Narrative transportation, identification, and storytelling in environmental (science) communication:

Immersing audiences in a story.

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September 2020
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Abstract

In this day and age, one of our most challenging communication topics is climate change and the degradation of nature (Fraenkel, 2020). The old model of science communication - whereby scientists in lab coats communicate their facts and truth through mass communication channels - is coming to an end (Climate Outreach, 2017). The science of science communication is a developing body (Climate Outreach, 2017; Corner & Clarke, 2016). There is an urgent need to understand how narratives can contribute to communicating about environmental science more effectively, by aligning with the needs and values of different audiences (Climate Outreach, 2017). Using narratives in environmental communication has become increasingly common (Smith et al., 2014). Yet, many scientists are uncertain about how to communicate and translate their research into compelling stories (Martinez-Conde et al., 2019).

This study aims to give scientists and environmental organisations insight into the mechanisms of narrative persuasive storytelling and how an audience processes stories. It concludes that stories are uniquely suited for changing emotionally held opinions and beliefs, and can help individuals to understand complex and abstract scientific subjects. Furthermore, this study concludes that identification is a vital element in narrative persuasion.

Keywords: *environmental communication, science communication, social sciences, storytelling, narrative transportation, narrative persuasion, identification, behavioural change, knowledge deficit model.*

Introduction

The old model of science communication - whereby scientists in lab coats communicate their facts and truth through mass communication channels - is coming to an end (Climate Outreach, 2017). Climate Outreach - Europe's leading specialist in climate change communication - claims that many science communication strategies still focus on one-way communication, and on communicating facts more clearly, instead of creating engagement with the audience.

A current four-year research programme from Mistra Environmental Communications (Mistra EC), initiated by SLU in Sweden, aims to reframe and set a grounded understanding of environmental communication in such a way that it can effectively foster sustainability transformations. One of their goals is to bridge the gap between theory and practice, and to "explore, develop and apply strategies for transformative environmental communication practices." (Mistra EC, 2019, p. 6).

This study involves narrative persuasive communications, also known as story-based communications. This contrasts argument-based communications, which strive to persuade by presenting a series of logical and cogent arguments in favour of a given viewpoint (Perloff, 2013). This study focuses on the communication of messages that are conveyed through audio, video, and text in a narrative form for public mediated communication with a strategic purpose. It is especially relevant for environmental organisations that strive to use communication strategically and purposefully to influence attitudes and behaviours of the public, to fulfil their overall mission (Falkheimer & Heide, 2018). This study also discusses which medium and conditions could be suitable for narrative transportation in a digital age whereby noise, distractions (pop-up messages), and interruptions (ads) play a role in our daily media consumption.

Extensive research about the importance of narratives in environmental communication has been conducted. Scientific publications such as *Climate Change and Storytelling* (Arnold, 2020) focus on narratives and cultural meaning in environmental communication, and **why** they matter.
Other research emphasises the importance of storytelling, characters and narrative structures in science communication. However, hardly any research in environmental (science) communications has involved the psychological aspect of story comprehension: **how** an individual assimilates information and stimuli derived from a story. Existing research about narratives in environmental communication states that narratives are naturally persuasive (Dahlstrom, 2014), but do not explore the mechanisms of narrative persuasion in depth. What makes a persuasive narrative?

To successfully craft and communicate environmental persuasive stories, the communicator must understand the underlying principles of narrative persuasion. The objective of this study is to present a clear foundation for narrative persuasive mechanisms for environmental (science) communicators. Its purpose is to increase understanding of story comprehension, and to highlight and offer potential directions for scientists, science communicators and storytellers.

Research questions

RQ1 What is environmental (science) communication and why is it challenging?

RQ2 How can stories close the gap between science and non-expert audiences?

RQ3 What is narrative persuasion and what components are needed to achieve it?

Methodology

This literature review synthesises existing research on environmental (science) communication, narrative transportation, and narrative persuasion. Its nature is exploratory and based upon literature containing the following keywords: environmental communication, science communication, storytelling, narrative transportation, narrative persuasion, identification, behavioural change, and knowledge deficit model. Literature about the nature-culture divide, human-animal relations, and the representation of nature in the media was excluded from the main body of this study.

