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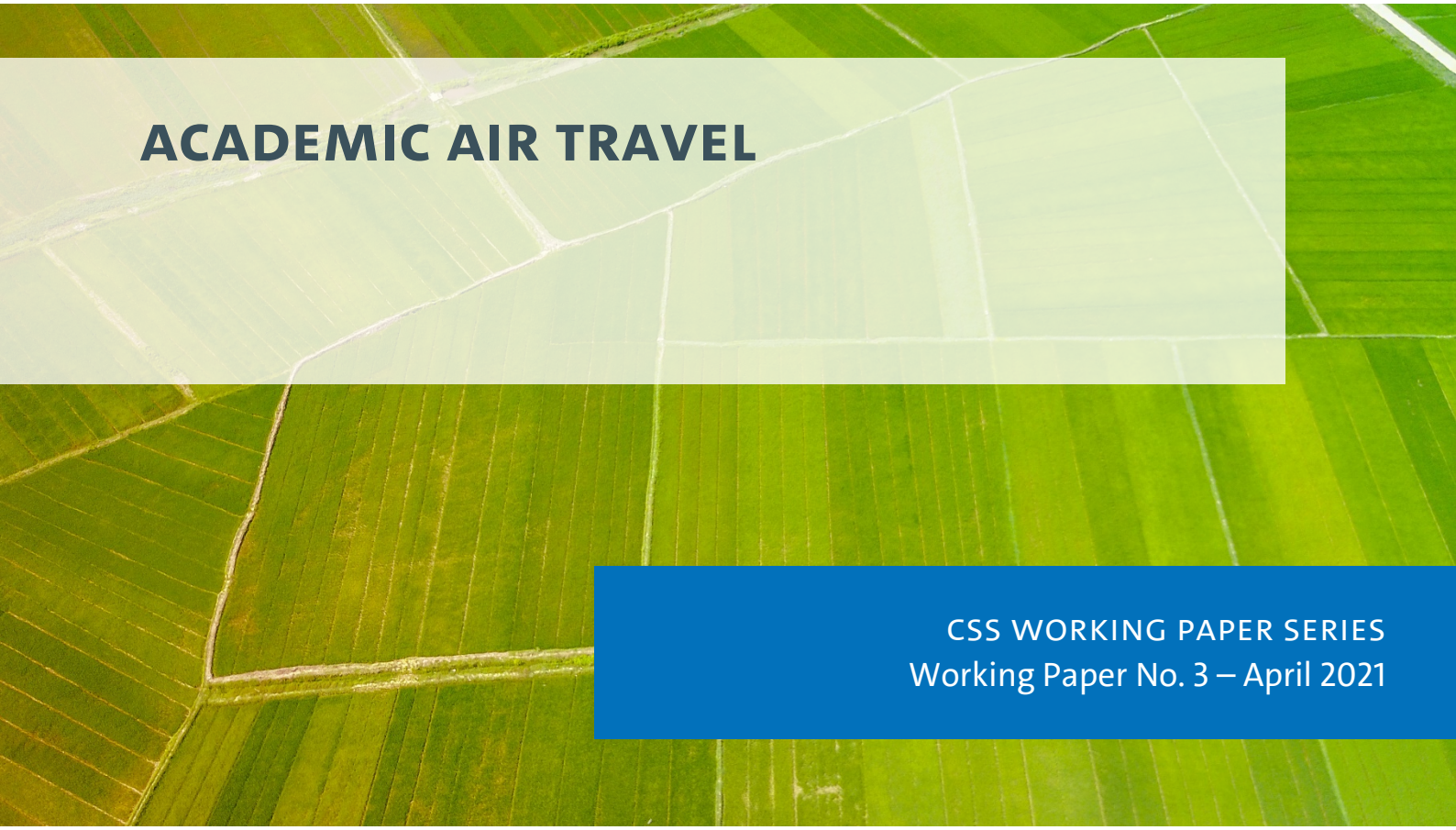

ACADEMIC AIR TRAVEL

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A Literature Review

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Abstract

Academic air travel (AAT) is increasingly critiqued for its carbon emissions. Based on an initial interest in the relevance, persistence and change of climate-impacting practices like AAT as part of global academic interaction and collaboration, this paper presents a literature review to take stock of existing research on AAT. A two-step literature search was conducted, resulting in a range of relevant publications (N=220). The following areas of interest were identified: first, the relevance that academic travel has in the development of the research university and the international connectivity of modern science. Second, functions of meetingness and physical copresence in the context of academic communication, scientific exchange and networking appear as the main drivers of AAT, yet characteristics of the academic career system and labour market as well as tourism aspects play a role, too. Third, discourses around AAT focus on the perceived obligation to fly ("fly or die"), its politicisation with regard to the inequality of access, and justifications for upholding current (pre Covid-19) rates of AAT. Fourth, AAT is increasingly critically discussed in the context of climate change (climatisation). Fifth, alternatives to AAT are discussed, ranging from the use of virtual meetings and the re-organisation of academic conferences to more fundamental changes in the mode of research practices. The review was started before the Covid-19 pandemic brought AAT to an abrupt halt, a situation that now makes researching this social practice particularly timely. We thus conclude that AAT is an emerging and promising area for future research.

Keywords: Academic Air Travel, Scientific Conferences, Scientific Careers, Climatisation, Digital Transformation, Research Governance, Covid-19

Content

1 Introduction[1]

Academic travel has been defined as "short-term and work-related mobility practices in academia" (Storme, 2014: 147), or "physical journeys by academics for the purpose of research, lecturing, visiting appointments, consulting and other professional tasks" (Jöns, 2008: 339). As the mode of travel since the second half of the twentieth century has shifted decisively towards aviation, the literature sometimes refers to it as academic aeromobility, academic flying, or *academic air travel* (AAT). The latter emphasises the short-term aspect of the travel and includes the dominant mode of transportation, which is an important driver of recent interest in the subject. As AAT has become the (silently) agreed-upon term for the form of short-term travel we are interested in, this paper consistently refers to AAT.[2]

The first systematic exploration of AAT as a social practice is a book based on a doctoral dissertation by Tom Storme (2014) entitled *Exploring a Small World,* which invokes the novel *Small World: An Academic Romance* (Lodge, 2011 [1984]). The novel's plot takes place in the highly connected and globalised world of academic conferences, and the time gap between literary and academic explorations of the subject suggests that, while AAT has been a known phenomenon for some time, scientific interest in it has only recently developed. Furthermore, AAT so far seems to be of interest mainly in the context of its consequences, namely aviation-related carbon emissions and unequal access to a globalised scientific world. This is reflected in the critical approach much of the literature takes in discussing AAT. Although there are exceptions, AAT is rarely a topic of research *sui generis* but rather part of a larger discourse, such as on climate change and sustainability. (The literature on Academic Train Travel, for instance, is likely to be considerably smaller.) Explicit justifications for the practice are notably rare, and engagement in AAT is often seen as a career obligation and described in terms of a dilemma.

