

*How to Write Impactful Stories about Regional Climate Change Adaptation Using
Cultural Theory*

Els Aarts

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Supervisors

Roald Verhoeff (UU), Jannette Bessembinder (KNMI), Bernadet Overbeek (KNMI)

Abstract

This thesis is an exploratory study that is conducted in collaboration with the Royal Netherlands Meteorological Institute (KNMI). It aims to give insight in the (dis)advantages of using stories to communicate about consequences of regional climate change. Three stories were written that would resonate with three different audiences, their typology based on Cultural Theory (CT). These stories were tested in a survey with 336 participants. I¹ looked at possible differences between the stories and audiences on the variables understanding, risk perception and self-efficacy, and compared them to a control story. The CT stories did not have significant effects on their matching CT audiences. When compared to each other, regardless of CT type, they had different influences on risk perception and self-efficacy. The heuristic of (in)congruence from the Narrative Policy Framework was an important factor in story favorability. Using stories has mostly positive and neutral effects on the KNMI's credibility. For the KNMI, I recommend using stories with the Hierarchist framing, in combination with logical-scientific information as in the control story.

¹ I prefer to use 'I' or 'we' instead of the passive form, though this is rather unusual in scientific writing. I have this preference because it increases readability, and was inspired by Hillier, Kelly & Klinger (2016) who found that articles with abstracts that contain story elements are cited more often. They apply their findings on narrativity in their own article, and so do I.

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Storytelling in Climate Change Communication

Already in 1897, climate scientists found the relation between greenhouse gas emissions from human activity and global warming (Arrhenius & Holden, 1897). In the century that followed, this idea was consolidated and ultimately in the 1990's, a consensus position was formed: the climate on Earth is warming, and this is caused by human activity. In 1990, the Intergovernmental Panel on Climate Change (IPCC) issued their first report in which they stated to be certain (*now "extremely likely"*) that human greenhouse gas emissions induce global temperature (IPCC, 1990; IPCC, 2014). Since then, the amount of scientific publications around this topic has doubled every 5-6 years (Haunschild, Bornmann, & Marx, 2016).

Along with this booming growth in climate change research, the question rose how to communicate about climate change most effectively (Moser, 2010). But what is effective climate communication? Science communication has one or multiple of the following goals: increase understanding, engagement, and behavioral change. Behavioral change is difficult to investigate in the time span of a masters' thesis, since a longitudinal study is needed. The focus here lies on understanding and engagement.

What makes climate science communication different from 'normal' science communication? According to Moser (2010) there are traits in the nature of the climate problem that makes it a very challenging topic to communicate about. Climate change is a distant concept that lies outside of the life-world of people, and many people do not consciously experience it (Schäfer, 2012).

Climate change communication also bears similarities to risk communication. One of the key concepts in risk communication, and climate communication as well, is *risk perception*. Risk perception is a subjective assessment of the probability of harm (Sjöberg, Moen, & Rundmo, 2004), and can influence especially engagement with climate change and behavioral change into environmentally friendly behavior. (Ohe & Ikeda, 2005; Weber, 2010).

Individual risk perception is hugely influenced by its political and social context: risks are often politicized. Discussions about risks are not merely scientific but also centered around political and societal issues (Tansey & O’Riordan, 1999). In the case of climate change, cultural values have become more important for (individual) risk perception than scientific facts. (Kahan, 2015) conducted a study to explore the drivers behind risk perception of climate change. Kahan found that the answer to a multiple choice question about the cause of climate change is hugely influenced by political preferences and very little by education; the latter correlation is -surprisingly- negative, see Figure 1. This effect will be explained in more detail in the theoretical background.

“[Is the earth] getting warmer (a) mostly because of human activity such as burning fossil fuels or (b) mostly because of natural patterns in the earth’s environment?”

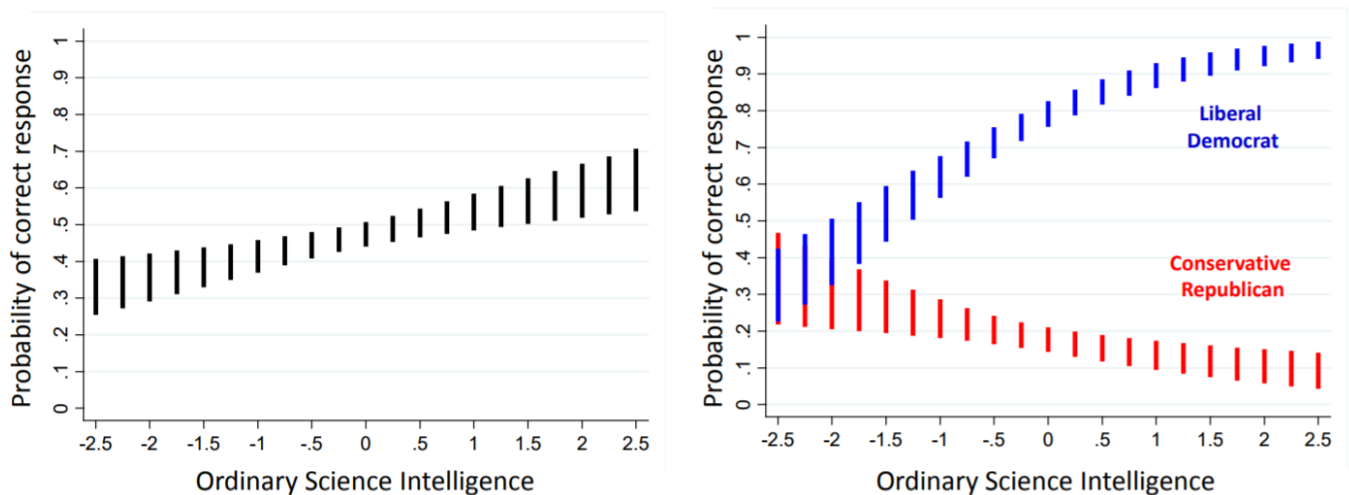


Figure 1: Effect of science literacy on knowledge of climate change cause. (Kahan, 2015).

Despite the complexity surrounding climate change communication, much empirical research has been done on barriers for climate change communication. Though, empirical research on effective climate change communication is more scarce. From these empirical studies, Dahlstrom (2014) summarizes recommendations for climate change communication:

- Close the distance. Climate change is often seen as a distant problem, both physically and temporal, and invisible (Lorenzoni, Nicholson-Cole, & Whitmarsh, 2007). Closing

the distance and making climate change visible by showing local climate change impacts can be effective (Scannell & Gifford, 2013).

- Provide an action perspective. Otherwise the public can feel paralyzed, especially with rather disastrous depiction of climate change (Lowe et al., 2006; Morton, Rabinovich, Marshall, & Bretschneider, 2011).

Also, in two literature reviews, Moser (2014, 2017) argues:

- Focus shift to adaptation ('preparedness' for climate change) instead of only mitigation of climate change. Climate change has become more 'real', local and tangible the last decades, and this could be used more in climate change communication, though empirical research is needed to support this claim.

The question rises how to incorporate these findings into a science communication design. What kind of form should this product have?

The deficit model

Many scientists warn for a form of communication that is probably not effective: the deficit model (sometimes transmit model). This model assumes that a *false* scientific idea is caused by a "knowledge deficit" in the mental model of a person. In the deficit model, this false scientific assumption can be solved by providing, or transmitting, the correct information on the issue. However, just providing more information is often either ineffective or even counterproductive, especially for controversial issues (Kellstedt, Zahran, & Vedlitz, 2008; Nisbet & Scheufele, 2009). Though, if this deficit model is not always effective (it can be in some situations, see Trench, (2008)), what else can be a suitable form to raise awareness of climate change?

Using Stories

Jones & Anderson Crow (2017) propose to use stories. With stories, one can communicate scientific knowledge that fits into the cultural values and world views of the receiver (Jones & Song, 2014). Also, research indicates that using stories to communicate science can offer increased comprehension, interest and engagement compared to traditional “logical-scientific”, or just factual communication (Dahlstrom, 2014).

According to Moser (2010), there is a lack in exchange among those practicing climate change communication and the ones researching it. Also, experts say that the available research on climate change communication is not always easily applicable to the practice of communicating climate science, since it is often not specific enough (KNMI, 2017). It is clear that there is a gap between theory and practice. This research aims to bridge this gap between existing science based strategies for communication and the practice of communication.

The study is commissioned by the Royal Netherlands Meteorological Institute (KNMI), one of the most reputable institutes for climate change research in the Netherlands. KNMI publishes both scientific papers and informational products for policy makers or the lay public about climate change. For this research, KNMI is especially interested in insights that can improve the impact of their scientific messages. KNMI would like to use the recommendations from this research in their communication strategy for their climate scenarios, which will be issued in 2021.

KNMI develops these climate scenarios in dialogue with the users, of which a considerable number are policymakers. During feedback sessions, presentation of information in the form of a story was specifically requested by these end-users. They indicated that they could use these stories about climate adaptation to generate more support among the general public for their policies.

Study outline

Thus, according to the literature, effective climate change science communication should contain scientific knowledge, bring climate change closer to the public, provide an action perspective and be congruent with the (cultural) values of the public. A story may be a suitable medium that could be used to meet all of these criteria.

Theoretically, this makes sense. But how about practice? What happens when such a research-based design is developed and tested? Do the theoretical indications fall apart or stand up tall? What does the target audience think of such a product? Which opportunities and pitfalls can be distilled? This preliminary research question involves it all and lays the foundations for the Theoretical Background:

How can storytelling be used by science communicators to increase public knowledge of and engagement with regional climate change and adaptation?

Theoretical Background

It was a dark and stormy afternoon in Fall 2017, when three employees at the Royal Dutch Meteorological Institute (KNMI) conceived the plan to integrate stories into their future climate scenario's. They hoped that the readers would be more interested in and engaged with their future climate, when the climate projections would be communicated through stories instead of just factual information. They were afraid, though, that there would be major constraints in using stories to convey information. Wouldn't the stories be distracting from the content? Wouldn't people think that it is not the role of a scientific institute to engage in stories? And what should such a story even look like? They searched through all kinds of researches and theories, but none of them provided a clear example of how to use a story in this case. On the verge of giving up, they decided there was only one solution: they needed to write and test a story themselves.

The power of stories

As you may have noticed immediately, the previous paragraph is different from what you are accustomed to when reading scientific articles. Probably the readability is higher than the introduction. This is because the text is written as a story, and not just as an enumeration of scientific arguments. According to the narrative paradigm theory, developed by Fisher (1984), humans mostly think in narratives, or stories, instead of rational structures. Stories are said to exert a powerful influence on how individuals perceive the world (Dahlstrom, 2014; Strange, 2002). Research indicates that using a narrative style can influence beliefs, attitudes, intentions and behaviors, though these studies show mixed results (Braddock & Dillard, 2016). Even in scientific language, including narrative elements can have positive effects. Scientific abstracts that contain narrative elements are cited more frequently and are published in higher-impact journals (Hillier, Kelly, & Klinger, 2016).

What is a story?

There are many definitions of a story (or ‘narrative’), but the first paragraph of this theoretical background contains all the elements that are mentioned in the most common definitions. In this thesis, I will use the definition that is provided in the Narrative Policy Framework (NPF), because it is the most extensive theory I could find and is widely used (cited 387 times in other articles). This framework is developed by Jones & McBeth (2010) and serves as an approach to study narratives, especially policy narratives. The NPF provides different research approaches, a definition of a story, and indications for research to different elements of a story.

According to the NPF, a story must contain:

- (i) a setting or context,
- (ii) a plot that introduces a temporal element (beginning, middle, end),

- (iii) characters that fix a problem (heroes), causers of the problem (villains) or victims (those harmed by the problem)
- (iv) the moral of the story, plot, or where the policy solution is offered.

In the NPF, two approaches to studying narratives are described: the structuralist and the post-structuralist approach. Structuralists seek to research the structure of a story: they assert that each story has consistent and identifiable components that can be researched and generalized. The post-structuralists object to the idea that a text can be separated from individual interpretations. They search for existing stories and research the content for framing or hidden ideologies (Jones & McBeth, 2010). Jones & McBeth (2010) make a call that more positivist, structural research to narratives is needed, including testable hypotheses and statistical analyses. Therefore, in this thesis I am using a structuralist approach.