This review begins with defining environmental and science communication, continues to explore current science communication models, and gradually moves onto storytelling and narrative persuasion. It ends with a discussion about the feasibility of narrative transportation on mobile devices, and points out future research related to the nature-culture divide and the representation of nature in the media.

Results

Environmental communication is vastly interdisciplinary. It 'focuses on how communication about the environment shapes people's perceptions of the natural world, what behaviours they adopt, and the policies they make' (Wimmer et al., 2004, p. 2). It has several areas of focus which analyse specific forms of communication. These include public participation, media, social movements, risk communications, and science communication. Scholars who focus on environmental communication through media could also study photography, films, television shows, websites, social media and advertisements (Wimmer et al., 2004).

Science communication covers a wide range of concepts, 'including professional communication by scientists; interactions between scientists and members of the public; media representations of science; and the ways how people use scientific knowledge in their own lives' (Climate Outreach, 2018, p. 8). The core goal of a science communicator is to communicate scientifically accurate information. They often approach this with the Knowledge Deficit Model (KDM): a model of communication that focuses on the repeating of objective and sterile information in an attempt to increase understanding (Jones Michael & Anderson Crow, 2017). The five primary purposes of science communication are: awareness, interest, enjoyment, increase understanding, and opinion formation (Burns et al., 2003).

The late Ralph J. Cicerone, former president of the US National Academy of Sciences and authority figure on climate change, already stated in 2005 - one year before his death - that there is a great need for new communication strategies to counter lagging public enthusiasm and reduce discomfort with science (Simis et al., 2016). Yet, many science communication strategies still focus on one-way communication, and on communicating facts more clearly, instead of creating engagement with the audience (Climate Outreach, 2017). Why does the deficit model persist in science communication?

First, a study by Simis et al. (2016) revealed that many graduate studies in "science, technology, engineering, and math (STEM) fields" (p. 401) lack training in public communication. They are not required to learn about communication practises during their studies, nor about opinion formation on scientific issues. Scientists are trained to process information rationally, make conclusions based on empirical information, and be objective in decision making. Simis et al. (2016) also discovered that scientists accept with the hierarchy within sciences, with 'softer' sciences (e.g. social sciences) at the bottom. The relationship between scientists' attitudes towards softer sciences and their attachment to the KDM presents both challenges and opportunities. For example, scientists with a more positive attitude towards soft sciences are less likely to use the KDM.

Scientists who have a less positive attitude may be unwilling to accept the findings from softer sciences about their communication toward public audiences. This negative image of soft sciences might mean that no amount of coursework in those areas will shift their perception about how the public forms attitudes toward science. Promoting a more positive image of soft sciences appears to be effective in shifting current thinking patterns. In other words, confronting scientists with this bias may lead to a more positive attitude towards soft sciences, which could lead to scientists considering more effective communication forms to reach the public (Simis et al., 2016).

A second factor that may sustain to the gap between scientists and the public is that most scientists view the public as 'other'. This viewpoint separates scientists from the public and creates a scientist-public dichotomy. Such a divide can contribute to unequal power hierarchies, in which scientist view themselves above other members of society. If scientists regard the public as unintelligent, ignorant, and therefore lesser than themselves, they will likely adhere to the KDM. Scientists with this mindset may make less of an effort to connect with public audiences in ways that are understandable and meaningful or think about the role of them in the scientific process (Simis et al., 2016).

Another issue in the communication of environmental (science) is the rise of fake news and the fragmentation of the media landscape (Mistra EC, 2019). People associate global warming with violence on television and see it as a minor concern to them (Hamblyn, 2009). Public perceptions about environmental and climate issues play a significant role when it comes to supporting climate policies (Arnold, 2018). However, using narratives in environmental communication has become increasingly common. (Smith et al., 2014). Narratives appear to be more effective, as long as the language reflects the values of the audience (Corner et al., 2012; Kahan et al., 2010). Particularly metaphors and analogies play an essential role in aligning messages with the existing values of the audience. They act as mental shortcuts to evaluate complex information (Shaw & Nerlich, 2015; Tversky & Kahneman, 1974), and increase engagement with broader audiences (Peters et al., 2006; Sinayev & Peters, 2015).