Storme's book already gives a noteworthy characterisation of AAT, pointing out the many similarities to the better-researched field of business travel and corporate mobility. These similarities include concerns connected to the economising of travel budgets and the impact of flying on family life, health, work-life-balance, and the environment. However, differences include less support through organisational channels with regard to arrangement of transport, accommodation, compensation, administration, and the scale of budgeting. Overall, for Storme, the higher degree of individualisation, more emphasis on self-management, the need to be proactive with regard to travel management, accompanied by a higher individual accountability for work and performance, set the academic world apart from the world of business. In the context of mobility, AAT forms distinct patterns of international connectivity. This literature review situates AAT as a phenomenon between academic mobility and career, science and higher education governance, and debates around climate-impacting practices; however, the vast literature on AAT's contexts is beyond the scope of this review paper. As a result, bodies of research on mobility in academia and higher education, on academic careers and international collaboration in science, discussions on the utility of carbon footprint models, conference and tourism studies can only be touched upon. The aim of this paper is to give an overview of the state and breadth of the heterogeneous approaches to AAT as an emerging area of research, situated at the nexus of science and technology studies (STS), higher education studies, mobility studies and the sociology of sustainability.

[1] The authors would like to thank two anonymous reviewers for their insightful comments and suggestions. They helped clarify some of the aspects of an earlier draft, specifically related to the methodology and some of the limitations (see section **7**).

[2] It must be noted that the literature is not always consistent in its terminology. Sometimes educational travel or exchange programmes, as well as long-term mobility, are discussed under the label of AAT. As far as possible, this review includes only studies that discuss the phenomenon as defined above.

1.1 Methodology

The literature search used Google Scholar and the Web of Science with the search terms “academic travel”, “academic flying”, “academic aeromobility”, “conference travel” and meaningful combinations of, among others, the terms “academic”, “research”, ”travel”, “conference”, “carbon”, “climate”, and “mobility”. Initially, the literature search aimed at including both English and German language publications. However, after a preliminary search for German language literature with relevant terms (combinations of “wissenschaftliches/akademisches Reisen”, “Fliegen”, “Flugreisen”, “Konferenzreisen” etc.) yielded only few results, we decided to focus on English language publications.[3] Supplemented by a following-up of references in relevant publications, we identified 351 publications. In a second step, these publications were screened and only those with a focus on AAT were included. Excluded were items which, upon closer inspection, were concerned with AAT only very indirectly, primarily those concerning non-academic air travel. The remaining 220 publications form the original corpus of literature yielded by the initial literature search. In the course of the review, additional literature has been consulted, so that the reference section exceeds 220 items. Analytically, the review process was inductive, beginning with the summarising and classification of the literature, from which topics of interest were clustered to eventually structure the present review. We aimed at including as much literature as possible while keeping the review to a reasonable length, which means that while some studies may be relevant to multiple sections, they are, where possible, only discussed under one headline (some references between related sections are provided, bold and in parentheses).

1.2 Outline

This review discusses the contexts, extent and function of AAT and their changes, the politicisation of AAT, especially concerning its climatic impacts, its justification despite an ongoing digital transformation of the academic world, as well as alternatives to physical travel, complemented by key topics that emerged out of the literature. Sections 2 and 3 situate AAT in the context of academic travel more broadly. Our overview of AAT’s wider context (2) includes its long history (the development of the Western, modern research university and the role of travel, 2.1) and AAT’s short history (increase of travel since the 1990s; trends of de-, inter-, and re-nationalisation of science, 2.2). Subsequently, an estimate of the quantitative extent of AAT (pre-Covid-19) is attempted (2.3). We then give an overview of functions of AAT as discussed in the literature (3), namely the maintenance of copresence and meetingness (3.1); its role in scientific knowledge production, circulation and networking (3.2); the perspective of labour markets, mobility, and academic work (3.3); and the connection between AAT, conferences and tourism (3.4). The ways in which AAT is discussed (4) include its status of being an imperative for academics (4.1), its politicisation and – less often – moralisation (4.2), as well as justifications of the current rate of AAT (4.3). The most prominent context in which AAT is recently discussed is *climatisation*, which brings the practice’s carbon emissions to the fore (5). There is both programmatic work such as essays and editorials calling attention to the phenomenon (5.1) as well as empirical studies attempting to quantify the carbon footprints of various academic activities connected to AAT (5.2). Individual and collective credibility especially in climate sciences is discussed (5.3). Lastly, alternatives to AAT are described (6), largely focussed on other ways of conference organisation (6.1), as well as calls for a change in how research is conducted (*Slow Scholarship*, 6.2). Some limitations from the review’s methodology and scope are noted (7). In the conclusion, we identify starting points for further research on AAT (8).

[3] A possible explanation for this lack of results is that the literature in German is fragmented and that no common term for the phenomenon has been established (yet), rather than that no German literature exists. A closer analysis of cultural factors in the emergence of AAT as a research topic would itself be an interesting avenue for further research (see e.g., Mkono, 2020).

