ARTICLE

IBG | WILEY

Attuning to ambiguous atmospheres: Currents of air, discourse and time in a steel town

Erin Roberts[1] | Christopher Groves[1] | Gareth Thomas[2] | Fiona Shirani[1] | Catherine Cherry[2] | Nick Pidgeon[2] | Karen Henwood[1]

[1]Understanding Risk Research Group & School of Social Sciences, Cardiff University, Cardiff, UK

[2]Understanding Risk Research Group & School of Psychology, Cardiff University, Cardiff, UK

Correspondence
Erin Roberts, Understanding Risk Research Group & School of Social Sciences, Cardiff University, Cardiff, UK.
Email: robertsem4@cardiff.ac.uk

Funding information
European Regional Development Fund & Welsh European Funding Office

Abstract

How atmospheric pollution is perceived by urban dwellers has long been a topic of interest within geography and the social sciences, whether to draw attention to environmental injustices, to better understand the materialities and affects associated with polluted air, or to grasp how people 'tune in' to polluted matter. In this paper, we draw on three interrelated geographical and social science literatures on polluted air to inform our exploration of how residents of an industrial town in the UK encounter and perceive localised ambient air pollution. Using creative methods, we explore residents' narrative accounts of everyday life in the town, revealing how their engagements with the matter of pollution over time are drawn from multiple registers, giving rise to a plurality of perceptions filled with tensions between near and far, and between past, present and future, producing an ambiguous atmosphere all of its own. The paper contributes to geographic explorations of urban atmospheres an understanding of how they are differently experienced and known, and how residential perceptions might persist or change over different timescales.

KEYWORDS

air pollution, air quality, ambiguity, atmosphere, atmospheric attunements, attunement

1 | INTRODUCTION

Ambient air pollution is a problem of global proportions, with over 90% of the worldwide population now living in places where concentrations of airborne pollutants exceed the limits recommended by the World Health Organisation (World Health Organisation [WHO], 2016). Although the effects are unevenly distributed on a global level, with low- to middle-income countries bearing the greatest burden, on a national level, geographical proximity (and thus exposure) to polluting infrastructures tends to coincide with higher levels of deprivation (Kelly & Fussell, 2015). Even in high-income countries such as the UK, where significant efforts have been made to improve air quality since the mid-twentieth century, air pollution remains a persistent problem that exerts a heavy public health burden (Royal College of Physicians [RCP], 2016).

Recognising this uneven distribution of effects and its implications in terms of environmental justice, social scientists have long been interested in the risk perceptions of urban residents and communities living near polluting infrastructures. More recently, geographic literature concerned with atmospheric pollution, has shifted the focus to the materialities of air pollution and its affects, emphasising a more fluid interpretation of people's atmospheric relationships. This paper seeks to contribute to these literatures by exploring how residents of the steel town of Port Talbot (hereafter PT) in South Wales (UK) come to know and make sense of ambient air pollution in their everyday lives, and whether these relationships persist or change through time. To do so, we explore resident perceptions by engaging with their narrative accounts of everyday life in the town, paying special attention to the materialities and temporalities evoked in discussions and stories about local environmental quality. Our analysis reveals that residents of PT engage with the matter of air pollution in a variety of ways; drawing on multiple registers—including embodied, social, spatial and temporal ones—to make sense of the local atmosphere and how it has changed (or not) over time. This gives rise to a plurality of residential perceptions filled with tensions between near and far, and between past, present and future, producing an ambiguous atmosphere all of its own.

2 | ENVIRONMENTAL KNOWING: FROM SOCIOCULTURAL MEANINGS TO ATMOSPHERIC ATTUNEMENTS

Over two decades of place-based risk research have drawn attention to the perceptions and cultural meanings surrounding polluting infrastructures and toxic air, shifting the focus from the techno-scientific analyses that dominate policy approaches towards more subjective understandings of air and its qualities (Kenis & Loomans, 2022). This body of literature has an explicitly spatial focus, emphasising the role of proximity to polluting infrastructures—often over long durations of time—in shaping people's relations to air (Bickerstaff, 2004; Bickerstaff & Simmons, 2009; Bickerstaff & Walker, 1999, 2001; Burningham & Thrush, 2004; Bush et al., 2001; Cupples et al., 2007; Day, 2007; Parkhill et al., 2010, 2011; Wakefield et al., 2001; Wakefield & McMullan, 2005). Research in this vein has also demonstrated how some social groups, such as low-income households as well as racial and ethnic minorities, are disproportionately exposed to and affected by pollution of all kinds, contributing to wider calls to address environmental injustices. Such analyses, however, often offer representations of poor air quality as being spatially fixed and unchanging (Kenis & Loomans, 2022, p. 2—notable exceptions include Bickerstaff & Simmons, 2009), prompting contemporary scholars to turn to complementary theorisations of air that build upon the foundations set by sociocultural risk research, whilst also accounting for spatio-temporal change.

Arguing for greater consideration of air's fluid materiality (Choy, 2018), recent scholarship of air and its pollution foregrounds its dynamic, elusive and unstable character by drawing on the notion of atmosphere (Kenis & Loomans, 2022, p. 2; see also Adey, 2015; Choy, 2010, 2011, 2018, 2020; Cupples, 2009; Engelmann, 2015; Ghertner, 2020; Grant, 2020; Hong et al., 2021; Kenner, 2021; Nguyen, 2020; Tripathy & McFarlane, 2022; Walker et al., 2022). Scholars in this tradition utilise the term in two interrelated ways; first, as referring to the gaseous medium that surrounds the planet, providing 'material continuity across space, albeit in uneven concentrations and circulations' (Grant, 2020, p. 537); and second, as denoting a generally shared sentiment or feeling (Choy, 2010) as part of the 'live background' that composes ordinary life (Grant, 2020, p. 537). Simply put, atmospheres can be both literal (i.e., meteorological) and figurative (or affective in the words of Anderson, 2009), and within this line of thinking, the elemental and the affective are co-constitutive (Adey, 2015; Verlie, 2019). Indeed, the interchangeable use of the terms 'climate' and 'atmosphere' to refer to either the meteorological or the affective in everyday as well as scholarly contexts evidences their 'always-already entangled nature' (p. 1). Consequently, rather than being a given, atmospheres are situated, emergent and changeable, as bodies are drawn into relation with all kinds of matter over time (Peterson, 2021). Atmospheres are therefore neither purely natural nor wholly social, being both external and internal to living, breathing bodies (Garnett, 2017, p. 325). Air pollution can thus be understood as a 'largely invisible socio-natural artefact, a hybrid human–non-human entanglement' that has 'very material, socially uneven consequences' (Kenis & Loomans, 2022, p. 3).

To better understand the co-constitutive nature of literal and figurative atmospheres, many scholars have explored the processes through which the meteorological is 'drawn into perceptibility' (Peterson, 2021, p. 5). This often entails researching atmospheres from the life-worlds of urban residents, offering a way of understanding the broader experience and condition of contemporary urbanism, particularly in relation to inequality and difference (Tripathy & McFarlane, 2022). Investigating the 'perceptual and experiential micro-geographies of atmosphere', Tripathy and McFarlane argue, connects a series of domains that are not often linked in research on atmosphere, and shows how these are entangled in the lives of residents of polluted places (p. 671). Increasingly, the concept of attunement—described broadly as a mode or

process of 'knowing the environment through its affects' (Kenner, 2021, p. 1115)—has offered one avenue of exploring the role of situated experience and embodied sensation in shaping atmospheric awareness and perception; one which is grounded through dwelling (Ingold, 2010). For example, equating attunement to habituation, Davies (2018) draws on Nixon's (2011) notion of 'slow violence' to emphasise the ways in which communities living near industrial facilities tune in to the incremental harm of exposure through everyday observations of environmental change and bodily affects. Here, not only is proximity to polluting infrastructures implicated in people's encounters with and sense making of air pollution and its affects, but so is *time*. Indeed, much of this burgeoning literature views air pollution as a spatiotemporally inconsistent phenomenon, as gases and particulate pollutants 'circulate, accumulate, dispense and dilute, and sometimes react and chemically change across space and over time' (Walker et al., 2022, p. 5). Walker and colleagues take this idea further, however, as they pay attention to the temporalities of polluting activities and processes whose patterns reoccur and repeat rhythmically. Such rhythms flow, vary and change—often directed by everyday activities such as driving—giving air (and pollution) 'polyrhythmic qualities' that can 'significantly shift between day and night, from day to day, and from weekday to weekend' (p. 4).

