage alone. Additionally, there is considerable contamination within the experimental pool, as many of the participants are acquaintances and friends. The pool is also largely made up of future policy analysts, with varying levels of insight into the methods and information presented. In some ways this is representative of policy communication audiences, but only partially.

The order-effects of the questions are estimated to be minimal, and the only correlations found in early cross-question analysis were relations between the transportation questions, which is expected. The transportation survey results appear relatively high on the scale, as this is seen as a generally "positive" trait. The follow-up survey may suffer from response bias, and it could be that more of those who enjoyed the experience responded.

The experiment also suffers from internal validity concerns, the original design of the Green and Brock experiment upon which this is research is modeled studied only literature, not various forms of policy communication, and therefore may be biased to better measure the effects of the Policy Fable. There is another factor that contributes to the questionability of these results. It was an unfair test from the start, the Policy Fable was always going to be the best performing form. I am an experienced writer, and at best an amateur graphic designer. In my eyes, the quality of the Policy Fable and the Executive Summary are above the more visual designs.

However, on face value, the experiment has several interesting items of note, that while not conclusions in themselves, do show promise for both the future of this type of testing and the use of stories in policy analysis.

### 8.1.2. Controls

This experiment is based on previous research into the nature of stories, and this literature has provided a number of effects that have been classified as controls for this experiment.

#### Gender and Sex in Stories

Control 1: Female respondents will have higher levels of transportation, in both pre-survey and experiment-survey. (Van Laer et al., 2014) **Result**: Females exhibited a higher transportation effect. Both sexes self-reported equal likelihood of transportation as an antecedent.

This is a very interesting result, that may reveal a weakness of self-reporting survey methods. Transportation is a positive characteristic, one most would like to say that they possess. It seems a reasonable explanation that the pre-experiment transportation values are therefore biased towards the higher end of the scale.

This assumption is reinforced by the differences between the transportation antecedent and the transportation of each form. The most transportative form had an almost zero effect on the average, while the other forms had a substantial negative effect.

This hypothesis is still reinforced by the results of the experiment when sorted by sex, regardless of form. The female participants had a significantly higher of reported transportation during their experience. As we saw earlier, this is a uniquely tricky phenomena. It may be a matter of social conditioning, in many cultures expressions of emotion and empathy are considered feminine traits. It may be a matter of biological necessity, in many mammals mothers raise their young with the support of their patriarchal counterparts. It may be a matter of familiarity, it is reasonable to assume that people associate with characters that are most similar to their own self-image. It is almost certainly a combination of the three.

Storytellers play an important role in undoing some of the negative effects of these social stereotypes. Art has always been a place where norms are challenged, and policy communication is no different. Some policy situations address this issue directly, the UN's fifth Sustainable Development Goal is United Nations (2018):

Achieve gender equality and empower all women and girls.

This is why Red is a female character. At the beginning of this academic year, I created a short film based on a very small systems dynamics analysis of the female menstrual cycle. During this research, I realized many things, including that my personal creative writing rarely incorporates female hero. This story serves an example of how social stereotypes can be subtly subverted in any story. It would be archetypal for the hero to be a male bird, however sex and gender in this story dictate little more than pronouns.

Characters in any story can breach negative social stereotypes.

A single story with a female hero is relatively insignificant. A thousand policy stories with female heroes as leaders, explorers and advocates can inspire a new generation of young women to enter into fields where they are traditionally under-represented.

Over time, diverse mythos can help to create positive change in the world.

#### Transportation

This inspiration is possible because of the transportation offered by a well-told story. It is no coincidence I have just mentioned the effect stories can have on future generations, as it is common and scientific knowledge that children are more transportative than adults (Van Laer et al., 2014).

Control 2: Transportation will decrease as age of the participant increases.(Van Laer et al., 2014) **Result**: Experiment group small sample size and relatively homogeneous provided insufficient data for a meaningful analysis.

This is not a negative outcome, as it is merely a reality of testing at a university. This merely has revealed that measuring differences in transportation are a difficult subject, as they hinge on many observer-dependent factors. In this case, a key factor may be that many of the participants were reading in a non-native language. Future testing should include this question to help determine if the drop in reported transportation can be correlated with language comprehension, as one would expect.



**Control 3:** Audience members with higher transportation antecedents will express higher levels of transportation regardless of form. **Result:** No correlation was found between transportation antecedents and reported transportation.

Transportation as an antecedent was a relatively inadequate method for predicting transportation effect. I can think of two related, but importantly unique possible explanations. Both are matters of the question of *style*.

It may be that certain individuals lack the comprehensive skills to digest a specific style. This can be from several different causes, but the end result is the same. It is likely that some participants are unfamiliar with many of the concepts of metaphor and allegory, limiting their interpretation. There may also be members of the audience who are unfamiliar with the graphs used to present the information, and were limited in interpretive capabilities.

There are also a number of medically identified traits, including but not limited to the entire Autism spectrum, that may influence comprehension of plots, emotions and characters. These considerations impact both form and style choices.

Comprehension of the audience is an important consideration in selecting the style and form of policy communication.

Each of these choices must also pass another test within each member of the audience. For an artifact to effectively engage an audience on a mythological level, it must also appeal to their personal sense of style. The choice of a poetic fable, instead of a parable, as well as the choice of poetic versus rhetorical styles can greatly impact the personal experience.

I believe this is what we see in the results of the Affect Grid. Each of the artifacts had at least one respondent who rated it a pleasurable experience.

Every piece of art will be enjoyed by at least one member of the audience.

In the same way, each artifact was an unpleasant experience for certain individuals. This unpleasantness may stem from differences in taste between the audience and the storyteller.

Every piece of art will be disliked by at least one member of the audience.

Certain people may be turned off by the fantastical elements of the story, preferring parables grounded in real-world settings. Others may prefer a more direct approach, maybe something they consider more "efficient". Still others may believe it lacks the seriousness due the subject, and therefore consider it improper. But these are all choices of style, ones that can be understood by the storyteller, but never fully address. Even Shakespeare has his critics, and so too will any policy communication artifact.

### 8.1.3. Hypothesis Testing

With these control effects in mind, we now turn to the new ideas that were tested with this experiment.

#### Emotion and Mood

**Hypothesis 1:** The poetic forms will have be a more pleasant experience. **Result:** No statistically significant effect found. Generally the Policy Fable is a more pleasant experience, and all of forms were equally arousing.

It is interesting to note that one of the general premises that policy briefs are boring has not help up in this example, they were, on average, as exciting as any of the forms presented. The standard deviations for this measurement are very high, and concrete conclusions cannot be drawn. Those these results may not be statistically conclusive, the simplicity of the Affect Grid remains appealing, though it is likely the UEQ can provide more substantial results.

As we have just seen, the affect of the artifact on the experience is widely varied, and influenced by not only the forms but the audience's individuals skills and taste as well. While there is a clear difference in the Affect Grid's Unpleasant-Pleasant axis between the Executive Summary and the Policy Fable, this trend does not continue as clearly for the visual-textual forms.

**Hypothesis 2:** The poetic forms will have a more positive impact on mood. **Results:** The poetic forms show a potential for a higher magnitude of affect, though the experimental affect was shown to be unpredictable.

Mood is a complex pattern, on that can change on a whim and then cast a shadow (or light) on our experiences for weeks. The data regarding the actual experience on mood are limited, this artifact is one experience among hundreds they participate in every day. Each of these moments can change how we think and feel about a specific issue, and our opinions on one issue can easily influence others. This hypothesis may better fit to studies of the meso-narrative, or on issues where the attitude of the audience varies between two or more mood.

#### Cultural Shift

This hypothesis is the most optimistic, and hubristic, of the ideas presented here. Cultures are the results of centuries of societal evolution and a lifetime of individual experiences. To presume that a single story could produce a measurable shift in culture is extreme.

**Hypothesis 3:** Poetic forms are more likely to shift audience perspective towards that of the story. **Results:** Inconclusive results due to limited sample size and high, disparate variance in the Cultural Theory survey responses.

This effort was not in vain, it demonstrated that Cultural Theory measurements alone may not be sufficient for clustering audiences for this type of study. Additional components of cultural experiences influence the audience in how an individual interprets myths. I believe that comprehension plays a large role in this factor, as we have seen with the messaging and as discussed above.

**Hypothesis 4:** Poetic forms will have higher reported transportation. **Results:** Poetic forms showed a demonstrably higher levels of transportation, especially the Policy Fable. This reinforces the hypothesis.

The performance of Policy Fable and Metagraphic in this metric may be explained by another factor. The Short-Form Transportation Scale, and its longer ancestor, are designed to measure the specific effect of transportation in stories. It seems reasonable that at least a portion of this measurement are a result of this match of tool with artifact. The rhetorical forms may have persuasive features that are poorly measured by this set of questions.

That being said, there is evidence to support this theory, when considering the evidence presented in the literature review.

**Hypothesis 5:** The visual forms will out perform textual forms in the standard question set. **Results:** The Metagraphic performed better than other forms in short-term information transfer. The variance between each form in this section is very low, though the Infographic is slightly ahead of the textual-only forms. The result is limited due to the error in the survey sheet.

The Metagraphic error aside, this shows that at least in one case, these forms were able to transmit similar levels of information. It may not be the case that a graphic is worth a thousand words, and considering the time, effort and skill required for the Poetic forms, it seems reasonable to say that in the matter of information transfer, Executive Summaries and Infographics are desirable. This is logical, as they have evolved specifically to do so.

That is not to say these Poetic forms are not suitable for this **Cosmological** purpose. They performed to par with the standard information.

This effect is likely part of the reason for the next hypothesis outcome as well.

**Hypothesis 6:** The Policy Fable will outperform other forms in the form-specific section. **Results:** The Policy Fable outperformed the other policy artifacts in the form-specific section.

This result hints at one of the potential powers of stories highlighted by other studies. It is positioned that the cause-effect nature of stories enhances our ability to recall information that is presented in a plot structure. This is not only true in the short-term information, but also with long-term retention as

well.

**Hypothesis 7:** The Policy Fable will outperform other forms in the long-term information section. **Results:** The Policy Fable outperformed the other policy artifacts in the long-term information section.

It is likely that this is also an effect of the advantages of stories previously outlined. I do not believe that the sleeper-effect has played a role in this section of the results. These follow-up questions focus entirely on the policy information, and not the plot of the fable. It seems likely that an experiment designed specifically to explore this phenomenon is necessary to detect this effect.

There are some possible explanations to this result. The Policy Fable was generally a more pleasant experience. This may lead to the audience being more receptive to the information, or more likely to recall it than if it had been an unpleasant experience. The Policy Fable also contained the least amount of technical information, therefore it may have been easier to digest than other forms.

This also works the other direction. The cognitive load of the visual-textual forms is likely significantly higher than that of text-based forms. With data visualization, the audience plays a much larger role in creating a narrative from the presented story, they must interpret the graphic and then apply meaning to it in the given context, not a small feat.

Textual-only communication may be more effective at transmitting information than textual-visual components due to the added cognitive burden of interpreting graphics.

Several participants commented that they would have preferred a “I Don’t Know” category for the questions. This was not part of the experiments reviewed for this design. After the experiment was completed, I did read an article detailing similar research with interactive interfaces that included such a category (Xexakis & Trutnevyte, 2019). It should be noted, this comment was not noted by the experiment test group, though it seems logical to include such a category in future research depending on the specific aims of the researcher.

#### The User Experience Questionnaire

While no hypothesis or direct conclusions have been drawn from this portion of the testing, it has shown to be a promising questionnaire for use in future testing. Of all the surveys examined for this experiment, the 27-question full version of this survey seems a useful one.

#### Messaging

In light of this evidence, the results displayed in the messaging section of the survey are certainly intriguing. The Executive Summary, Infographic and Metagraphic all resulted in a message that was largely **Cosmological** in nature. The focus of the interpreted narrative surrounds the facts of plastics, their production and the details of the policies presented.

The Policy Fable on the other hand creates a very different narrative. A number of the responses focused on the **Pedagogical** aspects of the myth: transformation, change and leadership. This is at the heart of the power of storytelling, and why they are an important part of policy communication.