2 Contexts

2.1 Historical roots

Historical and philosophical perspectives on modern science, as well as academic activity more generally, point to a tension between the aim for universal applicability and the necessity of always being done by individual scientists working in particular local contexts (Ophir & Shapin, 1991). Pietsch (2016: 22) characterises this as follows:

> *Academic travel sits at the heart of this tension between the local and the 'universal': students and scholars move between various centres, seeking the particular status and expertise of institutions and individuals renowned for their development of knowledge. But they do so constrained by history, conditioned by capacity, shaped by regulation, lured by money, and compelled by circumstances beyond their control.*

Travelling has been a crucial aspect of scholarly life since its early days, deemed important as part of advancing both scientific knowledge and individual reputation and of gaining experience in academic-humanistic education. The proliferation of travel guides written especially for scholars since the early 16th century is evidence of this (Seidel, 2019). Pietsch (2016) suggests that a division developed between two relatively separate European university systems post-reformation: one Catholic and one Protestant, as well as a later diversification of inter-university affiliations based on religious, political and economic alliances during the 18th century and into the time of the formation of nation states. Academic travel since the 19th century was tied to institution building in the emerging nation states and to the conferring of legitimacy in the context of European empires (for Britain: Jöns, 2008, 2016; Pietsch, 2010, 2013; for France: Heffernan, 1994). Evidence for this are academics' travel patterns in the British Empire between the core and its peripheral "settler" universities (Dean, 2005), which, according to Pietsch (2013), integrated the Empire's colonies into the European knowledge economy and formed a distinct and closed network of British academia with few ties to other university systems (e.g., German higher education). This network was gradually opened up at the beginning of the 20th century when British university reforms oversaw the introduction of the Ph.D. system in 1917, which was modelled on German higher education, and later with the intake of continental refugee scholars fleeing Nazi Germany in the 1930s and 1940s. There is, however, a debate as to whether pre-WWII university systems have had more differences than commonalities, and it has been argued that, rather than competing systems, there has always existed a "republic of letters" transcending national differences (Ellis & Kirchberger, 2014). Below the level of national or imperial university systems, the importance of travel and exchange across national borders in the formation as well as the professionalisation of scientific disciplines and practices has been highlighted (Novella, 2016; Sörlin, 1993). While Pietsch has studied mainly the British Empire before the 1930s, others have looked at the formation of travelling networks between universities since the 20th century more broadly (**3.2**).

2.2 Globalisation

One of the factors in the growth in AAT is the parallel development of an increasing international connectivity in science and increased transnational academic mobility since the 1990s (Alemu, 2020). However, it has been pointed out that these processes have to be understood as complex entanglements of nationalisation and denationalisation (Altbach, 2004; Crawford et al., 1993), and that despite a clear trend towards increasing internationalisation or globalisation, national contexts remain important (Vincent-Lancrin, 2006). Vincent-Lancrin's (2006: 190) diagnosis of academic trends predicted that the expansion of mobility, and therefore of AAT, will continue,

[u]nless a war, return to nationalism or international pandemy [sic] stop it.

Whereas this now seems near-prophetic, it is interesting to note that climate or environmental consideration did not play any role in his future scenarios. While Welch has argued (1997) that the increasing internationalisation of academia gives rise to a differentiation of academic staff into "indigenous", i.e. those who stay in their home country or institution, and "peripatetic", i.e. mobile and frequently travelling staff, the widely reported imperative for AAT seems to call this claim into question (**4.1**). Academics have long been theorised as "cosmopolitans" (Gouldner, 1957; Merton, 1957) who draw on social ties and maintain a reference group orientation based on their profession, not institutional membership. This rationale for (international) collaboration seems unabated, and the internationalisation of academia and increased academic mobility provide the context for discussions of AAT with regard to politicisation and climatisation, as well as discussed alternatives.

2.3 Estimate of extent

Quantitative estimates of the extent of AAT outside of individual universities are rare, mainly due to a lack of data (Mickelson, 2016), and would furthermore only be relevant to pre-Covid-19 times. Nevertheless, a rough outline is possible. According to one estimate, around 40,000 national and international academic meetings are held every year with overall nine million participants worldwide (Rowe, 2017). These numbers seem plausible, as the latest report of the International Association of Scientific, Technical and Medical Publishers (*STM Report*; Johnson et al., 2018) estimates that there are currently seven to eight million researchers in the world and that this number is growing. However, the STM Report notes strong national and disciplinary differences in academic mobility and collaboration. Given the geographical stratification of research and higher education activity (**4**) and the unequal distribution of higher education institutions worldwide, the inequality of access to academic travel has been discussed (e.g., Chen, 2017; Teichler, 2015, 2017; see also: UNESCO, 2015). Yet, in the context of AAT, a major question is to what percentage is academic travel air travel. This is very difficult to say. For a large international (pre-Covid-19) conference, it is suggested that over 90 percent of the participants arrive there by air (Klöwer et al., 2020). However, data from the University of Montreal (Arsenault et al., 2019) indicates that 35 percent of all travel for work and research purposes over a year is by aeroplane, with researchers travelling on average 8,500 km per year. This distance varies strongly with the position in the academic hierarchy (i.e. professors travelling up to four times more than that average, see also: Whitmarsh et al., 2020). Similarly, Ciers and colleagues (2019) found that researchers at a Swiss university, who participate in AAT, travel on average 10,000 km per year, with higher distances travelled by those in higher positions (**5.2**). Access to AAT thus is highly stratified, both at an international level and at the level of individual national institutions (**4.2**).

3 Functions

3.1 Copresence, meetingness

One of the main functions of AAT is what Boden and Molotch (1994), in their theoretical paper on meetings in the business sector and in reference to Goffman (1963), call *copresence*. They claim that face-to-face meetings allow for the highest possible amount of information exchange. This refers, besides the explicit content of conversations, to the "thickness" of information found in gestures, posture, facial expression, and micro-variations in tone of voice; in short, the processes analysed by conversation analysts, ethnomethodologists, and sociologists of face-to-face interaction (such as Simmel, Schegloff/Sachs/Jefferson, Goffman and Garfinkel). Mediated communications, from letter, phone call,

voice message, and email, to the then not yet readily available video call, all lose aspects of this thickness and serve at best in an auxiliary function to copresent interaction. This is especially the case where decisions are made, which Boden and Molotch call

> *[t]he indispensability of copresence among people in the highest circles (1994: 272).*

For them, these circles also include academia (274). Urry has called the quality of personal social interaction connected to physical copresence *meetingness* (Urry, 2003) and, following Boden and Molotch, recognises this as a central factor that motivates people to travel in person (physical travel). A number of empirical studies have picked up Urry's call to investigate "why people travel" (2002, 2003). Many have focussed on the business community, where e.g., Asheim and colleagues (2007) see a twofold motivation for travel: the importance of face-to-face meetings as well as the "buzz" of conferences. Similarly, Strengers (2015) found that while companies are willing to replace some of their business travel with telecommunication, there is a base line of physical travel that is deemed necessary, an observation Wynes and colleagues (2019) have also made for AAT (**3.3, 4.1**).

