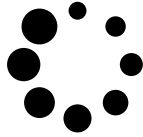AN-ICON

The Problem of Empathy in Immersive Experiences on Global Warming. A Matter of Empathy, Embodiment, and Hyperobjects

by Shannon Magri

360° VR film
Anthropocene
Empathy
Global warming
Hyperobjects

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Abstract

My paper focuses on the problem of empathetic response in immersive experiences concerning global warming issues. Following a rich scientific production, which points out the idea of virtual reality as both "the ultimate empathy machine" – as firstly stated by filmmaker Chris Milk – and a promising tool to promote ecological awareness, my essay presents, in the first place, the main characteristics of immersive experiences concerning the issue, showing how viewers interact with the environment from the perspective of presence, and body ownership. As describing potentials and limits of empathetic response in virtual environments, I draw attention to the fact that now it is impossible to build virtual reality experiences that fully embody the essence of global warming, as it is intrinsically an hyperobject – a term I take from Timothy Morton's philosophical approach towards environmental issues. In this framework, the purpose of my essay is to uncover the impossibility to represent global warming faithfully if we keep on conceive immersive experiences in the way we are doing now. What I propose is a radical change in our idea of virtual reality when it comes to represent global warming.

Keywords   360° VR film   Anthropocene   Empathy

Global warming   Hyperobjects

The worry is not whether the world will end, as in the old model of the *dis-astron,* but whether the end of the world is already happening, or whether perhaps it might already have taken place.[1]

Introduction

At the edge of the XXI century, Paul Crutzen and Eugene Stoermer had no doubt that the term Holocene ("Recent Whole") had become ineffective. Rather, considering major and growing impacts of human activities ecosystems, Crutzen and Stoermer vigorously asserted that the term "anthropocene"[2] would be more appropriate to define the geological era coming after the Holocene: indeed, "the impacts of current human activities will continue over long periods."[3]

Nowadays, the awareness of the Anthropocene in different scientific fields cohabits with the urgency of climate change issues. From literature to film studies, from hard sciences to engineering, global warming is an emergency that can no longer be ignored. Apparently, the degradation of ecosystems has already been perceived in the last centuries, notably in the field of fine arts. According to Anna Lea Albright and Peter Huybers,[4] Claude Monet's *Impression: Sun Rising* (1873) and J.M.W. Turner's *Rain, Steam, and Speed - The Great Western Railway* (1844) are peculiar examples of how art, at that time, could be a valuable mean of representing the effects of the industrial revolution on the environment: the Impressionism of Turner and Monet contained elements of the so-called "polluted realism."[5]

Across the centuries, the sensitivity towards ecological issues changed as fast as the balance of

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1   T. Morton, *Hyperobjects*: Philosophy and *Ecology After the End of the World* (Minneapolis-London: University of Minnesota Press, 2013): 16.
2   I use the lowercase letter with due regard to the original text written by Paul Crutzen and Eugene Stoermer.
3   P.J. Crutzen, E.F. Stoermer, "The 'anthropocene'," IGPB *Newsletter*, no. 41 (2000): 17.
4   A.L. Albright, P. Huybers, "Painting by Turner and Monet Depict Trends in the 19th Century Air Pollution," *PNAS* 120, no. 6 (2023), https://doi.org/10.1073/pnas.2219118120.
5   Ibid.: 8.

