sustainability

MDPI

Review

Climate Change, Time and Tourism Knowledge: The Relativity of Simultaneity

Stephen Schweinsberg * and Simon Darcy

UTS Business School, University of Technology Sydney, Sydney, NSW 2007, Australia
* Correspondence: stephen.schweinsberg@uts.edu.au

Abstract: Climate clocks are currently ticking down to a point in time when it will be impossible to arrest the rate of CO_2 emissions within the bounds of the parameters set by the Paris Climate Agreement. The tourism academy has been at the forefront of efforts to draw attention to the climate threat and to develop adaptation and mitigation responses in conjunction with industry. However, whilst the tourism academy is generally said to be in lock-step with the urgency of the climate threat and tourism's need to respond, outliers do exist. Why might a tourism scholar view the urgency of the climate threat differently from his or her colleagues? Drawing on conceptual insights from Einstein's *Special Theory of Relativity*, the present paper explores the sociological framing of time in relation to tourism academics and the implications for the development of a tourism knowledge force-field as a foundation for tourism knowledge creation.

Keywords: climate change; special relativity; Einstein; tourism knowledge

Citation: Schweinsberg, S.; Darcy, S. Climate Change, Time and Tourism Knowledge: The Relativity of Simultaneity. *Sustainability* **2022**, *14*, 16220. https://doi.org/10.3390/su142316220

Academic Editor: Lóránt Dénes Dávid

Received: 16 October 2022
Accepted: 2 December 2022
Published: 5 December 2022

1. Introduction

"Time is an illusion" (Albert Einstein)

"It is a strange thing, but when you are dreading something, and would give anything to slow down time, it has a disobliging habit of speeding up." (J. K. Rowling)

From 30 November 2022, the Human Impact Lab has estimated that the world has 9 years, 4 months, 22 days, 4 h, 48 min and 28 s before it reaches the +1.5 °C of warming above pre-industrial levels that were identified in the Paris Climate Agreement (https://climateclock.net/ (accessed on 30 November 2022)). Much as the Doomsday Clock, which has been in existence since 1947, is a metaphor for how close humanity is to nuclear Armageddon, climate clocks synthesise what is, in geological terms, a long-term and multi-faceted scientific process into language that is comprehensible to business, political leaders and society-at-large. Industry associations, including Tourism Declares (https://www.tourismdeclares.com/ (accessed on 22 September 2022)), have advocated for the urgency of addressing the climate impacts of tourism over the next decade. The UNWTO has similarly suggested that "tourism has to define its own 'high-ambition scenario'; a scenario where tourism would transform [in the period up to 2030] towards low emission and highly efficient operations" [1]. However, Gössling and Scott [2] observed that while there is "full agreement that the climate is already changing, and that tourism needs to make a contribution to mitigation [efforts] comparable with other sectors . . . leaders [also] revealed contradictory views regarding mitigation timelines" (p. 2083).

Paquin et al. [3] have argued that the time frames society perceives as being necessary for climate responses must be understood in terms of both the "system life span, [which] relies on the user's estimation of his [sic] planning timeframe and the climate vulnerability, [which] is estimated from climate model projections and observations" (p. 143). Modelling approaches have been characteristic of the broader environmental movement for a number of decades. For example, the Club of Rome's *The Limits to Growth* framed their study on how the combined impact of unmitigated economic and population growth would drive

resource consumption to such an extent as to detrimentally affect the conditions for the survival of humanity [4]. The report used the best computer modelling of its time, with the World3 computer simulation framing a 40 to 50-year period before those limits would be reached. However, while the scientific projections and modelling put forward by the Intergovernmental Panel on Climate Change are now being accepted by the majority of scientists, we have seen debate between optimists and pessimists over society's ability to control the effects of environmental change since the Malthusian arguments around resource scarcity in the late 18th century [5], which has extended to current climate discourse.

When society's rhythms are out of sync with respect to conceptualising each other's relationship to climate change, it is beholden on academia to explore other ways to illustrate the idea of temporal relativity and society's relationship to it. Values are an essential part of such debates. Page [6] observed that:

> "No matter how sophisticated one's natural scientific account of human environmental interactions, empirical research can at best explain how things actually are and not how things ought to be. Since policy making must aim for some desirable state of affairs—in democratic countries this is usually developed in terms of the common good, subject to the constraints of personal freedom and democratic rights" (pp. 11–12)

Issues such as climate change are complex because they are both scientific and values-based frameworks [7], and rather than accepting complexity for what it is and engaging with competing stakeholders, sceptics and advocates alike often tend to talk past each other, forming a logic schism [8]. Each successive COP at the United Nations conference is subject to sustained commentary both with respect to the evolving climate science [9] and managerial implications for sectors (such as tourism), as well as the social evolution of climate discourses [10]. Sun and Yang [11] have argued that the way forward in addressing climate change will be to stop viewing the problem in terms of a single linear solution(s) but instead work step-by-step to develop solutions at a local level and engage with society's messes as well as the inherent fragmentation of organisations and industries. An important step in such an endeavour will be to understand why people respond as they do with respect to climate change and, just as importantly, when they should choose to do it.

In this paper, we will use the analogy of Einstein's *Special Theory of Relativity* as a means of appreciating some of the complexities of climate time as it relates to tourism knowledge formation. The Cambridge Dictionary defines an analogy as the "comparison between things that have similar features, often used to help explain a principle or an idea" (2020 in [12]). In this paper, we are specifically interested in the concept by Einstein that time is relative and that the temporal phenomenology of our experience as human beings is guided by our experiences [13]. Paquin et al. [3] have noted that climate vulnerability thresholds and planning horizons are subject to different timescales. According to [3], the effect of this is that we must find ways of reconciling timeframes, which they attempt to do through the application of a 3D model demonstrating the relationship between vulnerability and lifespan timescales (both measured in years) and societal importance. As tourism academics, we have access to a range of disciplinary and interdisciplinary frameworks to create knowledge [14]. However, the interpretation/application of that knowledge is seen individually through the lens of our own framing of "truth", which is influenced by aspects of our knowledge force-field (person, ideology, position, rules and ends in [14,15]). In this paper, we will explore the interplay between temporal relativity and the tourism knowledge force-field, with reference to an exchange over the merits of climate skepticism between Shani and Arad [16,17] versus Hall et al. [18,19].

2. Tourism, Climate Change and Knowledge

Tourism has been recognised both as an instigator of climate change and as a victim of climate change impacts in low-level island nations, alpine areas and other fragile environments [20–27]. Scholars have an important role to play in developing, synthesising and communicating knowledge about wicked problems such as climate change. Recent

academic commentary has emphasised the importance of tourism contributing to societal efforts to achieve carbon reduction goals that are aligned with broader 2030 Sustainable Development Goals [22]. For this reason, it is not surprising that academic commentary on the relationship of tourism to the Paris Climate Accord has emphasised the words of the World Travel and Tourism Council:

> "The next 20 years will be characterised by our sector fully integrating climate change and related issues into business strategy, supporting the global transition to a low carbon economy, strengthening resilience at a local level against climate risks" (WTTC, 2015 in [28] (p. 5)).