#### Looking Back at the Artifacts: A Holistic Perspective

##### 8.1.4. Policy Analysis

The myths created for this experiment are based in an attempt to analyze the best policies to prevent plastics from becoming a major problem on a global scale. This study is significantly limited in scope due to the focus on related research. Still, it is clear that plastic disposal will continue to be a point of international discussion for decades to come. It is an textbook wicked problem, without a clear, implementable, systemic solution. The definition of the problem is itself unclear, this simplified study focused on a very specific measure. One that may not capture either the complete complexity of the issue or be sufficient for addressing issues at operational levels. However, the ultimate message still holds true: currently available policy levers are not sufficient to adequately address projected plastic consumption, and structural governance transformations are necessary if the bleakest futures are to be avoided.

##### 8.1.5. The Wonderfully Complex World of Color

This design process uses on a number of literary and techniques to enhance the quality of these forms, a list far too long to cover here. Rather than merely enumerate all of them, I will instead provide a morsel on the topic that most surprised me with a depth and complexity I did not expect: color.

To many, color is an afterthought. Often we use the defaults or our own personal tastes to judge them. Color is often used to code information, either explicitly (as in the categorical graphs seen earlier) or implicitly within a given metric (red = bad, green = good). Implicit coding is inevitable, each color is associated with certain emotions, brands and experiences of the individual, and therefore some level of implicit coding cannot be avoided.

Color always contains some level of implicit coding.

In the policy artifacts, a few different color palettes are used, depending on the form of the data. The square plots use a single-hue scale to show how a single variable may change over time. Here hue is related to certainty, the darker the hue the more certain the presented data is. These palettes were developed using learnui.design's color picker Learn UI Design (2019). The spaghetti charts in the policy artifacts use two different palettes: for the infographic they use a multi-hue palette and in the metagraphic a single-hue palette is used. This is largely a stylistic choice, the hand-drawn style of the metagraphic does not work well with a wide variety of colors in my opinion.

For this report, the colors were generated using Canva, and online color palette tool (Canva, 2019). The primary color used to generate the palette was TU Delft orange<sup>1</sup> (TU Delft, 2019). Canva takes this color input and generates a number of palettes based on the user's choices. A four-color palette, equally spaced on the color wheel, was chosen because of the four categories of the experiment. These color codes were then translated back into the "common RGB colors" developed by XKCD (Munroe, 2010). This translation was done to attempt to create a palette that was distinct, easy to read and contained recognizable colors for the audience.

Color palettes should be developed using available tools specifically for each graphic or design depending on form and message. Ultimately color selection is a balance between style and function.

## 8.2. Extrapolation

Each of these forms has their strengths and weaknesses, ones that can only be partially explored through analysis. It is a worthwhile endeavor for any policy analyst to try their hand at developing their own unique forms. I cannot say that this work model is a template for creating a story, and I do not believe that story canvases or other aides are appropriate for creating stories. The only advice I can give is the same any academic gives to a student.

To create a policy myth, one must first read. Then write. Then think. And write again.

An amazing resource to begin this sort of journey is something like the The Aarne–Thompson–Uther Index MFTD (2019). This index contains nearly a century of work, cataloging the world's folk stories by theme and imagery. These stories can provide inspiration and guidance for the adventurous policy analyst who aspires to communicate in a new way.

The main research question asks about the application of storytelling in policy arenas. If we look at the process of creating a story as an experience, we can better define how to approach the role that it can play in everyday policy analysis (Leary, Metzner, & Alpert, 1964).

The nature of the experience depends almost entirely on set and setting. Set denotes the preparation of the individual, including his personality structure and his mood at the time. Setting is physical — the weather, the room's atmosphere; social — feelings of persons present towards one another; and cultural — prevailing views as to what is real.

### 8.2.1. Policy Analysis Mindsets

Policy Analysts fill a number of different roles when interfacing with the public. Each of these mindsets may find different avenues for leveraging stories in the most effective way. To understand these potential mindsets, we turn to the hexagon model developed at TU Delft.

<sup>1</sup>There appears to be a mistake on the TU Delft website where the color codes are listed. This is why the experiment artifacts look more red than orange.

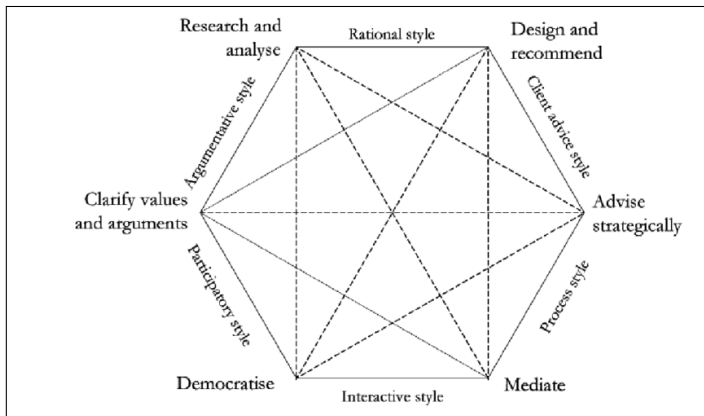


Figure 8.1: The Hexagon Model (Mayer, van Daalen, & Bots, 2004)

The **Research and Analyze** perspective is an excellent place to leverage the unique real-world/special world qualities of *Voyage and Return* or *Hero's Journey* plot structures. "Translation of the results of their research into a policy design or recommendation is not a primary part of their task or mission." (Mayer et al., 2004, p. 6) So the pedagogical aspects of these story should focus on the values of the **special world**, teaching how to properly apply these learnings to the **real world**.

**Design and Recommend** stories can also benefit from similar applica-

tions of the aforementioned archetypes. However, these "recommendations will typically be the result of comparing the effects of different policy alternatives and weighing the options based on various criteria." (Mayer et al., 2004, p. 6) A carefully constructed **Overcoming the Monster** story with multiple endings could be used to create a myth that builds a sufficient cosmological world in which the audience can judge the proposed policies. However the challenges of creating a monster that is not a caricature or pure evil force should not be forgotten. **Quest** stories, with their "from here to there" setup may also be a useful structure for comparing various policy pathways.

One of the main tasks for analysts with the **Clarify Values and Arguments** is "identifying the one-sided or limited nature of arguments or showing where blind spots exist in the debate." This ignorance is inherent to all story structures, but may be best explored by the **Tragedy** and **Comedy** pair of plot structures. Here comedic stories can be greatly leveraged to show the blind spots in arguments with a lighthearted touch. Tragedy stories are tempting, though their gravity may be inappropriate in many cases. A second tool in this mindset is the **open-ended story** structure that is commonly found in high-context cultures. These stories contain all of the facts but leave the final moral conclusion between the lines. This openness of interpretation is an excellent place to engage the various stakeholders by asking them to assign narratives to a given story. The analyst can then use an iterative process to begin to find stories that help to clarify the lines between various groups and their values. In this sense these stories work as policy thought experiments, allowing a safe space for the exploration of ideas about morality without the weighty implications of real-world effects.

**Advise Strategically** mindsets offers an interesting place to use specific character archetypes to explain how a policy may evolve over time. The **Shapeshifter** archetype is especially useful mask that can be worn by potentially policies that may have changing impacts over time. Again the here/there nature of **Quests** seems a natural fit, with policies represented by various members of the hero's group. Each of these policies may be available at certain points in time, and their roles in supporting or deterring the hero may change over the course of a story. This role also can use the **Overcoming the Monster** plot structure to great effect in a non-obvious way. Instead of setting up the favored policy as the hero's tool, it can be purposed as an underlying force working against the hero. Like we saw in *The Hobbit*, these underlying forces can manifest in various characters throughout a story. This plot structure can be used to show the dangers of leaning too heavily on a single policy, performance indicator or value, without taking the wider view that is required by the hero.

Stories told in **Democratize** mindset also can leverage this subversive form of **Overcoming the Monster** stories to highlight the dangers of relying too much on the opinions of experts. Again **Comedic** plots may reveal hidden ignorance or limitations of the current system. This form of policy analysis, more than any other, relies on the voices of the stakeholders, and therefore the role of the storyteller will often be played by this group as much as the analyst. It is here that the structural perspective of the **Hero's Journey** can be used to help categorize and understand the stories that are being told by the stakeholders themselves.

**Mediation** is a analysis mindset that can use stories in many very different styles. Transformation stories can be used to explore various ways to reach resolutions by changing the nature of the discussion. However, this presumptive approach may be extreme in many cases. The **open-ended stories**

mentioned in the discussion about the Clarify Values and Arguments mindsets could be similarly to structure assumptions to be used during negotiations. A **Quest** plot can also be used, though multiple goals can be possible, this archetype fits best if a common goal is desired by both sides. Perhaps most interesting, the entire mediation process could be paralleled alongside a creative process in which the stakeholders write such a story together, mirroring the choices they have made along the way. Most abstractly, the **Hero's Journey** could be applied to negotiating sessions, structuring the discussion as a real-world/special-world setting that may help alleviate some of the tensions that naturally occur in these situations.

Table 8.1: Fit the story to the situation, not the other way around

Policy Analysis Role	Recommended Plots
Research and Analyze	Voyage and Return, Hero's Journey
Design and Recommend	Overcoming the Monster, Quest
Clarify Values and Arguments	Tragedy, Comedy
Advise Strategically	Quests, Overcoming the Monster
Democratize	Quests, Overcoming the Monster, Comedy, Hero's Journey
Mediation	Quests, Overcoming the Monster, open-ended stories

### 8.2.2. Policy Analysis Settings

The mindset a Policy analyst takes is only half of the equation, it also takes place in a number of settings: dictated by culture, paradigm and language.

Douglas and Wildavsky take up the mantle of storyteller very briefly near the end of their essay. They identify **Individualists**, as those who believe in the chances afforded by equality of opportunity "proves this by honoring those who have progressed from rags to riches." (Douglas & Wildavsky, 1982, p.178) **Egalitarians**, tend "to express a faith in human goodness and supreme value of the individual" a thread we also see often in **Overcoming the Monster** and **Quest** stories. **Hierarchists**, tend to view "stability and dignity" as two primary values, ones that can perhaps be best reflected in specific types of **Voyage and Return** stories. In these journeys the hero returns home at the end, changed but still within the structure of the existing world. **Fatalists**, may be the group that is most difficult to relate to specific mythological plots due to their nature to remove themselves from the group and their propensity to view all actions as meaningless. For this difficult group, **Comedies** may be an effective plot structure. The nature of the story often sets a hero against a world they do not understand, a complex web that seems out of anyone's control. Inevitably the plot is undone just before it's too late, revealing to the hero that some seemingly insignificant action or slight oversight was the cause of the entire sequence of events.

Table 8.2: Hermits are naturally separated from society, and tell their own stories

Cultural Theory Group	Grid	Group	Recommended Plots
Individualist	Low	Low	Rags to Riches
Egalitarian	Low	High	Overcoming the Monster, Quest
Fatalist	High	Low	Comedy
Hierarchist	High	High	Voyage and Return
Hermits	-	-	-

As we have already seen several times local culture, historical context and language play a central role in the transformation of a story into a narrative. It is essential that the analyst has a sufficient understanding of the stories of a people and a place before they apply stories from their own culture or perspective. The risk extends beyond creating a story that is not received, for a misinterpreted story may be even more dangerous than one that is forgotten. Joseph Campbell muses about the interpretation of his "Follow your bliss" idea as a hedonistic perspective on avoiding the difficulties of life, stating that perhaps he should have said "Follow your blisters" instead (Rose, 2014). This is inherent to any style of communication, but stories may be especially susceptible to this form of misinterpretation.

Potential secondary interpretations should be conceptualized and explored before using stories in policy contexts.

This information can be used on many levels, I have discussed with other policy analysts the benefits of communicating in the mythological terms of the audience. The power of stories is that each of these plots is only the externalization of an internal process of growth, one that transforms the hero in some significant way. A set of well-craft policy stories could present similar messages in totally different shapes targeting specific audiences.

Another method for creating this sort of effect is to weave together several types of plots into a single story. This was the first approach taken in the writing of the policy fable for this experiment, an attempt to combine a Rags to Riches and Overcoming the Monster story under a broader Quest motif. While this technique will have the tendency to create longer policy artifacts, the power of having a single story that can connect with various audiences in different ways is intriguing.