Narratives and storytelling

Narratives appear to be uniquely suited for changing emotionally held opinions and beliefs (Mazzocco, P.J. & Green, M., 2011). Most people make sense of the world through stories, rather than numbers and facts. Narratives can help people to understand complex and abstract scientific subjects, and make it easier to remember and process (Climate Outreach, 2017).

Braddock and Dillard (2016) state that a message becomes a narrative "if it contains a story that contains information about setting, characters, and their motivations." (p. 446).
The terms *narrative* and *story* are often used in mixed context and are often seen as synonymous. However, there is a slight difference. In contrast to a story, a narrative is bigger: it can be seen as a frame or an overarching concept which gives meaning to a broader vision. A good narrative contains a range of stories which validate its message (Margolis, 2018). An example of a well-known narrative is 'The American Dream'. Multiple stories tell this narrative, but the narrative itself is not necessarily a story. Therefore, "all stories are narratives, but not all narratives are stories." (Gerace & McKee, 2008, p. 77). Where a story usually has a beginning, middle, and ending, a narrative can have an open ending, whereby the outcome is still to be explored (Margolis, 2018).

Stories often lack straightforward arguments. This is in contrasts with argument-based communications, which strive to persuade by presenting a series of logical and cogent arguments in favour of a given viewpoint (Perloff, 2013). Escalas (2007) found that narratives reduced counter-arguments compared to argument-based messages. Narratives are processed more comprehensively, which affects information integration. A good story can build a sense of belonging, be suspenseful and engaging, and can be persuasive (Arnold, 2018). But how does a story become persuasive? What are the underlying mechanisms and variables?

Narrative transportation

Individuals do not have to be taught how to transport into narratives. Even young children are naturally sensitive to immersion and are drawn into stories virtually before they can walk. Schank and Abelson (1995) argue that stories are the most natural way of thinking. They describe narrative transportation as a dreamlike state. According to Green and Brock (2000), leading scientists in the field of media-psychology, participating individuals[1] are like travellers. During transportation, travellers mentally leave their original world. This transportation makes some aspects of the world of origin inaccessible. When the traveller returns to the world of origin, they are somewhat changed by the journey. There is a difference between fictional and non-fictional stories and narratives and non-narratives. In fiction, it is possible to visualise a world in more detail resulting in a higher state of transportation. Every narrative needs plausible characters and settings that run parallel to the viewers' beliefs. Non-narratives (i.e. argument-based communications) do not create an alternative world for the viewer to transport to, and they are less likely to emotionally engage or create an image inside the mind of the viewer (Green & Brock, 2000). Emotional reactions to characters can form regardless of whether the narrative in question is fictional or factual (Mazzocco & Green, 2011).

[1] individuals who actively participates in a story by reading, viewing and/or listening.

Wang and Calder (2006, 2009) found that commercials, interrupting transportation in the middle of an entertaining film, were experienced negatively. Unsurprisingly, commercials at the end of the transportation experience benefit from the transference of positive emotions associated with the film. They conclude that disturbance or interruption during the transportation experience can have a negative influence on persuasion-related outcomes.

Narrative persuasion

According to Bettinghaus and Cody (1987), persuasion is "a conscious attempt by one individual to change the attitudes, beliefs, or behaviour of another individual or group of individuals through the transmission of some message." (p. 17). Examples of persuasive stories are the documentary films Blackfish (2013) by Gabriela Cowperthwaite, and Before the Flood (2016) by Fisher Stevens. These documentaries strive to change the viewer's attitudes and opinions in favour of the environment. When crafting persuasive stories, it is important to not sell it as 'persuasive'. This is called forewarning. When people are warned that they are going to be exposed to a persuasive message, the persuasion will likely not succeed. Cognitive response studies have shown that individuals create counter-arguments in response to the forewarning, strengthening their opposition to the advocated position (Petty & Cacioppo, 1977). For example: during breakfast, a couple discusses the colour of the walls. The woman leaves for work, but before she leaves, she says: "We will talk about this tonight, and you will see I am right!". The man realises that she will try to change his mind. His dominant response is to create counter-arguments, in favour of his position. William L. Benoit (1998) studied forewarning and concludes that informing someone about being exposed to a persuasive message, will make that message less persuasive.