This definition can thus be used for generalization and quantification in narrative research. Though, Jones and McBeth (2010) suggest that the research on story structure should be anchored in generalizable content, which means that the content should be made according to an existing theory or framework. This makes it easier to research different variables and compare researches with each other. This can be anchored by using the Cultural Theory as a framework for generating content.

Cultural Theory

Cultural Theory (CT) was firstly developed by Douglas & Wildavsky (1983) and became a solid theory in 1990 (Thompson, Ellis, & Wildavsky, 1990). It originates from cultural anthropology, and was developed to describe societies. The typology was based on observations, but is now used in empirical researches as well. For example, Cultural Theory is used manifold to categorize policy narratives, especially on climate change (Verweij et al., 2006). Also, it is used to conduct empirical research in different societies (i.e. Caulkins, 1999; Grendstad & Sundback, 2003). Cultural Theory is said to be a better predictor for policy

preferences and opinion than demographics, ideology or scientific literacy (Kahan et al., 2012; Kahan, Braman, Gastil, Slovic, & Mertz, 2007). Opinion and policy preferences on climate change have been subjects of research to test the above theory (Jones & Song, 2014), therefore indications exist for the relation between cultural type and climate change policy opinion.

What is Cultural Theory?

Cultural Theory, also known as grid-group theory, is a way to describe beliefs systems, or cultural values, by measuring them on a the 'grid' and the 'group' scale. Grid measures the extent to which societal ranking and stratification influence individuals. So, to which extent individuals accept formal influence from society. Group measures the extent to which individuals are committed to a group. An individual can score high or low on these two scales, resulting in four possible outcomes. These are *Hierarchist*, *Egalitarian*, *Individualist* and *Fatalist*.

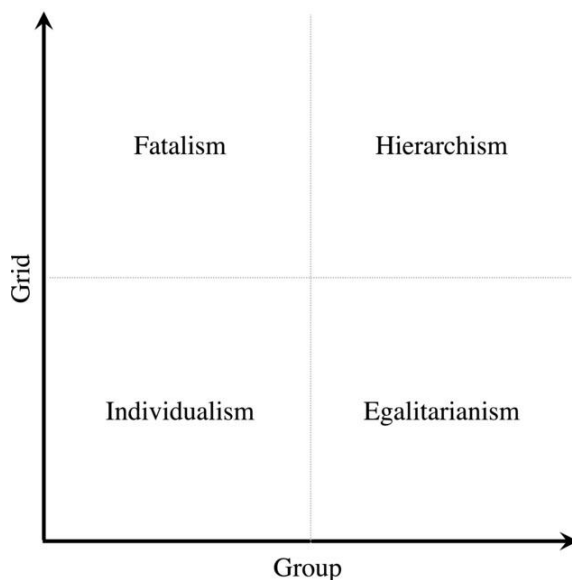


Figure 2: Graphic representation of Cultural Theory, (Ripberger, Song, Nowlin, Jones, & Jenkins-Smith, 2012)

Douglas (2007) theorizes that all four categories of people are present in all societies in the world. And more than that, they do not merely exist, but they are all four needed to keep a societal equilibrium.

I will first describe briefly the four cultural types and the attitude towards climate change (Douglas, 2007; Jones & Song, 2014):

- *Hierarchists (HR)* believe that in society, everybody has their own role and place, which is determined by birth or gender or family, and behavior is governed by positional rules. Society is hierarchic, based on tradition and order. Hierarchists are conservative: they want to preserve the things as they are. When it comes to their relation with nature, they believe nature is precariously balanced and requiring skilled experts and managers to maintain stability and avert disaster. Climate change is caused by a lack of proper planning; economic and societal systems should be managed to maintain responsible growth that the climate can tolerate. Solutions for climate change should come from the government and experts.
- *Egalitarians (EG)* are strongly focused on small groups without a clear hierarchical structure. They reject the inequalities they see outside their group, therefore they favor measures that increase equality. They are moralists, and are motivated by ‘doing good’. They view climate change as a moral issue, caused by overconsumption. They see nature as dangerously fragile, where human activities need to be cautionary, otherwise they will destroy the environment. They believe everyone has a moral responsibility in preserving nature. Solutions should come from small communities and NGO’s.
- *Individualists (IND)* are competitive. They believe positions in society are open to merit. Individualists are more concerned with private benefit than the other groups. They see nature as very resilient, it mostly returns to an equilibrium. Therefore they do

not perceive climate change as a very big threat. Innovation and new technologies will solve the issue in a way that is market-friendly, (techno-optimism). Also, they often favor adaptation to climate change over mitigation.

- *Fatalists (FAT)* are cultural isolates. They do not belong to a strong group, but still believe that others or society has a strong influence on their position. They feel powerless and not taken serious. Fatalists have a higher chance of being non-voters. Fatalists see nature as too unpredictable to take precautionary action on. Their view on solutions for climate change is highly diverse.

HIGH GRID

<p>B. Fatalism Apathy, risk-averse</p> <p>Nature capricious</p> <p>Blame fate</p>	<p>C. Hierarchy Bureaucracy, decisions from above</p> <p>Nature perverse/tolerant</p> <p>Blame deviants</p>
<p>A. Individualism Free exchange, competition Risk is opportunity</p> <p>Nature benign</p> <p>Blame incompetence</p>	<p>D. Egalitarianism/enclave Sharing, concern with moral purity and boundaries against outsiders</p> <p>Nature is ephemeral</p> <p>Blame the system</p>

LOW GRID

LOW GROUP

HIGH GROUP

Figure 3: Summary CT type characteristics, from (Caulkins, 1999)

Most studies on CT were conducted in the U.S. However Grendstad & Sundback (2003) discuss Cultural Theory for Northern European countries: Norway, Sweden, Finland, Iceland. Assuming these countries are culturally closer to the Netherlands than the U.S., a slightly modified application of CT is used.

Story Persuasion

In this research, Cultural Theory is used to construct stories with the ultimate goal of increasing understanding and engagement with regional climate change. But how does that work? Why would these stories be effective in persuasion? The NPF (Jones & McBeth, 2010) argues that the persuasiveness of stories can be studied at two levels: the micro and the meso level. The meso level is about explaining how policy narratives (or frames) influence policy outcomes. The micro level research is about how policy narratives impact individual opinions, thus it evaluates the persuasiveness of a single story. Such a micro level study can be done in an experimental design, according to Jones & McBeth (2010).

The NPF hypothesizes four distinctive causal mechanisms that may be indicators for the persuasiveness of a story and that can be used for empirical micro level research. These are: *canonicity and breach*, *narrative transportation*, *congruence and incongruence*, and *narrator trust*. In this research, *canonicity and breach* is left out of the scope. It is about breaking expectations, but this strategy is not compliant with the information that is delivered here. Also, *canonicity and breach* is the only indicator that is not supported by empirical evidence (yet).

Narrative transportation is about the extent to which the reader is ‘transported’ into the story, and becomes involved with its protagonists. A protagonist that the reader can identify with, helps this transportation. *Congruence and incongruence* is about the individuals understanding of the world or life experience. New information in a story is easier for individuals to process as it is structured in a way that they can connect to. Symbols such as characters, plots, causal connections and language help congruency. The more congruent the story is with the readers’ worldview, the easier the information is accepted. It works the other way as well; individuals perform ‘identity protection’ while reading incongruent stories and reject the information. *Narrator trust and credibility* is about the source where the

information comes from. The more trustworthy the source, the more likely the individual is to accept new information.

The theory above can be used to try to find an answer to the following question:

“How can storytelling be used by scientists to increase knowledge of and engagement with regional climate change occurrence and adaptation?” Jones & McBeth (2010) suggest

Cultural Theory in combination with the Narrative Policy Framework can be used to provide an answer to this question. But with only these theoretical notions, the question is not really answered. In this thesis, an explorative study with an experimental design is done to find indications for how to put this theory into practice. The following sub questions are extracted from the theory:

Research questions

RQ1: Do people react differently to a story about regional climate change written for their own Cultural Theory group than to other CT stories or a control text on the variables *understanding, risk perception and self-efficacy*?

RQ2: Can eventual differences be explained with the heuristics of *narrative transportation, congruence/incongruence, and narrator trust*?

RQ3: What is the effect of using storylines on the *credibility* of a scientific institute?

Previous literature & study outline

In this section I will briefly summarize other studies' findings with regard to the research questions. A study by Jones & Song (2014) served as an inspiration for this research: they constructed three different CT stories and a control story around the topic of climate change. Then, they classified their participants into the four CT groups and presented them one of the four stories. Ultimately they found evidence that the groups that were treated with their own story were more likely to cognitively organize concepts mirroring the story than the participants that were presented one of the other texts (except the Hierarchists). I used the

setup of this research but with adjusted stories. The stories Jones & Song used are about Climate Change with a big C: they are about worldwide climate change, about who causes it and who is responsible for a solution. KNMI indicated that they were curious what the effect would be of 'smaller' stories regarding regional climate change adaptation.

As impact variables I chose *understanding*, *risk perception* and *self-efficacy*.

Understanding because it fits the aims of KNMI as a knowledge institute. Risk perception is also important for KNMI. Self-efficacy can be used as an indicator for persuasiveness of a story because low self-efficacy can be a barrier to environmentally friendly behavior change (Gifford, 2011).

I did not only describe eventual differences between subgroups, but also tried to gain insight in the causes for these differences. Therefore I used open questions in the survey to find the reasons for favoring one story over another. I classified these answers according to the heuristics for story persuasion as provided by the NPF: narrative transportation, (in)congruence and narrator trust.

Dahlstrom (2014) writes that storytelling has a bad reputation among some scientists. For example Katz (2013), who calls it manipulative and distorted. Therefore, I wanted to know whether participants thought that using stories would harm the reputation of the KNMI with respect to credibility and objectivity, and their opinion on using stories in this way in general.

Methods

Construction of the CT stories

In constructing the CT stories, we used the stories by Jones and Song (2014) as example, in addition to descriptions of the cultural types by Douglas (2007). In Appendix B, the three CT stories and the control story can be found. They all contain similar information: due to climate change, the atmosphere is warming up and will hold more water. As a result,

future precipitation will be more intense. In the three CT stories, a character is staged who explains that this intensified rainfall is problematic to process for the water management systems in Amsterdam. The three characters all have implemented a solution that can store water in the case of heavy rain, which will alleviate the sewage system. More explanation and examples of this principle can be found at the website Amsterdam Rainproof.

Both the characters as the provided solutions are shaped according to the values in the CT characters. Story A corresponds to the Hierarchist frame, Story B corresponds to the Egalitarian frame and Story C corresponds to the Individualist frame. The words that are linked to the CT frame are underlined in the Appendix. In the survey they were not underlined. Story D serves as a control text (technically it is not a story), and contains only logical-scientific information about precipitation in the future. This is the type of text that the KNMI would normally use in its climate scenarios. All stories contain an image of the character as well as an image of the proposed solution. Story D contains a graph with more specific information on intensified precipitation. All stories are non-fictional, though, with permission of the interviewed characters, their motivations are framed slightly to fit the CT frames better.

Survey development

I developed a survey in order to formulate an answer to the research questions. The first questions in the survey would provide information about participants' age, residence and gender, to see whether these variables correlate with CT type. Subsequently, participants were asked to what extent they agree or disagree (7 point Likert scale) with 12 statements. This was done to measure their cultural worldview. The questions were derived from previous studies (Grendstad & Sundback, 2003; Jones & Song, 2014). For each cultural type (Hierarchist, Egalitarian, Individualist, Fatalist), three statements were prompted. For each statement, the participant placed himself on a scale from 1 (strongly disagree) to 7 (strongly agree). In order

to counter fatigue effects, the questions were randomized for each respondent. The scores were then aggregated to produce a score for each of the cultural types. The cultural type that the respondent scores highest on is then labeled as that respondent's cultural type (Jones & Song, 2014). The CT questions were repeatedly changed after several testing- and feedback rounds. For example, the statement "Decisions in business and government should rely more heavily on popular participation" resulted in only positive results, no persons in the sample disagreed with this statement. It was replaced by "Institutions should install quota to increase diversity in their boards.", this statement provided more variance in the respondents' answers.