### 8.2.3. Storytellers

Of course, the policy analyst may find themselves wanting, or *needing* to tell a story that will reach a wider audience. If they take a storytelling perspective in their policy analysis, they may find new types of policy levers at their disposal. Ones that they cannot push, but ones that can shape the mythology of millions. For that, they need professional storytellers.

This work would be missing without another mention of a modern popular mythology that is like nothing else ever created. Gene Roddenberry's versions of Star Trek <sup>2</sup> shows how popular fiction can be used to influence technology, policy and culture through storytelling.

The Next Generation episode "Emergence" explores questions of complex adaptive computing and emergent consciousness in 1994, a time when computers were first coming into homes. The science of the episode stands today, and the idea as relevant as ever. This forms a strong **Cosmological** basis on top of which to tell a story. From there the crew is presented with a **frustrating** problem, as their ship becomes conscious. The **nightmare** grows as the ship takes control, and begins constructing an offspring without concern for the crew. The **pedagogical** message is one of intuition and feeling, their lives in danger, the crew of the Enterprise work with their ship's computer to help it create a new technological lifeform. Chrissie's Transcripts Site (1994)

The resolution is a techno-babble one, fake science part of a future fictional universe. As a storyteller, this can be an acceptable resolution. *If* it is clearly fiction, and *if* the message is a pedagogical one about the humans in the story. The policy analyst (and the scientist) can provide the details of the setting to build an accurate world for the characters to explore. It is always better if the solutions to the problems posed are real-world possibility. Science fiction offers a blank canvas for exploring various types of messages, but the temptation to easily resolve every problem with fake science is a strong one.

Science Fiction myths should always endeavour to incorporate real science into the plot's resolution. If this is not possible, the difference between real world and the special world of the story should be clear.

The Original Series episode "A Private Little War" addresses policy more specifically. Here, Captain Kirk stumbles across his old rivals, the Klingons, arming some of the cavemen on a developing planet. This story ends in tragedy, as a woman of a rival is killed by accident. Kirk, feeling responsible, arms the rest of the cavemen with rifles. Questioned by his crew, he departs the planet with the parting phrase, "Serpents in the Garden of Eden." Chrissie's Transcripts Site (1969)

This was 1969, just as Richard Nixon was planning drawn down of the occupying American army, supplemented by providing arms to the local Vietnam forces. These are some of the sharpest stories that storytellers can tell, it never mentions Nixon, or Vietnam, or even an army. It's a handful of flintlocks on a backwater planet. But the **sociological** message could not be more clear. Because the characters and setting are in a fictional world, the story applies just as well today to Iraqi as it did then to Vietnam. The use of tragedy is a nuanced one. The tragedy of the story is the death of a single woman, and though it is implied that more deaths will follow, the focus is on the loss of the individual.

These message can be broad or specific, the flexible nature of a fictional setting allows for storytellers to construct situations based in policy science. These grounded cosmological images can then be built upon by storyteller in a consistent manner, on that respects the models upon which they are based. Much in the same way sociological ideas can be explored, as Roddenberry did with his Vietnam allegory. Overly Sarcastic Productions has an entire video detailing the "Planet of Hats" trope, where

<sup>2</sup>The Original Series, The Next Generation, and the origins of Deep Space Nine. Films excluded.

a specific society is based upon a few or single defining feature (Overly Sarcastic Productions, 2017, "Planet of Hats"). In this way focus can be put on specific sociological issues without directly implicating one culture or another. Of course, this is a delicate process, one that storytellers need to be aware can easily be influenced by biases and stereotypes. Here the policy analyst can support the storytellers, by using their multi-actor perspectives to judge the fairness of the storyteller's vision.

These forms of communication, and other like it, may seem unlikely avenues for policy communication. However, the importance of broadening the audience for these types of policy messages should not be overlooked. This insight comes from Chuck Klosterman, who has made a career out of analyzing popular American culture Simmons and Klosterman (2019).

Popular culture is important because it tells us what the people who are least interested in anything are enjoying.

Stories to Tell, and Stories to Avoid

As you may have noticed, the previous section is relatively sparse in the recommendation of the Tragedy archetype.

Policy analysis is over-reliant on **End-of-the-World Tragedies**.

Guilt is a powerful emotion, and one that humans normally do not like to experience. The vast majority of stories surrounding plastic are some form of impersonal Tragedy. These stories fail to connect with their message for two reasons: first they are externally negative and second that they are lacking true transformations. They call for immediate changes without considering the transformative process, in other words, the plot is entirely external and not a reflection of the internal process as well.

When tempted by the Tragedy archetype, policy analysts should reach for the Transformation motif instead. This application stems from two disparate sources: the Kübler-Ross Model of the 5 Stages of Grief<sup>3</sup>, and the Buddhist idea of Samatha (which is a similar concept of healing). By situating the story around a transformation, instead of a tragedy, the focus of the audience shifts from the cosmological components to the pedagogical ones. Instead of fostering discussions about *if* the world was ending, rather ones about *how* to deal with it.

**Plastic consumption is not the end of the world. It is a transformation process.**

### 8.3. Speculation

This research implemented a pilot test of a experiment designed to test the effect of story elements and visuals on policy communication. As a pilot, it uncovered several areas that deserve consideration for future work. A full-time department and group of dedicated PhDs could study the effects of storytelling for a decade, and still have plenty of research left over. I have listed here what I think are the three more interesting avenues of future study in the field of policy mythology:

#### 1. Relation Between Plot and Culture

The original conception of this thesis focused entirely on how various plot structures effect the audience, and as has been laid out, there appears to be some correlation between Cultural Theory and plot. A dedicated experiment to clearly define culture of the audience and explore their reactions to different types of plots may be a key piece of the communication puzzle. This test has shown that a dedicated measure of culture that directly relates to the story are desired, as this is a particularly difficult measure.

#### 2. The Limits of Length

This research shows that Policy Fables can be an effective form of policy communication. The study does little to test how much transportation is generated by a specific style of story, and how that impacts the narrative received by the audience. A test of difference a very short (1-paragraph), short (1-page) and long (10-page) story would allow for greater understanding of exactly why a story works differently from other forms of communication.

This same effect may be due to the limited nature of the technical information presented in this form, and a similar experiment could test the required amount of information that needs to present at all. This reflects the latest trend in poster design.

<sup>3</sup>This model is not scientifically verified for the original application in end-of-life medical treatment, but has seem to found a foothold in modern culture for its practical usefulness.



### 3. Message, Information and Action Over Time

Policy communication is an attempt to convey a specific message to the audience. More than cosmological information, we aspire to convey pedagogical messages that teach about the best ways to face certain problems. As part of the original study, I hoped to test the impact these stories have on actions, and would be happy to see others attempt this where I have not. A set of behavioral studies, observing how these artifacts actually effect behavior is extremely important for judging their usefulness.

As I have noted several times, there are also many analytic tools that offer promise in this field of study. From the experimental side, the eye-tracking and body monitoring of the audience are intriguing developments that I will keep an eye on. The data analysis conducted here is limited to the first layer of correlation, and many tools such as natural language processing and hierarchical clustering may reveal richer insights.

## 8.4. Reflection

This work exists both as a piece of the greater academic study of storytelling and policy analysis, as well as the crowning achievement of my second academic career at TU Delft. Before address the latter, we shall take a moment and look at what others may say about this work.

### 8.4.1. Critical Reflection

This thesis is built an number of very specific choices, choices that define not only the content, but also the context of this work. This work does not exist in a vacuum, it is on drop amongst a multitude and therefore benefits from a short trip back through these assumptions to better understand the strengths and limits, of these ideas.

Thesis Assumptions		
Perspective on Science	Normal	✓ Post-Normal
<i>Literary Approach</i>	✓ Structuralist	Post-Structuralist
<i>Science Communication Model</i>	Public Understanding	✓ Public Engagement
<i>Narrative Scope</i>	✓ Micro-narrative	Meso-narrative
<i>Number of Perspectives</i>	Single	✓ Multiple

The choice of a allegorical, structuralist approach to the stories is one that is surely going to be garner more than a few raised eyebrows in the literature community. Other structuralists may question the choice of model, however at least the Hero's Journey is well-known and widely used. Here my inexperience with the field has hindered me. Christopher Booker's work is an interesting one, though not a purely academic text. I discovered the excellence of Kurt Vonnegut<sup>4</sup> too late in this thesis process to include his insights, but he appears to be at least on par with Joseph Campbell in terms of storytelling and research. His works are very high on my reading list, and a lecture of his is in Appendix A.

Post-structuralists will point to the many examples of folk stories that do not follow this structure, and highlight the generalizations and assumptions made in the original analysis. Against this I can only point out that they are right, "All models are wrong, some models are useful." In the case, the model is *guide* not a *manual*. It exists merely to structure thoughts and provide insights, not as a fixed set of rules.

The assumption of a post-normal science world is not universal. In fact, much of the science is fairly certain, and at least technologically far from change in the near future. Even in policy science, there are clear relationships and proven models that do not foster debate. However, this a sort of trap that I enjoy to set for my scientific-minded friends and acquaintances. All science is an approximation, a model, a theory. It is all wrong if you are willing to stretch your mind a little bit. Likewise there are situations where only a single perspective should be considered, such as case of fundamental human rights.

Culturally, this work is as limited as the author's life experiences. Though I have endeavored to capture as many perspectives and stories as possible, the world is a grand place and I have only so

<sup>4</sup>There is an unverified internet infographic that claims he once tried to write a master's thesis very similar to this one.

much time. This possibly is most represented by the numerous references to a single religious text, at exclusions of half a dozen other potential sources. To this end I have endeavored to explore other perspectives, though my experience and comfort with interpreting these texts is limited.<sup>5</sup>

These assumptions reflect my personal journey that lead to the creation of this work. I was born at a unique time and place to experience a very specific world of storytelling. As I grew up, Disney and others were in the midst of run of exceptional animated films that greatly influenced my views of stories. I read voraciously as a child, devouring classical American and European literature that clearly influenced both my ideas about storytelling as well as my worldview<sup>6</sup>. My white, male, hetero identity has shielded me from many of the cultural biases that occur in these stories, and though now some of these same stories have been criticized, I still hold them dear. I have always sought out new and strange stories, and these days I consume as many translated works as I do books written in English. But somehow, no matter how far afield I may wander, it seems I always end up with a new Hemingway book on the shelf every few years.

All of these points lead to the final one, an important consideration in placing this work in the context of the remaining research on this subject. It is academically an amateur effort<sup>7</sup>. That is not to say that my experience and work have no value, they are grounded in years of practice and some application in the real world. Rather, this analysis should be taken with a discerning eye, no doubt there are points that first-year students of literature analysis would identify as incomplete or broad. However, overall I believe it is a unique perspective that does contribute to the overall state of science.

#### 8.4.2. Personal Reflection

There is part of a recorded lecture I have found myself returning to time and again as I have worked on this project:(Campbell, 1969)

The poet, the artist, the creative, thinker, and feeler. Is the one who experiences meanings in depth and seeks then to render them through images that will communicate them to another. Now there is a great difficulty here, because it is impossible to communicate an experience to someone who has not had this experience.

This is what Joseph Campbell calls the artistic experience, and one that I have become intimately familiar with over the course of this project. Art is itself and incredibly challenged endeavor, one that requires acceptance of imperfection at every turn. This becomes exponentially more difficult when this art is intended to prescribe a specific meaning. Even as a moderately experience writer and creator I found the process painstakingly difficult.

That is not say it was not a worthwhile effort. Specifically, there were three developments over the course of the project that were especially revealing. The first was when I first heard the above quote, which helped to put some the challenges I was facing in perspective. I have struggled with this exact issue for a year since I first took up the idea of becoming a sort of "policy poet". I believe this is a challenge all creators face, and though it is ironic that I attended TU Delft to become a better artist, here I am.

The second moment of clarity was as I completed the first version of the Policy Fable. This initial effort included two characters mapped to the expected values of different types of people: namely individualists and egalitarians. This symbolism-laden fable quickly stretched past the target page limit and told only a fraction of the intended tale. I am proud of the world that I managed to build, and hope someday to continue refining the story, however it revealed the impossibility of including multiple cultural perspectives into one short story. This is a challenge I underestimated at the beginning of the project, and one I look forward to taking on in the future.