ecosystems. A perceptible turning point has been marked by the theory of *Umwelt*, as theorized by Jakob Johann von Uexküll,[6] who introduced the idea of different sensorial attunement owned by animals, pointing out the fact that the very meaning of "world" differs from one creature to another, as highlighted by Philippe Bédard.[7] The unraveling of a novel, non-anthropocentric vision of the world, within the anti-specism philosophical movement, evolved side-by-side with the consciousness of the irreversible effects of human activities on Earth. The impactful results of scientific research conducted by the Anthropocene Working Group – in which a group of scientists agree to identify the world's first nuclear bomb explosion on July 16th in 1945 at Alamogordo, New Mexico, as the starting point of the Anthropocene Era[8] – acknowledge human beings to be a geological force. Considering these and the disturbing prospect of a future disrupted by global warming, scholars from different scientific fields have been struggling to find an impactful way to promote ecological awareness. In my essay, I will focus on the path taken by some scholars and filmmakers who consider virtual reality technology as the ultimate machine for the purpose of inducing ecological awareness. I will take this path – first analyzing immersive experiences concerning global warming produced so far, and then the mechanisms of incorporation, presence, and empathy that rush to a systematic treatment of virtual reality – with the primary aim of reversing the whole picture. As I will underline in the following paragraphs, global warming is intrinsically inaccessible to anyone, making any attempt to establish an empathetic response totally futile. Global

6   J. von Uexküll, *A Foray into the Worlds of Animals and Humans. With a Theory of Meaning* (1934), trans. J.D. O'Neil (Minneapolis: University of Minnesota Press, 2010).
7   P. Bédard, "Adventures beyond Anthropocentrism in Virtual Reality Art," *AN-ICON. Studies in Environmental Images* 2 (2022): 97, https://doi.org/10.54103/ai/18458.
8   J. Zalasiewicz et al., "When Did the Anthropocene Begin? A Mid-Twentieth Century Boundary Level Is Stratigraphically Optimal," *Quaternary International* 383: 196-203, https://doi.org/10.1016/j.quaint.2014.11.045; See also: C.N. Waters et al., "Can Nuclear Weapons Fallout Mark the Beginning of the Anthropocene Epoch?," *Bulletin of the Atomic Scientists* 71, no. 3 (2015): 46-57, https://doi.org/10.1177/009634021558135.

warming stays unreachable because it is, in fact, a hyper-object.

Being There: Immersive Storytelling at the Edge of Global Warming

The original narrative medium was the body and the spoken word, not a display nor joystick used to interact with virtual characters in a virtual world: the very first immersive environments were simulated by the body and the word.[9] However, in the age of Head-Mounted Displays (HDMs) and virtual experiences, we can now access to virtual worlds through our body, and leave the physical, familiar world behind us: we experience the virtual world, while we are aware that the physical world, whose proprieties we have come to know well through long familiarity,[10] will remain the same.

However, scientific data show that the world will not be as familiar as it used to be sooner than we expected. At the end of July 2023, the hottest month ever registered by scientists, the UN Secretary General, António Guterres, declared: "The era of global warming has ended, the era of global boiling has arrived."[11] The rise of global average temperatures, driven by pollution that traps sunlight and acts like a greenhouse around the Earth, has generated massive effects on ecosystems. The Sixth Assessment Report produced by the Intergovernmental Panel on Climate Change[12] shown during the Panel's 58th Session held in Interlaken, Switzerland, from 13th to 19th March 2023, claims urgent massive action for a livable future. Previously,

9   F. Biocca, "The Evolution of Interactive Media: Toward 'Being There' in Nonlinear Narrative Worlds," in M.C. Green, J.J. Strange, T.C. Brock, eds., *Narrative Impact: Social and Cognitive Foundations* (Mahwah NJ-London: Lawrence Erlbaum Associates Publishers, 2002): 97-130, 97.
10   I. E. Sutherland, "The Ultimate Display," in R. Packer, K. Jordan, eds., Multimedia: *From Wagner to Virtual Reality* (New York, NY: W. W. Norton & Company, Inc.), 506.
11   UN News Global Perspective Human Stories, "Hottest July Ever Signals 'Era of Global Boiling Has Arrived' Says UN Chief," (July 7, 2023), https://news.un.org/en/story/2023/07/1139162, accessed December 9, 2023.
12   Intergovernmental Panel on Climate Change, *Sixth Assessment Report* (March 20, 2023), https://www.ipcc.ch/report/ar6/wg2/, accessed December 14, 2023.

the "Great Acceleration" graphs,[13] originally published in 2004 to demonstrate socio-economic trends from 1750 to 2000, had a consistent impact on the common vision of human activities and their effects on ecosystems. These show, indeed, that long familiarity tells us very little in fact about the world we currently live in.