As far back as the mid-1960s, scholars Roger Randall and Hans Suess were influential in the early development of knowledge into the interrelationship between fossil fuels and carbon dioxide in the atmosphere; Their early pioneering work extended to the study of tourism planning processes in the 1970s [29]. The study of climate change by those that would characterise themselves as tourism scholars first emerged in the 1980s [30], and over the ensuing nearly four decades, the study of climate change in tourism has become more sophisticated [30,31] growing from a focus on gathering and presenting empirical data of climate-related themes in the early twentieth century [32] towards more of an impression that academics must advocate for particular climate futures that commensurate with their specific areas of knowledge and expertise [33]. In a recent reflection on the 26th Conference of the Parties in Glasgow, Scotland, in 2021 (otherwise known as COP26), Scott and Gössling [34] discussed how, in their opinion, there were no sufficient moves to build upon the earlier work by Djerba and Davos and arrest the growth trajectory of the global tourism industry. It was in the context of the outcomes from COP26 that it was suggested academia, as well as government, civil society and industry, must collectively move towards a "vision of reshaped tourism compatible with a net-zero society and the evolving realities of accelerating climate change" [34] (p. 219).

One of the challenges facing tourism scholars that have an interest in climate change relates to a general disinterest amongst some in the tourism academy, as well as a lack of cut-through with the industry at large [35,36]. This should not be surprising that climate change is a wicked problem that is subjected to various social framings. Tourism stakeholders will perceive the evolving threat of climate change through different conceptual lenses, including an understanding of enterprise risk and resilience [35,37], adherence to an economic growth agenda for tourism success [38], and levels of climate scepticism [39–41]. Even amongst those academics writing on the relationship between tourism and climate change, it is not surprising that the academy does not always speak with one voice. A particularly tense example between tourism scholars over the future of climate change was expressed nearly a decade ago by Scott [42] in relation to an exchange between Shani and Arad and a number of other scholars (see [16–19]):

> "The state of climate change in the tourism literature hit what might be considered a low point when a leading tourism journal published a climate change denial paper, in which Shani and Arad . . . falsely claimed that climate change was "hype" and "under intense scientific dispute. Their inaccuracies, misinformation and deliberate misrepresentations of the status of scientific knowledge and consensus on climate change demanded rejoinders by Hall et al. . . . because the journal would not retract it" (pp. 10–11).

While tourism scholars have commented on how macro-level shifts towards a circular economy [43] and more regional destination adaptation strategies [20] might aid the development of a sustainable climate strategy for tourism, the exchange between Shani, Arad and Hall et al. was a debate over a more fundamental issue—what is scientific truth on climate change? Einstein [44] described how one has to understand that "the meaning of 'truth' varies according to whether we deal with a fact of experience, a mathematical proposition, or a scientific theory" (p. 261). While many climate commentators seek to suggest that scientific theories can lead to an understanding of the truth about climate change,

there are others that would suggest that scientific knowledge is, on its own, "insufficient to overcome scientific skepticism" [45]. One of the principal challenges in such knowledge dissemination relates to the technical intelligibility of the material, which can often result in people struggling to understand underlying processes [46]. A process was at the heart of the Shani and Arad versus Hall et al. exchange, which, at its centre, was a call for a "more scientifically-based, skeptical and cautious approach in studies on climate change and tourism" [16] (p. 82). It is this idea of "caution" that is the focus of the rest of this paper. For many years climate change responses have been grounded on the idea that the precautionary principle—"when an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if cause and effect relationships are not fully established scientifically" [47] (p. 871)—should be the mantra of society's response to the climate threat [48]. It may be argued that the value of a precautionary approach to climate change lies in our ability to avoid the virtual tipping point where the negative climate practices of tourism become detrimental to the practice of tourism in society. However, how can one determine when such a tipping point might occur?

To begin to frame this question, we will turn in the next section to Albert Einstein's *Special Theory of Relativity*. To date, more broad applications of the Special Theory of Relativity to the study of tourism and the social sciences have been lacking [49]; However, exceptions outside of tourism do exist, e.g., McGann and Speelman's study of special relativity and psychology [50]. With respect to the study of tourism, publications to date have been limited to one conceptual study and a small number of papers that have used tourists to illustrate certain relativity principles (see [49,51,52]). At an experiential level, time is essential for the study of tourism because the act of travelling "marks our sense of time, differentiating the extraordinary and heightened time [of an experience] with the time of the mundane" [53] (p. 1). Although not a traditional science discipline, the study of tourism and its interplay with notions of time are also important because:

> "what social scientists have treated as the specifically 'human' aspects of time are in fact characteristic of the physical world . . . Adam argues that 'Past, present and future, historical time, he qualitative experience of time, the structuring of undifferentiated change into episodes, all are established as integral time aspects of the subject matter of the natural sciences'" (Adam, 1990 in [54] (p. 50)) (p. 67)

In this discussion, we will take the inference of special relativity—the idea that we perceive space and time relative to one another—and apply it to the study of tourism knowledge formation. In doing so, we are guided by the thoughts of Nolt [55], who said that "future people are vulnerable to our [climate] domination when we understand futurity not as absolute existence, but as a spatiotemporal distance in the future direction, relative to our reference frame" (p. 181).

3. Einstein's Special Theory of Relativity

Albert Einstein defined his Special Theory of Relativity in the 1905 paper entitled *On the Electrodynamics of Moving Bodies* [56] (the term "special relativity" should be distinguished from the Theory of General Relativity that focused on gravity, which Einstein published in 1915). As part of his "annus mirabilis", the essential premise of the paper was to argue that "the laws of physics and in particular the speed of light should appear to be the same to all uniformly moving observers" [57]. The idea that the laws of physics should be immutable was not particularly revolutionary at the turn of the twentieth century. After all, in 1687, Sir Isaac Newton articulated many of the basic laws of physics governing motion, force, mass and gravity in his work *The Principia: Mathematical Principles of Natural Philosophy* [58]. Newton's laws of motion read:

- "Law 1: Everybody perceives its state of rest or of moving uniformly straight forward, except insofar as it is compelled to change its state by force impressed
- Law 2: A change in motion is proportional to the motive force impressed and takes place along a straight line in which that force is impressed" [58].

The implication of Newton's laws is that the strength of an attraction between two bodies is directionally proportional to their mass and the distance between them [59]. If either of these variables should change (e.g., if the sun were to explode right now as you are reading this paper), then the Earth "which is some 93 million miles away—would instantaneously suffer a departure from its usual elliptical orbit" [59] (p. 56).