It is also important to keep reactance theory in mind, which can occur when someone is heavily pressured to accept a certain view or attitude, limiting their freedom of choice. Storytellers may use reverse psychology to influence someone to choose the opposite of what they request (Brehm, 1966).

Distraction is an unexpected persuasion technique that stimulates persuasion by blocking the dominant cognitive response to a message (Petty et al., 1976). If individuals listen to a message with which they disagree, their dominant response will probably be to mentally counter-argue with the character in the story. If their mind is elsewhere, for example, if the participating individual is laughing about an occurrence in the story, they won't be able to formulate counter-arguments. Thinking - especially mentally counter arguing - can increase resistance to persuasion (Perloff, 2013). Therefore, environmental (science) communicators could implement a distraction element in their narrative to block dominant cognitive responses from the audience, as distraction enhances persuasion-related outcomes.

This contradicts research by Hamby et al. (2016). Their research claims that distraction - by using a cognitive load - reduces persuasion. The cognitive load theory refers to the total amount of mental effort being used in the working memory of the brains. The basic idea is that the capacity in working memory is limited (de Jong, 2010). They argue that distractions could overload the working memory, possibly activate another region of the brain, and therefore diminish transportation. Inserting a cognitive load after the story also reduces retrospective reflection. Retrospective reflection is a mediator of the transportation-persuasion relationship; see figure 1 (Hamby et al., 2016).

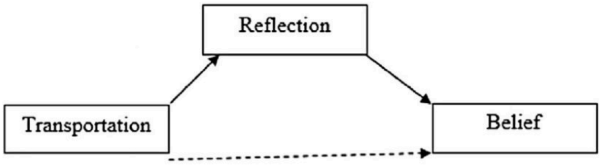

Figure 1 (Hamby et al 2016)

Retrospective reflection is a process whereby similarities between the story and consistent memories from the own personal story bank are brought to the viewer's mind. In this process, visual elements remind a viewer of real-world encounters and enhance story enjoyment (Hamby et al., 2016). Therefore, stories do not have to be 'real' to influence a viewer, but they must correspond with the viewers' beliefs and experiences to be accepted as reality. According to Gilbert (1991), participating individuals are more likely to recall story consistent beliefs because falsifying a message takes additional effort. Larsen and László (1990) describe retrospective reflection as 'personal resonance'. A story that evokes memories enhances appreciation of the story, legitimises and substantiates the narrative and increases persuasion (Bruner, 1986; Fisher, 1989). This is comparable with the concept of biased assimilation, whereby individuals tend to engage and accept information that affirms their existing understanding of themselves and the world, "and tend to reject information that does not" (Jones Michael & Anderson Crow, 2017, p. 2).

Narrative self-referencing is described as an individual's recall or generation of autobiographical memories in a story format. Individuals could recognise something in a story, that reminds them of an experience in their past. An affective transference occurs during this process; the positive experience of thinking about the self, enhances persuasion-related outcomes. Narrative self-referencing is a mechanism used to enter a story world. Participating individuals could be transported into their self-focused story (Hamby et al., 2016). Narrative self-referencing and retrospective reflection differ on several aspects, but are related to each other. Narrative self referencing involves the creation of a story about the self, which evokes positive emotions (Zwaan & Radvansky, 1998; Hamby et al., 2016).