However, it seems that scientific warnings concerning global warming are not enough, still. As Lorenzoni, Nicholson-Cole and Whitmarsh affirm from a sociological perspective,[14] people tend to think about climate change as something distant in both time and space that will not impact the self in the short period. From a certain point of view, this state of mind could be understandable: even if data report that, sooner or later, the Earth as we know it will change radically and irreversibly, only a small percentage of both people and countries are already affected by global warming directly. To overcome this issue, scholars have been confronting with potentials and limits of technologies to identify the most effective medium to promote global warming awareness. Among these, virtual reality has been considered "a promising tool"[15] to stimulate ecological awareness, and to make people "environmentally literate,"[16] whether corroborated by cinematic narrative, aesthetic constructions, or designed from the perspective of being employed in laboratory experiments only. A common intent of immersive experiences concerning global warming is to make certain parts of the world plagued by environmental issues accessible to people who do not live in those places. This purpose is strengthened by the fact that HMDs aim to provide immersive experiences in which

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13   W. Steffen *et al.*, "The Trajectory of the Anthropocene: The Great Acceleration," *The Anthropocene Review* 2, no. 1 (2015): 81-98, 82, https://doi.org/10.1016/j.quaint.2014.11.045.
14   I. Lorenzoni, S. Nicholson-Cole, L. Whitmarsh, "Barriers Perceived to Engaging with Climate Change among the UK Public and their Policy Implications," *Global Environmental Change* 17, no. 3-4 (2007): 445-459, https://doi.org/10.1016/j.gloenvcha.2007.01.004.
15   The idea of virtual reality as promising tool to promote climate change awareness comes from the title of this article: G. Fauville, A.C. Muller Queiroz, J.N. Bailenson, "Virtual Reality as a Promising Tool to Promote Climate Change Awareness," in H.Y. Song, J. Kim, eds., *Technology and Health. Promoting Attitude and Behaviour Change* (London-San Diego-Cambridge MA-Oxford: Academic Press, 2020): 91-108, https://doi.org/10.1016/B978-0-12-816958-2.00005-8.
16   G. Fauville, A.C. Muller Queiroz, J.N. Bailenson, "Virtual Reality as a Promising Tool to Promote Climate Change Awareness:" 91.

the audience member is transformed into an interactor, a term which suggests a sense of agency, activity, and "being there" feeling.[17]

Apart from immersive experiences created for scientific experiments only, there are few examples of VR documentaries which aim to promote climate change awareness: here I consider just live-action VR documentaries, as they are not mediated by animation or computer graphics but represent the world as it is using 360° cameras. This is climate change is a four-part series of short 360° VR films titled *Fire, Famine, Feast*, and *Melting Ice*.[18] The purpose of the experience is to give viewers a vivid look at the effects of human activities on Earth: *Fire* concerns wildfires that affected California back in 2017; *Famine* takes viewers to the arid desert in Somalia, in which inhabitants are enduring drought; *Feast* is settled in the Amazonian rainforest in Brazil mortified by deforestation; *Melting Ice* concerns the problem of melting icebergs in Greenland and its catastrophic consequences. A similar structure is adopted by *The Anthropocene Project*,[19] a multidisciplinary body of work which combines feature documentary, photography, scientific research, and, of course, virtual reality. Conceived as a complement to the nonfiction film *Anthropocene – The Human Epoch* (Jennifer Baichwal, Nicolas de Pencier, Edward Burtynsky, 2018), the VR documentary is divided in three short films, each of them settled in three different parts of the world – the caves of Carrara, the Dandora Landfill, and the Ivory Burn in Nairobi National Park – where human activity has been impactful in shaping nature. As well as *This is climate change*, three short VR documentaries aim to provide a unique gaze into three different locations in the world which would be inaccessible to viewers. Another powerful representation of the result of human activities on Earth is the 21-22 series (Thierry