In forming such an understanding, Newton was heavily influenced by the work of his teacher Isaac Barrow who saw time in absolute terms [60]. Newton [58] wrote of "absolute, true, and mathematical time, in and of itself and of its own nature, without reference to anything external, flows uniformly and by another name is called duration" (p. 54). However, as Wallace [61] has argued, there was still scope in the intervening period from Newton to Einstein to consider what Newton's idea of 'motion' and 'rest' actually means in practice. Newton talked of motion as if it was universal, as opposed to how it would be perceived by people operating from different material frames of reference [62]. However, Newton never addressed the question of what motion and, thereby, rest should be measured in relation. Drawing on a perspective that would later be characterised by philosophers as substantivalism, Newton argued that "the only way to define motion adequately was to admit something else to our picture of the world, something additional to all the moving matter, something which would persist even if the matter were to vanish: absolute space . . . the sensorium of God" [61] (p. 26).

Whilst Newtonian understandings of physics had become commonly accepted by the time of Einstein, other perspectives also existed. As far back as 1632, Galileo Galilei had described some of the characteristics of relative movement and, therefore, relative time. In his *Dialogue Concerning the Two Chief World Systems*, he included a thought experiment of a passenger on a ship in a windowless cabin who is unable to tell if the ship is moving without the benefit of an external reference point:

> "Shut yourself up with some friend in the main cabin below decks on some large ship, and have with you some butterflies, and other small flying animals. Have a large bowl of water with some fish in it; hang up a bottle that empties drop by drop into a wide vessel beneath it. With the ship standing still, observe carefully how the little animals fly with equal speeds to all parts of the cabin. The fish swim indifferently in all directions; the drops fall into the vessel beneath; and in throwing anything to your friend, you need to throw it no more strongly in one direction than another, the distances being equal; jumping with your feet together, you pass equal spaces in each direction. When you have observed all these things carefully (though there is no doubt that when the ship is standing still everything must happen this way), have the ship proceed with any speed you like, so long as the motion is uniform and not fluctuating this way and that. You will discover that not the least change in all the effects named, nor could you tell from any of them whether the ship was moving or standing still" (Galileo 1967/1632, in [63] (pp. 186–187)) (p. 54)

At the heart of this thought experiment by Galileo was an apparently simple notion that whenever one discusses motion or velocity, it is essential to understand who is doing the measuring [59]. Whether one is on Galileo's ship or observing from the shore, one can equally claim that it is the other vantage point (the ship or shore) that is moving relative to us. Einstein took up this idea by exploring how absolute time is conceptualised with respect to optical and electrodynamic phenomena [60].

In the early twentieth century, several physicists, including Hendrick Lorentz, were considering the nature of motion in relation to how the oscillation of electrons leads to the production of light [64]. For Einstein, the key was to consider the application of relativity principles of movement to the speed of light. While later scholarship has shown the applicability of relativity principles to experiments relating to objects travelling below the speed of light [65], Greene notes that for more than a decade, Einstein had been fascinated with what a beam of light would look like if you were able to run next to it at exactly the speed of light (299 792 458 m/s). Logic would suggest that the beam of light should appear

as if it were standing still. However, this conclusion was complicated by earlier work from James Clarke Maxwell into electrodynamic waves, which had ascertained that light could not stand still [66]. By simultaneously accepting this fact and choosing to discount common contemporary suppositions that light travelled through the universe in waves facilitated by a mysterious independent "aether", Einstein [56] was able to establish that light will always move at the same speed relative to anything and everything.

The effect of this realisation that light travels at one constant speed is that if one also accepts Newton's formula for velocity as equaling distance travelled divided by time, and if velocity stays the same, then either distance or time must change. Theoretical proof of this is often offered in the form of a light box experiment (see Figure 1).

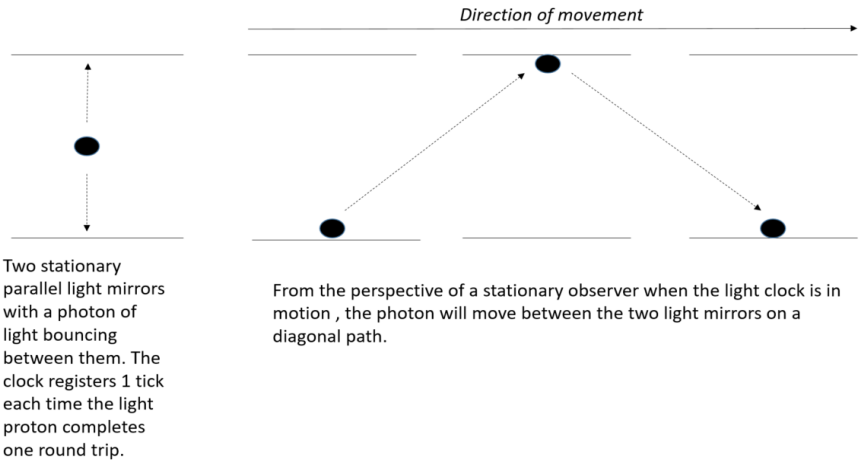

Figure 1. Light Box Experiment. Source: Adapted from [59] (pp. 37–41).

In the experiment, two stationary mirrors are placed six inches apart, with a photon travelling between them at the speed of light. One return trip between the mirrors will take 1 billionth of a second, and therefore, one billion ticks equate to 1 second of time elapsing. When, however, a second moving light mirror travelling at a constant speed is added, we can see that the photon of light must travel in a diagonal direction relative to the speed of the vessel it is travelling in, meaning that from the perspective of someone watching from a stationary position the light will take longer to complete one return trip between the two mirrors. The effect of this is that time will slow down on the moving clock, and more time will elapse for the stationary observer. Using a form of transport that would be familiar to readers of this paper, Hafele and Keating [67] demonstrated that caesium-beam atomic clocks sent around the world on commercial airlines do indeed run slower than stationary clocks on the ground, albeit slower to such a small extent (59 nanoseconds) that the differences are not always observable.

While Einstein's Special Theory of Relativity established that how we measure time, including notions of simultaneity and duration, is relative; it was also successful in drawing insights regarding the union of space and time. When science perceives space, it has traditionally done so with respect to a selection of coordinates, or frames of reference, that allows one physical object to be perceived in relation to another [60]. Einstein opened his explanation of the principles of Special Relativity with reference to the idea of Euclidean geometry. Euclidean geometry is built on the premise that the combination of three separate coordinate positions allows us to situate an object (such as an aeroplane) in space, e.g.,:

> "You might, for instance, take the plane of the equator, the plane of the meridian of Greenwich, and the plane of the 90th meridian, and say how far the airplane was from these planes . . . Or you might take the distance from London to a point vertically below the airplane, the direction of this distance (north-east, west-south-west, or whatever it might be), and the height of the airplane above the ground" [68].