Retrospective reflection occurs after narrative self-referencing and is a consequence of entering a story world. It includes the recall of memories related to the self and others and provides a base to contrast the individual's mental model of the story, to the individual's mental model of the 'real world' (Zwaan & Radvansky, 1998). Imagine someone at home, watching a good movie. He is about to partake in a very emotional and intense climax. Suddenly, his partner comes home from work and starts moaning about a new colleague. It pulls him out of the story and brings him back to reality. Narrative transportation might be a mental process, but both the setting and the medium influence this subconscious experience.

Three main aspects influence narrative transportation and therefore retrospective reflection, which is vital to narrative persuasion. First of all, participating individuals must be immersed in a story. To achieve this, individuals must be able to process the story. This process has internal and external factors. Internal factors for failing to process a story could be: not understanding the (academical) language. Therefore, scientists or environmental communicators need to make the language accessible. External factors could be: sound from the environment (e.g. ringing cell phone, crying baby), or the volume of the medium (e.g. TV, laptop) could be too low (Green & Brock, 2000).

The second aspect to engrossing people in a story is empathy. Empathy occurs when fidelity between the viewer and the character is high. Fidelity can be described as the degree to which a story lines up with what individuals know to be true in their own life. One factor that can lead to empathy is identification (Green & Brock, 2000). Zillman (2000) refers to our moral similarities with characters. We tend to like characters who seem morally right to us and, eventually, we empathise with them. Central to identification with characters is the adoption of their goals, needs, thoughts and behaviours. Film theorists such as Houston (1984) claim that offering one perspective or narration the participating individuals can identify with, enhances identification and transportation. This contradicts the theory of Mazzocco and Green (2011). They suggest that presenting a mix of stories may be an ideal strategy to enhance narrative persuasion, because of the differences between individuals. Cohen's (2001) definition for identification is "a process that consists of increasing loss of self-awareness and its temporary replacement with heightened emotional and cognitive connections with a character" (p. 251).

The third aspect is the plot structure. Playing with chronological order and creating gaps of information activates the imagination and curiosity of the viewer. The participating individuals will fill these gaps with figments of their own imagination, making the story more real and logical to them. Therefore, one could say, everybody experiences narratives in their own way (Green & Brock, 2000). The achievement of such an altered state of awareness relies upon the process of

transportation into the story. When participating individuals re-enter the real world, they have been transformed and might have a different mindset or perspective of the world (Oatley, 1999). Houston (1984) argued that television viewing cannot foster identification or transportation. He argues this, because television viewing tends to be an interrupted activity. The shots and program formats are shorter, and there are commercial breaks. It blends viewing with other activities, in comparison to a dark and quiet cinema, where the viewer is in line with the projector and the screen. The television viewer sits opposite the direction of projection (Houston, 1984), and can see reflections of the 'real world' on the (television) screen.

Medium and need for cognition

Each medium tells a different story. Recent research by Walter et al. (2017) discovered that participants in audiovisual media experienced increased cognitive involvement, higher than participants who were exposed to the same persuasive narrative in print media. Walter et al. (2017) discuss that print narratives may be more persuasive, since they provide more control for exposure, compared to audiovisual narratives. Readers can reread a sentence and visualise their own story-world, whereby in audiovisual media, the story-world is visualised for viewers, and the exposure to (audio)visual media and pacing of the story is set. Whether perceived control is a decisive factor in narrative persuasion is still questionable. It was not assessed in their study and is still a speculation. This form of control may also offer the participating individual the opportunity to pause in a story, and create space for (rational) thinking, which can increase resistance to persuasion (Perloff, 2013). Nevertheless, this claimed lack of control of audiovisual narratives stated by Walter et al. (2017) is arguable, as (portable) media devices and platforms offer options to pause, rewatch, or manipulate the pacing of the story.

Another factor that should be taken into account when constructing persuasive narratives, is the need for cognition. Mazzocco and Green (2011) measured individuals in need for cognition (NFC); a personality difference between individuals who enjoy effortful thinking, such as solving puzzles, debating issues, or considering complex problems (Cacioppo & Petty, 1982). Results showed that narratives were highly persuasive, but only to individuals who were highly transportable. Some individuals are more capable of being transported into a story-world than others. Individuals who have a bigger imagination should be more capable of 'filling in the gaps' and constructing the narrative world, compared to individuals who have less imaginative skills.