3.2 Knowledge production and circulation, networking

One of the first publications to discuss academic travel from a theoretical perspective (Barnett & Phipps, 2005) stresses the essential role that travel plays in connecting the academic world and develops a very broad notion of travel. Barnett and Phipps distinguish three forms of academic travel: material (physical, as bodies through space), epistemological (concepts crossing disciplinary boundaries, experts reaching out to lay people, practical application of knowledge), and ontological (an academic's "personal journey of change", 2005: 6), all of which are intertwined. Academic travel can also be seen as the material aspect of its counterpart, academic hospitality, connected with "epistemological hospitality" (Phipps & Barnett, 2007). The authors' in part normatively loaded framing of the discussion can be seen as due to the essayistic tone of the paper (participants in epistemic travel, for example, are described as "brave souls who are willing to venture into new lands", Barnett & Phipps, 2005: 8). However, the connection of physical and epistemic travel they point to informs a research programme in the geography and sociology of science. Geographers have investigated the role of space, from the domestic-public to the urban-rural and the colonial metropolis-periphery distinction, as well as the importance of "national culture" both in the historical formation of modern science and in its continuing influence on the organisation of science today (e.g., Epstein et al., 2008; Heffernan, 1994; Livingstone, 1993, 1995, 2000, 2003; Meusburger, 2015; Meusburger et al., 2010; Raj, 2007; Taylor et al., 2008). In this context, Jöns (2006), building largely on Kuhnian philosophy of science as well as on STS concepts, has looked at how physical travel of academics has historically worked to create networks of knowledge production and circulation. Jöns (2008) takes up a theoretical cue from Latour (1987) who argues for the central role of movement and travel in the production and legitimisation of scientific knowledge. Using the example of early modern naval expeditions, Latour describes the ways in which the circular process of scientists' going away, meeting others, crossing paths, and coming back allows them to mobilise resources, test truth claims in different settings, and spread arguments in time and space (Latour, 1987: 210ff, 220ff). From this point of view, academic travel includes anything from "a few days" to "a couple of years" (Jöns, 2008: 339) – important is the entire cycle of this Latourian movement, including the return to their home institution (thus allowing for a definition of academic travel against the labour market context of mobility, **3.3**). Through this lens, methodologically implemented largely by archival work and the analysis of data such as university requests for absence, the networks formed by linking material and epistemic travel can be seen as an important factor in many aspects of the academic world. They facilitate exchange across disciplinary boundaries (Jöns, 2007, 2018; Meusburger, 2015), foster the formation of distinct disciplinary cultures of travel (Driver, 2001; Heffernan & Jöns, 2007, 2013), and enable the

production and reproduction of hierarchies of global knowledge geographies (Jöns, 2008, 2009, 2015; Jöns et al., 2017; Meusburger et al., 2010). While the latter aspect is sometimes used as a starting point for critique (**4.2.1**), other commentators hold a positive view of increased connectivity per se (Orazbayev, 2017; Sugimoto et al., 2017). There is also evidence that the increased international connectivity that conferences are said to provide does not always play out this way, but that their main function is rather the strengthening and maintenance of already existing networks (Stegbauer & Rausch, 2012).

3.3 Labour markets, careers, academic work

Williams and McNeil (2007) argue that a "career ladder model" of educational and business travel, which supposes that the advancement of one's career by forming networks via travel is a crucial motivator for travelling, may be inadequate for understanding academic travel. They suggest that allocation of access to academic travel is also one of the university's means to reward staff and sometimes students, as well as a way for academics to learn new skills, irrespective of the career and network aspects. However, in the context of academia as a labour market and research as work, AAT appears closer connected to more long-term mobility practices of establishing networks, showing a willingness to change locations, and gaining cultural and social capital (Bauder, 2015). One common factor in the literature is the stressing of large differences in the reception and promotion of mobility between countries as well as between scientific disciplines (Bauder, 2020; Kim, 2017). This has largely been addressed in the context of mobility and habitus formation, as well as the discussion of "brain circulation" (Ackers, 2013; Bauder, 2020; Chen, 2017; Hoffman, 2007; Leeman, 2010; Leung, 2013). However, there is not always a clear distinction drawn between academic travel and mobility (Uusimaki & Garvis, 2017). This may be partly due to complicated working arrangements such as the phenomenon of "flying faculty", sitting at the edge between AAT and academic mobility (Whieldon, 2019). Often, academic travel is discussed in connection with the question of its link with academic (career) success, in particular to assess the claim whether researchers who travel more are also more successful (**4.1**). Aksnes and colleagues (2013), in an analysis of publication and citation histories of Norwegian researchers, find that mobile researchers do have slightly higher publication and citation rates. In addition, there is evidence that travel support for early-career researchers is beneficial for their careers (Majaneva et al., 2016). However, one of the first studies that asked the question not in terms of mobility but explicitly of AAT (Wynes et al., 2019) suggests that there is a "threshold" level of required travel that must be met in order to advance research careers. Wynes and colleagues found that the factors with the highest impact on an academic's h-index are their faculty position, salary, and gender, while the overall connection with AAT appears weak; a finding that resonated in the scientific community (Richler, 2019).

3.4 Conferences and tourism

It has been observed that conference travel not only serves the nominal purpose of conference attendance, but that academics also often combined it with tourism practices (Høyer & Næss, 2001; Oppermann & Chon, 1997). Lassen (2006) has pointed out the complex connection of air travel with work, tourism, and leisure, however not in the context of academia (on the interaction between the tourism industry and research, see also Slocum et al., 2015). For academic conferences, this connection has more recently come into focus (Ojong, 2013; Steyn, 2015; Tretyakevich & Maggi, 2012; Volden, 2019). Yoo and colleagues have drawn attention to the practice of academics' partners accompanying them to conferences (Yoo et al., 2016; Yoo & Wilson, 2020). It is interesting to note that in the context of consumer behaviour studies, an analytical framework has been proposed to frame travel – and thus also AAT – as "consumption of distance" (Heisserer & Rau, 2017), a development in the framing of AAT in behavioural terms (**5.1**).