While the choice of spacial dimensions available in a three-dimensional framework is limitless, if we apply a fourth temporal dimension (i.e., non-Euclidean geometry), we can only talk in terms of a specific time unit or moment in time where the measurement was taken [68]. For example, in our aeroplane example, we may talk in terms of London time or Sydney time or Auckland time. What constitutes the present for an observer in one location cannot be solely understood in terms of a past, present and future that is understood by all. Rather, there is also an extended present, an intermediate zone, which can be as small as a few nanoseconds between two localities here on Earth, or 15 min if we are discussing distances between Earth and Mars [69]. The reason why such an extended present occurs was described by Russell [68]:

> "Suppose an event E occurs to me, and simultaneously a flash of light goes out from me in all directions. Anything that happens to anybody after the light from the flash has reached it is definitely after the event E in any system of reckoning time. But any event, which happened in the intervening time is not definitely either before or after the event E. To make the matter more definite: suppose . . . I could observe a person in Sirius, and the Sirian could observe me. Anything that the Sirian does, and which I see before the event E occurs to me, is definitely before E; anything the Sirian does after seeing the event E is definitely after E. But anything that the Sirian does before seeing the event E, which I see after the event E has happened, is not definitely before or after E." (p. 39)

Einstein described space-time as a continuum where the corresponding events move successively along in a single direction [60]. When we take the concept of space-time and apply it to our individual experiences, Tegmark noted that "space-time contains a large number of braid-like patterns corresponding to subjective perceptions both at different places, corresponding to different people, and at different times". In the next section, we will argue that with each new climate change observer moment, a new perception is formed. Tegmark (2014) has argued that the structure of one's observer moments is localised, as opposed to being focused on "what's elsewhere in space (such as the external reality you see around you), and not on what's elsewhere in time (such as what you experienced a few seconds ago)" (p. 286). In the next section, we will also suggest that as climate clocks tick down to 0, observer moments (or, in the case of climate change, critical discourse moments) arrange themselves in patterns giving an individual understanding of space-time as it relates to climate change.

4. Climate Clocks, Academics and the Relativity of Simultaneity

Increasingly society is determining its reference frame for the climate in relation to the self-ordering potential of clocks. It was only in the fourteenth century Europe that clocks began to be seen as a tool synonymous with the regulation of society [70]. Over the ensuing seven hundred years, the mechanics available to clock makers have become ever more sophisticated to account for the need for society to coordinate time across different time zones in support of evolving transport technologies. Today, optical atomic clocks, which are precise to less than a second over the total 13.7 billion year timescale of the universe [71], are so advanced that it is perhaps not surprising that watches and watchmakers have been used as an analogy to debate the existence of intelligent design and the role of a Creator in the creation of the universe [72,73]. Events from COP26 included a youth-based Friday's For Future March that carried a clock showing the years, months, days, minutes and seconds remaining to transition to new green economy futures [74]. Drawing on the previous application of molecular clocks to aid our understanding of evolutionary biology, "enabling independent timescales to be placed on evolutionary events" [75], the popular discourse around the urgency of climate change mitigation has also been given a voice through climate clocks operated by Concordia University (Canada) and the Mercator Research Institute on Global Commons and Climate Change (Germany) [76]. Climate clocks have also been erected in New York, Seoul and Glasgow.

Climate clocks, such as the clock developed by the Human Impact Lab, define the time that is available to arrest the negative effects of CO_2 emissions (see methodology in [77]), and the role of clocks is to conceptualise a framing of time that is particular to a "stage of societal development and self-regulation" (Deem, 1996, [78] (p. 16)). Whilst often not explicitly referring to clocks, individual academics have concurred with the idea of a climate imperative that is inherent in such temporal discussions [79–81], with many tertiary institutions and individuals also signing on to initiatives, including the *2021 Glasgow Declaration: A Commitment to a Decade of Tourism Climate Action* (https://www.oneplanetnetwork.org/programmes/sustainable-tourism/glasgow-declaration (accessed on 2 October 2022)) and the *Tourism Declares a Climate Emergency* (https://www.tourismdeclares.com/ (accessed on 2 October 2022)).

However, whilst anecdotal evidence is that the science of climate change is largely accepted in the academy, the challenge remains that the study of tourism is a social construct. Tourism academics have access to a range of disciplinary and interdisciplinary knowledge bases [14], which have cumulatively grown over time as a result of efforts to frame the disciplinarity of tourism and determine its legitimacy as a field of academic inquiry [82–94]. The interdisciplinary nature of tourism is regarded as a strength of its ability to influence climate change knowledge formation [30]. However, what of the effect of the knowledge force-field that feeds into it? Tribe [15] first introduced the knowledge force-field as a means of illustrating the personal forces that impact knowledge creation, which are ideas comprising: our sense of person ("things our bodies carry with them our autobiographies, our socializations, our cultures, our genders, our sexual orientation, our instincts, our values" in 14) (p. 54); our ideology (that "set of common sense beliefs, which are unreflexively ingrained in our thought and guide our practice" in 14) (p. 54); and our position (both administratively and as part of a broader community of scholars) etc. Today the sociological nature of tourism has been popularized by the wider critical tourism network [95–97] with reflective consideration given not only to the role of issues, such as gender, in tourism knowledge formation [98] but also to questions regarding the role for academic activism in knowledge formation [99] and discussions regarding the role of academic dissent in tourism knowledge formation [7].

However, while we understand a lot about the components that make up the tourism knowledge system around climate change and the barriers to the transfer of that knowledge to other audiences [100], little is known about the level of belief that tourism scholars have over the science of climate change. Anecdotal evidence suggests that "tourism scholars and researchers are virtually all on board regarding the established climate change narrative" [16] (p. 82). Nevertheless, as Higham and Font [101] have argued, there is often a disconnect between the sentiments expressed by tourism academics and their practical behaviours, including reliance on air travel for conferences (see also [102]). Additionally, when academics debate each other over key scientific issues around climate change, there appears to be a correlation between their aspects of self (the knowledge force-field) and the perceived urgency that is attached to the climate change question.