Conclusion

(*RQ1)* Most scientists - especially those who have a less positive attitude towards social sciences - continue to use the knowledge deficit model. This model of communication focuses on the repeating of objective and sterile information in an attempt to increase understanding, and does not create engagement with audiences. Scientists are trained to process information rationally, make conclusions based on empirical information, and be objective in decision making. They are not required to learn about communication practises during their studies, nor about opinion formation on scientific issues. (*RQ2)* Stories could close the gap between scientists and non-expert audiences. They appear to be uniquely suited for changing emotionally held opinions and beliefs, and most people make sense of the world through stories, rather than numbers and facts. Stories can help people to understand complex and abstract scientific subjects, and make it easier to remember and process.

(RQ3) There is no blueprint for persuasive storytelling in environmental communications. Researchers are still working towards a full understanding. Narrative persuasion is optimal when the story succeeds in immersing the participating individual, but this could be interrupted by a variety of internal and external factors. Environmental (science) communicators need to make the language accessible and understandable for the public, and to make sure that the participating individual can identify with (one of) the character(s) in the story. Television viewing is not suited for narrative transportation, because of short formats, commercial breaks and the environment of the medium. To achieve transportation, the participating individual needs an entry point into the story. This could be identification with a character, or narrative self-referencing. The use of metaphors and analogies can foster the identification process, as these parallels stimulate narrative self-referencing and retrospective reflection. Not every individual can visualise how the root systems of trees communicate with each other. However, for instance, the majority of modern society can envision a router which connects multiple computers through network cables. To stimulate the individuals' imagination and to immerse them into the story world, the communicator should leave gaps of information in the narrative structure for individuals to fill in. This makes the story their own, and they might be more likely to accept it as reality.

With identification being a vital element in narrative persuasion, it is essential for environmental (science) communicators to not only think about what they want to communicate, but also take into account what their audience identifies with. For instance, impact scientists - such as climate scientists - are less popular with politically conservative groups. These groups tend to hold greater trust in 'production scientists', such as engineers who produce new technologies and products

which are beneficial to the economy. For this group, it may be strategic to not start with a normative attitude about climate change in the beginning of the story, but instead, start the story with identifiable trends and developments which are present in their world. Also, an introduction to these groups as a 'climate scientist' could undermine credibility and trust (also known as *ethos* in rhetorics). The level of trust between the science communicator and the public plays a crucial role in whether the communication is received positively or dismissed.

Limitations

This study was limited to the maximum amount of twelve pages (for the main body), and the results of the following databases: Academia, Researchgate, APA psychnet, Elsevier, ProQuest, and online search engines.

Discussion

It is evident that during the transportation process, the participating individual cannot be interrupted by any means. While the majority of modern society consumes media through digital devices (e.g. smartphones, tablets, television) on different platforms (YouTube, Netflix, Instagram, et cetera), and in different settings (on the train, in bed, on the couch), it could be of interest to research identification and transportation in these conditions. Consumer behaviour in the new media landscape is fast. Media consumers on digital devices tend to swipe from story to story, are interrupted by ads, and selectively choose which content they consume. This introduces a question for future research: is narrative transportation feasible on mobile devices streamed from a social platform? Furthermore, if so, which conditions are required?

Another angle that could explain the complications with environmental communication is the so-called nature-culture divide. The essence of this concern focuses on the question: is nature separate from culture? If so, how does the representation of nature - including its non-human inhabitants - contribute to anthropocentrism, and therefore intensify the nature-culture divide? In the media landscape, animals are present everywhere, but in the daily reality of modern life, animals of all kinds are increasingly absent. Reesink and Creed (2015) discuss that animals are often portrayed as a lower form of life and lack consciousness. This could make identification with animals more difficult. The use of literary devices such as *personification* - attributing human characteristics to something non-human - could foster identification with nature. *Personalisation* could make nature-related content more relevant. Thus the question: how could new frames and approaches for the representation of nature in media close the gap between modern society and nature?

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