Scholars who ascribe to the inherently embodied understanding of attunement have also challenged the widely held misconception that atmospheres—whilst commonly thought of as 'shared mediums' (Grant, 2020, p. 537)—are encountered in the same way by all. Attributes such as gender, class, race, and disability have all been shown to differently shape atmospheric attunements (see Choy, 2011; Ghertner, 2020; Grant, 2020; Kenner, 2021; Nguyen, 2020; Shapiro, 2015). Kenner's (2021) work on indoor air quality demonstrates that, rather than developing an awareness of the qualities of a shared atmosphere, people with asthma attune to qualities that disorder their breathing, marking a differential response to place that sets them apart (p. 1125). Kenner concludes that attunement is more than simply 'awareness'; instead, it is a labour that directs our engagements with the world and anchors our care (p. 1118).

Atmospheric attunements (Stewart, 2011), however, are not only guided by habituation and sensation, as demonstrated in the work of scholars such as Engelmann (2015), Nguyen (2020), Ghertner (2020) and Hong et al. (2021). These studies highlight how local media, artistic installations and/or informal social networks also play a role in the problematisation of air pollution, emphasising that the atmospheric emerges as a quality coalescing across multiple registers and relations (Peterson, 2021, p. 5). However, whilst attuning to atmospheres speak to relations, they also speak to *the absence* of relation, bringing us into contact with lost futures and haunted presents (Brigstocke & Noorani, 2016, p. 3). Attunement, therefore, is about more than a moment or presence, as the various temporalities of atmospheric attunements include remembering and anticipation, establishing a connection where past and future are folded into the present.

To summarise, bringing together insights from the literatures on sociocultural risk, urban atmospheres and attunement offers scholars the opportunity to explore the dynamic entanglements that underpin situated sense making processes. From work on sociocultural risk, we can better appreciate the role of context (i.e., social, cultural, economic, political, spatiotemporal)—and multi-scalar relationships in particular—in shaping perceptions of localised air pollution (see also Paiva & Sánchez, 2020; Tripathy & McFarlane, 2022). From work on urban atmospheres, scholars can better appreciate the materiality and emergent nature of polluted air and its affects. Finally, the concept of attunement offers a lens into embodied and collective sense making, with a particular appreciation for difference and plurality in atmospheric engagements. Bringing these concepts together is not only useful for those aiming to understand how atmospheric perceptions emerge, persist and/or change locally, but also points to broader, multi-scalar dynamics at play in their formation.

In what follows, we contextualise our research setting—the industrial town of Port Talbot in south Wales—and introduce the project from which this paper derives.

3 | AIR QUALITY AND CONTROVERSY IN PORT TALBOT, SOUTH WALES

As in many other industrial locations in the UK and beyond, air quality has long been a bone of contention for residents of PT and its surrounding areas. In 2018, however, PT's air quality became a particular focus of media and public concern following with the publication of the World Health Organization's (WHO) 2018 Global Ambient Air Quality Database,[1] which indicated that the town had greater levels of PM2.5 pollution than the UK's largest cities. Reported to be at 18 micrograms per cubic metre, this concentration of PM2.5 far exceeded WHO's recommended limit of 10. Media headlines subsequently labelled the town as the most polluted place in the country; a label that was challenged by the local authority (NPTCBC) responsible for monitoring and managing air pollution in the town. While poor air quality has been a longstanding issue in PT, the pollutants of greatest concern identified by NPTCBC are PM10, large particulates (i.e., nuisance dust), and polyaromatic hydrocarbons (PAH)—attributed to the activities of the local integrated steelworks,

the largest of its kind in the UK—levels of which have historically exceeded WHO and EU guidance (NPTCBC, 2020). According to NPTCBC, levels of PM2.5 measured in PT were just over half the figure reported by WHO and thus within permissible limits. It later transpired that the initial figure reported by WHO was an *estimation* based on measurements of PM10 in the town; an error that was swiftly rectified following a public apology by WHO (ITV News, 2018). The town's troubles with air pollution, however, had entered the popular vernacular in the UK, and in the months that followed, the continuous media coverage did little to repair the reputational damage.

Two months following the WHO controversy, reports surfaced of PT residents complaining that dust fallout[2] from the town's steelworks was coating their cars, homes and even their pets (Walesonline.co.uk, 2018). Whilst nuisance dust had been a longstanding seasonal issue in PT (see BBC News, 2013a, 2013b, 2014), the latest occurrence served to heighten media attention on, and public scrutiny of, the town and its steelworks.

PT's air quality made headlines once again before the end of the year, as in the depth of night on 19 December 2018—seemingly inspired by news coverage of the town's troubles with industrial air pollution—anonymous street artist, Banksy, gifted the town a mural, which was painted on a former steel worker's garage (BBC News, 2018). Dubbed 'Season's Greetings', the mural uses the corner of the structure to convey its message: on one side it appears to show a child playfully catching snowflakes on their tongue; when the viewer turns the corner, however, they realise that the substance is not snow, but ash generated by a burning skip. The imagery deliberately instils a sense of discomfort as an innocent scene shifts to one that confronts the viewer with the toxic consequences of air pollution. Symbolically evoking the town's main source of employment as threatening to the health of both residents and the environment has served to keep the steelworks in the public eye. Framing the steelworks in this way is a source of great contention locally, however, particularly given the precarity surrounding the steel industry over the last four decades.

Approaching the Banksy mural at Port Talbot. *Source*: Authors.

The image seen upon rounding the corner of the building (Banksy mural at Port Talbot). *Source*: Authors.

Described as one of Wales' economic crown jewels, the PT steelworks is not only a cornerstone of the local economy but is also of vital national importance to Wales and indeed the UK. The energy demand required to make steel, however, renders the works among the largest carbon emitters in the country. With the complex interlinkages between energy, air quality, economy, transport, and health being increasingly recognised through the language of synergies and co-benefits (Penn et al., 2022), shifting to lower-carbon forms of production that also do not produce other forms of pollution is clearly necessary. To remain economically viable the steelworks needs to decarbonise, which could offer simultaneous benefits in terms of improvements to the local environment, including better air quality. Industrial decarbonisation of this scale, however, would require significant energy-system transformations locally, and for such a project to be successful, it must first be deemed socially acceptable and desirable at the local level. To explore how residents of PT and its surrounding areas feel about a range of envisaged demonstrator projects centring on the town's energy-intensive industry, we studied their situated experiences of life in the town and how they are implicated in the evaluation of local sociotechnical change. Although our work focused on the town's future framed through energy system and industrial change, given longstanding concerns and recent developments, we anticipated that discussions of local air quality would arise unprompted during the workshops. Consequently, this paper draws upon data that specifically relate to discussions around local environmental quality and air pollution.

4 | METHODOLOGY

The empirical data that inform this paper are drawn from a major collaboration involving academic researchers (social scientists and engineers) and project partners (e.g., local government and industry), whose primary aim was to

develop and pilot smart and flexible low-carbon technologies in PT. Our social science component took as its starting point deliberative approaches to the ethical evaluation of sociotechnical change (Pidgeon, 2020). Combining deliberative approaches with sensibilities developed in the interpretive/sociocultural risk domain, our approach sought to study situated, lived experiences and engagements with air quality, which are communicated and made sense of narratively (Henwood et al., 2011; Parkhill et al., 2010). Our methodology differed from mainstream deliberative work as it centred on embodied subjectivity as a way of engaging with and knowing change, which enables an exploration of environmental risk perceptions that treats engagements with air quality in a more fluid or dynamic way.