5. The Case of Academic Climate Sceptics

In 2014 the journal *Tourism Management* published a research note which advocated that the science of climate change was open to question and that tourism academics ought to be more critical before jumping on the proverbial climate bandwagon [16]. The scientific merits of this position are not the focus of this paper, although we should declare at this point that the authors of this paper do believe in the anthropocentric nature of climate change and the urgency that is needed from the tourism sector into the future. From the opening abstract, Shani and Arad [16] put the issue of time at the centre of their argument, noting that "in light of the current scientific literature, advocating and implementing radical environmental policies are likely to be ineffective, **ill-timed** and harmful to the tourism industry" (emphasis added, p. 82). When the paper was published in early 2014, COP19 in Warsaw had recently finished, and the youth of the world were becoming more vocal in

advocating for leaders to recognise the importance of a future-focused approach to climate change [103]. The idea that individual academics would wish to, in effect, go against the grain of scientific debate, which had recently been described as moving into "a new phase of maturity and criticality in a sense of skillful, responsible and reflective thinking" (Lai, 2011 in [31]) might seem surprising until one looks at the evidence we have regarding their beliefs, values and positions, all components of their knowledge force-field.

Throughout the climate sceptic exchange in *Tourism Management* and a separate follow-up piece in another journal [40], various claims and counter-claims are made around issues related to the individual academics involved, including a perceived willingness of tourism scholars to engage critically (or not) with the science of climate change based on how it relates to their own values, suggestions that scholars seeking to engage with climate debates are being targeted for bullying and innuendo, and the idea that arguments around climate change are based on a scholar's institutional linkages [16,18,19,40]. We do not wish to suggest that any such arguments are correct or not in that we do not have evidentiary information on the issues raised. However, with each conference of the parties (COP), there is a youth climate march or other similar events that represent a "critical discourse moment [around the study of climate change], as they affect public understanding of climate change by leveraging challenges to established discursive representations" [104] (p. 195). The climate sceptic exchange illustrates that more work is required to understand how tourism academics move from critical discourse moment to critical discourse moment. If we accept the climate science and projections around deadlines for responding to GHG emissions by 2025 and 2030, we can all see where we are going. What is often harder to see is how our temporal perspective will take us there.

Tourism academics exist in space-time as framed by Einstein; space-time is where we interact with different critical discourse moments "at different places, corresponding to different people, and at different times" [105] (p. 285). However, we so often interpret time narrowly as isolated, separate events as opposed to things which have a genuinely temporal connection; the question for all things is where will they be tomorrow [70]? When we stop to consider that other people will not always perceive the temporal relationship between things as we do, we can begin to consider the time we have available to us between now and the climate deadlines of 2025 and 2030 (see Figure 2). Each observer moment propels us at different speeds towards the recognised benchmark when a climate tipping point will be reached. Narin [106] has, for example, observed that young people are frequently driven to protest by an aim to collectivise hope and despair and, through positive action, create a better climate future. With an understanding of the wider goals, each observer moment or experience is viewed as a small incremental step towards that goal [107].

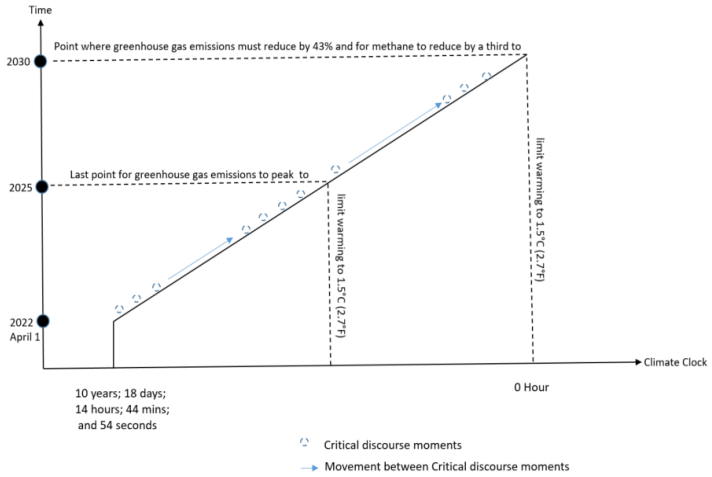

Figure 2. Observer moments on the path to 2030. Source: Adapted from [105] (p. 285).

6. Conclusions

Imagine for a moment that it is COP27 in Sharm El-Sheikh in November 2022 or a year from this writing at COP28 in the United Arab Emirates. We arrived by train instead of flying because that is what Albert Einstein and Greta Thunberg would have wanted. We are waiting to move from a station adjacent to another parked train going in the opposite direction, which obscures all of our view of the station platform and surroundings. We then notice the other train beginning to move, and we wonder where it is going. However, we then notice somewhat disconcertingly that it is our train that is moving. Relativity is always seen in relation to who is observing it. In this case, the other train is moving relative to us; it is not moving from the perspective of passengers on the adjacent platform, still waiting for the time to board the stationary train we were observing. While we will never in our lifetimes travel at the speed of light, we have experienced the principles of Einstein's *Special Theory of Relativity* in our daily lives. As demonstrated in the train example, we have experienced the idea that a thing has no inherent motion except with a frame of reference (another example would be a plane travelling at a constant velocity at 600 km per h; from the point of view of the person below they are travelling at approaching Mach 0.86, and from the point of view of the passenger sipping a cocktail they do not appear to move at all).

Relativity is all around us, and in this paper, we have sought to apply the principles of special relativity to our study of climate change science and tourism knowledge formation. The idea that tourism academics will perceive the occurrence of an 'observer moment' based on their own ideology, position and values draws our attention both to the relativity of time as it relates to climate change, as well as the need to consider what constitutes a privileged present a "moment in time that is metaphysically special in some respect" [13] (p. 186). Such as a resident living in the Pacific Island nations, where their homes are literally just above the rising sea level, many in academia have advocated for the urgency of the climate threat. In contrast, however, others continue to hedge their bets. To begin to understand why this is the case, we have contrasted the principles of the tourism knowledge force-field with the idea of relativity, noting that how we progress to a final climate change reality involves us considering time relatively. As Einstein would say, time is not absolute—it is but a stubborn illusion.