In the second part of the survey, the participants were exposed randomly to one of the four stories. Table 1.

Experimental design (Jones & Song, 2014) summarizes possible combinations.

Table 1.

Experimental design (Jones & Song, 2014)

Individual Cultural Type	Cultural Story Frame
Egalitarian	Control List Egalitarian Story Individualist Story Hierarch Story
Individualist	Control List Egalitarian Story Individualist Story Hierarch Story
Hierarch	Control List Egalitarian Story Individualist Story Hierarch Story

After being exposed to one of the three CT stories or the control story, the participants were asked questions to measure their score on three variables: understanding, risk perception

and self-efficacy. Finally, they were asked whether they would prefer a story with or without persons.

Because I wanted the sample groups to be as large as possible, I kept the first part of the survey short, to prevent respondents from quitting the survey before finishing it. After finishing the first part of the survey, participants could choose between finishing, or continuing to the qualitative part. In the qualitative part, the three stories and the control text were presented to the participants. Thereafter, in-depth open questions were asked about their preference for one story over the other, and about their opinions on using stories to explain scientific information. The survey questions are listed in Appendix A.

Survey questions background

The question about respondents' risk perception of climate change was based on Leiserowitz (2006). The CT questions were mostly derived from Grenstad & Sundback (2003), but were adjusted after a pilot version with 15 participants. According to Maleki & Hendriks (2015) the precise formulation of CT questions is dependent on societal context. I asked the participants which political party they supported. This was not used in defining cultural type, but was used to check whether the CT classification made sense, especially in the pilot phase.

Then, participants were randomly exposed to one of the four CT stories. After reading this story, they were asked to describe concisely what they just read about precipitation in the future (Q8). This was to measure understanding. Thereafter, three questions were asked to measure risk perception (Q9, Q10 and Q14, based on Kahan et al., (2012)) and two questions to measure self-efficacy (Q11 and Q12, based on O'Neill & Nicholson-Cole (2009)). Q15, which asks whether respondents rather have a story with persons or one without, is to gain insight in the second and third research question.

Halfway the survey, the participants could quit the survey or continue with the second, qualitative part. They were presented all four stories and asked to rank them from favorite to least favorite story. In Q18, they were asked for reasons for story preference. This question was used to find an answer to RQ 2: to see if and which heuristics (transportation, (in)congruence, narrator trust) were causing story preference. Q21 and Q22 (based on Roberts (2010)) were used for answering RQ3: they ask whether using stories affects credibility and objectivity of the KNMI. Q23 finally aims to find whether respondents have a positive or negative opinion on using these kind of stories to tell about climate change consequences.

Data analysis

Respondents

The first part of the survey was filled in by 336 respondents. I did not aim to generate a representative sample, but strived for a minimum of 50 Egalitarians, 50 Hierarchists and 50 Individualists. Fatalists are left out of comparable researches (Jones & Song, 2014; Kahan et al., 2012) mostly because they are hard to characterize and hard to persuade to fill in a survey. Therefore I did not aim to include a sample of Fatalists in my research. However, I sometimes included the few Fatalists that participated in the qualitative analyses. The respondents were collected through my own network (e-mail and social media) and the KNMI's network. Also, I emailed city council members that affiliate with conservative or right-winged parties, to get more diversity in my sample. I targeted respondents with middle or higher education level, according to the definition from CBS (2016), because the text level and questions might be not appropriate for low education level respondents. Table 2.

Respondent demographics summarizes demographic information per CT type.

Table 2.*Respondent demographics*

CT Type	Gender		Residence is Amsterdam	Age mean	Education mean (1- 4)	Climate change risk perception mean (1-7)
	Total	m/f				
Total	336	209 124	56	41,8	3.7	5.85
Hierarchist	72	49 39	5	39,3	3.7	5.74
Egalitarian	166	91 73	46	41,5	3.7	6.19
Individualist	46	36 10	2	47,0	3.8	4.87
Fatalist	8	5 2	3	42,6	4.0	5.63

Age and education have no significant effect on risk perception in this study.

However, cultural type has a significant effect: using an ANOVA with Bonferroni correction, Hierarchists are less concerned about climate change than Egalitarians ($p = .061$, $d = .40$) and more concerned than Individualists ($p = .001$, $d = .64$). Egalitarians are more concerned than Individualists ($p < .001$, $d = .99$). This fits the pattern provided by literature in which Individualists view the nature as robust, Hierarchists view it as tolerant and Egalitarians as ephemeral (Mamadouh, 1999). Figure 4 explains these differences visually: the ball is the state of the natural system. For Egalitarians, this natural system can be easily pushed out of balance, and restoring the previous state is then almost impossible. For Individualists, it takes a lot of effort to disturb the system. Hierarchists think there is a tipping point after which unrepairable damage is done. Fatalists think the system state can go into any direction and can't be controlled.

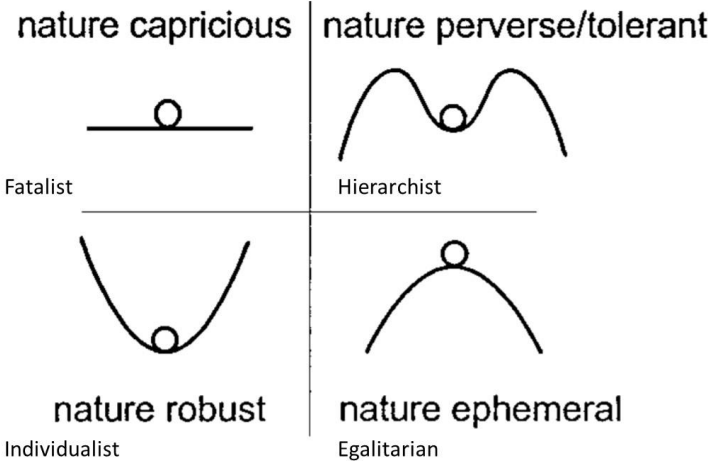


Figure 4: CT perspective on nature, from Mamadouh (1999)

I made a distinction between respondents that live in Amsterdam and those who do not, because all three CT stories take place in Amsterdam. I wanted to see whether proximity of place in the story affects risk perception of the respondents. The answer to this question is in the result section.

Also, 44 respondents scored equally high in two or more CT groups, see Table 3. I choose to take them out of the quantitative sample, following Jones & Song (2014) because they could confuse the results that depend on cultural type.

Table 3.

Respondents with double CT type scores.

Double	Number of respondents
Total	44
HR+EG	19
HR+IND	14
Other	11

179 respondents choose to continue with the second, qualitative part of the survey.

Processing survey results

For finding answers to the research questions, I transformed the answers to survey questions into variables. Some answers to survey questions were merged, i.e. the average of different questions was taken. Other survey questions were open questions, and had to be coded following a coding scheme. As a guideline I used the recommendations by Denscombe (2014) on content analysis for qualitative research.

Survey Part I.

Understanding was based on the answers to Q8. The coding scheme is included in Appendix C.

Risk perception was based on an average of the answers to Q9 and Q10 ($\alpha = .677$). Q14 was coded according to the scheme in Appendix C. Both Q11 and Q14 had negative effect on α and were left out.

Self-efficacy was based on Q12. Q11 was meant as a measure for self-efficacy as well but did not correlate well with Q12 ($r = .225$). On second thoughts, this question is more about risk perception than self-efficacy.

Character preference was based on Q15. It provides an indication for quantitative analysis on whether respondents prefer a story over logical-scientific information after having read one of the stories.

Survey part II.

Storyfavorite was based on Q17. Here, respondents read all the texts and could indicate their preference. This gives more insight in RQ1, to whether CT groups prefer their own story above other stories.

Storyleastfavorite was also based on Q17. This gives insight in which stories are least preferred by the CT groups.

Heuristics was based on Q18. This question is to seek for heuristics that indicate the reasons for certain story preferences.

Credibility is based on Q21. *Objectivity* is based on Q22. They both seek to find answers to RQ3.

Attitude is the respondents general attitude towards using stories in climate change communication. Coding schemes for Heuristics, Credibility, Objectivity and Attitude are in Appendix C.

Results

This study is of exploratory nature. The subsamples are small due to time and financial limits. Therefore, an alpha level of $p < .1$ is used, instead of the customary $p < .05$. This means that I suggest that significant values **may** be an indicator for a H1 hypothesis when this research would be conducted on a larger scale. Sometimes differences with a $p < .2$ are reported here. Fatalists are sometimes left out of the analysis, because their group is very small ($n = 8$)

RQ1: Do people react differently on a story about regional climate change written for their own Cultural Theory group than to other CT stories or a control text on the variables *understanding, risk perception, self-efficacy and character preference*?

A multivariate analysis of variance (MANOVA) test was done to find an answer to this question. With this statistical test, all dependent and independent variables with more than two categories are compared and searched for mean differences between samples. When the test outcome gave an indication for a significant difference, a post-hoc test (Bonferroni) was used to determine what the difference was. Also, effect sizes are calculated for significant differences, using Cohen's D. For variables with two categories, a χ^2 (Chi-squared) test was used.

At first, I calculated whether there was a significant difference between respondents that were presented their own story (match) against the respondents that were presented another story (non-match), on the variables understanding, risk perception, self-efficacy and character

preference, on a 7-point Likert scale, using χ^2 . The results are shown in Table 4. No differences were found between match and non-match respondents.

Table 4.

Matching and non-matching type with story

n = 292	Mean match (1-7)	Mean non-match (1-7)	Significance
Understanding	1,87	2,10	p = .579
Risk perception	5.33	5.55	p = .575
Self-efficacy	4.93	4.91	p = .759
Character preference	3.9	4.1	p = .682

Secondly, I looked at differences between cultural type and presentation of stories on the above-mentioned variables. So, for example, to see if Hierarchists that were presented the Hierarchist Story scored differently on understanding than Hierarchists that were presented the Egalitarian Story. I used both MANOVA and a Simple Effects Test with SIDAK correction. With regard to understanding the scientific message in the stories, no such differences were found. I found that Egalitarians reported a higher risk perception after having read the EG story than the HR story (n = 43, p = .071). Individualists that were presented the HR story reported a higher self-efficacy than Individualists that were presented the control story (n = 12, p = .026). However, these results could very well be a Type II error, since many combinations (144) are possible. The chance of finding some false rejections of the null hypothesis is large.

It makes more sense to compare bigger subsamples. For example the influence of being exposed to either the control text (control group) or a story (story group). The results are shown in Table 5. There are indications that the control group scores slightly higher on *understanding* than the story group. Vice versa, the groups that were presented a story indicate to report a

higher *self-efficacy* than the control group. Furthermore, the control group *prefers characters* in a story *more* than the story groups.

Table 5. *Differences between control group and story groups*

n = 336	Control group	Story group	p value	Effect size <i>d</i>
Understanding	2.21	1.92	.012	.23 (small)
Risk perception	5.45	5.48	.181	-
Self-efficacy	4.55	5.00	.082	.30 (small)
Character preference	4.59	3.85	.030	.46 (small/medium)

Then, I looked at differences between story presentation independently of respondents' cultural type. So, for example, whether respondents that read the Hierarchist story reported a higher self-efficacy than the respondents that read the control text. The results are shown in Table 6.