4 Discourses around AAT

4.1 Relevance for individual career and scientific reputation: "Fly or die"

In analogy to the academic publication system's unofficial imperative to "publish or perish", Strengers (2014) has characterised the obligation for AAT as "fly or die". Gärdebo et al. (2017: 73) pick up this phrase and connect it to scientists' "silent dilemma", namely having to "balance flight miles versus scholarly output". Implied is the negative environmental impact of flying, a context in which much of its relevance or rather obligation is criticised. Storme and colleagues (2017) point out that different *obligations of presence* exist, such as building networks and working at the "frontiers of academic knowledge". Storme (2014) distinguishes three types of obligations for AAT: firstly, "hard" obligations, i.e. studying a specific geographically bound phenomenon such as archaeological sites and archives or funding agreements which have to be signed face-to-face; secondly, "role obligations" such as a president of a scientific society showing commitment to the role by attending a meeting in person; and thirdly, "soft" obligations including maintaining networks or creating a sense of belonging to a (reference) group. The third type is emphasised way beyond a "soft" imperative by work in the sociology of science, which places a focus on the relevance of disciplinary belongings for academic identities (Stichweh, 1993). This aspect of belonging, in addition to the relevance of being present at reputable conferences for individual scientific reputation, arguably firms up the status of the (bi-)annual conferences of national and international academic associations in the schedule of any academic.

A geographical factor in the production of flying obligations that is intensely discussed is "remoteness" and the supposed need to overcome it, particularly emphasised by researchers based in New Zealand and Australia (Glover et al., 2016, 2018, 2019; Higham et al., 2019; Hopkins et al., 2016, 2019). However, Glover et al. (2019) and Higham et al. (2019) point out that remoteness serves as a justification to academics who connect AAT with increased career benefits, and thus consider the imperative as in part discursively produced. Nursey-Bray and colleagues (2019) have termed this "the fear of not flying". Hopkins et al. (2019) found in an interview study that AAT is an important part in academic subject identity formation through the construction of figures such as "the jet-setter", "the successful academic", and "the globally recognised scholar" (480). Storme et al. (2013) suggest that varying strategies exist to cope with the different *obligations of proximity*. In a study of academics with tenure track, the authors found that those who do not feel the need to expand their network capital aim to reduce their travel due to feelings of constraint and look for alternatives (Storme et al., 2017), an effect also observed among some senior staff in corporations (Julsrud et al., 2014; Lindeblad et al., 2016), and pointing towards the limits of the obligation of presence (**6.1**).

4.2 Inequality of access

Besides climatisation, the main point of politicising AAT is the inequality of access. Access to AAT as a part of doing science is hampered especially for researchers from outside the central networks of knowledge circulation, mostly from geographical locations in the Global South (**4.2.1**). In addition, exclusionary mechanisms that are at work in academia generally also apply to AAT (**4.2.2**). While discourses of valorisation of AAT and its role in forming an academic habitus are discussed critically (Wilson, 2006), this is occasionally put in moral terms. Parker and Weik (2014: 167) claim that:

> *The original notion of intellectual detachment and academic freedom has developed into a demand for social and moral detachment by the ever growing circuit of international 'visibility' as celebrated at international conferences.*

For some time, the main destination of AAT, *academic conferences*, have come into view of research in studies of science and higher education (González-Santos & Dimond, 2015; Hansen, 2020; Hauss, 2020, Skelton, 1997; Söderqvist & Silverstein, 1994). Henderson has proposed a critical academic mobilities approach (CAMA), emphasising mobility practices in conference attendance with regard to young researchers' participation and exclusionary practices in conference organisation (Henderson, 2015, 2019; Henderson & Burford, 2020; Henderson & Moreau, 2019). It is noteworthy that the connection between *critical conference studies* and the AAT literature appears not fully established at this time (**4.2.2, 7**).

4.2.1 Geographical stratification

The processes outlined above (**2.1, 3.2**) have produced and are producing a network of knowledge circulation and exchange through travel, which is globally unevenly distributed. Its centres are in Western Europe and the US, as well as, historically, the European colonial apparatus (Jöns, 2015). Accompanied by the advent of affordable air travel since the 1950s (Beaty, 1979), these networks changed, yet some of their structuring factors remain. An example is expensive specialist laboratory or field equipment that can only be bought by wealthy universities or states, necessitating the travel of respective researchers to these centres, a phenomenon best observable today in Big Science facilities like the CERN (Jöns, 2008). The historically grown networks still visible today become politicised in the context of access to travel. Britz and Ponelis (2010) point towards the hurdles for African scholars, who often find themselves unable to participate in European or US conferences due to visa restrictions, and argue for reforms in the short-term visa application process (see also Roelofs, 2019). AAT is also politicised in the context of travel restrictions and sanctions, as Woodman (2019) discusses for the case of academic travel between the US and Cuba. Changes in the composition of knowledge production and exchange networks are a topic of research with respect to China, notably the increasing return of Chinese scholars from abroad (Chen, 2017; Leung, 2013). Evident here is the inequality of access not only in terms of formalised or bureaucratic hurdles scholars from outside the West face in participating in AAT, but in the more covert connection of restrictions of knowledge, staff, and student mobility, like language barriers and lack of inter-university connections (e.g., Gunther & Raghuram, 2017; **7**).