To situate discussion in the context of place and everyday life, 37 participants ranging from their 20s to their 70s and representing a diverse range of geographical areas within PT and its surrounding areas were purposively selected based on their distinctive relationships to the town (see Table 1). Initial interviews were conducted using biographical and mapping techniques, where participants were invited to identify and discuss emotionally and biographically salient areas of the town as well as talk about their lives and situated engagements with the local environment. Approximately 2 weeks later, participants were divided into five groups (comprising six to eight participants each) that were organised around shared 'proximal interests' that provided each group with a common vernacular and repertoire of experiences (Cherry et al., 2022; see Table 1). For the workshops, a composite of the individual maps of group members was produced for each group to contextually ground lived experiences and facilitate meaningful discussion of place change. Combining place-based and emotionally sensitised approaches to deliberation, our approach foregrounded participants' relational connections to the town's past, present and future (see Cherry et al., 2022; Pidgeon et al., 2021; Thomas et al., 2022, for a comprehensive discussion of our methodology).

Interviews and workshops were audio recorded, professionally transcribed, and subsequently checked and anonymised by the research team in accordance with protocols approved by the School of Social Sciences Research Ethics Committee at Cardiff University. Data management was facilitated by NVivo 12 software, enabling the rapid and systematic retrieval of data. We utilised a thematic approach to analysis based on grounded theory, where data were organised into themes and patterns; a process that involved drawing on our research aims, relevant literatures and transcripts to inform a coding framework that was iteratively refined to ensure openness to emerging themes. Adopting a relational lens to guide our analysis of each theme, we sought to explore the relationships underpinning discussions and resident perceptions. The data presented in this paper focus specifically on the theme of environmental—including air—quality, and in what follows, further details of the analytic process are provided.

5 | ANALYSIS

Air pollution arose in talk about the town's past, present and potential futures, with discussions revolving around the steelworks in particular. Participants' accounts were situated and meaningful, but were also threaded through with ambiguity, as no singular collective narrative emerged. Instead, several—often contradictory—narratives were present, which reflected variation in the relationships between individual residents and the steelworks/town. Taking care to

TABLE 1 Workshop groups.

Group and abbreviation used in text	Description
Multi-generational residents (MG)	People with longstanding familial ties to place, represented by members of families who have lived in PT for at least three generations
Steelworkers (SW)	People whose livelihoods have depended on heavy industry in PT, represented by current and retired employees or contractors for companies based on the Tata Steel site
River users (RU)	People with a connection to the outdoor environment in PT and its coastline for leisure activities (e.g., angling, boating, walking)
Young professionals (YP)	People who may have a central role in future sociotechnical changes in the town. Represented by residents aged under 30 in employment or training for engineering, IT or social service-related occupations
Green-fingered residents (GF)	People involved with horticulture, either in private gardens, allotments, or community gardens who may have perspectives on the long-term ecosystem impacts of heavy industry in the town

interpret the data in the context of individual interviews as well as the broader dataset (workshops), we paid close attention to the ways in which participants engaged with the literal and figurative atmospheres of PT. Specifically, we attended to discussions of how and where pollution was encountered, the perceptions, frictions, debates and/or actions such engagements brought about, as well as the materialities and temporalities evoked. Guided by our reading of the literature—particularly pertaining to the temporality and changeability of aerial atmospheres, variation in atmospheric attunements, and the discursive dynamics of absencing and presencing risk—we were interested in exploring the tensions and ambiguity inherent in PT's atmosphere(s). As such, the following analysis is structured to highlight different processes of attunement, which involve tuning in to pollution through:

1. *Habitation*—sensory engagements and embodied experiences that have developed over time.
2. *Temporal patternings*—residents' experience of the polyrhythmic patterns attributed to polluting infrastructure.
3. *Social interactions*—engagements with the matter of air pollution through social interactions, including social and mass media.
4. *Responses to governance*—perceptions of the policies aimed at reducing ambient air pollution in the town, with specific attention being paid to the spatialities and materialities implicated (or not) in such efforts.

5.1 | Habitation, habituation and the labour of attunement

Most participants had lived in PT and/or the surrounding area for significant portions of time, accruing knowledge incrementally through embodied experiences (Davies, 2018; Shapiro, 2015), describing how ambient air pollution was a normalised part of their everyday lives: 'I don't notice it [air pollution] ... I can't visibly say that the steelworks has affected my health' (Emily, 20s, YP). Prolonged exposure to the polluted atmosphere of the town meant that many of the residents had become habituated to the smells, sounds and particulates that often 'hang' in the air (Choy, 2018): 'I suppose as soon as you hit Taibach, you get that smell. I don't notice it so much now—I'm used to it' (Carol, 40s, MG). The districts of Taibach and Margam were widely identified as being particularly affected by air pollution due to their proximity to the steelworks. Participants who had experience of living in these areas described how their washing, cars, windows, pets and even wildlife were regularly stained pink, red and/or orange by dust fallout, and how a glitter-like substance would sometimes be suspended in the air:

> ... There's been times when we've had major fallouts, like, and we've put washing out on the line, and it's gone out white and it's come in pink. Oh, yeah, we've had that major fallout before. Anything that was white was pink. Animals included as well. We've had cats coming in red. We've had dogs coming in red, pink 'cos they had a fallout of red dust.
>
> (Crystal, 40s, SW)

Many participants reflected on how living in/with the polluted atmospheres of these districts necessitate certain practices to manage the constant presence of airborne dust. Everyday practices such as wiping down surfaces prior to their use—both indoors and outside—had become second nature to many. For some of our participants, such adaptive practices were little more than an unavoidable inconvenience given the industrial nature of the surrounding area. For others, however, these practices served as a daily reminder of the harmful potentials of living and breathing in polluted air:

> ... if I open my windows, I have to wipe my windowsills down like every day, and the cloth will be black. So, I don't tend to open them as much now, with the baby in the house and stuff, I try to ... even though if I take him outside it's the same stuff he's breathing in outside I guess, but ...
>
> (Claire, 30s, SW)

> If you go to Margam it's orange ... Dust, yeah. It goes in your eyes, you can feel it, and you blow your nose and it's orange. So, it's doing something. I don't know what that's doing. I'm happier more away from it [in Baglan]; I feel more content with my son and what have you ... But, no, it must have an impact on people's health.
>
> (Emma, 30s, MG)

Shapiro (2015) argues that awareness of the atmospheric surround becomes most pronounced or perceptible at 'the crossing of thresholds', before they recede and become ordinary (p. 374), using the example of physically moving from one space to another to illustrate their point. Claire and Emma's excerpts not only demonstrate this, but also provide an example of a different kind of threshold crossing, one that is more symbolic than physical; that is, the transition to parenthood. At the time of the interviews Claire and Emma were both on maternity leave and had reflected on how becoming a parent had re-orientated their atmospheric engagement. Whilst bodily sensing is described by Kenner (2021) as a 'labour of attunement', the resulting adaptive practices are a labour of care that increases the physical distance between bodies and atmospheric pollution. For Claire, wiping down surfaces and keeping windows closed can be seen as an attempt to control the immediate (indoor) environment to protect the health of her family. For Emma, bodily registers of pollution had greater significance as a parent, influencing her decision to live further away from the steelworks.