The final moment was one of clarity through music. I typically listen to obscure and complex music across a disparate set of genres, far from what is considered popular or mainstream. I enjoy untangling every sound and combination over repeated listening, when I find a particularly interesting composition I often play it repeatedly at first until I feel I understand the entire work. Near the end of the development of the communication artifacts, I attended the PinkPop music festival, and took the opportunity to observe how these artists constructed their messages. I was struck by how simple the most popular

<sup>5</sup>If I could have a single super-power, it may be read any language in the world. Or at least Ancient Greek, Latin and Sanskrit.

<sup>6</sup>My favorite stories as a child were the tales of Robin Hood and his Merry Men.

<sup>7</sup>Something my French philosopher friends may enjoy pointing out.

works appeared to be<sup>8</sup>, while these artists were all extremely skilled musicians they balanced this with an understanding of the audience’s expectations and taste. It was after this experience that I was able to finally craft simpler and yet satisfying set of stories.

Many of the other challenges I have faced throughout this project are not new to me, especially my propensity to create complex ideas and attempt tasks that are far too large for a single individual to accomplish on a schedule. This project is not the first to suffer from an overly-optimistic scope. In teams, I often find that this is balanced by the pragmatism of others, and I believe it is important to challenge ourselves to accomplish more than we think possible. I will continue to take on grandiose tasks, as some things are part of our nature and should not be avoided.

The readings, especially Campbell’s *Hero with 1000 Faces*, has challenged my very perception of human existence, as it has dipped deep in the discussions of where we come from, what it means to live, and why we tell stories. It was a fun ride that I am still processing.

To be honest, there were times on long walks through Den Haag when I would become physically afraid. Afraid that what I was research was somehow a key to that higher level of consciousness. I wondered if it was ethical to even study such a topic. If stories and mythologies are indeed so powerful, who am I to create them? But as I watch politicians and pundits continue to use such negative and flat stories in society, I knew that these new types of policies stories are necessary. Now more than ever.

### 8.5. Coming Full Circle

The results of this experiment are extremely promising for the future of storytelling. This journey has taken us throughout history and across continents as we have looked at a variety of stories and ideas from around the world. I hope now you recognize the shape that this grand story has taken, as we look again to the questions we set out at the beginning.

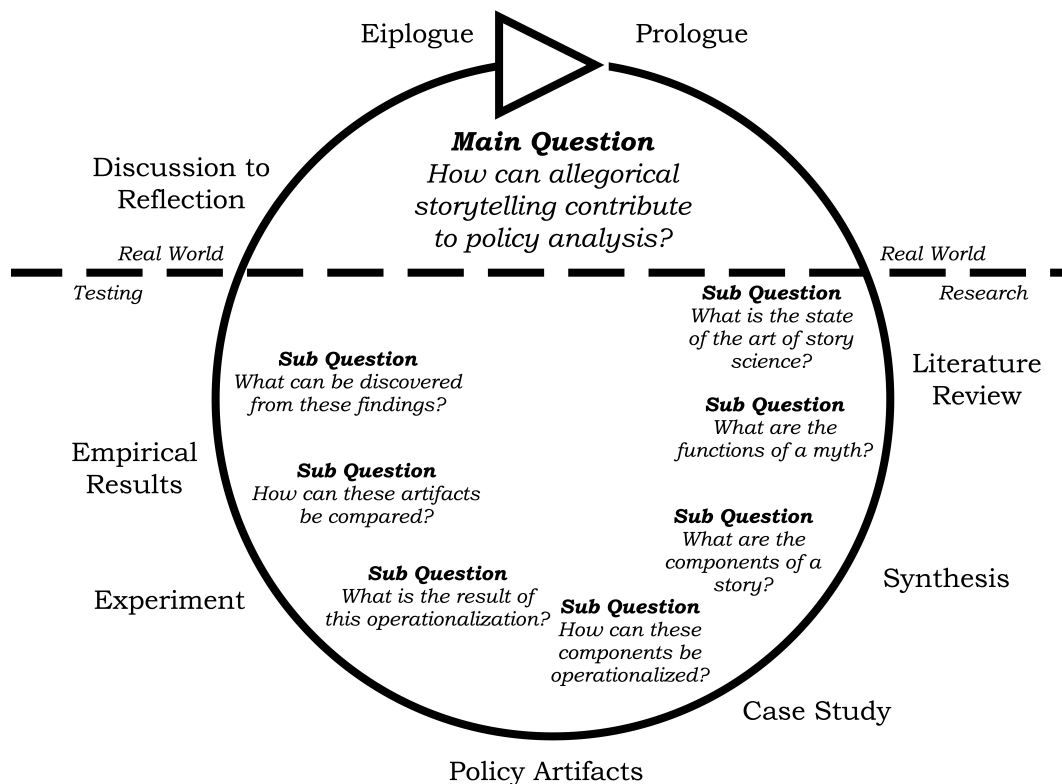


Figure 8.2: A journey through theory and practice

<sup>8</sup>Noted Dutch DJ Armin Van Buren electrified the crowd, myself included, with a track that revolves around the refrain "La la la, blah blah blah."

We began with a simple question.

*What is the state of the art of story science?*

The Extended Imagery Transportation Model is the idea upon which the rest of the work has been based, providing not only a theory of what happens when we engage in storytelling experience, but also the basis for the experiment that was conducted. The Narrative Policy Framework has provided the second essential piece of this study by their distinction between the story that is told and the micro-narrative that is heard. This framework has also provided an over-arching perspective on these narratives, tying together the strands of each individual perspective into a grand meso-narrative.

From this scientific vantage point, the meaning of these stories intended was examined through the question:

*What are the functions of mythology?*

Here, the works of Joseph Campbell provided us with four functions of any mythology. It begins with the Mystical, that wonderful power of a story to pull us away from our worldly selves. This leads to a world where the Cosmological functions of the universe can be explored, along with the Sociological functions of those who inhabit it. But these stories are more than that, they are Pedagogical in nature. They teach us how to face the challenges we inevitably as we try to make the best decisions in any situation. No matter our true beliefs, our mythologies guide us. So, if we are to create a new mythology, how can this be accomplished? This question is at the heart of this study:

*What are the components of a story?*

Continuing with Campbell's work, and picking up Christopher Booker's, we explored what plots have emerged as repeating pattern over time. Each of these thinkers created their own framework for understanding stories, frameworks that fit most, but not all stories. This exploration also looked deeper, into the hearts of characters that let us live out these plots. We saw the strive of balance over the Ego, that essential human strive to attain a higher level of consciousness where worldly desires are secondary, is what propels stories onward. Joseph Campbell rightly highlights that this is often a process of catharsis, atonement and finally apotheosis. A journey all heroes must go through if they are to grow into their own.

But we also saw that these characters and story are not the only components of a story. The synthesis of this literature review reveals that the form, message and setting play an important role in delivering the underlying message.

While theory is wonderful, without a tangible output, it remains just an idea. To change the world, these ideas of mythological stories must be put into practice.

*How can these components be operationalized to create a policy myth?*

To accomplish this, these myths must be grounded in policy science. So a basic system dynamics study of global plastics production was conducted, one that revealed that current policies are projected to be relatively ineffective over the next three decades. This study provided a challenge of presenting a typically tragic outcome in a different light.

To prepare for this test, the latest in policy communication artifacts were reviewed, revealing the good and bad practices commonly found in the industry today. These examples, along with guidance from designers, data visualization experts and a few friends, help to answer the next question:

*What is the result of this operationalization?*

The booklet speaks for itself, a labor of love by an at times outmatch artist. The artifacts show the strengths and weaknesses of leaving communication up to one individual.

Specifically, the Executive Summary represents the best of what academia offers, a logical flow of thought from strong introduction to bold conclusion, with plenty of fact in between. The modern influences of Massimo Vignelli are clear in the clean and spartan Infographic, a piece focused presenting large amounts of data in visualizations. The Metagraphic blends the line between science and story by using characters and data together, breaking the fourth wall as Hermes and his Stickman student explore the special world of model land.

And of course, there is the Policy Fable, the form that took three attempts to get just right. A transportative fable about a bird who cannot sing, a story of transformation and exploration. An allegory to the problem of plastics and modern society. The forms ready, all that remained was to build the stage upon which they will play:

*How can these forms be tested?*

Following in the footsteps of Green, Brock, Appel, and others, this research designs and implements a three-part experiment to test the forms against one another. Each component of the survey presents its own challenge: from the complexities of survey design to the very simple problem of soliciting participants. The final audience was smaller than hoped, but successful enough to provide an intriguing set of results.

*What can be discovered from these findings?*

This experiment serves as a pilot study, one that shows promising potential for future development. The results, while limited in statistical confirmation, as a whole point towards several possible advantages and disadvantages to each form. This test also reveals the inherent complexities of numerically measuring individuals and communication tools.

This study reinforces the ideas that females are more likely to experience transportation than their counterparts. Unfortunately, I have nothing to add to this causes of this mysterious effect. However, it was shown, at least for this pilot experiment, that some component of the story is a determining factor in that experience.

The **Executive Summary** is a very common form, one that performed well one of it's primary functions: presenting a **Cosmological** narrative. The design of this form, as well as the content, may be an unpleasant experience for the the audience, though it is seen as efficient by the audience. In comparison to the more artistic efforts, these focused forms still perform well in most areas of the experiment. Especially where a neutral tone is required, the Executive Summary succeed in passing on only information, without underlying messages or influencing emotions.

The **Infographic** shows promise as a form that can present a neutral message, one limited in transportative effects. There are many applications where this neutrality is desired by an analyst or a storyteller. This form, and the modern principles on which its style is based, follow state-of-the-art design recommendations. I believe that this design excels at presenting a **Mystical** myth, data viz is an emerging art, and will only continue to grow in importance.

The **Metagraphic** on the other hand, shows the potential implications of adding complexity to policy communication artifacts. This additional cognitive burden may have resulted in the poor performance on the Long Term Information section. This is the most ambitious form of the group, and may have not been on fair footing. This form may stand in as a proxy for even more complex forms of policy communication: interactive charts, games and videos that add additional channels and layers to a mythological message. Just because we can make complicated interactive experiences, does not mean they are the most effective forms of policy communication. The design of this form does allow for unique approaches to the **Sociological** function by breaking the fourth wall and critique society through a character.

The **Policy Fable**, at the heart of this thesis, shows promise as a unique tool in the policy communication toolkit. This form warrants additional testing to determine the real effect this type of communication have on forming the nature of the interpretative narrative. Not only in the numerical measurements, where it out performs in transportation and most information transfer, but maybe even more importantly in shifting that underlying message. Where the other three experiment groups focused on rephrasing the problems presented by plastics and traditional solutions, the group of respondents who read the Policy Fable spoke of transformation, change and society. This **Pedagogical** aspect of this form of myth is especially useful when attempting to engage policy makers or the public in specific actions or behaviors.

*How can allegorical storytelling contribute to policy analysis?*

The result of the experiment show that allegorical storytelling, myth-making, can contribute in a number of ways to policy analysis. The Policy Fable outperformed the other forms in several of the metrics tested, proving that stories are more than just for entertainment. This form shows promise as a

new method of communicating that goes beyond facts and direct messaging to influence the narrative formed by the audience in ways other forms cannot.

A varied and diverse mythology is also able to address underlying social issues in unique ways, by placing characters in positions that subtly break with norms that have long outlived their usefulness. This secondary ability of myths to contribute to many meso-narratives at once is an intriguing one that was not anticipated at the outset of this quest.

This work also serves as a guide for other policy analysts looking to apply stories to their own work, by providing insight into how stories fit into some common policy analysis roles, settings and audiences. We also saw how policy can influence popular stories as a way of reaching out to those who may otherwise not actively search out policy messages. For many challenges, including those surrounding plastics, this form of communication is essential to create change in the world.

These ideas are just the first steps of a long journey back to where it all began. A time when science and myth were interwoven into the stories that shaped human history.

# Epilogue

## **On the Things Read for This Thesis**

I have read a lot, and now I have asked you to read a lot. We have explored a unique perspective on the relationship between policy and mythology by looking at the stories we tell each other and ourselves. The relationship we have discussed are complex ones.