4.2.2 Gender inequality

Gendered obstacles to conference participation are another area of politicisation of the ability to participate in AAT. There are a number of factors that systematically make conference participation, and thus participation in AAT, more difficult for young researchers, female researchers, and researchers with families, resulting in decreased chances of cultural and social capital accumulation and with adverse effects on career paths (Leeman, 2010). Jöns (2017) finds that women at Cambridge University in the first half of the 20th century were less integrated in the university knowledge circulation system, as their requests for leave, i.e. travel, were, more often than men's, explicitly for research purposes and less often for teaching, lecturing, and conference attendance, i.e. network-building. In Storme's (2014: 158ff) sample, women travelled less often than men; unlike expected, researchers who were in relationships travelled more often than those who were not, and when children were involved, the trend that men travelled more frequently than women persisted. Bos and colleagues (2019) have argued that among the factors preventing academics with family obligations from attending conferences is the lack of consideration given to childcare obligation by conference organisers. Besides more child-friendly conferences, strictly enforced codes of conduct and more women in conference organisation and speaker invitation committees, Sardelis and Drew (2016) have called for easier access to travel funds as a means for facilitating women's conference participation. While AAT is seen as a central part in the construction of academic subject identities (Hopkins et al., 2019; Leeman, 2010), Cohen and colleagues (2020) have found in their analysis of interview data that figures such as that of the "mobile" academic are often

gendered and associated with masculinity. Furthermore, the imperative to travel often comes into conflict with discourses around both motherhood and fatherhood (Cohen et al., 2020; see also: Yoo & Wilson, 2020; Yoo et al., 2016).

4.2.3 Health concerns

One literature review (Cohen & Gössling, 2015) lists among the "darker sides of hypermobility" many physiological, psychological, and social aspects, however, not with a focus on academics. Few studies explicitly address this group's specific vulnerabilities, e.g., disturbed sleep-wake patterns in the context of international travel (Bergström, 2010; Takahashi et al., 2002). A reason for this lacuna might be the high variability of career paths and life styles, which make generalising conclusions difficult (Richardson & Zikic, 2007). As Carrozza and colleagues (2017: 57) have pointed out, the fact that researchers, besides brains, also have bodies is often overlooked. The reliance on air travel in academic short-term mobility also excludes researchers with disabilities or medical conditions that make flying difficult or impossible. This issue is only mentioned in passing (Glover et al., 2019: 468) in the literature (see **7**).

4.3 Justification, legitimisation

Explicit justifications of the current rate of AAT are rare. Even authors who caution against hasty calls for a drastic reduction acknowledge that the current rate of AAT is not sustainable in ecological terms. In one debate in *Area*, Hall (2007) replied to Bonnett's (2006) call for creating sustainable conferences with an appeal to the systemic "market inequalities" (Hall, 2007: 129) underlying the incentives for the current rate of AAT and the need for a broader conversation. Similarly, the *British Medical Journal* provided space for an exchange over the question "are international medical conferences an outdated luxury the planet can't afford?" While Green (2008) answers this in the positive and argues that a combination of decentralised meeting hubs mediated by technology could serve as a viable alternative to AAT (**6.1**), Drife (2008) is more explicit in his defence than Hall (2007). He points towards the long tradition of cynical attitudes towards conferences in "posh places", the UK's relatively small share of international CO_2 output, and the allegedly indispensable aspects of meetingness such as inspiration and pathos, concluding that "for relating to people, video conferences are less effective than the mobile phone" (Drife, 2008: 1467). Some appeals to the long tradition of academics' travelling can be read as ostensible legitimisation efforts of AAT (Barnett & Phipps, 2005; Gärdebo et al., 2017). For tourism academics, Witsel (2013) argues that travel is an essential and overall positive part of professional life. Wallinga (2002) praises academic travel in the context of the "hard" obligation of archival work. It appears that the main justification for AAT is the perceived obligation, and Le Quéré and colleagues (2015) speak of young researchers' network building as a legitimising factor for AAT (**6.1**).

5 Climatisation

5.1 Climatisation, AAT, and academia

Aviation has been pointed out as a large contributing factor to climate change due to its high carbon emissions (Lee et al., 2009; Bows-Larkin et al., 2010). Consequently, AAT has been increasingly discussed in the context of climate change and thus can be seen as an instance of the *climatisation* (Aykut et al., 2017) of a social practice, by which Aykut and colleagues mean a discursive link of an issue to climate change, often associated with a critical and moralising stance. While Vaeng & Øksnevad (2013) suggest that most of their academic interviewees were unaware of the AAT-climate connection, Storme's (2014) larger sample mostly demonstrated awareness. Participation in AAT is often seen as a dilemma by

commentators since its perceived relevance has been increasingly viewed as conflicting with appeals to cut or decrease flying (Gärdebo et al., 2017). This dilemmatic aspect of AAT is particularly highlighted in the context of environmental and climate science, as the scientific basis for appeals for a reduction of aviation comes from these disciplines (Grémillet, 2008). Drawing on Nixon (2011), Nevins (2014: 306) calls participation in AAT a privilege, which should be used for "laying the groundwork of overcoming the system of privilege and disadvantage", referring to the systematic inequalities mediating differences in how areas are affected by the consequences of climate change. There is a long-standing argument that something must be done about reducing AAT (Lester, 2007; Pedelty, 2008). While it is sometimes acknowledged that the actual contributions to carbon emissions from academia in general and individual disciplines in particular are overall low in relative terms, many commentators stress that science, and especially climate science, "must take its responsibility and lead by example" when it comes to reducing AAT (Caset et al., 2018: 3; Anderson & Nevins, 2016; Anderson, 2013; Anglaret et al., 2019; Hamant et al., 2019). Within academia, Higham and Font (2020) have called for tourism studies to take the lead in applying their knowledge more and to lead research into possibilities of emission reduction.