Just as life-course transitions can make ambient atmospheric pollution more perceptible, so too can 'episodic exposure events' (Shapiro, 2015); that is, moments in which new experiences orientate our 'atmospheric attention' (Choy, 2018). For example, Monica (30s, GF), a resident of nearby Neath for the last 6 years, could not draw on a lifetime of emplaced experience as a resource through which to tune in to the atmospheric qualities of PT. Consequently, there is a physical and experiential distance between Monica and PT's atmospheric surround; what Brigstocke and Noorani (2016) term an 'absence of relation':

> I was helping out my friend, the landscaper, and he was doing a job in Port Talbot … and this person's patio slabs were red from … I don't know if it's like iron ore or … And this dust, it stains everything. There was no smell in the air, there was no dust, you couldn't see any of it [in the air], anything like that. But when I got home that night and I had a shower, the water was red coming off me. So it was, it was really surprising to me that I was breathing this stuff in all day long and didn't know anything about it. There was no signs of it at all until I had a shower. And it was, it was quite a significant amount, like you know, being outside all day in that. You know, for somebody who would work in Port Talbot, in that area, all day, every day, that can't be good for their, for their lungs really, or their bodies. It would be pretty horrendous. It's not a place that I would want to live, or I would want [my children] to live, for that reason alone.
>
> (Monica, 30s, GF)

Monica's account highlights how air pollution can be both perceptible and imperceptible at the same time. In its static/restful state, air pollution was partially perceptible to her, and her initial observations did not register it as threatening as the nuisance dust remained quite distant from her everyday experiences; that is to say, in the absence of relation, Monica did not dwell on the matter of pollution. In its more mobile, suspended state, however, dust was present but remained imperceptible or invisible, only later revealing the extent of atmospheric pollution's ability to permeate boundaries and bodies. For Monica, this event momentarily foregrounded air pollution as an object of concern as she wondered, with some uncertainty, about the harmful potentials of exposure.

Other places and times also featured in participants' attunements to PT's polluted atmosphere, which function primarily as a means of achieving distance from pollution in a more discursive way (Bickerstaff & Simmons, 2009). This is most clearly observed in assertions about improvements in the local environment over time as well as through atmospheric comparisons with distant places; assertions that serve to make air pollution risk less 'experientially and emotionally salient' (Ibid.) in the here and now:

> … being as we moved from the Milton Keynes, Bletchley area, which is absolutely surrounded by London brickworks at the time, the air in Port Talbot is actually quite clean and doesn't smell.
>
> (Richard, 50s, GF)

> I've grown up in a working town with a steelworks and a BP [British Petroleum petrochemical plant] you know. I don't really know what less pollution would look like, 'cause there's already a lot less from when I was younger.
>
> (Sheryl, 20s, YP)

Memories of embodied engagements with the atmospheric qualities of different places featured in participants' accounts too. For example, Sheryl, a lifelong resident of the town that currently lives in Baglan, spoke of how her allergies and respiratory issues were greatly reduced in PT compared with more rural settings:

> I've got family who live up in England, they live in a little village, where there's literally nothing there, but my allergies and my asthma, they're much worse soon as I get up there [laughter] than they are here. I think the pollution in the air stops the pollen! [the group laugh] ... I think it protects me.
>
> (Sheryl, 20s, YP)

Sheryl's account exemplifies an inversion of common assumptions, given how ambient air pollution is widely recognised as causing/exacerbating a range of respiratory and pulmonary conditions. The above excerpt instead demonstrates how a shared atmospheric surround differently affects individual bodies, sometimes in surprising and unexpected ways (Shapiro, 2015; see also Choy, 2011; Grant, 2020; Kenner, 2021).

5.2 | Extraordinary attunements: atmospheric temporalities and their disruption

In recent years, several scholars have highlighted air's fluid and often 'fleeting and mutable' nature (Adey, 2015; Kenis & Loomans, 2022; Walker et al., 2022). Atmospheric temporalities, however, are more complicated than such statements might suggest. Atmospheres wax and wane as they emerge from the temporal patterning of material entanglements, giving rise to repetitions and rhythms occurring at different tempos (Kenis & Loomans, 2022; Walker et al., 2022), all the while appearing to be consistent or unchanging: a dynamic stability of sorts (Roberts et al., 2021). Paying attention to these temporal patternings, along with their effects and affects, was another way in which our participants attuned to PT's polluted atmospheres.

Within our dataset, the dynamic play of light on the local landscape provided a means of attending to diurnal, rhythmic patternings of 'aerial atmospheres' (Peterson, 2021). In particular, the 'effervescent light of the sunset' (Edensor, 2017) on the industrial landscape shaped participants' engagements with air pollution in ways, that whilst fleeting, left a lasting impression. For example, the presence of particulate pollution from the steelworks was said by some to 'enhance' the beauty of local sunsets by refracting the light; 'Port Talbot is rated in the top 10 places in the world for sunsets ... it's the steelworks [that] does it' (Richard, 50s, GF). Much like Sheryl's earlier assertion about the protective qualities of pollution, Richard's comments subvert expectations as he alludes to an enchantment emerging from his (spatio-temporally) situated engagement with the effects and affects of the polluted atmosphere. However, what is for one person an aesthetic delight, might be unsettling for another:

> I remember when I was, I'm gonna say 11 or 12, my dad used to live in Margam, and I remember going out, and it was around six o'clock, and the sky wasn't blue, it was glowing orange, like, like smog, just, like, layering the sky. And I was like, that's not a sunset; you just knew it was the steelworks, which was strange.
>
> (Emily, 20s, YP)

> ... If you've driven into Port Talbot in the evening or in the night in the wintertime particularly, you think Dante's Inferno (laughter). It is, isn't it? ... It is quite a picture ... the flames and everything.
>
> (Geoffrey, 70s, RU)

In reading such excerpts, Peeples' (2011) 'toxic sublime' springs to mind, which emphasises 'the tensions that arise from recognizing the toxicity of a place, object or situation, while simultaneously appreciating its mystery, magnificence and ability to inspire awe' (p. 375). Indeed, this dynamic is perhaps most aptly demonstrated by Geoffrey, who draws on cultural resources to liken the awe-full and unsettling aesthetics to Dante's Inferno.

How participants engaged with these sublime atmospheres relied not only on the perspective of the observer—the *where*—but also *when*. During the day, the steelworks is a homely/familiar and comforting presence, guiding travellers home: 'when you've been away and you cross the bridge, the first thing you see are the towers and you know you're home' (Heather, 20s, YP); illuminated by night, it becomes an extraordinary object that solicits awe. Drawing attention to the magnitude and splendour of the illuminated works, Reggie (60s, MG) for example, likened it to a 'wonderful city', while Marcus (50s, MG) equated it to 'a Wales version of Blackpool'. Similarly, Jennifer (60s, RU) described the works as 'quite spectacular looking' when lit up in the dark, Emily (20s, YP) thought it looked 'pretty', and Anne (40s, MG) declared that from the mountaintops, 'it does look beautiful ... it does! [laughs]'. Anne's laughter at her own seemingly incredulous claim suggests an awareness of the subversive nature of what she had said, as it challenges cultural associations that equate heavy industry with ugliness, danger and dirt (Parkhill et al., 2010; Wakefield & McMullan, 2005). Together, these assertions mark another crossing of thresholds, where the dynamics

of matter, light and verticality transforms a familiar or ordinary landscape into an extraordinary one (Edensor, 2017; Parkhill et al., 2010; Shapiro, 2015).

The patterning of atmospheric temporalities also became apparent in our dataset through discussions of the rhythms of industrial production. Whilst many talked about how a constant deluge of fallout from the steelworks has always featured in life in PT—reflected in residents' endearing moniker of 'the cloud factory' (Harriett, 30s, RU), and outsiders' less pleasant nickname of 'Port Toilet' (Carol, 40s, GF)—some participants also tuned in to the nocturnal patterning of its industrial activities:

> My sister lives in Margam and there's a fallout in the night … so, I haven't seen it. But I have been like Morfa Beach at the early hours of the morning when it's pitch black and there's a massive sulphur smell, you know, the fallout. They do it in the dark so nobody can see it, but it's pungent, I've got to be honest with you.
>
> (Darren, 40s, RU)

> People are not seeing the … it's black, you wanna see it. You wouldn't believe it. It's always in the middle of the night. I'm always up late, about two o'clock in the morning and they shoot it out of there and, you know, and they go, oh it's just normal smoke, it's not different from the day. Well, why do they do it about two o'clock in the morning. It's black. It's a bit dodgy, isn't it? I think like it's not good.
>
> (Rhiannon, 30s, GF)

Here, Darren and Rhiannon seem to be suggesting that the qualities of the steelworks' emissions change as day turns to night. Suggesting that the nocturnal emissions would be perceived as unacceptable during the day, their attunement to the rhythms of industrial pollution contributed to a charged atmosphere of its own; one laced with tension and distrust.