Stories exist is much as art as they do science, and require that delicate balance of style and function. They also demand a wide knowledge-set, few individuals can master more than a handful of forms in a lifetime. Each analyst does not need to become an expert. All they must do is set sail the vast Sea of Stories and inspiration will follow. Or find a expert and make something great together.

This work lays out a basic framework for these adventures. Unfortunately, the only real rule is that there are no rules. For each example presented, there are dozens of refutations. Stories are incredibly organic creations, one that can reveal hidden assumptions and emotions unknown even to ourselves. I encourage everyone to engage in at least one creative hobby, whether it be writing or painting; music or dance. The transportative experience is a powerful one, as much as for the storyteller as the audience.

## **On the Nature of These Questions**

Transportation. That essential, inexplicable experience. Stories allow us to move beyond sympathy and empathy, into moments where we see the world through the mind of another. This allows us to do and feel things that would otherwise be impossible. To ignore these types of experiences is an oversight.

The ancient meso-narratives that dominated policy for generations, religion, are fading in the most developed countries as science has become the main mythology. Like all myths, it is growing subject to questioning and uncertainty. Unlike others, science has canonized this process, and is equipped to resolve some of these issue within its normal process. But many of the grandest challenge lay beyond even our advanced capacities. It is here where stories serve their greatest purpose, to explain what we cannot understand. A unique historical opportunity exists, the opportunity to create a new mythology. One grounded in the principles of the scientific method, while also incorporating the rituals, formalization and symbolic power of traditional mythologies. This mythology is already emerging but remains un-unified, a disparate collage of conflicting messages and confusing symbols.

Successful mythologies use consistency of imagery and individual experience to their advantage, by providing a unified set of stories that can fulfill all four functions simultaneously. As more of the world turns from traditional mythologies towards scientific ones, they will be searching for new narratives. Too often in the modern world, they find stories in the form of alarmism, conspiracy, ignorance and hate. It is the responsibility of policy analysts working at every level to confront these issue in their stories whenever possible, both directly and indirectly. Even the smallest choices can be made with these ideas in mind.

## **On the Words We Use**

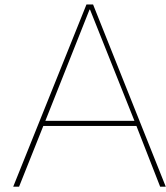
The words we use to prescribe meaning to our experiences are especially important. We have been introduced to several new ways to use words we already knew, and learned more than a few new ones along the way. But we also saw the importance of the words we use, and the difference they can make.

## **Why Stories Matter**

These must be applied with a discerning eye, their influences can be subtle and unpredictable. They are not appropriate for every situation. As the situations we face grow ever unclear, analysts, storytellers and society all can benefit from incorporating mythology, storytelling and policy. After all, everything is meaningless. Only our stories have meaning.







## Read, Watch, Listen

This is a list of recommended experiences that relate in some way to this work. Or they are something I found along the way that deserves sharing.

### Read

**Flatland** by Edwin A. Abbott

*An intriguing story told in two parts. The first half sets up the rules of a two-dimensional world, the second half challenges the assumption that these rules are the only set that govern the universe.*

**The Garden of Forking Paths** by Jorge Louis Borges

*An example of how an old story can embody new concepts, in this case as an example of path-dependency.*

**The Sniper** by Liam O'Flaherty

*A classic form of a specific message about war.*

**A Jury of Her Peers** by Susan Glaspell

*A mystery with a surprising conclusions.*

**Silent Spring - Introduction** by Rachel Carson

*A parable about the dangers of pesticides from a book that changed policy.*

**Silent Spring - Introduction**

*A fable of unknown origins that demonstrate the duality of perceived weaknesses.*

### Watch

**Alternative Math**, written by David Maddox and Malcolm Morris

*9 minutes. A wonderful example of allegorical storytelling where the hero uses the power of the enemy to resolve the story.*

**The Power of Myth** by PBS

*6 hours. An interview with Bill Moyer and Joseph Campbell, covering the past, present and future of mythology. A well spent 10 Euros.*

**Drenthe aan Zee** by Jonathan Hielkema

*6 minutes. Not strictly a story, but a wonderful example of a quality production on a very low budget.*

**Amazing Crabs Shell Exchange** by BBC Earth

*A fascinating example of optimization in nature.*

**Shape of Stories** by Kurt Vonnegut

*An amazingly funny and informative lecture.*

### Listen

**Angles** by Scroobius Pip

*A story that explores multi-actor perspectives and exemplifies how the sequence of information can influence emotion.*

**Wattswave IV** and **Wattswave V** by Akira the Don featuring Alan Watts  
*An example of the emerging style known as metawave, a form of sound that mixes philosophical lectures with synthesized music.*

**The Virus** by A Tribe Called Red featuring Saul Williams and the Chippewa Travelers  
*A sample from an entire album that explores the history, policy implications and emotional experience of the Natives of North America.*

**Myth vs. History: A story at a Lunch Counter** by Joseph Campbell *An amusing tale that explore the difference between traditional and scientific mythology.*

# B

## Experiment Tools

This appendix contains the documents used to conduct the experiment.

1. Pre-Survey
2. Experiment Script
3. Experiment Photos
4. Experiment Surveys
  - (a) Executive Summary
  - (b) Infographic
  - (c) Metagraphic
  - (d) Policy Fable
5. Post-Survey
6. Debrief



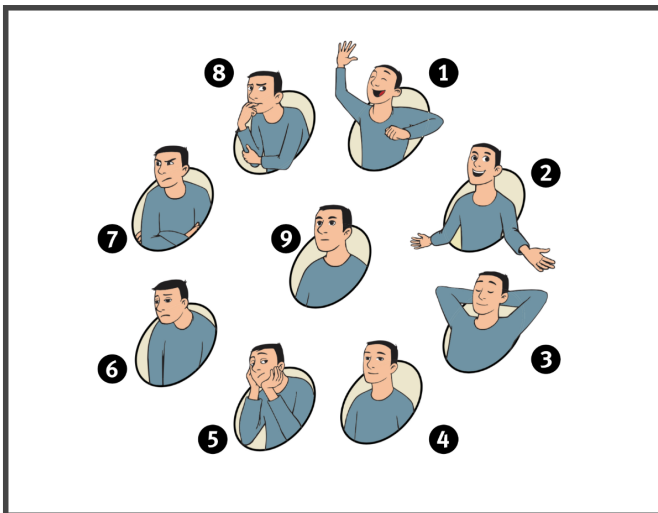
## Section 4

Please answer these questions based on your experiences with written stories in any form: novels, magazines, new articles, comics, etc.

	1 (not at all)	2	3	4	5	6	7 (very much)
I can easily envision myself in the events described in a story.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I get mentally involved in the story.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am often impatient to find out how the story ends.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am often emotionally affected by what I've read.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have vivid images of the characters.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Section 5

Please use this photo for answering the following question.

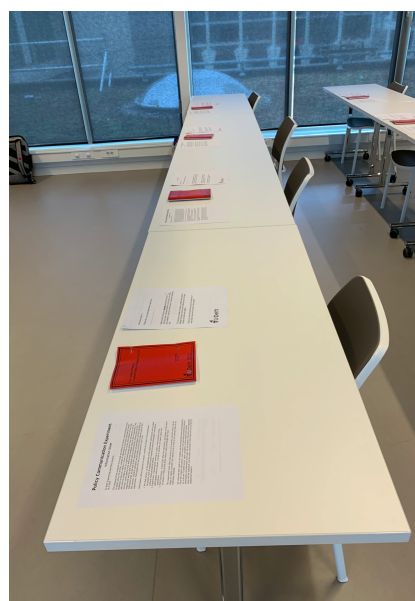
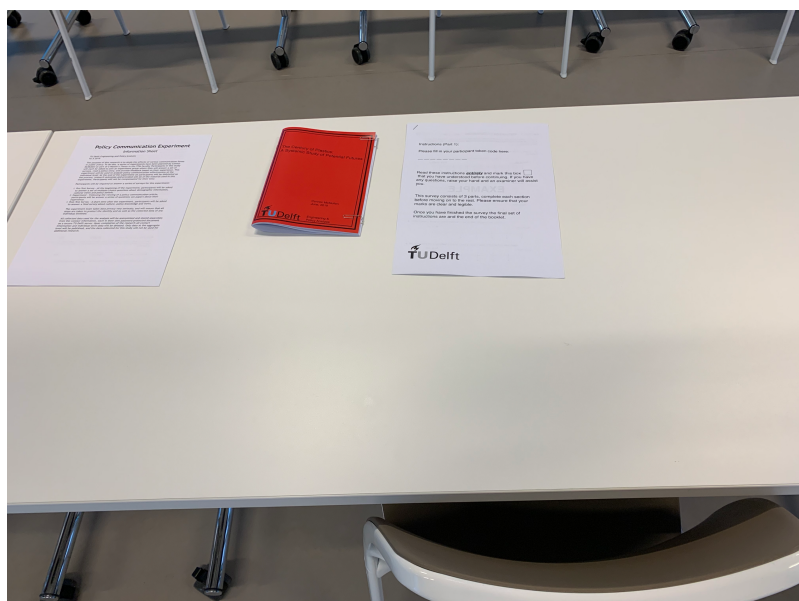


When I think about the future of plastics in society my mood is best represented by:

Choose one of the following answers

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

# Experiment Setup Photos



# **A Policy Experiment**

A Policy Communication Experiment Script written by Connor McMullen.

## **Setting (The Hague):**

*The wall between Labs 1 and 2 is open, each table is set up with chairs, booklets and writing utensils as shown in the figure. The front door is open and participants are invited to come in with a sign at the door. One Examiner is at the front of the room. The blinds are closed.*

Time: 12:15

Date: June 18th, 2019

Weather:  
Predicted Sunny.

## **Setting (Delft):**

Time: 12:30

Date: June 19th, 2019

Weather:  
Predicted Overcast & Rainy.

## **Examiner 1:**

Name: Connor McMullen

Clothing:

---

## Act 1, Scene 1: Sign Informed Consent

*<Examiner 1 and Examiner 2 prepare the room as described above.>*

*<All Participants arrive>*

**Examiner 1:** Good morning. Thank you for participating in this experiment on policy communication.

First, I will give you a paper to sign. This is an informed consent letter. You should know that you are entitled to withdraw from the experiment in case you change your mind. Please ensure that you read both the front and the back, there are several boxes to check before you sign on the second page. Don't hesitate to ask questions if you have any throughout the process.

After you have signed the paper, place it at the end of your table and I will collect them shortly.

*<All papers are signed. Examiner 1 collects forms.>*

---

## Act 1, Scene 2: Instructions

**Examiner 1:** Now, I will read some instructions about the experiment to you. Please listen carefully and do not talk to the other participants.

Before we begin, take out your phones and open the email with your participant code, and write it where prescribed on the white booklet. When you have finished reading the experiment materials, you will answer questions in this booklet, but for now you can set it aside.

Once you have finished, please turn your phone to airplane mode for this experience.

Now is a chance to ask any questions you have before we begin with the experiment.

Thank you for your consideration.

*<All participants fill in code.>*

**Examiner 1:** In a moment, we will ask you to open your booklet and read the marked section.

After you have finished reading please open the questionnaire booklet and answer the questions in that order. These questions are about your experience and the information in the document, so please read it thoroughly. To be clear, these questions are designed to be a test of the documentation not the reader. Please answer every question to the best of your ability.

Please finish each page of the survey before continuing to the next. Once you have finished close you may close your booklet and leave through the back door.

These steps are listed here on the screen, and please feel free to ask any questions. Thank you, and you may begin.

---

## Act 1, Scene 3: Experiment

*<All participants begin survey.>*

*<Examiner 1 answers questions as needed.>*

*<As participants leave, participants collect their cookies.>*



## Instructions (Part 1):

Please fill in your participant token code here:

— — — — —

Read these instructions ***entirely*** and mark this box  that you have understood before continuing. If you have any questions, raise your hand and an examiner will assist you.