Table 6. *The influence of story presentation independent of cultural type*

n = 336	Story HR	Story EG	Story IND	Mean difference	Effect size
Understanding					
Story HR	-	-	-	-	-
Story EG	1.000	-	-	-	-
Story IND	.253	1.000	-	-	-
Story CTL	1.000	.451	.066**	-.49 (IND – CTL)	<i>d</i> = .40
Risk perception					
Story HR	-	-	-	-	-
Story EG	.069**	-	-	.39 (HR – EG)	<i>d</i> = .43
Story IND	.010**	1.000	-	.49 (HR – IND)	<i>d</i> = .51

Story CTL	.532	1.000	.867	-	-
Self-efficacy					
Story HR	-	-	-	-	-
Story EG	1.000	-	-	-	-
Story IND	1.000	1.000	-	-	-
Story CTL	.250	.117*	.673	.54 (EG – CTL)	$d = .36$

* The mean difference is $< p = .200$ and thus reported

** The mean difference is $< p = .100$ and thus effect size is calculated

Concluding, no differences were found between the group that was presented their own story versus the group that was presented another story (Table 4). Though, I found that the control group scored higher on understanding, and lower on self-efficacy (Table 5). Also, the control group scored higher on character preference (Table 5). The findings per story, independent of CT type, were (Table 6): the control text group scored higher on understanding than the IND story group. The HR story group scored higher on risk perception than the EG and IND groups. The EG story scored higher on self-efficacy than the control text group.

RQ2: Can eventual differences be explained with the heuristics of *narrative transportation, congruence/incongruence, and narrator trust*?

No difference existed between the respondents that were exposed to a matching story in comparison to those who were exposed to a non-matching story on the variables understanding, risk perception and self-efficacy. According to the NPF, the causes for success in story persuasion are transportation, congruence/incongruence and narrator trust. Does this imply that the stories are not successful at all in targeting a specific audience? And does the extent of narrative transportation, congruence/incongruence and narrator trust play a role in story preferences, which may be an indicator for persuasiveness as well?

In this results section, I will firstly examine whether the stories had any effect at all on the groups as to whether they ranked the stories from favorite to least favorite. Also, I will give an overview of the presence and frequency of the above mentioned heuristics. The question whether the lack in difference between matching and non-matching groups exists because the stories were fitting the CT framework well enough (and thus the heuristics did not work), is discussed in the discussion section.

In the second part of the survey, which was filled in by 179 respondents, both quantitative (Likert scale) as qualitative (open) questions were asked.

Story preference

At first, we looked at story preference; in a within-subject setup, in which participants were presented all four texts and were asked to rank them from most favorite to least favorite. The results are presented in **Fout! Verwijzingsbron niet gevonden..** Using X^2 , no statistical significant differences between the groups were found for which story was their favorite. However, for the least favorite story, a significant difference ($p = .094$) was found between

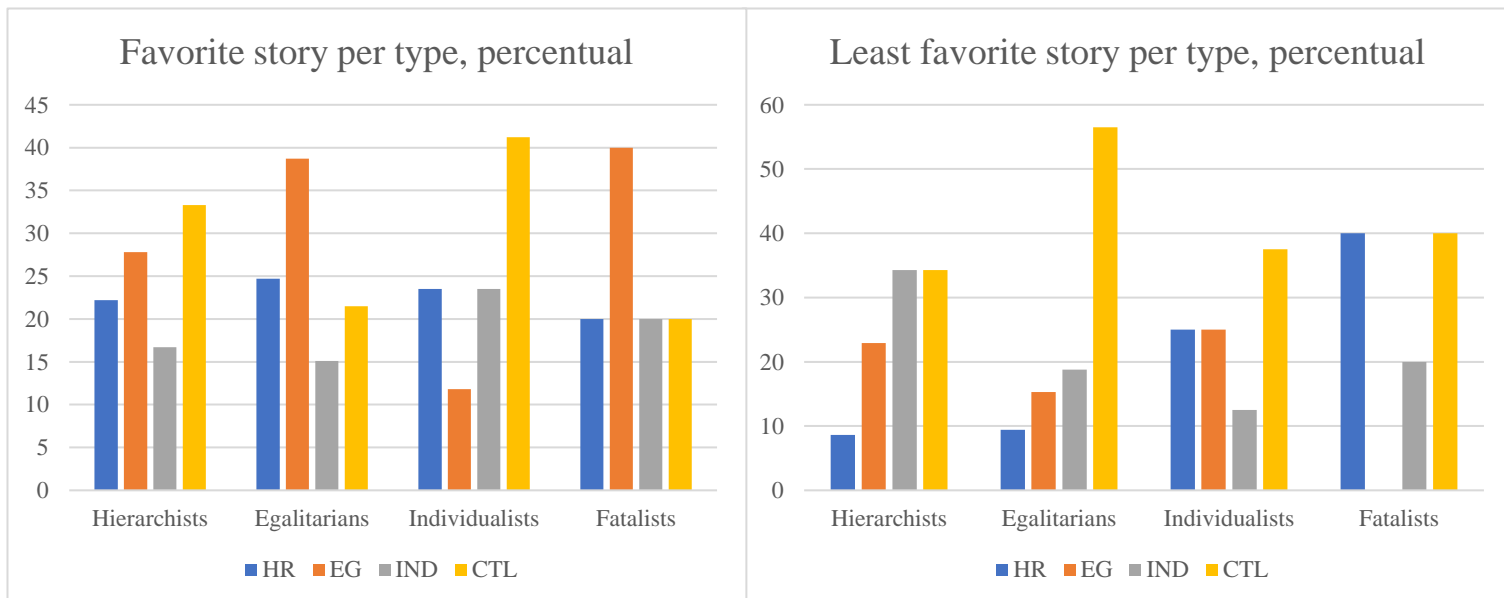


Figure 5: favorite and least favorite stories, percentual per story type.

groups.

To examine what this significant difference means, it is necessary to zoom in on the data. I applied a post-hoc test to the X^2 results: residual Z-scores. This test calculated to what extent the preferences per group are different from the total mean preferences. A positive Z-score means that the group choose the story more often than the other groups, a negative Z-score means that the group choose the story less often. The results are in shown

Table 7 and

Table 8, which are placed in Appendix E.

As

Table 7 shows, the Hierarchists (HR) do not have preferences that are significantly different from those of the whole sample. Egalitarians like the EG story significantly more than average ($p = .0574$), and they choose the control story significantly less often as their favorite ($p = 0.0719$). Individualists choose the Egalitarian story significantly less often as their favorite ($p = 0.0455$). Again, a clear difference between the Individualists and the Egalitarians was found. The other differences are not significant, but may still be worthy of having a look at: for example the control story is most popular in the Individualist group.

Table 8 (in Appendix E) shows differences between groups for which story they marked at their least favorite. It is remarkable that the control story is the least favorite story in all groups. The Hierarchists significantly dislike the Individualist story ($p = .0455$). Also, on average they do not dislike the control story in comparison to other groups ($p = .0574$). A group that does dislike the control story are the Egalitarians ($p = 0.0164$). The Hierarchist story is disliked by both Individualists ($p = .0891$) as Fatalists ($p = .0455$). These results fit the way in which I used Cultural Theory to write the stories.

Heuristics frequencies

The extent in which stories can be persuasive can be influenced by different heuristics as explained in the NPF: narrative transportation, (in)congruence and narrator trust.

In the qualitative part of the survey I asked participants for their reason for preference of one of the four stories. Their answers were categorized according to coding scheme Q18 in Appendix C, which also includes a more in-depth explanation of the heuristics. The results are summarized in Figure 6.

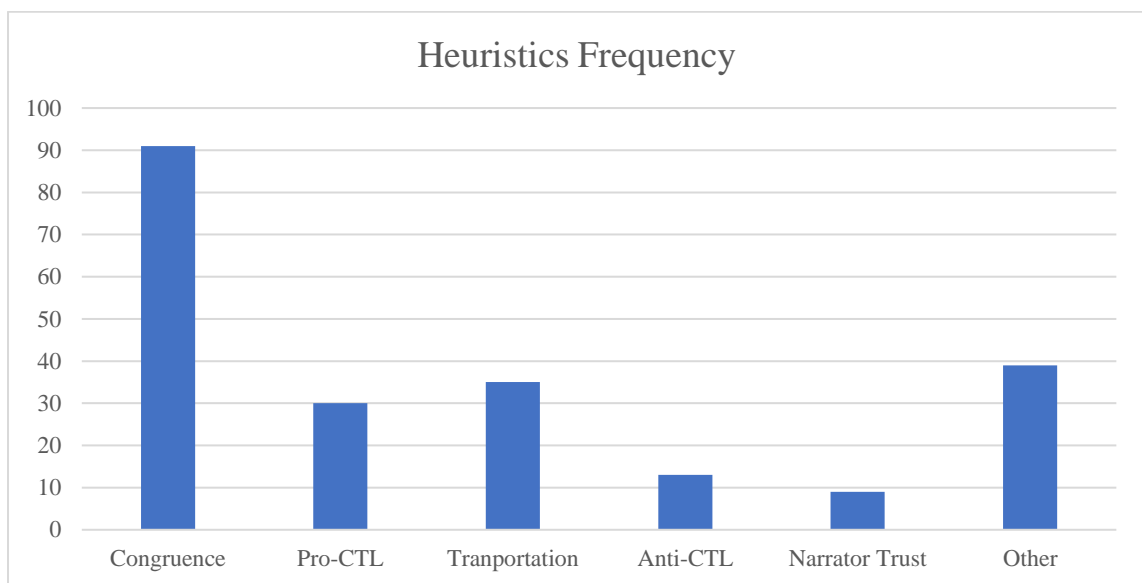


Figure 6: Heuristics Frequency

(In)congruence

(In)congruence is about the extent that the values in the story are congruent with the worldview and cultural values that reader beholds. Over 90 respondents answered with an argument that was labelled as (in)congruence. According to the NPF, (in)congruence is the heuristic that relates most to Cultural Theory; respondents' worldviews are either congruent with the CT story or not. Some examples of (in)congruence arguments are:

p. 78, EG, "Story B appealed to me most because one reads that the solution has a binding effect on the neighborhood. It is a project from civilians, and that gives me a good feeling. Story A seems like a too flashy idea from a functionary that may try to disguise certain policy choices. With Story C, I felt distracted by the question "How much is his financial profit?""

p. 213, IND, "Story C is about an entrepreneur who sees chances in sustainability and indicates that acting against climate change creates opportunities instead of just a financial burden"

These quotes relate to the Cultural Theory framework that I used for constructing the stories. For example that the Egalitarian respondent is skeptical about making profit, though the Individualist is happy to see that his value of 'creating opportunities' is confirmed.

According to Figure 6, (in)congruence is mentioned most frequently as an argument for story preference. This may be an indication that the significant differences per group in

Table 7 and

Table 8 are caused by the (in)congruency with the stories, and less by other 'disturbing' factors that affect transportation or narrator trust. The authors of the NPF, Jones & McBeth (2010), call for more research that supports their hypotheses about these heuristics. Also, they can serve as a guideline for science communicators that want to write persuasive stories.

Narrative transportation.

Narrative transportation is the extent in which the participant can imagine himself in the world of the story. High narrative transportation means that the reader lives in the story mentally and is not easily distracted (Green & Brock, 2000). Some quotes from respondents that illustrate narrative transportation:

p. 33 "Personal stories appeal more to me"

p. 44 "Story C I could totally imagine myself, as an entrepreneur"

p.19 "Story C takes place close to where I grew up, so for me it feels more special and I pick up things easier from this story"

p. 320 "These stories are too specific for me, I wanted to stop reading very soon"

These remarks are not about values, what is good and what is bad. They are about imagination and interest. The last remark illustrates ‘negative transportation’, the reader is not transported and therefore doesn’t like reading the stories.

In the survey, participants were asked to which extent² they agreed with the statement “I’d rather read (such) a text with persons than without” (Q15), after they were exposed to one of the three stories or a control story. I searched for a difference between the matching (match between cultural type and story) and non-matching groups. I expected that respondents that just were exposed to a story with a character that was congruent with their cultural type would be more positive about reading stories with characters than the respondents that read a story with a non-matching character. No statistically significant difference was found between these two groups, using a Mann-Whitney test. However, a significant statistical difference was found between the group that was presented the control text ($M = 3.85$) and the respondents who were presented one of the three CT stories ($M = 4.59$, $p = <.001$). The participants who were presented the control texts were significantly more positive about the presence of persons in a text than the participants that just read a story with a person. The Cohen’s d effect size ($d = .45$) is considered medium. So, participants that read the control text prefer a text with persons. Participants that got a story were less enthusiastic about them.