Whilst much of what was discussed by participants concerned the temporal patterning of the industrial landscape and its consequent effects and affects, there were some who reflected on times when the ordinary temporalities were disrupted. For example, at the time of data collection, the town was still reeling from an explosion at the steelworks that occurred during the early hours of the morning a mere 3 months earlier. Thankfully no one was harmed, which participants recognised was largely due to the *timing* of the accident; something that hit a little closer to home for one participant in particular:

> Luke: God forbid, lucky it happened at the time it did.
>
> Crystal: Yeah, because I would've been in the epicentre of it because I'd have been right outside when it blew, because that's where I pack, normally.
>
> (SW workshop)

As highlighted before, for many of our participants, ongoing exposure to the sights, smells and sounds of regular industrial activity had rendered them almost perceptually undetectable (Shapiro, 2015). Unusual events such as accidents produce ruptures in the normal rhythms of the industrial landscape. Such ruptures foreground proximity to risks that are unique to places of heavy industry, which have the potential to produce an enfeebling atmosphere, as evidenced in Luke's assertion '*that [the] incident was inevitable*' (Luke, 20s, SW). The explosion serves as another example of a 'crossing of thresholds' (p. 374), where the harmful potentials of living in the shadow of the giant were suddenly and violently presenced. As time passes, memories of the accident and the enfeebling atmosphere it produced will fade, but not disappear, becoming a background resource on which participants will draw when the next eruption/rupture occurs.

5.3 | 'Banksy put us on the map': social interactions and media discourses as reminders of risk

The affective ruptures caused by unusual events often have a broader reach than the immediate vicinity alone. Indeed, they often feed into social- and mass-media discourses, differently shaping the perceptions of those (un)affected by polluted atmospheres, both locally and beyond. As noted earlier, air pollution is a 'big area of contention' (Sheryl, 20s, YP) in PT;

something that was widely discussed by participants. Their narratives revealed not only contention between residents, but also between residents and those living elsewhere. Specifically, differences in experiential resources led many to augment their accounts by drawing on cultural narratives encountered via social interactions, both in person and through various forms of media (see also Engelmann, 2015; Hong et al., 2021). For example, observing and/or hearing of rumours regarding high rates of ill health in the town was used by some to convey concerns through public discourse about the physical impacts of long-term exposure to ambient air pollution from the steelworks. Such narratives proved influential, either by reinforcing or challenging personal embodied experiences accrued through habitation, serving as a haunting reminder of risk that leaves an 'imprint on the level of personal and collective experience' (Bickerstaff & Simmons, 2009, p. 868):

> I can't say that I think the steelworks affects you very much. I know people believe it does, and there's evidence that we've got more pollution ... but my grandparents, both my great-grandparents lived to be 97, 98 ... so as far as I'm concerned, they weren't affected.
>
> (Emily, 20s, YP)

> Everyone says the increasing cancer and asthmas in the area. We've got a high rate of asthma sufferers, yes, we probably have ... I haven't seen the figures; I couldn't say for definite. Probably a lot of the fallout would come from the steelworks, but also it provides a lot of work in the area ... if I saw some sort of proof on the asthma figures and you know, the lung cancer figures and things like that, then I would probably be a bit more shocked about it and probably want to do something more about it for my health and my daughter's health. I can't say, touch wood, I've ever suffered. My daughter is fine, she's not suffering, my partner, no health issues or anything like that.
>
> (Tina, 30s, SW)

Both Emily and Tina's excerpts are examples of a non-alignment between personal experience and a collective narrative, emphasising the entangled nature of atmospheres, where bodies, particulate matter, cultural discourses, and medical knowledge 'hang together' (Choy, 2018); from this tangled web emerges an atmosphere full of uncertainty.

Speaking of their online engagements with narratives of local ambient air pollution, participants emphasised how social media had led to the amplification of local concern, sometimes through misinformation, whether deliberate or otherwise. Specifically, participants recounted how forums such as Facebook sometimes exacerbated issues instead of addressing them, creating a charged polluted atmosphere of its own:

> Facebook makes everyone hysterical, that's one thing I notice. Like I say, I go out of curiosity a lot of the time and just to know what's going on. There's a lot ... like if there's a crime in the PACT[3] meetings, they'll discuss crime like if there were a few break-ins or things in the day. But then the police said, 'No, there weren't'; it was just hyped up on social media. So, in that respect ... like at one point one of the Councillors said, 'Information goes around on Facebook and it winds everyone up in Baglan'; it happens a lot.
>
> (Emma, 30s, MG)

> ... There's a site on Facebook, 'Port Talbot debate and argue', and the amount of people who've taken photos, you know, when [the steelworks] leave everything out, they open something and they leave steam out, or whatever, people have taken photos and it's not nice. It's like an orangey dust ... I think the issue with the dust has got worse because I think with, you know, things like social media, and everything, now, I think people are more aware of it and, obviously, they can share their opinions more than what, obviously, they used to before, but there's always something on the Port Talbot sites about the steelworks. Someone will take a photo when it's at its worst.
>
> (Carol, 40s, MG)

Whilst their proliferation on social media is a relatively new phenomenon, stories about air pollution in PT have featured in regional and national news reports for decades, shaping the social imaginary of those living beyond its borders: 'Port Talbot has the reputation, across south Wales—anywhere, I guess—as being a dirty town' (Gordon, 60s, SW workshop). Many participants took issue with how the media projected the town as a dirty, polluted and 'dreary' place (Anne, 40s, MG workshop), despite vast improvements in local environmental quality, as evidenced by many references to Aberavon beach's designated blue flag status. At the time of data collection, the image of PT as a 'faulty environment' (Irwin et al., 1999) was most recently perpetuated in the media following the latest publication of WHO's Global Ambient Air Quality Database:

They weren't the right figures ... Nobody's been accountable for that. Nobody's actually said to the people who—you know, they've lost out on things like house prices, things like that, but being acknowledged at all ... but nobody—again, nobody seems to care what Port Talbot thinks. They just think oh, well, it's Port Talbot. They can deal with it, you know.

(Emma, 30s, MG)

Emma's excerpt highlights the inaccurate, misleading, and even harmful potentials of media reporting, where reinforcing an already 'spoiled identity' (Bush et al., 2001) has socioeconomic consequences for the residents of places in receipt of stigmatising labels. This finding resonates with Schwela and Haq's (2020) contentions that while efforts to raise awareness, measure progress, and inspire action against deleterious air quality is crucial, challenges exist in terms of the comprehensiveness of, and comparability within such datasets, which has potentially disastrous consequences when it comes to reporting on and improving air quality.

Similar concerns arose during discussions of the sudden appearance of the Banksy mural, as the artwork and the media attention that followed its arrival affectively resonated with participants in quite varied ways. For Anne (40s, MG), Banksy had brought a 'bit of cheer to Port Talbot' and 'put us on the map', suggesting that for her at least, the prestige associated with hosting artwork by the famous artist—the first ever Banksy piece to appear in Wales—overshadows its substantive content. Conversely, Elaine (20s, YP) felt an appreciation for the mural precisely because of its substantive content, remarking that it was 'spot on really' as it 'raised issues about the pollution'. For others, however, foregrounding pollution-risk in the public sphere was felt to carry with it the danger of perpetuating the circulation of stigmatising discourses; '[it's] kind'a slating the town ... literally calling it the, you know, a dirty place ... it's basically Chernobyl [laughs]' (Joey, 20s, YP). Such insights highlight artwork's potentials for 'forcing thought' as it becomes another resource through which people engage with the 'material-affective nexus of air and atmosphere' (Engelmann, 2015, p. 432).