Funding: This research received no external funding.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. UNWTO. Transport-Related CO2 Emissions from the Tourism Sector. Available online: https://www.unwto.org/sustainable-development/tourism-emissions-climate-change (accessed on 1 September 2022).
2. Gössling, S.; Scott, D. The decarbonisation impasse: Global tourism leaders' views on climate change mitigation. *J. Sustain. Tour.* **2018**, *26*, 2071–2086. [CrossRef]
3. Paquin, D.; De Elía, R.; Bleau, S.; Charron, I.; Logan, T.; Biner, S. A multiple timescales approach to assess urgency in adaptation to climate change with an application to the tourism industry. *Environ. Sci. Policy* **2016**, *63*, 143–150. [CrossRef]
4. Meadows, D.; Randers, J.; Medows, D. *The Limits to Growth: The 30-Year Update*; Chelsea Green Publishing Company: Windsor, VT, USA, 2004.
5. Gleditsch, N.P. This time is different! Or is it? NeoMalthusians and environmental optimists in the age of climate change. *J. Peace Res.* **2020**, *58*, 177–185. [CrossRef]
6. Page, E.A. *Climate Change, Justice and Future Generations*; Edward Elgar Publishing: Cheltenham, UK, 2007.
7. Schweinsberg, S.; Fennell, D.; Hassanli, N. Academic Dissent in a Post COVID-19 World. *Ann. Tour. Res.* **2021**, *91*, 103289. [CrossRef]
8. Hoffman, A.J. Talking Past Each Other? Cultural Framing of Skeptical and Convinced Logics in the Climate Change Debate. *Organ. Environ.* **2011**, *24*, 3–33. [CrossRef]
9. O'Riordan, T. COP 26 and Sustainability Science. *Environ. Sci. Policy Sustain. Dev.* **2021**, *64*, 2–3. [CrossRef]
10. Chen, Y.; Thorson, K.; Lavaccare, J. Convergence and Divergence: The Evolution of Climate Change Frames Within and Across Public Events. *Int. J. Commun.* **2022**, *16*, 23.
11. Sun, J.; Yang, K. The Wicked Problem of Climate Change: A New Approach Based on Social Mess and Fragmentation. *Sustainability* **2016**, *8*, 1312. [CrossRef]

12. Bowie, D.; Quinton, S. A tapestry analogy: Analogical thinking to support academic research. *Tour. Manag.* **2022**, *91*, 104529. [CrossRef]
13. Barron, S.; Miller, K. *An Introduction to the Philosophy of Time*; John Wiley & Sons: Hoboken, NJ, USA, 2019.
14. Tribe, J.; Liburd, J. The tourism knowledge system. *Ann. Tour. Res.* **2016**, *57*, 44–61. [CrossRef]
15. Tribe, J. The truth about tourism. *Ann. Tour. Res.* **2006**, *33*, 360–381. [CrossRef]
16. Shani, A.; Arad, B. Climate change and tourism: Time for environmental skepticism. *Tour. Manag.* **2014**, *44*, 82–85. [CrossRef]
17. Shani, A.; Arad, B. There is always time for rational skepticism: Reply to Hall et al. *Tour. Manag.* **2015**, *47*, 348–351. [CrossRef]
18. Hall, C.M.; Amelung, B.; Cohen, S.; Eijgelaar, E.; Gössling, S.; Higham, J.; Leemans, R.; Peeters, P.; Ram, Y.; Scott, D.; et al. No time for smokescreen skepticism: A rejoinder to Shani and Arad. *Tour. Manag.* **2014**, *47*, 341–347. [CrossRef]
19. Hall, C.M.; Amelung, B.; Cohen, S.; Eijgelaar, E.; Gössling, S.; Higham, J.; Leemans, R.; Peeters, P.; Ram, Y.; Scott, D.; et al. Denying bogus skepticism in climate change and tourism research. *Tour. Manag.* **2014**, *47*, 352–356. [CrossRef]
20. Hoogendoorn, G.; Fitchett, J.M. Tourism and climate change: A review of threats and adaptation strategies for Africa. *Curr. Issues Tour.* **2016**, *21*, 742–759. [CrossRef]
21. Demiroglu, O.C.; Lundmark, L.; Saarinen, J.; Müller, D.K. The last resort? Ski tourism and climate change in Arctic Sweden. *J. Tour. Futures* **2019**, *6*, 91–101. [CrossRef]
22. Scott, D.; Hall, C.M.; Gössling, S. Global tourism vulnerability to climate change. *Ann. Tour. Res.* **2019**, *77*, 49–61. [CrossRef]
23. Fauzel, S.; Seetanah, B. Climate Change and Tourism. In *Encyclopaedia of Tourism Management and Marketing*; Buhalis, D., Ed.; Edward Elgar: Cheltenham, UK, 2022; pp. 506–509.
24. Schweinsberg, S.; Darcy, S.; Beirman, D. 'Climate crisis' and 'bushfire disaster': Implications for tourism from the involvement of social media in the 2019–2020 Australian bushfires. *J. Hosp. Tour. Manag.* **2020**, *43*, 294–297. [CrossRef]
25. Scott, D.; Steiger, R.; Dannevig, H.; Aall, C. Climate change and the future of the Norwegian alpine ski industry. *Curr. Issues Tour.* **2019**, *23*, 2396–2409. [CrossRef]
26. Dannevig, H.; Gildestad, I.M.; Steiger, R.; Scott, D. Adaptive capacity of ski resorts in Western Norway to projected changes in snow conditions. *Curr. Issues Tour.* **2020**, *24*, 3206–3221. [CrossRef]
27. David, L.; Baros, Z.; Patkos, C.; Tuohino, A. Lake Tourism and Global Climate Change: An integrative approach based on Finnish and Hungarian case-studies. *Carpathian J. Earth Environ. Sci.* **2012**, *7*, 121–136.
28. Scott, D.; Hall, C.M.; Gössling, S. A report on the Paris Climate Change Agreement and its implications for tourism: Why we will always have Paris. *J. Sustain. Tour.* **2016**, *24*, 933–948. [CrossRef]
29. Rutty, M.; Steiger, R.; Demiroglu, O.C.; Perkins, D.R. Tourism climatology: Past, present, and future. *Int. J. Biometeorol.* **2021**, *65*, 639–643. [CrossRef] [PubMed]
30. Scott, D.; Gössling, S. A review of research into tourism and climate change-Launching the annals of tourism research curated collection on tourism and climate change. *Ann. Tour. Res.* **2022**, *95*, 103409. [CrossRef]
31. Becken, S. A review of tourism and climate change as an evolving knowledge domain. *Tour. Manag. Perspect.* **2013**, *6*, 53–62. [CrossRef]
32. Font, X.; Montano, L.; Wu, J.; Coghlan, A.; Woosnam, K.; Li, S. The purpose of a sustainable tourism journal. *J. Sustain. Tour.* **2022**. [CrossRef]
33. Gardner, C.J.; Thierry, A.; Rowlandson, W.; Steinberger, J.K. From Publications to Public Actions: The Role of Universities in Facilitating Academic Advocacy and Activism in the Climate and Ecological Emergency. *Front. Sustain. Food Syst.* **2021**, 42. [CrossRef]
34. Scott, D.; Gössling, S. From Djerba to Glasgow: Have declarations on tourism and climate change brought us any closer to meaningful climate action? *J. Sustain. Tour.* **2021**, *30*, 199–222. [CrossRef]
35. Jarratt, D.; Davies, N.J. Planning for Climate Change Impacts: Coastal Tourism Destination Resilience Policies. *Tour. Plan. Dev.* **2019**, *17*, 423–440. [CrossRef]
36. Jourdan, D.; Wertin, J. Intergenerational rights to a sustainable future: Insights for climate justice and tourism. *J. Sustain. Tour.* **2020**, *28*, 1245–1254. [CrossRef]
37. Dogru, T.; Marchio, E.A.; Bulut, U.; Suess, C. Climate change: Vulnerability and resilience of tourism and the entire economy. *Tour. Manag.* **2018**, *72*, 292–305. [CrossRef]
38. Danish; Wang, Z. Dynamic relationship between tourism, economic growth, and environmental quality. *J. Sustain. Tour.* **2018**, *26*, 1928–1943. [CrossRef]
39. Amadu, I.; Adongo, C.A. Climate Action (Goal 13): The role of climate beliefs, health security and tourism prioritisation in 30 Sub-Saharan African countries. *Clim. Chang.* **2022**, *171*, 25. [CrossRef]
40. Hall, C.M.; Amelung, B.; Cohen, S.; Eijgelaar, E.; Gössling, S.; Higham, J.; Leemans, R.; Peeters, P.; Ram, Y.; Scott, D. On climate change skepticism and denial in tourism. *J. Sustain. Tour.* **2014**, *23*, 4–25. [CrossRef]
41. Cavaliere, C.T.; Ingram, L.J. Climate change and anger: Misogyny and the dominant growth paradigm in tourism. *Ann. Leis. Res.* **2021**, 1–18. [CrossRef]
42. Scott, D. Sustainable Tourism and the Grand Challenge of Climate Change. *Sustainability* **2021**, *13*, 1966. [CrossRef]
43. Prideaux, B.; Thompson, M.; Pabel, A. Lessons from COVID-19 can prepare global tourism for the economic transformation needed to combat climate change. *Tour. Geogr.* **2020**, *22*, 667–678. [CrossRef]