Narrative transportation can be enhanced when respondents know the place of action from their own world. Therefore, I asked for place of residence. Since all the stories take place in Amsterdam, I expected that maybe narrative transportation would be higher in this group. An indication could be that respondents living in Amsterdam score higher on risk perception ($p = 0.10$). However, this group is also extremely Egalitarian (46 out of 56) and since Egalitarians

² See Appendix C, 7-point Likert scale

report higher on risk perception in general, it is not clear whether living in Amsterdam really makes a difference in this case.

Narrator trust.

Narrator trust is not mentioned very often as an argument for story preference. It is mostly mentioned in relation to the control story, of which the KNMI is the narrator. This narrator trust was evaluated both positively and negatively, three quotes are:

p. 195: “Story D seems the most trustworthy, because it is numbers from the KNMI and not from another commercially motivated source”, or found it less trustworthy,

p.168 “Story D invokes reaction: are those numbers right?” or

p.208 “I never really trust graphs”.

These quotes illustrate that the factual control story invokes issues with narrator trust, surprisingly more than the other stories. The presence of numbers seems to have either a positive effect on narrator trust or a negative effect, as p.168 and p.208 point out.

Control text versus stories. (Pro-CTL and Anti-CTL)

43 respondents mentioned an argument that related to favoring stories or the control text. 30 respondents preferred a story above a control text, 13 vice versa. Even though stories seem more popular than the control text, still a significant amount of people (26.5 %), see

Table 7, prefers the control text. An hypothetical reason for this could be that control stories are more congruent with some respondents’ worldviews than stories with characters.

Quotes that illustrate this hypothesis are:

p. 141 “Story D is interesting to me because of my analytical work and background, but will be less appealing for others”

p. 222 “Unfortunate to some, I am not very fond of “people”. Just give me facts and numbers, ..., but the feelings of others barely interest me.”

RQ3: What is the effect of using storylines on the *credibility* of a scientific institute?

Participants were asked if they agreed with the statement “The KNMI is a credible scientific institute” (Q20). The average was a 6.3 on a scale from 1-7, in which 6 meant “Agree” and 7 meant “Totally agree”. The SD was 1.3. So, the KNMI is considered quite credible according to the respondents of this survey. However, I wanted to know whether using stories would affect this credibility. Question Q21 was an open question, asking “Do you think using stories will affect the KNMI’s credibility?” Credibility was rated as either positive, negative or a neutral opinion on whether using stories would affect the KNMI’s credibility. Participants that indicated they were employed at the KNMI were removed from the sample.

The data showed that people interpreted ‘credibility’ in a different way than I intended: p.97 answered “*Yes, the stories are of negative influence on the KNMI’s credibility. [The KNMI’s communications] should be factual and scientific, yet clear and readable.*” That was how I also interpreted the question: in my view, ‘affecting credibility’ would always be negative in this case. However, p.48 said “*Yes, the KNMI becomes more credible when using stories, because when someone in the story trusts the KNMI and I trust the character in the story, that makes the KNMI more credible*” or p.51 said “*Yes, telling stories makes their arguments more credible, since you can imagine their connection to reality better*”. Those answers show that I made a mistake in formulating the question: I did not take into account that respondents could also think that using stories would affect the credibility positively.

Many people answered just “Yes” to the question, which made their answer impossible to code, since I did not know whether they meant ‘yes’ in a positive or negative way. Fortunately, many people provided more arguments to their opinion in the next question (Q22) about the influence of stories on objectivity. Apart from some exceptions, most people indicated either a positive influence on objectivity **and** credibility when using stories, or a negative influence. Not many people had the opinion that using stories would influence objectivity negatively but the credibility positively, or vice versa. Therefore, I made only one variable out

of these two variables, since many times explanation was only provided at one out of two questions. This variable measures opinion on the influence of using stories on the scientific reputation of the KNMI. The coding scheme is provided in Appendix C.

Then, the answers were coded into three categories: participants who thought that using stories had a positive effect on credibility and positive or no effect on objectivity were coded positive (39). Participants who thought using stories had no effect on credibility and objectivity were coded neutral (67). Participants who thought using stories had a negative effect on either credibility or objectivity were coded negative (42). 35 answers could not be categorized, because it was impossible to extract an opinion. The results are summarized in Figure 7.

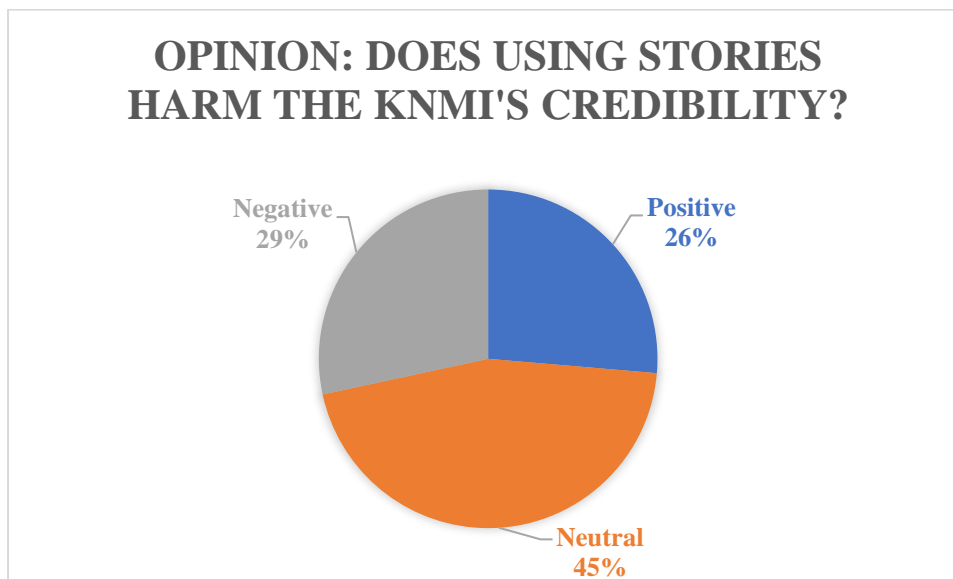


Figure 7: Does using stories harm the KNMI's credibility?

Some participants said that using stories would not have a negative effect as long as certain criteria were met. One example was that only non-fictional stories could be used, p.33: "as long as they are real stories". Another example was that the language should not be too complicated or too 'scientific', p. 99: "stories can increase credibility of the KNMI as long as they are not written too scientifically". Yet another example was that no names of commercial organizations should be mentioned: p. 195 "Story B is most trustworthy, because in the other

two names of companies are being mentioned. They might have a commercial motivation which makes the story less trustworthy”.

It is remarkable that the percentage of participants that have a negative opinion on the influence of stories is 29%, and also 26.5% prefers the control story. I wondered whether they are the same people, but this is not exactly the case: only 15 out of 38 respondents that had a negative opinion also preferred the control story. Though, this percentage of respondents with a negative opinion within the control story preference group was higher than average ($p = 0.0455$), using Chi Square. At last, the general opinions per CT type were calculated. They are displayed in

Table 9, which can be found in Appendix E. Two significant values were found: Egalitarians are significantly more negative about story influence on credibility ($p = .09$) and Hierarchists are significantly less negative ($p = 0.03$).

Should research institutes use stories to communicate their scientific message?

The last question (Q23) in the survey asks participants' general opinion on using stories to communicate about climate change ($n = 185$). Again, these answers were coded positive, negative, neutral and unknown. The results are shown in Figure 8 .

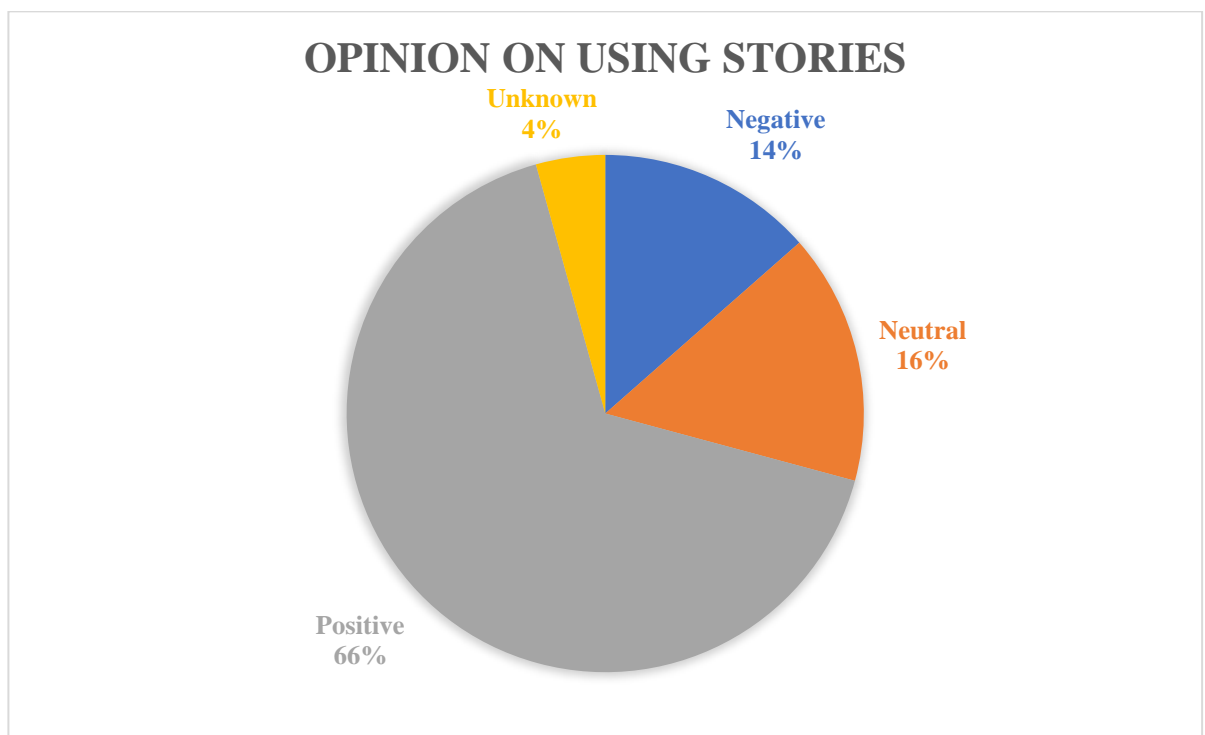


Figure 8: General opinion about using stories to communicate about climate change.

A significance analysis was done on whether CT type correlates with opinion. Only one significant result was found: Individualists are significantly less positive about using stories ($p = .09$). A variety of comments that might be useful for climate change communicators is included into Appendix D.

Discussion

This research is an exploratory study that seeks to discover practical indications that science communicators can use to increase public knowledge of and engagement with regional climate change and adaptation. Cultural Theory has been used as an anchoring theory, as suggested by the authors of the NPF, Jones & McBeth, (2010).

Research question 1: Do people react differently to a story about regional climate change written for their own cultural group than to other CT stories or a control text on the variables understanding, risk perception and narrator trust?

The question was inspired by the research by Jones & Song (2014), who found significant cognitive differences. However, this difference was not replicated. Jones & Song (2014) used a very different measuring instrument of ‘understanding’. They asked participants to organize concepts from the story, and sought whether the participants clustered those concepts in the same way as they were clustered in the stories. My stories were too short to contain that many concepts, therefore this way to measure understanding was not suitable for my research.

Also, I chose to focus more on risk awareness than understanding, since that was the main aim as well for the science communicators at the KNMI. That is why I included only one question to gain insight in understanding, but focused more on affective components such as risk perception and self-efficacy. Understanding is very hard to measure, especially in just one question. Therefore I was not surprised that no significant results were yielded. However, for risk perception and self-efficacy I am more surprised to not have found differences between the matching group and the non-matching group, especially since ‘congruency’ is mentioned by far the most as an argument for story preference, and CT based persuasion is based on this congruency heuristic. I have not found an explicit explanation for this lack in difference in the methodological chain of story construction, development of the CT

measuring questions, or the instrument that measures the variables. However, some small significant results were found between different story representations presented per type (see page 22). These are not ground-breaking: when performing that many statistical analyses (4 types * 12 story combinations * 3 variables = 144 analyses), the chance of making a Type II error (assuming non-significant data to be significant) is very high.