5.4 | Backgrounding and foregrounding risk: the elevated elephant in the room

Just as interactions with media discourses and art installations were resources for forcing thought, so too were engagements with official efforts to tackle air pollution locally. Departing from the ambiguity inherent in the analysis thus far, perhaps the only area where there seemed to be wholesale agreement in discussions of ambient air pollution among participants pertained to the ways in which it was governed. When it comes to governing ambient air pollution, air quality is generally made knowable and legally accountable through techno-scientific monitoring processes based on quantitative data (Calvillo, 2018, p. 384). Local governments are tasked with tracking and documenting the chemical and material composition of the air to comply with maximum limits for specific pollutants, defined by epidemiological and toxicological studies, and stipulated by the 2008 EU Air Quality Directive (Calvillo, 2018, p. 375; Council directive 2008/50/EC on ambient air quality and cleaner air for Europe, 2008). The areas of greatest concern identified in PT by the local authority, NPTCBC, relate to particulate matter less than 10 microns in diameter (PM10), large particulates, nuisance dust, and polyaromatic hydrocarbons (PAH),[4] all of which are attributed to the activities of the steelworks and have a history of exceeding WHO and EU guidance (NPTCBC, 2020). It comes as no surprise then, that public concerns about the air quality in PT centre on the activities of the local industry.[5] While some participants appeared to accept that not much could be done, as living in an industrial town entailed 'consequences' (Tina, 30s, SW), others talked about the steelworks' attempt to 'clean up' and/or reduce their emissions, albeit with the view that more could be done:

I can remember years ago, Margam, the windows and the cars were all metal filings in them, they [the steelworks] were paying out ... they were even giving grants out to houses in Margam for cleaning windows and having their cars polished. Because when they go up in the steam, the metal filings dropped down and were burning into the car.

(Steve, 40s, MG)

Steve's excerpt alludes to a perception that approaches to improving local air quality are treating the symptoms of pollution rather than the cause. Some participants mused that the costs of doing more to address pollution are probably seen as prohibitive by the steelworks, much to the detriment of the town: 'they need particulate filters on the towers. And they're easy

enough to do, yes, but it's going to cost them money. But then, what price is there on people's lives?' (Harriett, 30s, RU). Whilst some vented their frustration at the steelworks, others spoke of their irritation regarding air quality measures championed by NPTCBC. Specifically, participants referred to the newly placed 50mph speed restriction spanning 3 miles between junctions 41 and 42 of the elevated M4 motorway, which splits the town in two[6]:

> The council have actually reduced the speed limit, the 50 zone in Port Talbot, now it's going all the way to Neath on the motorway, because of air quality and pollution. Look right [to the steelworks], you know, and that's where your air quality and pollution's coming from ... I mean, there's motorways going through plenty of other areas.
>
> (Harriet, 30s, RU)

NPTCBC's approach to reducing air pollution was seen as disruptive to the smooth patterning of everyday life for residents of PT. Such friction shaped participants' engagement with the surrounding atmosphere by foregrounding debates about responsibilities when addressing air pollution. The resulting charged atmosphere could best be described as one of frustration, as participants such as Harriet alluded to the unfairness of tasking the least responsible to change their ways, whilst those that are most responsible are allowed to continue polluting the air. This perceived misplacement of policy mechanisms arose time and time again in the data. Along with the frustration of motorists being targeted rather than industry, concerns commonly raised by participants also touched upon a widely held perception that speed restrictions are counterintuitive:

> Marcus: ... They're on about the pollution in Port Talbot. Now, what annoys me is they're saying, 'Oh, well, because of this, that and the other', you're limited to 50 miles-per-hour.
>
> Reggie: And it causes chaos.
>
> Marcus: Chaos. And if they could up that to the 70 so you've got a constant flow ... It would be better ...
>
> Anne: There's no need for a 50 zone in Port Talbot. (MG Workshop)
>
> I don't see the need for limiting it to 50 miles-an-hour ... I think it does cause problems because the traffic builds up a little bit more ... you're there for longer, you're sitting in the smoke, because cars, when they're moving at 50 miles-an-hour, produce a hell of a sight more smoke with their brakes and inching forward all the time than they would if they were just flying through. And while people are sitting there at slower speeds, they become more frustrated, more likely to have accidents, you know? ... it's become a bottleneck simply because of that 50 mile-an-hour restriction, which I don't think needs to be there. So, yeah, I would say, in some respects the M4 can be dangerous because of the way [the council] treated it, really.
>
> (Dai, 50s, GF)

For many of our participants, speed restrictions were worsening congestion and pollution rather than improving it. Such views serve not only to absence pollution risk from the motorway, but sees any potential risk or danger as derived entirely from poor decision-making. As talk revolved around traffic congestion, an unforeseen consequence of the newly-enforced speed limit, participants highlighted yet a further mismatch between Local Air Quality Management approaches and lived reality in the town; 'A lot of cars still don't have like the eco-mode, where if they're at a standstill it shuts itself off ... As there's not much money in Port Talbot, then people don't have the newer cars' (Joey, 20s, YP). Joey's comments subtly highlight a concern that socioeconomic disadvantage in the town would limit the effectiveness of the air quality measures, as a high proportion of residents do not have the economic means to access more energy-efficient technologies. Such a concern further demonstrates how residents of polluted places often draw upon a variety of registers to engage with atmospheric pollution, differing significantly from the techno-scientific approach adopted by policymakers.

6 | DISCUSSION AND CONCLUSION

This paper set out to better understand how residents of the industrial town of PT make sense of and relate to localised ambient air pollution. To do this, we drew on concepts from three separate but interrelated literatures. From *sociocultural*

risk research—which focuses on the broader, sociocultural dynamics of air quality perceptions—we explicitly emphasise the role that spatial and sociocultural context plays in shaping such processes. In doing so, our research highlights the power of discourses in connecting the near and the far—spatially, temporally and experientially—in the formation of atmospheric perceptions. From research on *atmospheres*, which highlights the complex materiality and emergent nature of atmospheres (both literal and affective) and atmospheric pollution, we found inspiration in Walker et al.'s (2022) conceptual developments and attended to the multiple and conflicting temporalities and affects implicated in residential narratives of atmospheric pollution. Our analysis shows that atmospheres can have a temporal patterning that, whilst not immune to disruption, contributes to the formation of residential perceptions. And from research on *attunement*, which relates to the embodied registers through which individuals 'tune in' to and are affected by atmospheric pollution, we explored the sensorial registers through which different 'proximal interest groups' made sense of ambient pollution, revealing a plurality of perceptions that coalesce and 'hang together' along with the suspended matter of pollution.

Together, these concepts enhanced our reading of the data by bringing a range of experiences—embodied registers as well as broader contextual (sociocultural and spatiotemporal) ones—into a single frame. Doing so has enabled us to attend to a range of atmospheric engagements that give rise to a multiplicity of atmospheric perceptions—some complementary and others conflicting—which 'hang together' as both components and products of polluted atmosphere(s). Such complexity defies straightforward characterisation, and the resulting ambiguous atmosphere is one filled with tensions; between near and far, and between the town's past, present and future. To this end, our analysis, similarly to that of Tripathy and McFarlane (2022), contributes to geographic explorations of urban atmospheres an understanding of how atmospheres are differently experienced and known, and how residential perceptions of their local atmosphere might persist or change over different timescales (e.g., daily, annually, biographical).

Our analysis also revealed that participants reflected on distant times and places to engage with air pollution as a matter of concern in the present. These 'spatio-temporal foldings' (Bickerstaff & Simmons, 2009) were integral to engagements with PT's polluted atmospheres (both literal and figurative) as they oriented participants' subjective understanding and concerns. Specifically, we found that whilst inhabiting a polluted place over time can result in habituation to one's environmental surrounds, the ensuing entanglements—of bodies, discourses, cultural norms, pollution and other forms of matter over time—were not immune to disruption and change. Whilst bodily registers were at least partly implicated in participants' attunements to the enveloping atmosphere, the meanings ascribed to these embodied engagements were not always the same. Specifically, the symbolic (rather than physical, as originally conceptualised by Shapiro, 2015) 'crossing of thresholds'—whether through departures from the everyday (i.e., from ordinary to extraordinary) or life-course transitions, along with the sociocultural relations associated with these changing states—played a part in shaping how individuals make sense of environmental risks. Our analysis thus further contributes to the literature on atmospheric pollution by highlighting how attunements and perceptions are not necessarily permanent, but can, and often do, shift and change over time.