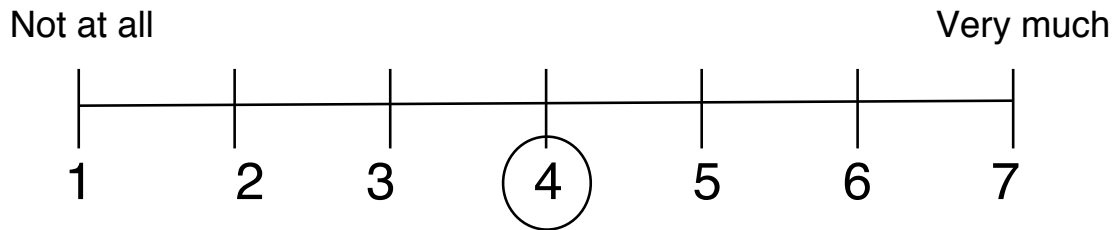
This survey consists of 3 parts, complete each section before moving on to the rest. Please ensure that your marks are clear and legible.

Once you have finished the survey the final set of instructions are and the end of the booklet.

## Section 1 - Instructions - 6 Questions:

A set of statements about the presented materials will be shown. Please the number that most closely corresponds with your experience, ranging from 1 (not at all) to 7 (very much).

E1. I could picture myself in the scene of the events described in the presented material.



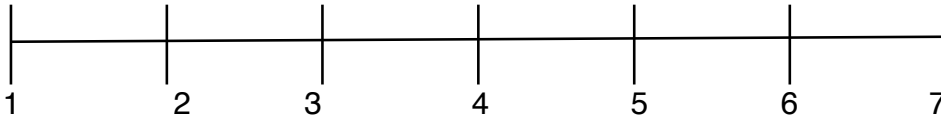
# EXAMPLE

# Section 1 - Responses - 6 Questions (Page 1 of 2):

1. I could picture myself in the scene of the events described in the presented material.

Not at all

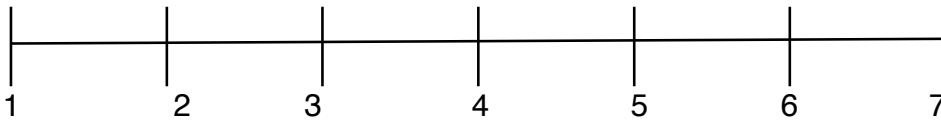
Very much



2. I was mentally involved in the presented material while reading it.

Not at all

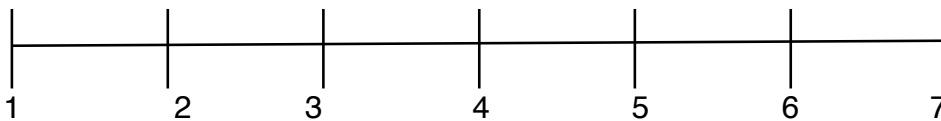
Very much



3. I wanted to learn how the presented material ended.

Not at all

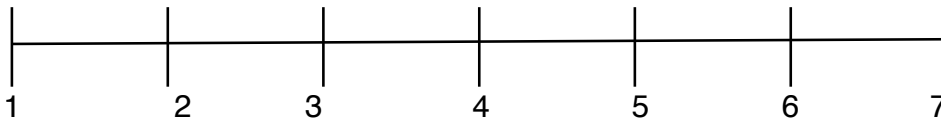
Very much



4. The presented material effected me emotionally.

Not at all

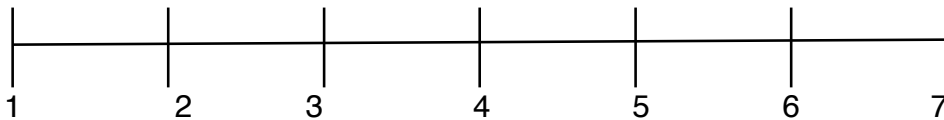
Very much



5. While reading the presented material I had a vivid image of the Red bird.

Not at all

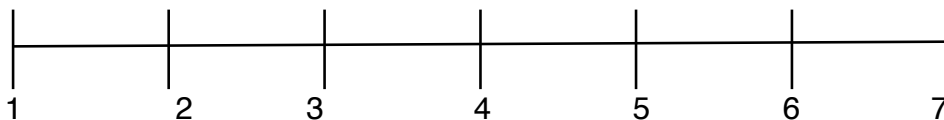
Very much



6. While reading the presented material I had a vivid image of the Black bird.

Not at all

Very much



## Section 2 - Instructions - 12 Questions:

A set of statements about the presented materials will be shown. Please mark each statement as True or False.

**E1.** TU Delft is located in the Netherlands.

**True**

X

**False**

\_\_\_\_\_

# EXAMPLE

## Section 2 - Responses - 12 Questions:

E

**A.** Answer the following True False questions about the presented materials.

	<b>True</b>	<b>False</b>
1. Plastics take approximately 4500 years to decompose.	_____	_____
2. This model used 500 simulations per policy.	_____	_____
3. This model uses system dynamics to estimate global plastic production.	_____	_____
4. These policies effect the same system components, and cannot all be implemented together.	_____	_____
5. The policies mentioned in this report are: Reduce, Reuse and Replace.	_____	_____
6. This model does not include the potential for innovations or new technologies that fundamentally change the system.	_____	_____
7. Plastics in this model can be recycled up to 2 times.	_____	_____
8. The primary recommendation is a need for new global governance and regulation of plastics production.	_____	_____
9. The largest gains from reuse policies could be in business to business shipping.	_____	_____
10. Water demand from large-scale bioplastics is a limiting factor of this type of policy.	_____	_____
11. Bioplastics products require investments at one points in the system to reduce plastics in the environment and nature.	_____	_____
12. Plastics in the environment and landfills are the main metric of evaluating this model.	_____	_____



# Section 3 - Response - 1 Questions:

1. Mark (X) on the Affect Grid the square that corresponds with your experience reviewing the presented material.


**Stress** (top-left), **High Arousal** (top-center), **Excitement** (top-right), **Unpleasant Feelings** (middle-left), **Pleasant Feelings** (middle-right), **Depression** (bottom-left), **Sleepiness** (bottom-center), **Relaxation** (bottom-right)

### Instructions (Part 3):

Thank you for completing this section of the experiment. In the following week, we will be sending you a short final survey. Please close this booklet and quietly leave the classroom, outside you will find a table with the cookie you were promised for your participation. Once again thank you for your help!



# Survey Booklet

Instructions (Part 1):

Please fill in your participant token code here:

— — — — —

Read these instructions ***entirely*** and mark this box  that you have understood before continuing. If you have any questions, raise your hand and an examiner will assist you.

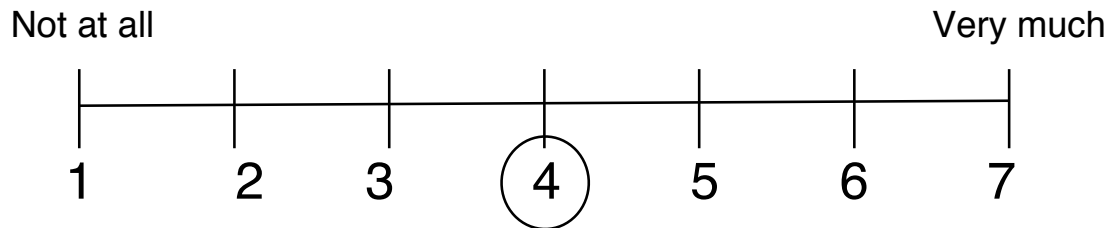
This survey consists of 3 parts, complete each section before moving on to the rest. Please ensure that your marks are clear and legible.

Once you have finished the survey the final set of instructions are at the end of the booklet.

## Section 1 - Instructions - 6 Questions:

A set of statements about the presented materials will be shown. Please the number that most closely corresponds with your experience, ranging from 1 (not at all) to 7 (very much).

E1. I could picture myself in the scene of the events described in the presented material.



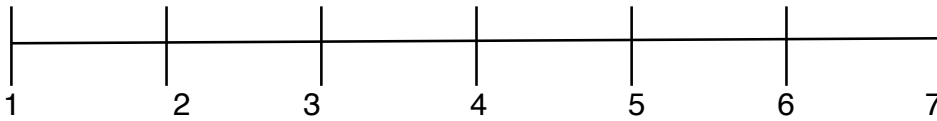
# EXAMPLE

# Section 1 - Responses - 6 Questions (Page 1 of 2):

1. I could picture myself in the scene of the events described in the presented material.

Not at all

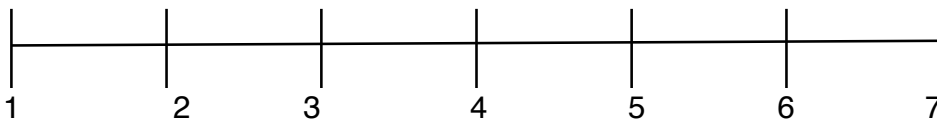
Very much



2. I was mentally involved in the presented material while reading it.

Not at all

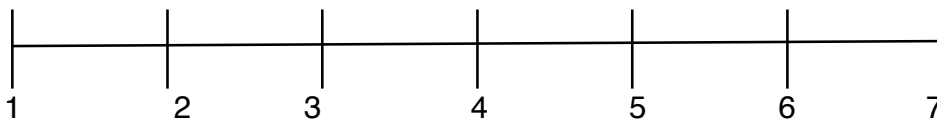
Very much



3. I wanted to learn how the presented material ended.

Not at all

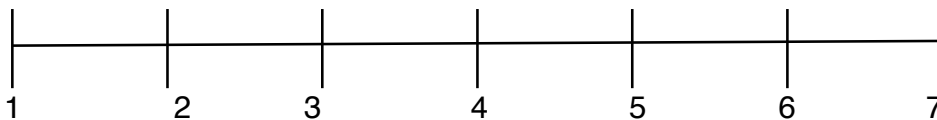
Very much



4. The presented material effected me emotionally.

Not at all

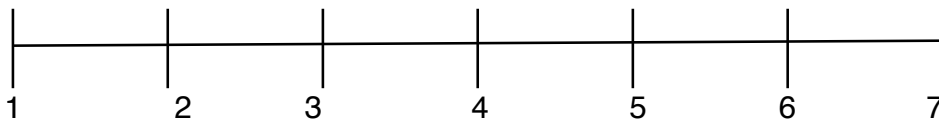
Very much



5. While reading the presented material I had a vivid image of the narrator.

Not at all

Very much



6. While reading the presented material I had a vivid image of the setting described.

Not at all

Very much



## Section 2 - Instructions - 12 Questions:

A set of statements about the presented materials will be shown. Please mark each statement as True or False.

**E1.** TU Delft is located in the Netherlands.

**True**

X

**False**

\_\_\_\_\_

# EXAMPLE

## Section 2I - Responses - 12 Questions:

**A.** Answer the following True/False questions about the presented materials.

	<b>True</b>	<b>False</b>
Plastics take approximately 4500 years to decompose.	_____	_____
Replace policies can substitute organic sources for 90% of current plastics produced.	_____	_____
This model uses system dynamics to estimate global plastic production.	_____	_____
This model used 500 simulations per policy.	_____	_____
Currently 9% of all plastics are actually recycled.	_____	_____
Plastics in the environment and nature are measured in mTonnes.	_____	_____
Plastics in this model can be recycled up to 2 times.	_____	_____
The largest gains from reuse policies could be in business to business shipping.	_____	_____
Bioplastics products require investments in biomass energy facilities to reduce the flow of plastics to landfills and the environment.	_____	_____
Water demand from large-scale bioplastics is not a limiting factor of this type of policy.	_____	_____
Plastics in the environment and landfills are the main metric of evaluating this model.	_____	_____
Reduce policies focus on reducing consumption by about 30% in 2050.	_____	_____



# Section 3 - Response - 1 Questions:

1. Mark (X) on the Affect Grid the square that corresponds with your experience reviewing the presented material.

<b>Stress</b>				<b>High Arousal</b>				<b>Excitement</b>
<b>Unpleasant Feelings</b>								<b>Pleasant Feelings</b>
<b>Depression</b>				<b>Sleepiness</b>				<b>Relaxation</b>

### Instructions (Part 3):

Thank you for completing this section of the experiment. In the following week, we will be sending you a short final survey. Please close this booklet and quietly leave the classroom, outside you will find a table with the cookies you were promised for your participation. Once again thank you for your help!



## Instructions (Part 1):

Please fill in your participant token code here:

— — — — —

Read these instructions ***entirely*** and mark this box  that you have understood before continuing. If you have any questions, raise your hand and an examiner will assist you.