Regardless of CT type, comparing the control text respondents to the respondents that were presented a story, the latter group scored significantly higher on self-efficacy (*Table 5*). Seems logical, since in the control story, no solutions were provided. The control group scored significantly better on understanding. It could be an indication that stories are a barrier for understanding, but this difference could also be caused by a methodological difficulty while comparing the questions. For the control group, two points could be scored at once when repeating statistical information from the graph. This was necessary to make it possible for both groups to score a maximum of 5 points. Because this difference was significant with a small effect size, I would recommend to not take this statistical difference too seriously. What I found a more compelling result is that the Hierarchist story seems to correlate with a higher risk perception, regardless of CT type (*Table 6*). This could be an indicator for further research. A hypothesis could be that the government or experts are trusted more in providing solutions in the Netherlands, regardless of CT type.

Research question 2: Can eventual differences be explained with the heuristics of narrative transportation, congruence/incongruence and narrator trust?

No difference was found between the matching and non-matching respondents. An explanation could be that the stories were not congruent enough with the CT types. As shown in Figure 5: favorite and least favorite stories, percentual per story type., in all groups a preference for the HR story of 20-25% exists. Also, the favorite story of Hierarchists is the Egalitarian story. The distinction between Hierarchists and Egalitarians seems not sharp

enough in this research. Though, making a correlation matrix, Hierarchism correlates with Individualism in my sample, and correlates negatively with Egalitarianism. This is congruent with the finding of other studies, see (Maleki & Hendriks, 2015), but strange since Individualism and Hierarchism are opposites on both scales. This shows that it is hard to make a CT survey list that results in CT types that are mutually exclusive. Olli (2012) proposes to use question scales that measure only on grid and group, and not specifically the four CT types.

Regarding narrative heuristics, indeed (in)congruence is an important argument for preference for a story, see Figure 6. This could be caused by the fact that the differences in the stories were mostly caused by (in)congruence, and not by differences in transportation or narrator trust. However, my research shows that these congruency differences invoke reactions, and are an important factor to consider.

I left canonicity and breach out of the scope, because this is about the surprise effect in a story. A high canonicity and breach did not fit the aims of this research, because non-fictional stories had to be designed around the same topic. I hypothesize that the canonicity and breach was low in all my stories. This could have affected the overall persuasiveness of the stories. Though, Jones & Song (2014) also do not reflect on canonicity and breach and still found significant persuasive differences.

Research question 3: What is the effect of using storylines on the credibility of a scientific institute?

The question about credibility itself could have been formulated better; it should have asked whether the influence was meant positively or negatively. In general, the questions to answer RQ3 could have been formulated better as a Likert scale. I had expected for 30-50 respondents to fill in open-question part of the survey in-depth, but ultimately 180 respondents filled in this part. In retrospective, I would have included less open questions and

more clearly formulated narrow questions in the survey, or I would have done more in-depth interviews with a few respondents. This because 180 answers to a not very precisely formulated open question were hard to transform into sensible data. With either many closed questions with high internal validity or more in-depth interviews, the quality of the data may have been better.

Using statistical significance in social research

The way I used statistical significance is debatable³, see for example (Benjamin et al., 2018). Though I use the disclaimer that my p values should be used as indicators for further research instead of proof, I still produce recommendations for science communicators using those p-values. So, I would strongly urge climate science communicators to not indiscriminately implement my recommendations, but also read some other articles about Cultural Theory and story persuasion, such as the one by (Jones, 2014). My research, in combination with those articles, can provide an insightful overview for science communicators about what kind of frameworks one can use to target and persuade audiences. Even if not the Cultural Theory itself is applied, reading about applying persuasion heuristics in stories may result in more effective, or at least thought through science communication.

Ethics

In my opinion, there are some ethical questions that raise around using CT for story persuasion. Is this not quite the same as what Cambridge Analytica did; using micro-targeting storylines to persuade Facebook users to vote for Donald Trump in the 2016 U.S. elections? I think, in a way it is. Critics could say that by writing stories based on (in)congruency with the readers could increase polarization in society. By increasing ‘filter-bubbles’ in which

³ <https://www.vox.com/science-and-health/2017/7/31/16021654/p-values-statistical-significance-redefine-0005>

everyone lives in their own world of values, and only seeks for information that confirms these values. Though, I could argue that there is one difference to using this kind of story persuasion: the core message is a scientific one. About climate change and precipitation in the future. Still, I am not so sure about the validity of this argument. Even this scientific message has become politicized, and if it is not, the aim of increasing risk perception certainly is. Personally, I think that framing is inherently a part of good communication. Also, by framing the same idea (climate change) differently to different groups, I think that is also can bring people together instead of polarizing them, namely when people have different motivations but can still agree on tackling climate change.

An important notice is that my intention of ‘story persuasion’ is not necessarily the intention of the KNMI. Officially, the goal of the KNMI is to inform, not to persuade to increase awareness or risk perception. However, the question rises whether it is even possible to make a clear separation between providing information and increasing awareness. Also, within the KNMI opinions differ on to which extent the KNMI should warn for consequences of climate change, as opposed to just provide data about climate change. However, if their intention is to bring climate change (data) closer to the general public, I think it is important that they are conscious about the effects of using different frames to present their information.

Further research

Replicability: The quality of this research would have been higher with a bigger sample size, more questions measuring each construct, and more variety in the cultural types that filled in the survey. For that, more time and monetary funds would be required.

Also, I would recommend to add more ‘surprise effect’, or *canonicity and breach* into the stories. If their intention is to persuade, I think that they should ‘stick’ more, and thus be more involving (Heath & Heath, 2007). However, I am also curious to whether this canonicity

and breach might interact with credibility. This might be an indication for further research as well.

To build a valid and reliable framework, it might be better to isolate variables from this research and try to study them separately. For example, if a study would be only about risk perception, the researcher could try to dive really deep into the triggers for certain groups that invoke a higher risk perception. Then, stories for (climate change) persuasion could be based even more on scientific evidence.

Conclusion and recommendations

CT theory can be used as a basis for designing different storylines that resonate with different target audiences. The significant differences in story preferences per group conclude that different CT groups indeed have different story preferences; the Egalitarians like their own story more than the Individualists like their story. Also, in comparison with the control text, stories score better at self-efficacy, which can be an important driver for environmentally friendly behaviour (Gifford, 2011). The majority of respondents (71%) thinks that using stories has a positive or no influence on the KNMI's credibility, 82% has a positive or neutral opinion on using stories for climate change communication in general.

The different stories can be used to target different audiences. When the most common cultural type in a group is unknown, a combination of the Hierarchist story with the control text is the safest bet: in all groups (except the very small Fatalist group), at least 45% of the audience lists the HR story as their favorite, and it is also invoking the least negative reactions in the groups.

Stories potentially can attract attention for a scientific issue. Because they can exist alongside logical-scientific information, they can be used to connect the scientific information to the real world, which will, according to 26%, even increase credibility. Respondents may be triggered by a story, and read it while they might not have read the control story otherwise.

Then, the scientific content could reach audiences that would not have been reached with only factual information.

At last, I think that the 29% that thinks using stories has a negative influence on the scientific reputation should not be taken lightly. However, respondents that are “neutral” or “disagree” with “I find the KNMI a credible institute” have also significantly more often a negative opinion on using stories ($p = .037$). As respondent 23 pointed out “haters gonna hate!”.

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Appendix A

Survey questions.

Q1: Wat is uw geslacht? (MP)
Q2: Wat is uw leeftijd? (MP)
Q3: Wat is de hoogste opleiding die u heeft afgerond? (MP)
Q4: Woont u in de gemeente Amsterdam- (MP)
Zo nee, in welke gemeente woont u? (open)
Q5: In hoeverre bent u het eens met de volgende stelling (Likert scale)- [Ik maak me zorgen over klimaatverandering.]
Q6: In hoeverre bent u het eens met de volgende stellingen (Likert scale):
[Er wordt tegenwoordig te weinig naar autoriteit geluisterd.]
[Het is erg belangrijk om onze tradities te behouden en door te geven aan toekomstige generaties.]
[De maatschappij werkt het best als mensen zich altijd aan alle regels en wetten houden.]
[De wereld zou een betere plek zijn als welvaart eerlijker verdeeld was.]
[Grote bedrijven en rijke mensen zouden meer belasting moeten betalen dan ze nu doen.]
[Instanties moeten quota invoeren om voor meer diversiteit te zorgen in hun bestuur.]
[De overheid moet zo min mogelijk ingrijpen, om iedereen een gelijke kans op succes te geven.]
[Marktwerking is in principe de beste manier om diensten betaalbaar te houden.]
[In een eerlijk systeem verdienen mensen die meer kunnen ook meer geld.]
[Het lijkt niet uit te maken op welke partij je stemt, er verandert toch niets.]
[De meeste mensen zijn vooral sociaal om zelf verder te komen in het leven.]
[Ik heb het gevoel dat het leven een loterij is.]
Q7: Ik herken mij het best in de standpunten van de volgende politieke partij (MP):

Q8: Wat werd er, volgens u, in de tekst gezegd over regen in de toekomst- Probeer de verschillende elementen kernachtig weer te geven.(open)
Q9: Een toename in de hoeveelheid regen is een risico voor de samenleving. [In hoeverre bent u het eens met bovenstaande stelling-] (Likert scale)
Q10: Er moeten snel maatregelen genomen worden om wateroverlast door hevige regenbuien te voorkomen. [In hoeverre bent u het eens met de bovenstaande stelling-] (Likert scale)
Q11: Ik denk dat ik zelf te maken ga krijgen met wateroverlast door hevige regenbuien. [Geef aan in hoeverre u het eens bent met de bovenstaande stelling.] (Likert scale)
Q12: Ik denk dat ik zelf iets kan doen om wateroverlast door hevige regenbuien te voorkomen. [In hoeverre bent u het eens met de bovenstaande stelling-] (Likert scale)
Q13: Wat zou er volgens u gedaan moeten worden om wateroverlast door hevige regenbuien te voorkomen- (open)
Q14: Op welke termijn (weken, maanden, jaren, decennia) moeten er maatregelen genomen worden om wateroverlast door hevige regenbuien te voorkomen- (open)
Q15: Ik zou liever een verhaal lezen met alleen feitelijke informatie dan een verhaal met personages. [Geef aan in hoeverre u het eens bent met de bovenstaande stelling.] (Likert scale)
Q16: Wilt u doorgaan met de enquête of stoppen? (MP)
Q17: Welk verhaal sprak u het meest aan? Zet de verhalen op volgorde van meest aansprekend naar minst aansprekend. Zet het meest aansprekende verhaal bovenaan in de lijst. (MP)

Q18: Kunt u deze volgorde toelichten? (open)

Q19: Wat vindt u van de toon en stijl van de verhalen- (open)

Q20: In hoeverre bent u het eens met de volgende stelling- [Ik vind het KNMI een geloofwaardig instituut.] (Likert scale)

Q21: Vindt u dat het gebruik van verhalen invloed heeft op de geloofwaardigheid van het KNMI- (open)

Q22: Vindt u dat het gebruik van verhalen invloed heeft op de objectiviteit van het KNMI- (open)

Q23: Wat vindt u er van als dit soort verhalen gebruikt worden om over (de gevolgen van) klimaatverandering te vertellen- (open)

Q24: Wilt u nog iets kwijt over het gelezen verhaal / de gelezen verhalen of de enquête? (open)

Appendix B

OPLOSSINGEN VOOR WATEROVERLAST

Sacha Stolp werkt voor het Ingenieursbureau van de gemeente Amsterdam. De gemeente Amsterdam beheert de openbare ruimte, onder andere wegen, parken, bruggen en het riool. Sacha adviseert de gemeente over hoe deze openbare ruimte toekomstbestendig gemaakt kan worden. “Per jaar besteden we 200 miljoen euro om de stad schoon, heel en veilig te houden.”