Whilst some of the burgeoning literature on atmospheric temporalities tends to focus on the more visible polyrhythmic qualities of mobile sources of pollution, such as traffic (e.g., Kenis & Loomans, 2022; Walker et al., 2022), our analysis highlights the various ways in which temporal dynamism is implicated in encounters with seemingly 'fixed' source polluters. Far from being static, our research contributes to atmospheric literatures by illuminating how the meanings ascribed to places and their associated atmospheric pollution are open to relational reinterpretation, not only through the accumulation of experiences and the diurnal rhythms of source polluters themselves, but also through the everyday practices, shifting circumstances and priorities of those that dwell near them. Such findings demonstrate the value of our analytic approach, as it has enabled us to attend to temporal complexity, which we argue is necessary to better understand the dynamics of ever-changing atmospheres.

Our research also highlights the different ways through which embodied experience, everyday observations, interpersonal relationships and other socially mediated attunements 'force thought' (Engelmann, 2015) about air pollution in a variety of sometimes unexpected ways. Our exploration of participants' narratives revealed how they tuned in to the issue space in both direct (e.g., bodily registers, everyday frictions as speed reductions disrupt everyday rhythms) and indirect ways (e.g., through social interactions and engagements with social and mass media). Harkening back to Brigstocke and Noorani's (2016) assertion that attuning to atmospheres speaks not only to relations but to their absence as well (see also Bickerstaff & Simmons, 2009), the tensions between narratives relied on different combinations of direct and indirect experience (see Masco, 2006). The one area where there was broad consensus among participants, however, related to their critical response to local air quality management strategies, which targeted traffic-related emissions rather than those of the local industry. This response seemed to stem from the ways in which

—WILEY 15

participants engaged with the steelworks and traffic as sources of pollution, which differed considerably. Whilst the steelworks' pollution was directly experienced by some, most tuned in to the matter of industrial pollution indirectly; conversely, everyday mobility practices had made the car experientially nearer. As such, we suggest that this difference in experiential proximity has a bearing not only on perceptions of what constitutes a matter of atmospheric concern, but also on opinions of how to address it.

Methodologically, our approach contributes to the literature on polluted airs by attending to residential experiences and perceptions that are communicated narratively. While narrative inquiry is replete with techniques for engaging with interpretive questions about locally communicated risk issues and their sociocultural framings (Henwood et al., 2011) and for conducting critical analysis of dynamic spaces of risk perception (Masco, 2006), it is perhaps a less obvious method for engaging with matters arising from multisensoriality and attunement. We argue that engaging with residential narratives has provided a route to better understanding the multiple registers implicated in sense-making processes, and how perceptions are not permanent but can shift and change over time (see also Henwood et al., 2011), providing new insights into how aerial matters become a focus of concern (or not) for urban residents. Moreover, our use of creative methods, which included mapping exercises and biographical techniques, was invaluable for not only encouraging wide-ranging discussions of emplaced experiences through time, but in doing so, provided yet another means of recognising and engaging with the dynamic relationships between near and far, and between policy and everyday life. Following Walker et al. (2022), we would argue that research concerned with urban atmospheres could benefit greatly from this development, as it illuminates the multiple and conflicting materialities and temporalities implicated in atmospheric perceptions.

DATA AVAILABILITY STATEMENT
The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

ORCID
Erin Roberts https://orcid.org/0000-0003-4818-2926
Christopher Groves https://orcid.org/0000-0002-5873-1119
Gareth Thomas https://orcid.org/0000-0002-8462-0236
Fiona Shirani https://orcid.org/0000-0002-6963-4971
Catherine Cherry https://orcid.org/0000-0002-1443-9634
Nick Pidgeon https://orcid.org/0000-0002-8991-0398
Karen Henwood https://orcid.org/0000-0002-4631-5468

ENDNOTES
[1] Biannually published, this database compiles annual averages of airborne particulate matter (PM10) and fine particulate matter (PM2.5) from public air monitoring stations in more than 3400 cities around the world.

[2] Also termed 'large particulates' or 'nuisance dust'.

[3] Referring to the local Partnerships and Communities Together initiative.

[4] Other pollutants widely recognised as harmful to human and ecosystem health are also monitored in PT, however their concentrations have not exceeded permissible limits.

[5] Ambient air pollution, however, is comprised of a mixture of solids and aerosols from multiple sources, including both local and transboundary, naturally occurring and anthropogenic sources.

[6] The M4 was built to alleviate traffic congestion along the pre-motorway roads of the south Wales corridor in the 1960s. Two hundred homes and three chapels were demolished to make way for the pillars that would eventually hold the leviathan aloft, and the remnants of once-whole streets serve as a haunting reminder of the sacrifices made for enhancing mobility. Providing a fast and convenient route into and out of PT, affording opportunities for work and leisure further afield.

REFERENCES

Adey, P. (2015) Air's affinities: Geopolitics, chemical affect and the force of the elemental. *Dialogues in Human Geography*, 5(1), 54–75. Available from: https://doi.org/10.1177/2043820614565871

Anderson, B. (2009) Affective atmospheres. *Emotion, Space and Society*, 2(2), 77–88. Available from: https://doi.org/10.1016/j.emospa.2009.08.005

BBC News. (2013a) *Tata Steel Port Talbot issued with notice over pollution*, 30th July 2013. Available from: https://www.bbc.co.uk/news/uk-wales-south-west-wales-23505103 [Accessed 3rd May 2022].

BBC News. (2013b) *Dust from Tata Steel, Port Talbot, continues to fall on homes*, 24th August 2013. Available from: https://www.bbc.co.uk/news/uk-wales-south-west-wales-23802035 [Accessed 3rd May 2022].

BBC News. (2014) *Tata Steel acts to address dust problem in Port Talbot*, 17th June 2014. Available from: https://www.bbc.co.uk/news/uk-wales-south-west-wales-27890895 [Accessed 3rd May 2022].

BBC News. (2018) *Banksy confirms Port Talbot 'Season's greetings' piece is his*, 19th December 2018. Available from: https://www.bbc.co.uk/news/uk-wales-46617742 [Accessed 3rd May 2022].

Bickerstaff, K. (2004) Risk perception research: Socio-cultural perspectives on the public experience of air pollutio. *Environment International*, 30, 827–840. Available from: https://doi.org/10.1016/j.envint.2003.12.001

Bickerstaff, K. & Simmons, P. (2009) Absencing/presencing risk: Rethinking proximity and the experience of living with major technological hazards. *Geoforum*, 40(5), 864–872. Available from: https://doi.org/10.1016/j.geoforum.2009.07.004

Bickerstaff, K. & Walker, G. (1999) Clearing the smog? Public responses to air-quality information. *Local Environment*, 4, 279–294. Available from: https://doi.org/10.1080/13549839908725600

Bickerstaff, K. & Walker, G. (2001) Public understandings of air pollution: The risk of 'localisation' of environmental risk. *Global Environmental Change*, 11, 133–145. Available from: https://doi.org/10.1016/S0959-3780(00)00063-7

Brigstocke, J. & Noorani, T. (2016) Posthuman attunements: Aesthetics, authority and the arts of creative listening. *GeoHumanities*, 2(1), 1–7. Available from: https://doi.org/10.1080/2373566X.2016.1167618

Burningham, K. & Thrush, D. (2004) Pollution concerns in context: A comparison of local perceptions of the risks associated with living close to a road and a chemical factory. *Journal of Risk Research*, 7(2), 213–232. Available from: https://doi.org/10.1080/1366987042000158721

Bush, J., Moffatt, S. & Dunn, C. (2001) Even the birds round here cough: Stigma, air pollution and health in Teesside. *Health & Place*, 7, 47–56. Available from: https://doi.org/10.1016/s1353-8292(00)00037-x

Calvillo, N. (2018) Political airs: From monitoring to attuned sensing air pollution. *Social Studies of Science*, 48(3), 372–388. Available from: https://doi.org/10.1177/0306312718784656

Cherry, C., Thomas, G., Groves, C., Roberts, E., Shirani, F., Henwood, K. et al. (2022) A personas-based approach to deliberating local decarbonisation scenarios: Findings and methodological insights. *Energy Research & Social Science*, 87, 102455. Available from: https://doi.org/10.1016/j.erss.2021.102455

Choy, T. (2010) *Air's substantiations*. Paper for Berkeley environmental politics colloquium. Available from: http://globetrotter.berkeley.edu/bwep/colloquium/papers/ChoyAirEP.pdf [Accessed 3rd May 2022].