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17   F. Biocca, "The Evolution of Interactive Media:" 98.
18   For further information: "This is Climate Change," Docubase MIT Documentary Lab, https://docubase.mit.edu/project/this-is-climate-change/, accessed December 10, 2023.
19   Program and purposes of the project are available at the following website: "Anthropocene VR," *The Anthropocene Project*, https://theanthropocene.org/interactive/360-vr/, accessed December 10, 2023.

Loah, 2024 - ongoing),[20] a series of VR films which offer a planetary journey and reveal the state of the Anthropocene epoch. Each film provides a beyond-human-scale perspective on the planet, with the purpose to provide the spectator an experience of the entropic and negentropic states in the Anthropocene.

These projects share the common idea of taking people far from their "safe place" and giving them the possibility to see how human activities are modifying the Earth from a distance. Another aspect we may consider is the design of these 360° VR short films, which aim to make the viewer witness[21] a particular urgency, even without being asked by other virtual characters or induced to interact.

This purpose corroborates scientific research that supports the concept of virtual reality as a promising tool to promote climate change awareness, which is argued by studies which employ psychological tools to analyze data collected during experiments regarding virtual reality technology as "a machine for learning."[22] In fact, various experiments concern brand-new immersive experiences that are designed to make viewers learn more about global warming. Another frontier of study reflects on how virtual reality could effectively have an impact on fears and beliefs related to global warming, and allegedly behavior change towards the issue. Ahn, Bailenson and Park, for instance, conducted two different experiments in order to prove that immersive virtual environments could lead participants to consume 20% less paper than participants who just read a print description of tree cutting.[23] Another experiment conducted by Meijers, Torfadóttir, Wonneberger

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20   For further information: "21-22," https://21-22.earth/en/, accessed December 11, 2023.
21   K. Nash, "Virtual Reality Witness: Exploring the Ethics of Mediated Presence," *Studies in Documentary Film* 12, no. 2 (2018): 119-131, 124, https://doi.org/10.1080/17503280.2017.1340796 .
22   D.M. Markowitz *et al.*, "Immersive Virtual Reality Field Trips Facilitate Learning about Climate Change," *Frontiers in Psychology* 9, no. 2364 (2018): 1-20, https://doi.org/10.3389/fpsyg.2018.02364.
23   S.J. Ahn, J.N. Bailenson, D. Park, "Short- and Long-Term Effects of Embodied Experiences in Immersive Virtual Environments on Environmental Locus of Control and Behavior," *Computers in Human Behavior*, no. 39 (2014): 235-245, https://doi.org/10.1016/j.chb.2014.07.025.

and Maslowska[24] demonstrated that Immersive Virtual Environments (IVEs) could make people rethink about their meat-based diet and switch to a largely plant-based diet, as being aware of how consuming less diary and meat could have a significant impact on an individual's carbon footprint. However, side effects are not that rare. In 2016, Ahn and colleagues[25] conducted three experiments in which viewers could embody animals: even if they demonstrated that virtual reality could increase environmental involvement by allowing users to embody animals in IVEs, rather than simply watching a bidimensional video, the effects of the heightened interconnection with nature persisted for one week, and then vanished. This result shows clearly how there is still much work to do to understand whether virtual reality could be a valuable tool to make people aware about climate change.