De gemeente probeert de stad voor te bereiden op de gevolgen van klimaatverandering. Volgens het KNMI gaat het in de toekomst vaker hard regenen. Het klimaat in de wereld, en dus ook in Nederland, wordt warmer. Warmere lucht kan meer water vasthouden. Hoe meer water er in de lucht zit, hoe meer er ook weer uit kan vallen.

Deze verandering in neerslag kan voor problemen zorgen. “De capaciteit van het riool is niet groot genoeg om extreme buien op te vangen. De druk op het riool wordt erg hoog, en het wordt lastig om het rioolwaterpeil te handhaven. Er is weinig ruimte onder de grond om het riool aan te passen aan extreme buien. Het water blijft dan op plekken staan, waar het schade kan veroorzaken. Daarom zijn we op zoek naar andere, innovatieve oplossingen.”

Een van de oplossingen waar Sacha samen met kennisinstellingen en het bedrijfsleven aan werkt is het Smartroof 2.0. “Het Smartroof 2.0 is ontwikkeld om meer water op te vangen in de stad. Het bestaat uit een laag kratjes met vezelstructuren er in. Hier wordt water in opgeslagen. Op het systeem groeien planten, die zo de hele zomer genoeg water hebben. Bij extreme regenbuien hoeft het watersysteem zo minder water te verwerken, omdat het water op het dak blijft staan in plaats van dat het door een regenpijp direct het riool in stroomt”

Als het aan Sacha ligt, wordt het Smartroof-systeem straks grootschalig toegepast. “Een dak is eigenlijk een stukje braakliggend terrein in de stad. Er gebeurt vaak niks mee, terwijl het extra waarde voor de stad kan hebben. De experimenten die we nu op daken doen, kunnen later misschien op andere grote oppervlaktes in de stad toegepast worden. Zoals rond wegen of sportvelden. Dan kunnen we veel impact hebben en problemen met water oplossen.”



Sacha Stolp



Smartroof 2.0

OPLOSSINGEN VOOR WATEROVERLAST

Arnoud Hekkens is lid van het Jan Maijen collectief in de van Galenbuurt in Amsterdam. Samen met de buurt maakte hij van een stenen binnenpleintje een openbare binnentuin.

Deze binnentuin is onder andere bedoeld om de buurt voor te bereiden op de gevolgen van klimaatverandering.

Volgens het KNMI gaat het in de toekomst vaker hard regenen. Het klimaat in de wereld, en dus ook in Nederland, wordt warmer. Warmere lucht kan meer water vasthouden. Hoe meer water er in de lucht zit, hoe meer er ook weer uit kan vallen.

Deze verandering in neerslag kan voor problemen zorgen. “We begonnen met een tijdelijke broedplaats voor kunstenaars in het oude schoolgebouw aan het pleintje. Toen merkten we dat bij elke regenbui het plein blank kwam te staan. Het is een soort badkuip. Al het water dat op de omringende gebouwen valt, komt hier terecht. De afwatering was ook niet goed. Bij flinke regenbuien liep het zo de ateliers in.”



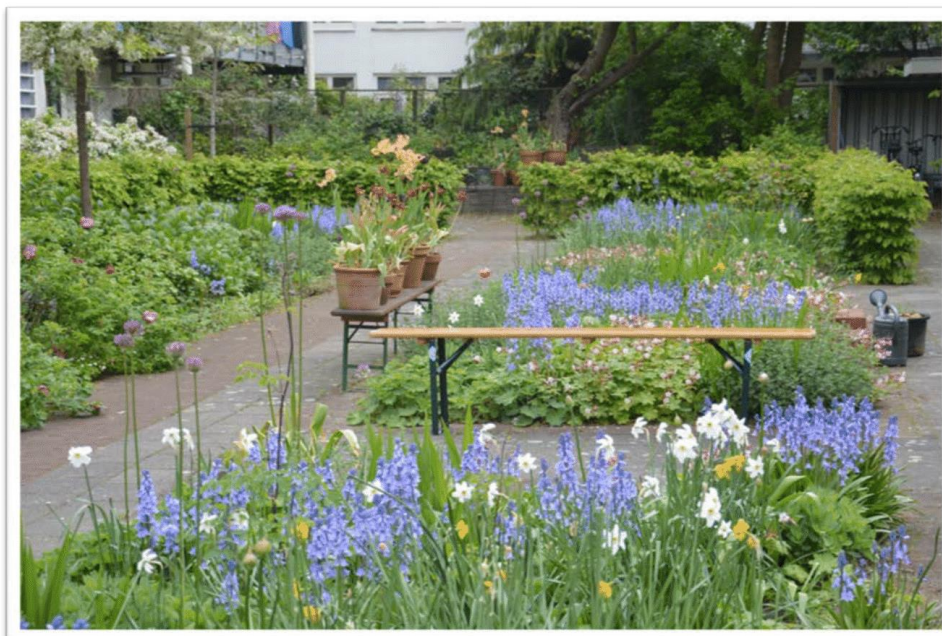
Arnoud Hekkens

© Amaury Miller

Hij vatte het plan op om van het stenen plein een binnentuin te maken voor de buurt. Buren werden uitgenodigd en gevraagd naar hun ideale stadstuin. “Rust, verkoeling en natuur waren begrippen die vaak opdoken. Ook moest er veel ruimte zijn voor water, en voor opslag van water om de waterproblemen aan te pakken.” Met deze wensen in het achterhoofd ontwierp het collectief een tuin.

De gemeente keurde het plan goed en verleende een vergunning. Volgens Arnoud zijn stadstuinen goed voor het leefklimaat in de buurt en fungeren ze als spons. “We hebben verschillende low-tech oplossingen in de tuin om water vast te houden. Zoals de 10.000 stoeptegels die op het plein lagen, die hebben we hergebruikt om plantenbakken van te maken. Er zijn ook grote waterbakken die het water opvangen. Sinds de tuin er is loopt het water niet meer de omliggende gebouwen in.”

De tuin is dus een oplossing voor waterproblemen, maar vergt wel onderhoud. “We organiseren in het voorjaar tuindagen waarop buren kunnen meehelpen met snoeien en onkruid wieden. Het oplossen van waterproblemen vraagt om een collectieve aanpak, waarin iedereen meehelpt. Gelukkig doet de tuin ook nog iets terug voor de buurt. Het is nu officieel een schooltuin. We hebben een lesprogramma ontwikkeld en ontvangen tientallen klassen per jaar. Die leren we over de natuur en over de planten die in de tuin staan.”



De tuin van Jan

© Sanne Horn

OPLOSSINGEN VOOR WATEROVERLAST

Hans Vugts is de directeur van Hotel Casa in Amsterdam. Op het dak van het hotel liet hij een groen dakterras aanleggen voor zijn gasten.

Een van de redenen om dit dakterras aan te leggen, is om de omgeving voor te bereiden op klimaatverandering. Volgens het KNMI gaat het in de toekomst vaker hard regenen. Het klimaat in de wereld, en dus ook in Nederland, wordt warmer. Warmere lucht kan meer water vasthouden. Hoe meer water er in de lucht zit, hoe meer er ook weer uit kan vallen.

Deze verandering in neerslag kan voor problemen zorgen. "Hotel Casa ligt in een van de laagste stukjes Amsterdam, zo'n vijf meter beneden de zeespiegel. Het is hier echt een soort kuil. Als het hard regent zie je het water als een kleine vloed hierheen stromen. Het is te veel water voor de putten in de stoep om te verwerken, dan blijft er allemaal water op straat staan. Ik maak me daar wel zorgen over."

Er was ook een ander probleem dat speelde rond het hotel. "We merkten dat hotelgasten bij mooi weer 's ochtends vertrokken en pas 's avonds laat weer terug kwamen. Dat kwam doordat er bij het hotel geen fijne plek was om buiten te zitten. We vonden dat zonde, we hebben in het hoogseizoen 1000 gasten en die wilden we graag meer bij het hotel houden. Dat levert meer omzet op."

Hans maakte kennis met een organisatie van bedrijven uit de buurt, die wil investeren in een 'Green Mile' een groene strook door de stad. Geïnspireerd door de High Line in New York; een oude spoorlijn die nu als stadspark dient. De bedoeling is om het gebied aantrekkelijker te maken voor bedrijven, bewoners en toeristen.

Hans kwam op het idee om een groot dakterras aan te leggen. "Het dakterras is een zonnige plek waar gasten kunnen komen zitten met een hapje en een drankje. We hebben plantenbakken waarin we groenten en kruiden verbouwen die we gebruiken in het restaurant en in cocktails. We organiseren ook activiteiten op het terras voor de hotelgasten."

Sinds het dakterras er is, loop er minder water langs het gebouw en blijft er minder water op straat staan. "Het dak houdt het regenwater vast, en dat water wordt gebruikt door de planten die er boven groeien. Het groen zorgt voor een aantrekkelijke buurt en leefomgeving. Sinds het dak is geopend hebben we veel publiciteit gehad. Dat zorgt weer voor extra gasten en meer omzet."

Picture is copyrighted

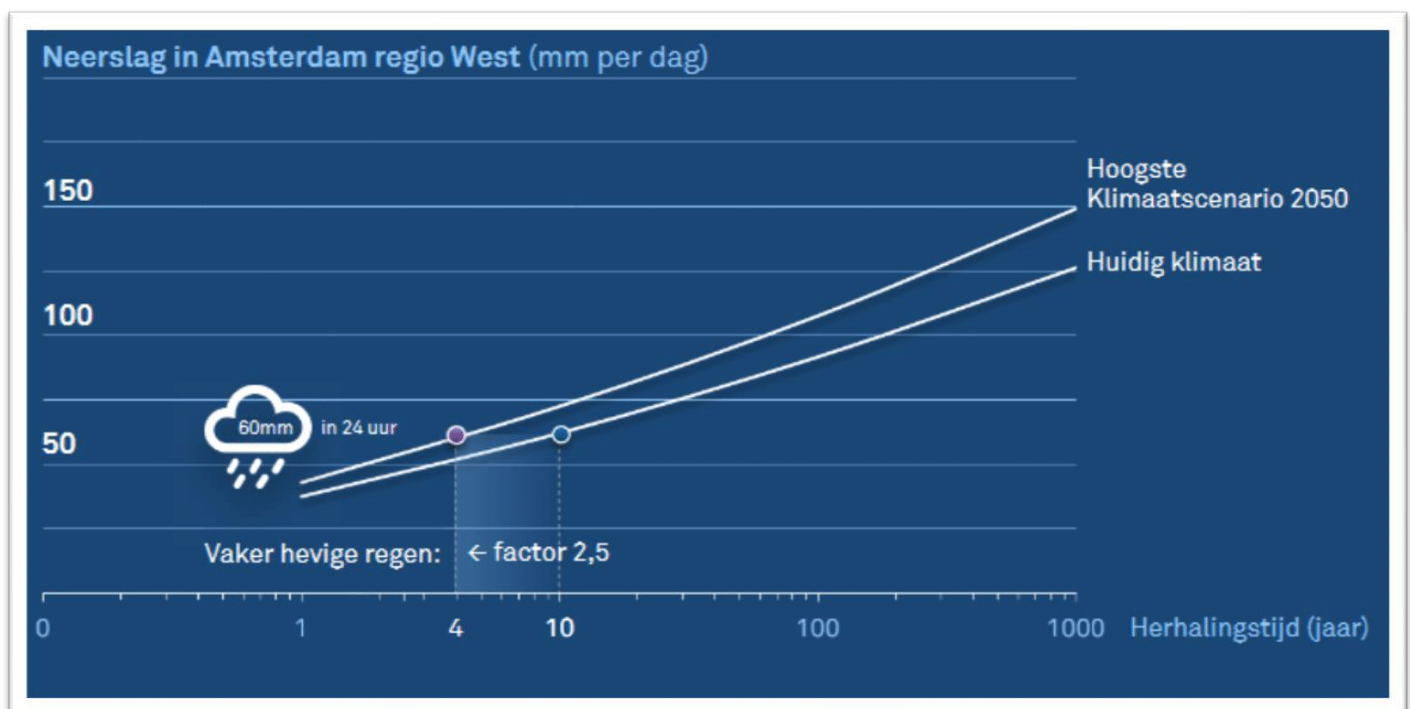


Dakterras Hotel Casa

HET WEER VAN DE TOEKOMST

In de toekomst gaat het vaker hard regenen. Dat komt door klimaatverandering. Het klimaat in de wereld, en dus ook in Nederland, wordt warmer. Warme lucht kan meer water vasthouden. Hoe meer water er in de lucht zit, hoe meer er ook weer uit kan vallen. In de warmere zomers van de toekomst kunnen er daardoor extreme regenbuien voorkomen. Er valt dan, vaak in korte tijd, een enorme bak regen uit de lucht. De kans op dit soort regenbuien wordt groter. Er kunnen ook hoeveelheden regen voorkomen die we niet eerder hebben gehad in Nederland. Hoe warmer het wordt, hoe harder het kan gaan regenen.