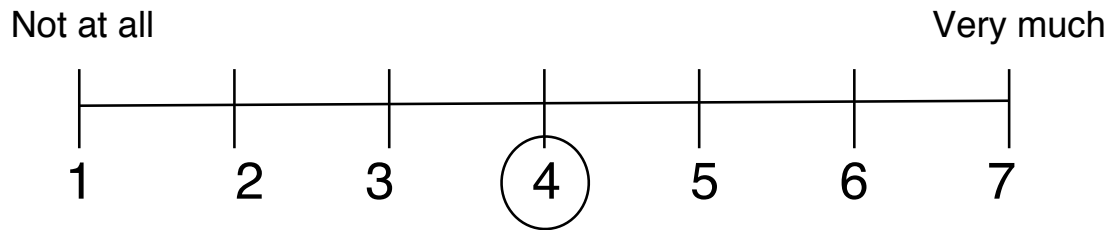
This survey consists of 3 parts, complete each section before moving on to the rest. Please ensure that your marks are clear and legible.

Once you have finished the survey the final set of instructions are at the end of the booklet.

## Section 1 - Instructions - 6 Questions:

A set of statements about the presented materials will be shown. Please the number that most closely corresponds with your experience, ranging from 1 (not at all) to 7 (very much).

E1. I could picture myself in the scene of the events described in the presented material.



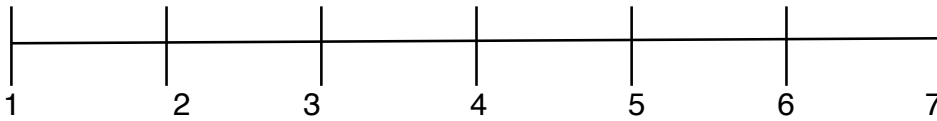
# EXAMPLE

## Section 1 - Responses - 6 Questions (Page 1 of 2):

1. I could picture myself in the scene of the events described in the presented material.

Not at all

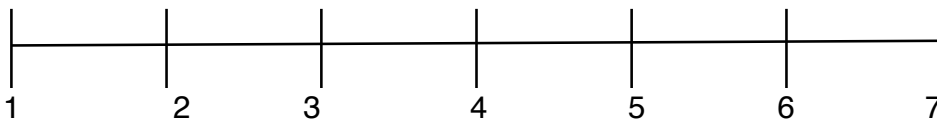
Very much



2. I was mentally involved in the presented material while reading it.

Not at all

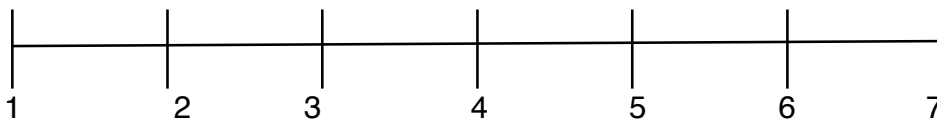
Very much



3. I wanted to learn how the presented material ended.

Not at all

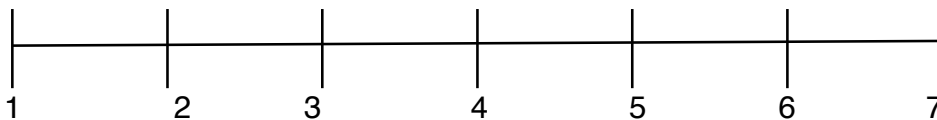
Very much



4. The presented material effected me emotionally.

Not at all

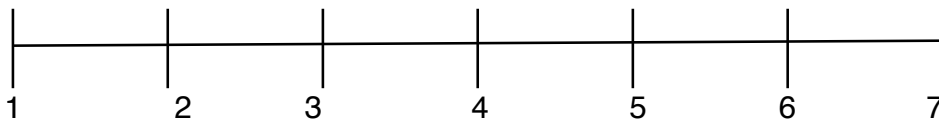
Very much



5. While reading the presented material I had a vivid image of the Red bird.

Not at all

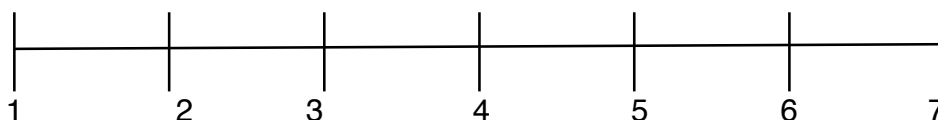
Very much



6. While reading the presented material I had a vivid image of the Black bird.

Not at all

Very much



## Section 2 - Instructions - 12 Questions:

A set of statements about the presented materials will be shown. Please mark each statement as True or False.

**E1.** TU Delft is located in the Netherlands.

**True**

X

**False**

\_\_\_\_\_

# EXAMPLE

# Section 2 - Responses - 12 Questions:

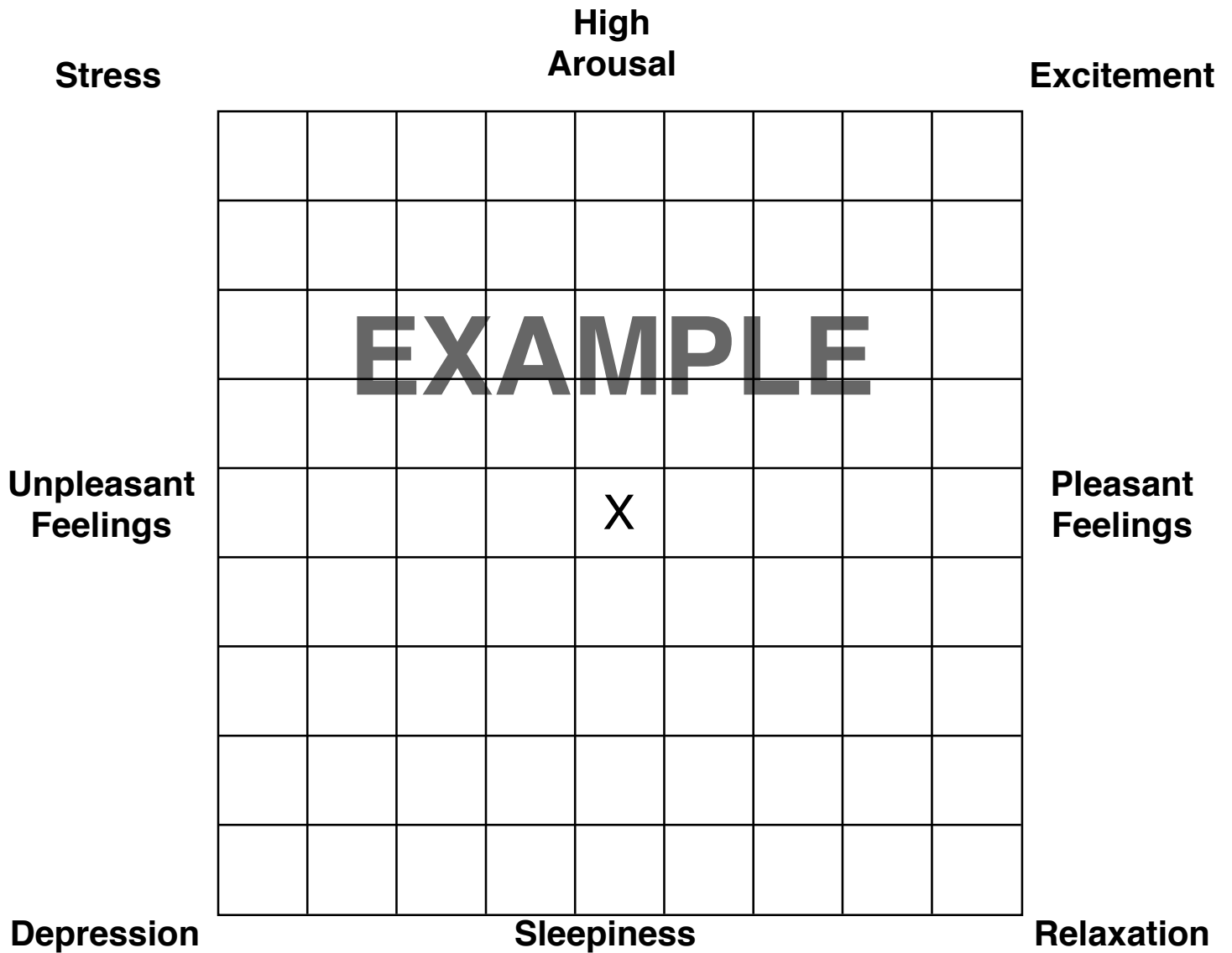
## M

**A.** Answer the following True False questions about the presented materials.

	<b>True</b>	<b>False</b>
1. Plastics take approximately 450 years to decompose.	_____	_____
2. This model estimates that there are currently 5 billion plastic consumers.	_____	_____
3. Future plastic consumers may number 14 billion in 2050.	_____	_____
4. This model used 500 simulations per policy.	_____	_____
5. This model uses system dynamics to estimate global plastic production.	_____	_____
6. Plastics in the environment and nature are measured in mTonnes.	_____	_____
7. Plastics in this model can be recycled up to 5 times.	_____	_____
8. The largest gains from reuse policies could be in business to business shipping.	_____	_____
9. Water demand from large-scale bioplastics is a limiting factor of this type of policy.	_____	_____
10. Bioplastics products require investments in biomass energy facilities to reduce the flow of plastics to landfills and the environment.	_____	_____
11. The hermit crab character lives in a shell.	_____	_____
12. Currently 9% of all plastics are actually recycled.	_____	_____

# Section 3 - 1 Questions:

##. Mark (X) on the Affect Grid on the square that corresponds with your experience reviewing the presented material on the next page.





### Instructions (Part 3):

Thank you for completing this section of the experiment. In the following week, we will be sending you a short final survey. Please close this booklet and quietly leave the classroom, outside you will find a table with the cookie you were promised for your participation. Once again thank you for your help!



## Instructions (Part 1):

Please fill in your participant token code here:

— — — — —

Read these instructions ***entirely*** and mark this box  that you have understood before continuing. If you have any questions, raise your hand and an examiner will assist you.

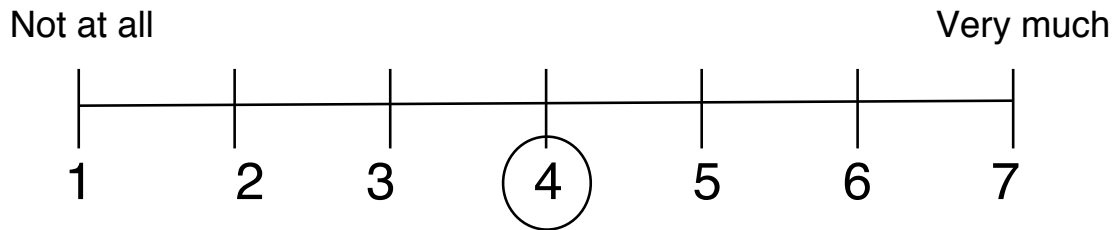
This survey consists of 3 parts, complete each section before moving on to the rest. Please ensure that your marks are clear and legible.

Once you have finished the survey the final set of instructions are and the end of the booklet.

## Section 1 - Instructions - 6 Questions:

A set of statements about the presented materials will be shown. Please the number that most closely corresponds with your experience, ranging from 1 (not at all) to 7 (very much).

E1. I could picture myself in the scene of the events described in the presented material.