Feeling It, Living It: Empathy and Immersive Storytelling

In 2015, filmmaker Chris Milk had no doubt when declaring that virtual reality could be "the ultimate empathy machine." As VR filmmakers began to explore the cinematic potential of immersive technologies, VR scholars, on the other side, had to face new ethical problems within virtual reality. In the last part of his speech, Milk stated:

We can change minds with this machine. [...] It connects humans to other humans in a profound way that I've never seen before in any other form of media, and it can change people's perception of each other. And that's why I think Virtual Reality has the potential to actually change the world. So, it's a machine, but through this machine we become more compassionate, we become more

24   M.H.C. Meijers *et al.*, "Experiencing Climate Change Virtually: The Effects of Virtual Reality on Climate Change Related Cognitions, Emotions, and Behavior," *Environmental Communication* 17, no. 6 (2023): 581-601, https://doi.org/10.1080/17524032.2023.2229043.
25   S.J. Ahn, *et al.*, "Experiencing Nature: Embodying Animals in Immersive Virtual Environments Increases Inclusion of Nature in Self and Involvement with Nature," *Journal of Computer-Mediated Communication* 21, no. 6 (2016): 399-419, https://doi.org/10.1111/jcc4.12173.

empathetic, and we become more connected. And, ultimately, we become more human.[26]

In this sense, virtual reality is strongly associated with empathy, especially when discussing about immersive storytelling and immersive journalism recording the horror of wars, poverty, mental and physical diseases, or climate change issues.[27] At the time I am writing this essay, HMDs are the most common – and most affordable – devices: when the user puts on the HMD, they are immersed in the virtual scenario; joystick, hands, the voice and eventually eyes are implied to interact with the virtual world. What differs from other devices, according to Slater and Sanchez-Vives,[28] is essentially the consistent "grade of immersiveness" provided by HMDs, that is the consciousness of the virtual scenario, which coexist, however, with the participant's knowledge of its fallacious nature.

Indeed, the perceptual immediacy and the illusion of presence in a virtual environment appear to be the essential consequence of "the solicitation (and perturbation) of the spectator's vestibular system and emotions,"[29] which shows how VR can stimulate the perceptual, cognitive, and emotional immersion, which aim to solicit the user's engagement. In this perspective, viewers are stimulated by virtual (or haptic) feedback, which appear to be more impactful as viewers embody a virtual presence.[30] Immersive VR solicit a strong sense of presence, providing an immediate and pre-reflexive empathic comprehension. In this sense, the "empathy machine" is involved to

26   C. Milk, "How Virtual Reality Can Create the Ultimate Empathy Machine," filmed 2015 at TED Talk, https://www.ted.com/talks/chris_milk_how_virtual_reality_can_create_the_ultimate_empathy_machine, accessed December 9, 2023.
27   H. Kool, "The Ethics of Immersive Journalism: A Rhetorical Analysis of News Storytelling with Virtual Reality Technologies," *Intersect 9*, no. 3 (2016): 1.
28   M. Slater, M.V. Sanchez-Vives, "Enhancing Our Lives with Immersive Virtual Reality," *Frontiers in Robotics and AI* 3, no. 74 (2016): 3-4, 10.3389/frobt.2016.00074.
29   A. D'Aloia, "Virtually Present, Physically Invisible: Virtual Reality Immersion and Emersion in Alejandro González Iñárritu's *Carne y Arena*," *Senses of Cinema* (2018), https://www.sensesofcinema.com/2018/feature-articles/virtually-present-physically-invisible-virtual-reality-immersion-and-emersion-in-alejandro-gonzalez-inarritus-carne-y-arena/, accessed December 14, 2023.
30   A. Ijsselsteijn et al., "Presence: Concept, Determinants and Measurement," *Proceedings of SPIE, Human Vision and Electronic Imaging* (San Jose CA: 2000).

describe how VR can make the viewer see through another's eyes, embodying their experiences, and "empathizing" with them.[31]

In this framework, as Chris Milk stated, empathy plays a relevant role in immersive experiences dealing with urgent contemporary issues, being the main interest of a certain body of work in scientific literature.[32] Scholars like Jon Rueda and Francisco Lara[33] consider "Virtual Reality Embodied Perspective-Taking" as the most promising form of VR empathy enhancement. In fact, "[t]he potential of VREPT for the reduction of some biases and discriminatory attitudes, along with the increase of prosocial and altruistic motivation, is empirically well-supported." However, authors point out that, beyond promising results, it remains controversial if cognitive empathy, and empathy in general, could be the only factor to induce such psychological mechanisms.