A number of authors discuss flying as a behavioural choice at the individual level, drawing on psychological concepts such as the theory of planned behaviour (Greaves et al., 2013; Yuriev et al., 2018). This has also been applied to AAT, for example, by Lassen (2010), who found that there is rarely a connection between environmental attitudes and environmental behaviour. Schrems and Upham (2020) apply a cognitive dissonance framework to sustainability academics' attitudes towards AAT (see also Petzold, 2017; Vincent, 2019); however, the limits of cognitive theories have in this context been pointed out, too (Moloney & Strengers, 2014). Eriksson and colleagues' recent study (2020) of computer scientists' views of AAT highlights the lack of consensus among the participants with regard to their participation in AAT as well as methodological difficulties. The discussion of the "flyer's dilemma" sometimes takes place within individual disciplines, such as ethnomusicology (Grant, 2018), medicine (Storz, 2019; Young, 2009), cultural anthropology (Nevins, 2018), or religion studies (Zoloth, 2014), and particularly in those connected to climate and environmental sciences (Fox et al., 2009; Grémillet, 2008; Michaelowa & Lehmkuhl, 2004; Waring et al., 2014). These calls are at other times also addressed to the scientific community as a whole (Anonymous, 2019; Jean & Wymant, 2019; Nathans & Sterling, 2016; Peeters, 2020; Reay, 2004; Smythe, 2010; Thompson, 2011). Here, the *Academic Flying Blog* acts as an additional forum for discussion (Wilde, 2019a). Anthropologist Baer (2018, 2019) has called AAT "the elephant in the sky", and pointed out that small scale individual solutions such as reduction of short-term trips and less attendance of faraway conferences do not go far enough, since the reasons for climate change go deeper, ultimately only resolvable in an alternative world system (see also Burian, 2018; Dwyer, 2013). The case to reduce or even stop AAT, connected with an individualising framework of action is laid out in contributions to Watson's (2014; e.g., Krumdieck, 2014) collection of personal essays about stopping to fly as well as in Smith's (2019) report for an aviation de-growth NGO. In addition, disciplinary organisations are called upon to support individual members' reduction of AAT (Cobb et al., 2018; petition by Wilde, 2019b). AAT is also discussed in the contexts of university policy such as many institutions' plans for sustainability. Following exploratory work by Hopkins and colleagues (2016), Glover et al. (2017; 2018) have found that while many of the Australian universities they reviewed had a plan for becoming sustainable in the future, more than half ignored AAT in their sustainability statements.

5.2 Carbon emissions, footprint calculations

Apart from alternative forms of conference organisation or a larger change in the mode of academic work (**6.1, 6.2**), carbon-offsetting has been discussed and is partly practiced as a means for mitigating emission (Broderick, 2009; Burke, 2010; Tyers, 2016). This approach, however, is controversial, if not

widely disregarded (Anderson, 2012; Le Quéré et al., 2015; Moura-Costas & Stuart, 1998). Similarly, technological solutions such as alternative, hypothetically less carbon-intensive modes of aviation are often rejected as not sufficiently tackling the underlying problem of the extent of flying (Baer, 2019; Caset et al., 2018). The discussion around emissions from AAT takes place largely in terms of ecological footprints (EF), and a genre of studies calculates the EF of different conferences (Astudillo & AzariJafari, 2018; Becken, 2002; Borggren et al., 2013; Desiere, 2016; Fehr et al., 2019; Hirschier & Hilty, 2002; Jäckle, 2019; Klöwer et al., 2020; Neugebauer et al., 2020; Ponette-Gonzáles & Byrnes, 2011), universities with students (Arsenault et al., 2019; Hale & Vogelaar, 2015; Mendoza-Flores et al., 2019) and without (Ciers et al., 2019; Wynes & Donner, 2018), and compares academic disciplines (Balmford et al., 2017; Waring et al., 2014), research units (Stohl, 2008), a PhD project (Achten et al., 2013), and the production of a conference paper (Spinellis & Louridas, 2013).

5.3 Credibility

The status of AAT as relevant and obligatory, on the one hand, and as an activity which is suggested to be undesirable, on the other, becomes particularly tense for climate scientists and their roles in public and policy contexts. Rapley and De Meyer (2014: 745) have argued that a much-expected new contract of science with society, connected to "additional commitments in the area of public discourse and policy", as proposed by Lubchenco (1998), did not materialise, partly because the global reorganisation of science and its increasing competitiveness do not leave scientists any spare time. With climate change becoming more salient in news media coverage (Schmidt et al., 2013), environmental and climate scientists gain prominence in the public sphere, where the role of "honest broker" (Pielke, 2007) is not easily played and where activities such as AAT can be perceived as evidence of a double standard (Cox, 2013; Gauchat et al., 2017; Knudsen & De Bolsée, 2019). There is evidence that the credibility of climate scientists is influenced by their public perception (Attari et al., 2016; Nordhagen et al., 2014). The complex relationship of "environmental behaviour" and its connection with credibility among environmental and climate scientists, especially those who have a high public profile, is highlighted by findings from Sparkman and Attari (2020). They provide evidence that communicators in the context of climate science need not be seen to partake in non-environmental behaviour, it is also detrimental to their credibility when they hold, or are seen to hold, themselves to standards the majority of the public finds unattainable.

6 Discussions of alternatives

6.1 Alternative conference organisation

Urry (2003: 171f) suggests that different "requirements of travel and copresence" exist: besides the need for corporeal copresence, there is also the need for response presence (as developed by Knorr-Cetina & Bruegger, 2002 in the context of financial markets), which needs less "thick" information and could be supplemented if not replaced by what Urry (2002) calls "virtual travel", or *virtual meetings (VM)*. In the context of organisation studies, it has been shown that companies that use VM do not decrease their physical travel, but that instead both physical and virtual travel increase at the same time (Haynes, 2010). VM in the form of video conferences are central when alternatives to AAT are discussed, and what is identified as most important is the tradition of academic conferences (Bossdorf et al., 2010; Henderson, 2015; Lassen et al., 2006; Sarabipour et al., 2020). This is often discussed in the context of climatisation, such as by Coroama and colleagues (2012), who affirm that substituting AAT by VM does indeed reduce greenhouse gas emission. Le Quéré and colleagues (2015) propose a change in the current carbon-intensive research culture by means of applying a formula to calculate whether an instance of