De volgende grafiek laat zien hoe de neerslag kan veranderen in de toekomst. Een bui die nu eens in de tien jaar voorkomt, komt in het hoogste klimaatscenario in 2050 eens in de vier jaar voor. Zo'n eens-per-vier-jaar bui in de toekomst is zo'n 15 procent heftiger dan een eens-per-vier-jaar bui in het huidige klimaat.



Appendix C

Coding schemes

Q8 Understanding

A: (1 punt) Het gaat vaker hard regenen. Of hoeveelheid regen neemt toe.

B1: (1 punt) Dit komt door klimaatverandering. Er is klimaatverandering. Het wordt warmer.

B2: (1 punt) Omdat warme lucht meer vocht kan vasthouden.

C1: (2 punten) *Alleen bij controletekst.* Specifieke informatie over hoe de regen in de toekomst gaat veranderen. Bijvoorbeeld stijgende lijn, of zo veel procent in zo veel jaar. Noemt herhalingstijd, etc.

C2: (1 punt) Noemt problemen die kunnen ontstaan doordat het harder gaat regenen.

C3: (1 punt) Noemt oplossingen om problemen door harde regen tegen te gaan.

D: (0 punten) Foutieve of onvolledige of onbegrijpelijke informatie.

Q14 Risk perception.

Q: On which term measures should be taken to prevent damage from intensified precipitation?

(in days, weeks, months, years)

A: Should have been done already/now/as soon as possible/urgently/directly

B: Within weeks / a few months

C: Within months or a few years

D: Within years / Within 10 years

E: After 10 years or more / wait until decide / focus on something else

F: Unclear answer, unspecified, I don't know

Q14 is not used for the construct Risk Perception, because it made the alpha-level lower. Only the average of the answers to Q9 and Q10 were used.

Q18 Heuristics

Coding Narrative Transportation, Congruence and Incongruence and Narrator Trust. Look for hints in the answers to one of these constructs. Which ones are most omnipresent?

Narrative transportation

Based on Green & Brock (2000). Becomes involved with its protagonists/indicates that the participant is ‘transported’ into the situation. Relates it to their own daily life (in place or time)/indicated that certain emotions were evoked by the story. Indications for transportation can be that the participant states that he can (not) imagine himself in the situation. Or places themselves into the world of the story in terms of space or time or act. Also, when participants indicated to favor the story more because it was more ‘fun’ or ‘inspiring’, I assumed transportation. Because transportation is about to which extent someone is involved in the story.

When participants state that they favor an ‘action perspective’ for themselves from the story, it is also coded transportation because the participant imagines himself taking action according to the situation in the story. ‘T’ indicates a hint to Transportation in the answer.

Congruence and incongruence

Congruence with individuals understanding of the world and especially the values that persons behold of the world. Congruent with belief systems. Through symbols, characters, plots, causal connections and language. Congruence is preferred, incongruence rejected, so when a value laden judgement of the story is stated, it is congruence/incongruence. Also links to CT are under this umbrella. Since this indicator is linked to life experience, the distinction between congruence and transportation is not always easily made. But whereas in transportation the reader almost literally transports himself into the story, congruence means that the participant states that their *values* are (in)congruent with the story. When participants reasoned that they favored a story because it was more “sympathetic” or “morally good”, so when they attached a

morally laden value to it, it was coded as an indication of congruence. ‘C’ indicates a hint to (in)congruence in the story.

Narrator trust

In this case, we look at the narrator trust in the narrator *in the story*. So when a participant says something about the trustworthiness of one of the characters, this is indicated with ‘NT’ (Narrator Trust).

Other variables

X means that the reader indicates to favor the control story over the other stories.

Z means that there is no hint to either of the three heuristics.

Q21 & Q22, credibility and objectivity

When people also answered ‘yes’ to whether telling stories affects the objectivity of the KNMI, their overall opinion is coded as ‘negative’, since an influence on objectivity is meant negatively. The others, who answered ‘Yes’ to Q21 and ‘No’ to Q22 were removed from the sample, because the intentions were unclear.

Q23 Opinion on using stories

When the opinion was only positive, the answer was coded as positive. When the opinion was not both positive and negative, or neutral, the answer was coded as neutral. When the opinion was negative, the answer was coded negative. When the answer was not an opinion, it was labeled as unknown.

Appendix D

In this section, quotes that could support hypotheses about heuristics in persuasive stories, according to the Narrative Policy Framework, are shown. These quotes may provide insight in the heuristics behind the CT stories that are used in this thesis, or may be useful to science communicators that want to use the CT/NPF framework to construct persuasive stories.

Transportation quotes

p. 19 “Story C takes place close to where I grew up, so for me it feels more special and I pick up things easier from this story”

p. 33 “Personal stories appeal more to me”

p. 44 “Story C I could totally imagine myself, as an entrepreneur”

p. 52 “[my order in favorite stories] is based on with which person I could identify best”

p. 242 “This is how I would decide as a politician”

Congruence quotes

The congruence heuristic is mostly based on cultural theory: CT is a measure to predict which values are congruent for certain CT types. Therefore, most of the quotes could be linked to values as described in Cultural Theory. Here follow some examples:

p. 226, HR, “Story A, because I’m mostly interested in solutions that can be applied on a larger scale.”

p. 328, HR, “To catch water on older buildings will cause technical problems. Gardens are more applicable on a larger scale.”

p. 78, EG, “Story B appealed to me most because one reads that the solution has a binding effect on the neighborhood. It is a project from civilians, and that gives me a good feeling. Story A seems like a too flashy idea from a functionary that may try to disguise certain policy choices. With Story C, I felt distracted by the question “How much is his financial profit?””

p. 219, EG, “Story B, because tackling global problems together is just more fun and effective than doing it alone”

p. 213, IND, “Story C is about an entrepreneur who sees chances in sustainability and indicates that acting against climate change creates opportunities instead of just a financial burden”

p. 206, IND, “I like that in Story B and Story C, people are taking action themselves instead of just looking away in apathy”

p. 250, FAT/IND, “Even though the value of climate models can be debated, I prefer a scientific story. The rest is much of a muchness, I just see three people trying to profit from extreme precipitation with either a product, an educational program or just higher revenues.”

Though, the statements are not always congruent with CT type, or with CT in general:

p. 198, EG, “Story B is an utopia”

p. 313 EG, “The stories do not appeal to me because I think they are all futile”

Narrator trust quotes

Not many comments were made on narrator trust in the stories (frequency X). However, surprisingly, all of the comments were about the control story. Participants either found the control story *more trustworthy*, as

p. 195: “Story D seems the most trustworthy, because it is numbers from the KNMI and not from another commercially motivated source”, or found it less trustworthy,

p.168 “Story D invokes reaction: are those numbers right?” or

p.208 “I never really trust graphs”.

Variety of answers to **Q23**: “What is your opinion on using these kind of stories to communicate about (the consequences of) climate change?”

p. 40 “Stories make the problem more accessible”

p. 50 "I liked the stories a lot. The big disasters that are being predicted are frightening, while these kind of stories (with creative solutions) give me hope. Furthermore they give me the feeling that I can do something myself"

p. 52 "It is a good idea, but should not be done by the KNMI to maintain their status as a fact-distributing institute. This is the role of the media"

p. 79 "Use all means to tell the story, but keep the story complete"

p. 93 "As long as the stories are chosen well, good! But do not try to illustrate climate change with weather events"

p. 129 "Very positive. Better than the present doom and gloom stories that haven't achieved much. Especially if you look at the 'normal people's' opinion."

p.228 "Positive but they should be concrete and realistic"

p. 229 "Positive but do not make them too childish (Jip-en-Janneke)"

p. 231 "Good, the more personal the better. That the ice at Antartica melts and caused a 30 cm sealevel rise in 50 years is for many people a far-from-my-bed show."

p. 281 "Can be useful for lower-educated people"

p. 292 "Good, they can have more impact and provide action perspective"

Appendix E

When the Z-score is > 1.645 or > -1.645 ; $p = < .1$, these values are marked with an *. Z-scores that are > 1.96 or < -1.96 are significant at the $p < .05$ level, and marked with **.

Table 7

Crosstabulation of favorite stories per cultural type

Type * Favorite story							
			FAVSTORY				Total
			HR	EG	IND	CTL	
TYPE	HR	Count	8	10	6	12	36
		% within TYPE	22,2%	27,8%	16,7%	33,3%	100,0%
		z-score	-,3	-,8	,0	1,1	
	EG	Count	23	36	14	20	93
		% within TYPE	24,7%	38,7%	15,1%	21,5%	100,0%
		z-score	,3	1,9*	-,6	-1,8*	
	IND	Count	4	2	4	7	17
		% within TYPE	23,5%	11,8%	23,5%	41,2%	100,0%
		z-score	,0	-2,0**	,8	1,5	
	FAT	Count	1	2	1	1	5
		% within TYPE	20,0%	40,0%	20,0%	20,0%	100,0%
		z-score	-,2	,3	,2	-,3	
Total		Count	36	50	25	40	151
		% within Total	23,8%	33,1%	16,6%	26,5%	100,0%

* $p < .1$

** $p < .05$

Table 8:

Crosstabulation of least favorite stories per cultural type.

Type * Least favorite story							
			Least favorite story				Total
			HR	EG	IND	CTL	
TYPE	HR	Count	3	8	12	12	35
		% within TYPE	8,6%	22,9%	34,3%	34,3%	100,0%
		z-score	-,7	,9	2,0**	-1,9*	
	EG	Count	8	13	16	48	85
		% within TYPE	9,4%	15,3%	18,8%	56,5%	100,0%
		z-score	-1,2	-,9	-1,1	2,4**	
	IND	Count	4	4	2	6	16
		% within TYPE	25,0%	25,0%	12,5%	37,5%	100,0%
		z-score	1,7*	,8	-1,0	-,9	
	FAT	Count	2	0	1	2	5
		% within TYPE	40,0%	0,0%	20,0%	40,0%	100,0%
		z-score	2,0**	-1,1	-,1	-,4	
Total		Count	17	25	31	68	141
		% within TYPE	12,1%	17,7%	22,0%	48,2%	100,0%

* $p < .1$

** $p < .05$

Table 9: Opinion on influence stories credibility and objectivity per CT type.

		TYPE				Total
		HR	EG	IND	FAT	
Opinion	Count	34	70	25	3	132
	% within Opinion	25,8%	53,0%	18,9%	2,3%	100,0%
	Z-score	,4	-1,2	1,4	-,4	
Negative	Count	4	27	7	1	39
	% within Opinion	10,3%	69,2%	17,9%	2,6%	100,0%
	Z-score	-2,2**	1,7*	,4	-,1	
Neutral	Count	19	33	7	2	61
	% within Opinion	31,1%	54,1%	11,5%	3,3%	100,0%
	Z-score	1,3	-,5	-1,0	,3	
Positive	Count	6	20	4	0	30
	% within Opinion	20,0%	66,7%	13,3%	0,0%	100,0%
	Z-score	-,6	1,1	-,4	-1,0	
Unknown	Count	9	16	3	2	30
	% within Opinion	30,0%	53,3%	10,0%	6,7%	100,0%
	Z-score	,7	-,4	-,9	1,4	
Total	Count	72	166	46	8	292
	% within Opinion	24,7%	56,8%	15,8%	2,7%	100,0%