The criticism regarding empathy in immersive experiences has led to different scientific approaches towards the topic, which point out the moral affordances of VR. The risk of putting the viewer at an "improper distance", to a sensitive topic and to conflate attention and learning with "slacktivism"[34] (to support a social cause through social media or online petitions, with very little commitment) or "identity tourism"[35] (putting oneself in the other's shoes as a leisure activity) and thus fetishizes the other. Through such non-mediation, according to Chouliaraki,[36] VR technology aspires to eliminate distance while mediating a false proximity. When analyzing Chris Milk's well-known 360° VR documentary *Clouds over Sidra* (Gabo Arora, Chris Milk,

31   G. Bollmer, "Empathy Machines," Media International Australia 165 (2017): 63-76, 63, https://doi.org/10.1177/1329878X17726794.
32   F. Herrera *et al.*, "Building Long-Term Empathy: A Large-Scale Comparison of Traditional and Virtual Reality Perspective-Taking," *PLoS ONE* 13, no. 10 (2018): 1-37, https://doi.org/10.1371/journal.pone.0204494.
33   J. Rueda, F. Lara, "Virtual Reality and Empathy Enhancement: Ethical Aspects," *Frontiers in Robotics and AI* 7, no. 506984 (2020): 1-18, 10.3389/frobt.2020.506984.
34   E. Morozov, *The Net Delusion: How Not to Liberate the World* (London: Penguin, 2011).
35   L. Nakamura, "Feeling Good about Feeling Bad: Virtuous Virtual Reality and the Automation of Racial Empathy," *Journal of Visual Culture* 19, no. 1 (2020): 47-65, 54, https://doi.org/10.1177/1470412920906259.
36   L. Chouliaraki, *The Spectatorship of Suffering* (London: Sage, 2006): 202.

2015), Rainoldi affirms that VR engenders an occasion of emotional contagion, "which is the quite literal infection of the character's feeling to the VR user."[37] This is far from a valid moral and decision-making guide: in fact, as Bloom states,[38] VR can be dangerously misleading. In this sense, empathy could be a double-edged sword when dealing with VR documentaries and immersive journalism, as well as during experiments.

How Can We Empathize with a Hyperobject?

After having discussed the main issues concerning global warming narratives and empathetic response in immersive experiences, it seems that Chris Milk's statement concerning the "ultimate empathy machine" and the idea of VR as a promising tool to promote climate change awareness may be both problematic as well. Moreover, as I am going to argue in this part, the nature of global warming itself concerns not only the problem of empathetic response, but also the impossibility to represent it through virtual reality technology.

Within the term "global warming," I propose the term "hyperobject" as coined and conceived by philosopher Timothy Morton in *The Ecological Thought*, which refers to "things that are massively distributed in time and space relative to humans:"[39] a black hole, the biosphere, the Solar System, the total sum of all the nuclear materials on Earth, or the very long-lasting product of human activities.[40] As Morton states, hyperobjects have some proprieties in common: they are viscous, as they are capable "to stick" to beings involved with them; they are nonlocal, consequentially human beings cannot perceive them, but only their "local manifestations;" they have Gaussian temporality,

37   G. Rainoldi, "Face-to-Face, or Face-to-Visor: Is Cinematic Virtual Reality the 'Ultimate Empathy Machine'?," *Bollettino Filosofico* 37 (2022): 163.
38   P. Bloom, "It's Ridiculous to Use Virtual Reality to Empathize with Refugees," *The Atlantic* (2017): https://www.theatlantic.com/technology/archive/2017/02/virtual-reality-wont-make-you-more-empathetic/515511/, accessed March 2, 2024.
39   T. Morton, *The Ecological Thought* (Cambridge MA: Harvard University Press, 2010): 130-135.
40   T. Morton, *Hyperobjects:* 1.