flying is justified, based on the extent of travel, duration and emission, weighed against justifying factors, such as career stage and reason for flying. Mainly, the shift from centralised conferences to hybrid forms of continental or national hubs in different constellations, supplemented by virtual attendance is seen as a realistic alternative (Aguiléra et al., 2012; Fraser et al., 2017; Gäredbo et al., 2013; Klöwer et al., 2020; Le Qéré et al., 2015; Orsi, 2012; Ponette-Gonzáles & Byrnes, 2011; Stroud & Feeley, 2015). Ekstrom et al. (2020) highlight the need for widely available free video conferencing platforms in order for virtual conferences to be accepted, but privacy concerns remain an issue (Parncutt & Seither-Preisler, 2019). Not surprisingly, in some universities' sustainability programmes, reducing AAT is set in the context of IT development (Glover et al., 2017; 2018). Neustaedter and colleagues (2018) report on trials of using robots as a means of telepresence at conferences, with results ranging from mixed at best to discouraging. Some highlight the benefits of virtual conferences besides emission reduction, such as less time spent travelling (Ørngreen et al., 2019), while others report on some negative experiences, such as the challenge of giving presentations alone in front of an unresponsive computer (Pacchioni, 2020). Alternative forms of travel are mostly mentioned as a side note. Caset and colleagues (2018) reject the hope for technological solutions, innovations in aviation such as electric aircrafts or biofuel propulsion, likening them to Cold War era pipe dreams of nuclear powered planes. Train travel is sometimes discussed, albeit often in essayistic and slightly romanticising form (Bissell & Overend, 2015; Quinton, 2020).

6.2 *Slow Scholarship*

Since the mid-2010s, there are efforts to review the imperative to participate in AAT in the light of broader developments in how academic life is conducted and regulated. Against trends of a neoliberalisation of the academy, New Public Management practices, and increasing pressure on university staff, a call for *Slow Scholarship* as a qualitative change in research culture (**6.1**) is made, including a reduction of conference attendance as well as more time for individual research and better teaching (Mountz et al., 2015). Connected often to feminist perspectives in the humanities as well as educational theory, there is a multiplicity of calls for embracing *Slow Scholarship*, although emphases vary (Bergland, 2018; Berkowitz & Delacour, 2020; Glover et al., 2017; Hartman & Darab, 2012; Stengers & Muecke, 2018). Mendick (2014), however, criticises the *Slow Scholarship* movement for emanating from a perspective that is itself very close to a neoliberal logic of optimisation, suggesting that *Slow Scholarship* suffers from a narrow view of science – namely research that is being conducted at humanities departments of high prestige universities – without much potential for application in other areas of science.

7 Limitations

This literature review presents AAT as an emerging topic of scholarly interest. However, with a view to covering the range of contexts in which AAT has become relevant as well as the heterogeneity of the literature under review, it must be acknowledged that some parts of the discussion remain cursory. The narrowing of the search focus on explicit mentions of AAT necessarily occludes some aspects, notably, relevant aspects of academic travel and air travel more generally. The literature on mobility, migration, and tourism studies, as well as the closely related field of conference studies could thus not be given the space they deserve. A number of topics relevant to AAT did not appear in the reviewed literature for two possible reasons: one can be the above mentioned limitation of the literature search; another reason can be a lack of research on these issues as has been discussed, e.g., in the context of health concerns (**4.2.3**). In the context of geographical stratification, the issue of time is, if at all, only covered in passing: one

factor that makes AAT appealing in many contexts is its fastness; substitution is not possible everywhere, e.g., in Europe many universities are in closer proximity than in e.g., the US, Australia, or India, thus making AAT more difficult to substitute (see also **4.1** on "remoteness"). Similarly, copresence is by far not the only functional aspect in international academic mobility – inequalities between national contexts play a role in both long and short-term academic mobility practices, too (**2.2, 4.2**). Interestingly, the role of scientific reputation appears only as a secondary concern in the literature (**3.3**), and has as of yet not been theorised with a focus on the role of conferences and AAT.

8 The Elephant in the Sky: Conclusions and outlook

Academic travel has long been an integral part of the development of the research university and the international connectivity of modern science; the scholarly interest in the phenomenon, however, has as of yet hardly kept pace with the growth and extent of the practice itself. Based on a literature review, we here take stock of the status quo of research on AAT. The key functions of meetingness and physical copresence in academic communication and scientific exchange, as well as the special characteristics of the academic labour market, appear as the main drivers of AAT. Yet, functions for individual scientific reputation and academic belonging, as well as tourism aspects, play relevant and, as of yet, underexplored roles, too. Furthermore, AAT has become the subject of politicisation for the inequality of access to it and the environmental costs of aviation. Its relevance for individual academic careers versus its environmental impacts has been carved out as AAT's central tension. Most discussions of the critique as well as the legitimisation of AAT, however, are implicit, and it needs to be further investigated how academics justify their current rates of air travel (pre-Covid 19). We suggest that one has to expect both ambivalences and ambivalence management strategies especially in early career researchers, which should be investigated empirically and preferably across disciplines.

Storme already asked in 2014 for the current function of historically grown travel patterns and networks in the context of legitimising institutions, such as in a university hierarchy. What role do conferences still play in connecting researchers, including the cases of new research projects, research agendas, and new specialties growing out of copresent meetings? Is learning about new approaches, ideas, people and fields in face-to-face interaction still a relevant function of conferences in a time of an increasingly digital academia? Another research gap concerns the role of scientists in changing patterns of air travel. Is there a (climate-related) moralisation and politicisation of air travel, and is there evidence of changes in scientists' social role, or their "virtues" (Shapin, 2008)? How are the ambivalent roles of scientists in "leading by example" and aiming for personal credibility, and the individualisation of (symbolic) responsibility in the context of framing of air travel as "consumption of distance" negotiated? To study both, the implications for individuals as well as for institutions, it would be interesting to take a look at higher education institutions' (changing) travel policies, the involvement of individual scientists in campaigns such as Scientists for Future's *unter 1000* (Scientists for Future, 2021) as well as the activism specifically in Climate Science (No Fly Climate Sci, 2021).

The review at hand was started when the Covid-19 pandemic was only beginning to show its effects on the academic world, and there is a possibility that what we describe is a status quo ante, the return to which might be undesirable if not impossible. At this point, scholarly contributions on the pandemic's impact on AAT and the scientific world at large abound (see e.g., Bidmon et al., 2020; Gerhards, 2021; Glausiusz, 2021; Palm, 2021; Shelley-Egan, 2020). Given the disruptive power of the pandemic also on the academic world, AAT appears as an emerging and particularly timely area of research. To fly or not to fly – this is a practical, political and scientific matter. Further research on the impact of Covid-19 on patterns and extent of AAT as well as an exploration of the emerging ubiquity of virtual meetings will be needed.

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