44. Einstein, A. On Scientific Truth. In *Ideas and Opinions*; Einstein, A., Ed.; Three Rivers Press: New York City, NY, USA, 1954; pp. 261–262.
45. Anfinson, K. How to tell the truth about climate change. *Environ. Politi.* **2017**, *27*, 209–227. [CrossRef]
46. De Bruin, W.B.; Rabinovich, L.; Weber, K.; Babboni, M.; Dean, M.; Ignon, L. Public understanding of climate change terminology. *Clim. Chang.* **2021**, *167*, 37. [CrossRef]
47. Kriebel, D.; Tickner, J.; Epstein, P.; Lemons, J.; Levins, R.; Loechler, E.L.; Quinn, M.; Rudel, R.; Schettler, T.; Stoto, M. The precautionary principle in environmental science. *Environ. Health Perspect.* **2001**, *109*, 871–876. [CrossRef] [PubMed]
48. Ziegler, J.A.; Silberg, J.N.; Araujo, G.; Labaja, J.; Ponzo, A.; Rollins, R.; Dearden, P. Applying the precautionary principle when feeding an endangered species for marine tourism. *Tour. Manag.* **2018**, *72*, 155–158. [CrossRef]
49. Christou, P. Einstein's theory of relativity informing research relating to social sciences, tourism and the tourist experience. *Curr. Issues Tour.* **2020**, *23*, 2223–2229. [CrossRef]
50. McGann, M.; Speelman, C.P. Two kinds of theory: What psychology can learn from Einstein. *Theory Psychol.* **2020**, *30*, 674–689. [CrossRef]
51. DePillis, J.; Wudka, J. *Illustrated Special Relativity through Its Paradoxes: A Fusion of Linear Algebra, Graphics, and Reality*; American Mathematical Soc.: Providence, RI, USA, 2013; Volume 78.
52. Shoshany, B. Lectures on faster-than-light travel and time travel. *SciPost Phys. Lect. Notes* **2019**, 10. [CrossRef]
53. Kaaristo, M.; Järv, R. "Our Clock Moves at a Different Pace": The Timescapes of Identity in Estonian Rural Tourism. *Folk. Electron. J. Folk.* **2012**, *51*, 109–132. [CrossRef]
54. Urry, J. *What Is the Future?* John Wiley & Sons: Cambridge, UK, 2016.
55. Nolt, J. Domination across Space and Time: Smallpox, Relativity, and Climate Ethics. *Ethic Policy Environ.* **2019**, *22*, 172–183. [CrossRef]
56. Einstein, A. On the Electrodynamics of Moving Bodies. *Ann. Phys.* **1905**, *17*, 891–912. [CrossRef]
57. Hawking, S.; Mlodinow, L. *The Grand Design: New Answers to the Ultimate Questions of Life*; Bantam Press: London, UK, 2010.
58. Newton, I. *The Principia: Mathematical Principles of Natural Philosophy*; University of California Press: Berkeley, CA, USA, 1999.
59. Greene, B.; Schwarz, J.H. The Elegant Universe: Superstrings, Hidden Dimensions, and the Quest for the Ultimate Theory. *Am. J. Phys.* **2000**, *68*, 199–200. [CrossRef]
60. Kos, P. On the meaning of Einstein's relativity—Scientific review of and philosophical reflection on Einstein's theory of special relativity. *Phys. Essays* **2014**, *27*, 411–447. [CrossRef]
61. Wallace, D. *Philosophy of Physics: A Very Short Introduction*; Oxford University Press: Oxford, UK, 2021.
62. Friedman, M. *Newton and Kant on Absolute Space: From Theology to Transcendental Philosophy*; Springer: Berlin/Heidelberg, Germany, 2009; pp. 35–50. [CrossRef]
63. Budden, T. Galileo's ship thought experiment and relativity principles. *Endeavour* **1998**, *22*, 54–56. [CrossRef]
64. Orzel, C. *How to Teach Relativity to Your Dog*; Basic Books: New York, NY, USA, 2012.
65. Cartwright, J. Relativity Comes down to Earth: Nature Publishing Group. 2010. Available online: https://www.nature.com/articles/news.2010.487 (accessed on 10 September 2022).
66. Greene, B. *The Fabric of the Cosmos: Space, Time, and the Texture of Reality*; Penguin Books: London, UK, 2004.
67. Hafele, J.C.; Keating, R.E. Around-the-World Atomic Clocks: Observed Relativistic Time Gains. *Science* **1972**, *177*, 168–170. [CrossRef] [PubMed]
68. Russell, B. *ABC of Relativity*; Routledge: London, UK, 2009.
69. Rovelli, C. *Reality Is Not What it Seems: The Journey to Quantum Gravity*; Penguin: London, UK, 2018.
70. Rovelli, C. *The Order of Time*; Penguin: London, UK, 2019.
71. Theresa, D. Scientists Unveil One of the Highest Performance Atomic Clocks ever. Available online: https://interestingengineering.com/science/highest-performance-atomic-clocks (accessed on 16 September 2022).
72. Dawkins, R. *The Blind Watchmaker: Why the Evidence of Evolution Reveals a Universe without Design*; WW Norton & Company: New York City, NY, USA, 1996.
73. Paley, W. *Natural Ecology*, 2nd ed.; J. Vincent, J., Ed.; Cambridge University Press: Oxford, UK, 1828.
74. Climate Clock World. Use a Clock to Take Action This Earth Week. Available online: https://climateclock.world/earth-day-2022 (accessed on 29 October 2022).
75. Ho, S.Y.W.; Larson, G. Molecular clocks: When times are a-changin'. *Trends Genet.* **2006**, *22*, 79–83. [CrossRef] [PubMed]
76. Asayama, S.; Bellamy, R.; Geden, O.; Pearce, W.; Hulme, M. Why setting a climate deadline is dangerous. *Nat. Clim. Chang.* **2019**, *9*, 570–572. [CrossRef]
77. Human Impact Lab. Climate Clock. Available online: https://climateclock.net/ (accessed on 14 October 2022).
78. Dickinson, J.E.; Peeters, P. Time, Tourism Consumption and Sustainable Development. *Int. J. Tour. Res.* **2012**, *16*, 11–21. [CrossRef]
79. Gössling, S.; Higham, J. The Low-Carbon Imperative: Destination Management under Urgent Climate Change. *J. Travel Res.* **2020**, *60*, 1167–1179. [CrossRef]
80. Hambira, W.L.; Saarinen, J.; Atlhopheng, J.R.; Manwa, H. Climate Change, Tourism, and Community Development: Perceptions of Maun Residents, Botswana. *Tour. Rev. Int.* **2021**, *25*, 105–117. [CrossRef]
81. Seyfi, S.; Hall, C.M.; Saarinen, J. Rethinking sustainable substitution between domestic and international tourism: A policy thought experiment. *J. Policy Res. Tour. Leis. Events* **2022**, 1–15. [CrossRef]