as they generate spacetime vortices; they are invisible to humans as they occupy a high-dimensional phase space, and they are visible just in the interrelationships between aesthetic proprieties of objects. Global warming – a term which Morton finds more impactful than climate change, as it supposes the idea of mere changing from a state to another – is, in fact, a hyperobject. "Every decision we make is in some sense related to hyperobjects," Morton states; "these decisions are not limited to sentences in texts about hyperobjects. When I turn the key in the ignition of my car, I am relating to global warming."[41] From this perspective, hyperobjects do not come into conflict with the profound materiality of global warming, as it exhibits its effects interobjectively,[42] even if they are inaccessible intrinsically. Moreover, Timothy Morton supports the idea that hyperobjects are "what have brought about the end of the world,"[43] which does not mean that the world is about to end: instead, Morton declares that the concept of world is no longer operational and cannot cohabit with hyperobjects, in a way that should not scare people, rather inducing them to act. This is, indeed, another key point which corroborates the issue of representing the hyperobjective nature of global warming.

The incapability of current narratives to deal with the essence of global warming dialogues with its inaccessibility, in a way that is not so far from the issue put forward by Carlos Santana with the "problematic" point of view of the "geologist of the future." The problem occurs within immersive experiences and VR documentaries as well. Potential viewers wearing an HMD and deciding to watch any sort of immersive experience concerning global warming may find themselves constrained into a narrow gaze into the issue. Talking about This is climate change VR series, or 21-22 series, e.g., we have the possibility to investigate environmental issues only from their "local manifestations:" consequentially, the hyperobject-global

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41   Ibid.: 20.
42   Ibid.: 1.
43   Ibid.: 6.

warming remains inaccessible. In this sense, experiences that aim to represent the evolution of global warming in a few minutes and showing its effects from a human perspective may negatively affect the perception of the global warming itself.

The second problem concerns embodiment and perspective-taking in immersive virtual environments. As I stated in the previous paragraph, the peculiarity of virtual reality technology lays in the possibility to be immersed in a virtual environment. When considering immersive experiences about global warming, the hyperobjective essence may be perceived as a critical point. The main question may be formulated as follows: from which perspective one could experience a hyperobject like global warming? Brand-new experiences from laboratories working on VR generally choose "the witness" model:[44] viewers are immersed in a virtual environment, and they experience how climate change affects a precise environment from a human-scale perspective. However, viewers are just capable to observe it and eventually to learn more about physical and geological proprieties of specific environments – in this sense, we may call these "immersive lectures." Indeed, these are valuable experiments which clearly show the benefits of VR in facilitating learning about global warming issues. Nonetheless, I believe we should make a further step into the storytelling design of these kind of immersive experiences, according to the fact that VR filmmakers have been working on the cinematic potentials of VR. In this framework, further critical issues rush in when dealing with perspective-taking in VR films about global warming. On one hand, the embodiment of someone living on their skin the effects of global warming may put the viewer at an improper distance, appropriating the experience of others momentarily, as assumed by Kate Nash[45] and previously underlined in this essay. Co-presence or "co-witnessing" does not guarantee a deeper understanding of traumatic

44   K. Nash, "Virtual Reality Witness:" 124.
45   Ibid.: 125.

events: as argued by Chouliaraki, "the spectacle of human pain […] may be manipulative for spectators. Unless accompanied by practical action or compassionate care, the spectators' pity vis-à-vis distant sufferers may become part of a persuasive machine."[46]