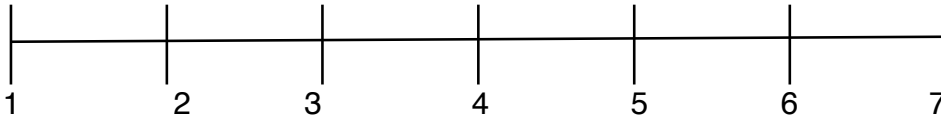
# EXAMPLE

# Section 1 - Responses - 6 Questions (Page 1 of 2):

1. I could picture myself in the scene of the events described in the presented material.

Not at all

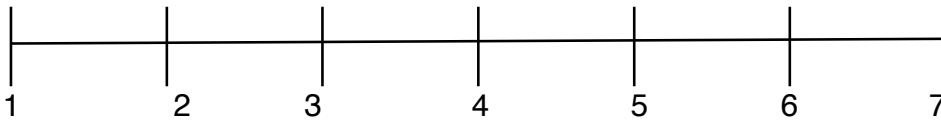
Very much



2. I was mentally involved in the presented material while reading it.

Not at all

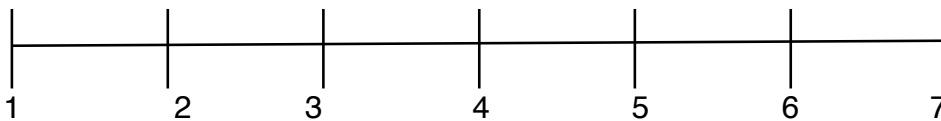
Very much



3. I wanted to learn how the presented material ended.

Not at all

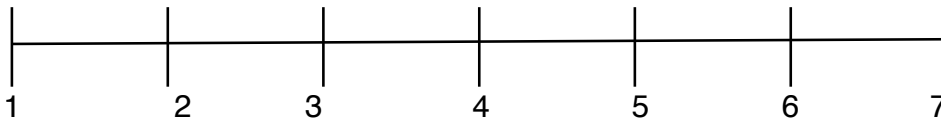
Very much



4. The presented material effected me emotionally.

Not at all

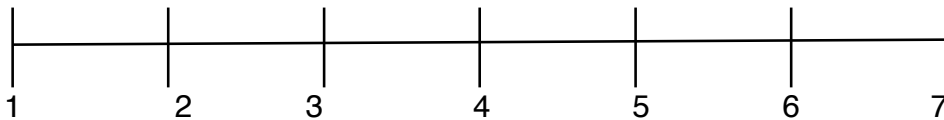
Very much



5. While reading the presented material I had a vivid image of the Red bird.

Not at all

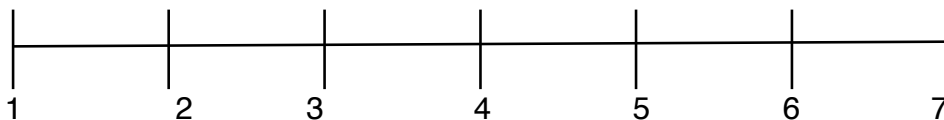
Very much



6. While reading the presented material I had a vivid image of the Black bird.

Not at all

Very much



## Section 2 - Instructions - 12 Questions:

A set of statements about the presented materials will be shown. Please mark each statement as True or False.

**E1.** TU Delft is located in the Netherlands.

**True**

X

**False**

\_\_\_\_\_

# EXAMPLE

## Section 2 - Responses - 12 Questions:

F

**A.** Answer the following True False questions about the presented materials.

	<b>True</b>	<b>False</b>
1. The Red bird lives by herself because she does not like to listen to the other birds.	_____	_____
2. The man captured the birds from the jungle.	_____	_____
3. The birds' life on the island is not easy at first.	_____	_____
4. The used shells was from under the tree towards the beach.	_____	_____
5. The Black bird can only be understood by the Red bird.	_____	_____
6. The Black bird has always lived on the island.	_____	_____
7. The Red bird sings the man's song on the shell beach with the other birds.	_____	_____
8. All of the birds agree in the end to follow the Red bird's lead.	_____	_____
9. The White bird is the leader of the group.	_____	_____
10. The man teaches the birds to sing together.	_____	_____
11. The birds do not like to live in the cage.	_____	_____
12. The other birds agree with Red as soon as they see the problem.	_____	_____



## Section 3 - Response - 1 Questions:

1. Mark (X) on the Affect Grid the square that corresponds with your experience reviewing the presented material.

<b>Stress</b>										<b>Excitement</b>
<b>Unpleasant Feelings</b>										<b>Pleasant Feelings</b>
<b>Depression</b>										<b>Relaxation</b>

**High Arousal**

**Sleepiness**

### Instructions (Part 3):

Thank you for completing this section of the experiment. In the following week, we will be sending you a short final survey. Please close this booklet and quietly leave the classroom, outside you will find a table with the cookie you were promised for your participation. Once again thank you for your help!



\*What is the main message(s) you received from the materials you read during the experiment?

! This is the only survey question that is not multiple choice, so please write as much as you wish.

If you are part of the control group (i.e. you did not read anything for this experiment) please just write "control" in the box.

\*This section consists of pairs of contrasting attributes that may apply to what you read. Please decide spontaneously. Don't think too long about your decision to make sure that you convey your original impression. Please remember: there is no wrong or right answer!

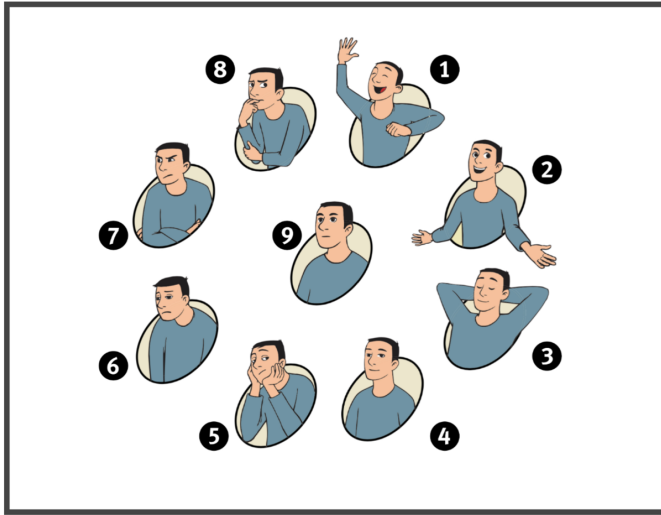
	1	2	3	4	5	6	7	
Obstructive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Supportive
Complicated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Easy
Inefficient	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Efficient
Clear	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Confusing
Boring	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Exciting
Not Interesting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Interesting
Conventional	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Inventive

Please answer these questions based on what you read in the presented material during the experiment.

	True	False
Replace policies can substitute organic sources for 60% of current plastics produced.	<input type="radio"/>	<input type="radio"/>
Reuse policies tested extended the lifetime of plastics by 20%.	<input type="radio"/>	<input type="radio"/>
It is estimated that approximately 40% of all plastics could be recycled.	<input type="radio"/>	<input type="radio"/>
Plastics in the environment and landfills are estimated to reach at least 4 times the current levels by 2050 regardless of policy.	<input type="radio"/>	<input type="radio"/>
Reduce policies focus on reducing consumption by about 50% in 2050.	<input type="radio"/>	<input type="radio"/>



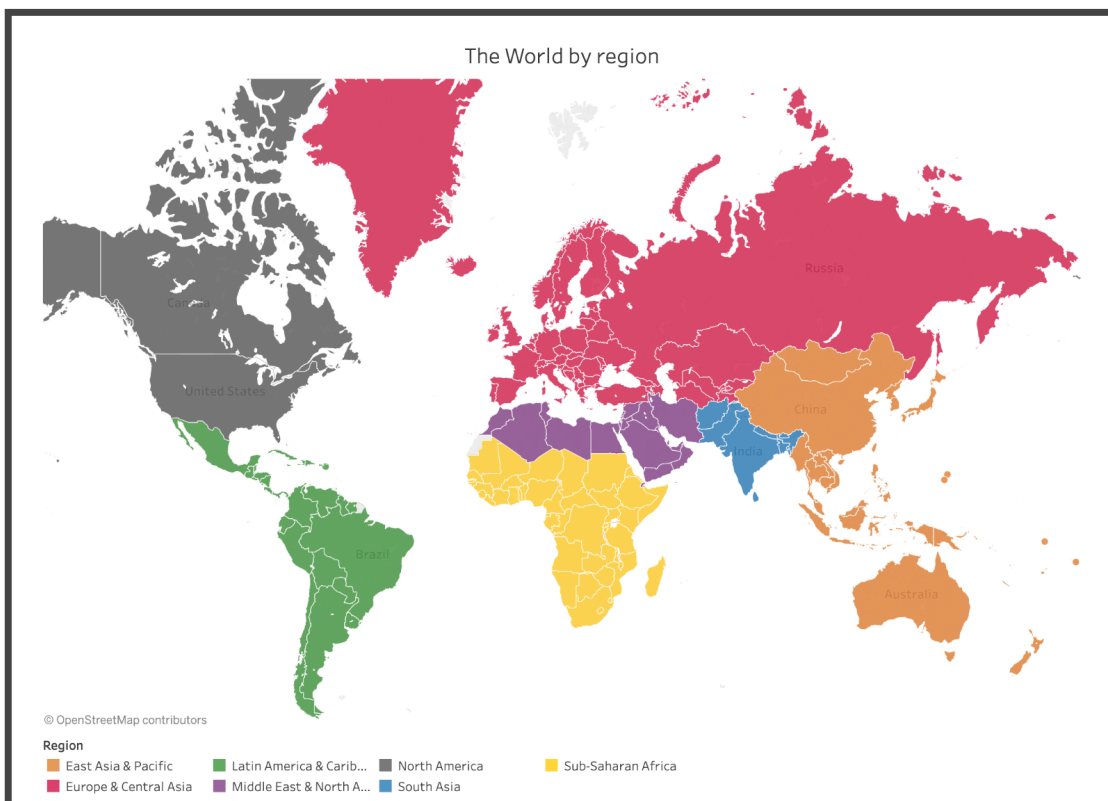
Please use this photo for answering the following question.



When I think about the future of plastics in society my mood is best represented by:

Choose one of the following answers

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9



What region of the world are you from?

# Policy Communication Experiment Debrief

Connor McMullen

Experiment  
Design

Policy Fable	Metagraphic
Executive Summary	Infographic

So, did you figure it out? There were 4 sections of the booklet, and each of you read one of them. The sections was designed along two axes. Vertically is the poetic vs. rhetoric axis, which dictates the language and style of communication. The horizontal axis shifts from textual-only to textual-visual forms. This lead to four design: a traditional **Executive Summary**, a data-visual driven **Infographic**, an allegorical **Policy Fable** and a comic-inspired **Metagraphic**.

The experiment was designed to test the effect that form and style have on communicating a specific message. Central to the experiment is the idea that when a *story* is told a *narrative* is heard by the audience. Each of you received a different narrative, based on your mood, emotional response to the material and a handful of other factors we tried to control for along with dozens we could not. Still, we do have some interesting results. I will not bore you with the details, you can find the entire thesis online in the TU Delft repository. However, I will leave you with my favorite result from the experiment, one that shows the power of stories to change the narrative surrounding plastics.

Thanks to all of you for participating in this experiment, I appreciate your time and effort to help me complete this Master's Thesis!

Connor McMullen



Figure 7.30: Executive Summary Messaging Centers Around the Problem



Figure 7.31: Infographic Messaging Centers Around the Problem



Figure 7.32: Metagraphic Messaging Centers Around the Problem



Figure 7.33: Policy Fable Messaging Centers Around the Solution

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# EXECUTIVE SUMMARY

*Some modelling work showed the future of plastics is bleak.*

*There are not many easy technological solutions...*

*I strongly remembered the part about not being able to combine the used methods of battling plastics.*

*No matter what is done it seems that a lot of plastic will still end up in the environment.*

*it was very clear for me that we are facing a much bigger problem than I thought.*

*...considering the increase and population and rise of developing countries this problem will get worse.*

## INFOGRAPHIC

*The model had several factors it took into account...*

*Some of them are more efficient, some of them are less.*

*...a lot of uncertainty...*

*A model was created to predict the amount of plastic waste for the next decades.*

*...there is no silver lining if nothing is done.*

*Recycling plastics is a complex issue.*



*It is very difficult to reduce the amount of plastic in the world.*

## METAGRAPHIC

*...a serious and huge issue...*



*Due to growing world population and growing demand the use of plastic will continue to grow.*

*The part that stayed with me is that the actions we as a society need to take should be different than what we currently do even if this means that we need to first learn and adapt and then change our path.*

*...the noise and pollution in the story reflects the plastic pollution our planet faces.*

*One individual can make a huge impact if provided with the right tools.*

*The pathway we are now is for sure meant to fail the development goals.*

## POLICY FABLE

*One cannot change all the corruption but s/he can lead and influence others to make a difference...*