82. Brooker, E.B.; Joppe, M. Rethinking tourism scholarship beyond disciplinary convention. *Tour. Manag. Perspect.* **2017**, *23*, 112–118. [CrossRef]
83. Coles, T.; Hall, C.M.; Duval, D.T. Tourism and Post-Disciplinary Enquiry. *Curr. Issues Tour.* **2006**, *9*, 293–319. [CrossRef]
84. Darbellay, F.; Stock, M. Tourism as complex interdisciplinary research object. *Ann. Tour. Res.* **2012**, *39*, 441–458. [CrossRef]
85. Echtner, C.M.; Jamal, T. The disciplinary dilemma of tourism studies. *Ann. Tour. Res.* **1997**, *24*, 868–883. [CrossRef]
86. Hollinshead, K. The under-conceptualisation of Tourism Studies: The case for postdisciplinary knowing. In *The Critical Turn in Tourism Studies: Creating an Academy of Hope*; Ateljevic, I., Morgan, N., Pritchard, A., Eds.; Routledge: London, UK, 2012; pp. 55–72.
87. Leiper, N. Towards a cohesive curriculum tourism: The case for a distinct discipline. *Ann. Tour. Res.* **1981**, *8*, 69–84. [CrossRef]
88. Leiper, N. Tourism Systems: An Interdisciplinary Perspective. In *Occassional Paper*, 2nd ed.; Massey University: Palmerston North, New Zealand, 1990.
89. Leiper, N. An emerging discipline. *Ann. Tour. Res.* **2000**, *27*, 805–809. [CrossRef]
90. Lew, A.A. Tourism Geographies: Straddling disciplinary and transdisciplinary perspectives. *Tour. Geogr.* **2018**, *20*, 331–332. [CrossRef]
91. Oviedo-García, M. Tourism research quality: Reviewing and assessing interdisciplinarity. *Tour. Manag.* **2016**, *52*, 586–592. [CrossRef]
92. Tribe, J. The indiscipline of tourism. *Ann. Tour. Res.* **1997**, *24*, 638–657. [CrossRef]
93. Tribe, J. Indisciplined and unsubstantiated. *Ann. Tour. Res.* **2000**, *27*, 809–813. [CrossRef]
94. Weiler, B.; Moyle, B.; McLennan, C.-l. Disciplines that influence tourism doctoral research: The United States, Canada, Australia and New Zealand. *Ann. Tour. Res.* **2012**, *39*, 1425–1445. [CrossRef]
95. Gibson, C. Critical tourism studies: New directions for volatile times. *Tour. Geogr.* **2021**, *23*, 659–677. [CrossRef]
96. Morgan, N.; Pritchard, A.; Causevic, S.; Minnaert, L. Ten Years of Critical Tourism Studies: Reflections on the Road Less Traveled. *Tour. Anal.* **2018**, *23*, 183–187. [CrossRef]
97. Pernecky, T. Critical tourism scholars: Brokers of hope. *Tour. Geogr.* **2020**, *22*, 657–666. [CrossRef]
98. Eger, C.; Munar, A.M.; Hsu, C. Gender and tourism sustainability. *J. Sustain. Tour.* **2022**, *30*, 1459–1475. [CrossRef]
99. Hales, R.; Dredge, D.; Higgins-Desbiolles, F.; Jamal, T. Academic Activism in Tourism Studies: Critical Narratives from Four Researchers. *Tour. Anal.* **2018**, *23*, 189–199. [CrossRef]
100. Loehr, J.; Becken, S. The Tourism Climate Change Knowledge System. *Ann. Tour. Res.* **2020**, *86*, 103073. [CrossRef]
101. Higham, J.; Font, X. Decarbonising academia: Confronting our climate hypocrisy. *J. Sustain. Tour.* **2019**, *28*, 1–9. [CrossRef]
102. Schweinsberg, S.; Sharpley, R.; Darcy, S. Competitive positioning of tourism academic knowledge. *Tour. Manag.* **2022**, *91*, 104502. [CrossRef]
103. Gibbons, E.D. Climate change, children's rights, and the pursuit of intergenerational climate justice. *Health Hum. Rights* **2014**, *16*, 19.
104. Van Eck, C.W.; Feindt, P.H. Parallel routes from Copenhagen to Paris: Climate discourse in climate sceptic and climate activist blogs. *J. Environ. Policy Plan.* **2021**, *24*, 194–209. [CrossRef]
105. Tegmark, M. *Our Mathematical Universe: My Quest for the Ultimate Nature of Reality*; Penguin Books: London, UK, 2014.
106. Nairn, K. Learning from Young People Engaged in Climate Activism: The Potential of Collectivizing Despair and Hope. *Young* **2019**, *27*, 435–450. [CrossRef]
107. Budziszewska, M.; Głód, Z. "These Are the Very Small Things That Lead Us to That Goal": Youth Climate Strike Organizers Talk about Activism Empowering and Taxing Experiences. *Sustainability* **2021**, *13*, 11119. [CrossRef]