On the other hand, we may consider the possibility of embodying non-human presence, e.g. animals, stones, insects, and they perception of global warming. However, even if this second proposal may be a groundbreaking point for anti-specism, it is impossible to ignore the fact that human gaze persists underneath the question "what it is like to be" [47] something other than human, as stated by Philippe Bédard.[48] According to the elements pointed out in this paragraph, the problem of empathetic response in immersive experiences concerning global warming is grounded in the intrinsic nature of global warming itself, as well as in the problem of identifying which perspective one should take. Pointing out the nonlocal and fluid essence of hyperobjects, including the impossibility to experience it totally, and the narrow gaze which determines immersive experiences concerning environmental issues, it is intrinsically impossible to elaborate a long-term, effective, and realistic empathetic response towards the representation of global warming through virtual reality technology. However, this is supposed to be, without any doubt, the most sincere and respectful starting point to build impactful immersive experiences on global warming. In this framework, I find Grant Bollmer's rejection of empathy and his move towards radical compassion[49] a valuable starting point in the discussion concerning VR experiences on global warming. As Bollmer affirms, compassion concerns the potentials of not understanding another, in a way that does not negate

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46   L. Chouliaraki, *The Spectatorship of Suffering: 203.*
47   A. Pinotti, "What Is It Like to Be a Hawk?: Inter-Specific Empathy in the Age of Immersive Virtual Environments," in Y. Hadjinicolaou, ed., *Image Practices and Falconry* (Berlin-Boston: De Gruyter, 2020): 31-47. See also: R. Grusin, *The Nonhuman Turn* (Minneapolis: University of Minnesota Press, 2015).
48   P. Bédard, "Adventures beyond Anthropocentrism in Virtual Reality Art:" 96.
49   G. Bollmer, "Empathy Machines:" 63-76.

or ignore the experience of another, but rather is open to it, even though compassion can never fully grasp it.[50]

Conclusion: Do Not Expect Too Much from the End of the World

"The end of the world has already occurred," states Timothy Morton in the first chapter of his reflection on hyperobjects and global warming: "We can be uncannily precise about the date on which the world ended. Convenience is not readily associated with historiography, nor indeed with geological time. But in this case, it is uncannily clear."[51] The provocation roots into environmental activism struggling to make people aware of the issue, the denial of global warming as perceived as something distant, and the incapability to perceive the hyperobjective essence of it in an immediate glance. Indeed, the struggle laying in the conflict among the terms corroborates the fact that we should perceive a hyperobject just through its material effects on our everyday life: this idea is not far from the objectification of global warming into the allegorical comet running towards the Earth as depicted in feature film *Don't Look Up.*[52]

The empathetic response following any immersive experiences concerning global warming could not be anything but limited to local and interobjective manifestation of the hyperobject. Indeed, this assumption may be perceived as provocative: however, considering the urgent issues concerning global warming and disastrous effects on ecosystems, I strongly believe that we as part of human community should reckon on the effectiveness of our actions and awareness towards the problem. Indeed, we should rethink about how we can employ virtual reality technology to foster an effective ecological awareness,[53] not only from

50   Ibid.: 72.
51   T. Morton, *Hyperobjects:* 7.
52   B. Goldfarb, "How Do You Make a Movie about a Hyperobject?," *High Country News* (December 31, 2021), https://www.hcn.org/issues/54.2/climate-change-how-do-you-make-a-movie-about-a-hyperobject, accessed December 14, 2023.
53   T. Morton, *The Ecological Thought*.

the perspective of the content, but also from the ecological impact of VR front.[54] We are overwhelmed by data concerning the evolution of global warming in a short and long period: we need to put into dialogue experiments conducted in laboratories and immersive experiences accessible to anyone, leaving empathy-related concerns behind. Even if the problem of empathy affects fully impactful and attitude-changing in viewers, I strongly support the idea that we should start from this limitation to better identify specific immersive storytelling which need to be designed for a truthful experience of global warming. Even though the essence of the hyperobject remains inaccessible, still we can use virtual reality to design immersive experiences – while keeping in mind the limits of representation and empathetic response intrinsic to global warming.

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54   The CEPIR Project determines the ecological impact of VR: "Cas d'Étude Pour un Immersif Responsible," CEPIR, https://www.cepir.info.

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