Choy, T. (2011) *Ecologies of comparison: An ethnography of endangerment in Hong Kong*. Durham, NC: Duke University Press.

Choy, T. (2018) Tending to suspension: Abstraction and apparatuses of atmospheric attunement in Matsutake worlds. *Social Analysis*, 62(4), 54–77. Available from: https://doi.org/10.3167/sa.2018.620404

Choy, T. (2020). A Commentary: Breathing Together Now. *Engaging Science, Technology, and Society*, 6, 586–590. Available from: https://doi.org/10.17351/ests2020.771

Cupples, J. (2009) Culture, nature and particulate matter – Hybrid reframings in air pollution scholarship. *Atmospheric Environment*, 43, 207–217. Available from: https://doi.org/10.1016/j.atmosenv.2008.09.027

Cupples, J., Guyatt, V. & Pearce, J. (2007) 'Put a jacket on, you wuss': Cultural identities, home heating, and air pollution in Christchurch, New Zealand. *Environment & Planning A: Economy & Space*, 39(12), 2883–2898. Available from: https://doi.org/10.1068/a3932

Council directive 2008/50/EC on ambient air quality and cleaner air for Europe (2008). *Official Journal of the European Union L 152*, 11 June 2008, pp. 1–44.

Davies, T. (2018) Toxic space and time: Slow violence, Necropolitics, and petrochemical pollution. *Annals of the American Association of Geographers*, 108(6), 1537–1553. Available from: https://doi.org/10.1080/24694452.2018.1470924

Day, R. (2007) Place and the experience of air quality. *Health & Place*, 13, 249–260. Available from: https://doi.org/10.1016/j.healthplace.2006.01.002

Edensor, T. (2017) Seeing with light and landscape: A walk around Stanton moor. *Landscape Research*, 42(6), 616–633. Available from: https://doi.org/10.1080/01426397.2017.1316368

Engelmann, S. (2015) Toward a poetics of air: Sequencing and surfacing breath. *Transactions of the Institute of British Geographers*, 40, 430–444. Available from: https://doi.org/10.1111/tran.12084

Garnett, E. (2017) Enacting toxicity: Epidemiology and the study of air pollution for public health. *Critical Public Health*, 27(3), 325–336. Available from: https://doi.org/10.1080/09581596.2017.1302562

Ghertner, A. (2020) Airpocalypse: Distributions of life amidst Delhi's polluted airs. *Public Culture*, 32(1), 133–162. Available from: https://doi.org/10.1215/08992363-7816329

Grant, S. (2020) Aggregate airs: Atmospheres of oil and gas in the Greater Chaco. *Engaging Science, Technology, and Society*, 6, 534–554. Available from: https://doi.org/10.17351/ests2020.423

Henwood, K., Pidgeon, N., Parkhill, K. & Simmons, P. (2011) Researching risk: Narrative, biography, subjectivity. *Historical Social Research/ Historische Sozialforschung*, 36(4), 251–272.

Hong, W., Wei, Y. & Wang, S. (2021) Left behind in perception of air pollution? A hidden form of spatial injustice in China. *Environment and Planning C: Politics & Space*, 40(3), 666–684. Available from: https://doi.org/10.1177/23996544211036145

Ingold, T. (2010) Footprints through the weather-world: Walking, breathing, knowing. *Journal of the Royal Anthropological Institute*, 16(1), S121–S139. Available from: https://doi.org/10.1111/j.1467-9655.2010.01613.x

Irwin, A., Simmons, P. & Walker, G. (1999) Faulty environments and risk reasoning: The local understanding of industrial hazards. *Environment and Planning A: Economy and Space*, 31(7), 1311–1326. Available from: https://doi.org/10.1068/a311311

ITV News. (2018) *World Health Organisation wrongly names Port Talbot one of the 'most polluted areas in the UK'*, 4th May 2018. Available from: https://www.itv.com/news/wales/2018-05-04/world-health-organisation-wrongly-names-port-talbot-one-of-the-most-polluted-areas-in-the-uk [Accessed 3rd May 2022].

Kelly, F.J. & Fussell, J.C. (2015) Air pollution and public health: Emerging hazards and improved understanding of risk. *Environmental Geochemistry and Health*, 37, 631–649. Available from: https://doi.org/10.1007/s10653-015-9720-1

Kenis, A. & Loomans, M. (2022) Just air? Spatial injustice and the politicisation of air pollution. *Environment and Planning C: Politics & Space*, 40, 563–571. Available from: https://doi.org/10.1177/23996544221094144

Kenner, A. (2021) Emplaced care and atmospheric politics in unbreathable worlds. *Environment and Planning C: Politics and Space*, 39(6), 1113–1128. Available from: https://doi.org/10.1177/2399654419851347

Masco, J. (2006) *The nuclear borderlands: The Manhattan project in post-cold war New Mexico*. Princeton, NJ: Princeton University Press.

Nguyen, V. (2020) Breathless in Beijing: Aerial attunements in China's new respiratory publics. *Engaging Science, Technology, and Society*, 6, 439–461. Available from: https://doi.org/10.17351/ests2020.437

Nixon, R. (2011) *Slow violence and the environmentalism of the poor*. Cambridge, MA; London, UK: Harvard University Press.

NPTCBC. (2020) *2020 Air Quality Progress Report In fulfillment of Part IV of the Environment Act 1995 Local Air Quality Management*, September 2020. Available from: https://www.npt.gov.uk/media/15338/npt-aq-progress-report-2020.pdf?v=20210309102532 [Accessed 3rd May 2022].

Paiva, D. & Sánchez, I. (2020) The territoriality of atmosphere: Rethinking affective urbanism through the collateral atmospheres of Lisbon's tourism. *Transactions of the Institute of British Geographers*, 46, 392–405. Available from: https://doi.org/10.1111/tran.12425

Parkhill, K., Henwood, K., Pidgeon, N. & Simmons, P. (2011) Laughing it off? Humour, affect and emotion work in communities living with nuclear risk. *The British Journal of Sociology*, 62, 324–346. Available from: https://doi.org/10.1111/j.1468-4446.2011.01367.x

Parkhill, K.A., Pidgeon, N.F., Henwood, K.L., Simmons, P. & Venables, D. (2010) From the familiar to the extraordinary: Local residents' perceptions of risk when living with nuclear power in the UK. *Transactions of the Institute of British Geographers*, 35, 39–58. Available from: https://doi.org/10.1111/j.1475-5661.2009.00364.x

Peeples, J. (2011) Toxic sublime: Imaging contaminated landscapes. *Environmental Communication*, 5(4), 373–392. Available from: https://doi.org/10.1080/17524032.2011.616516

Penn, A.S., Bartington, S.E., Moller, S.J., Hamilton, I., Levine, J.G., Hatcher, K. et al. (2022) Adopting a whole systems approach to transport Decarbonisation, air quality and health: An online participatory systems mapping case study in the UK. *Atmosphere*, 13(3), 492. Available from: https://doi.org/10.3390/atmos13030492

Peterson, M. (2021) *Atmospheric noise: The indefinite urbanism of Los Angeles*. Durham, NC: Duke University Press.

Pidgeon, N. (2020) Engaging publics about environmental and technology risks: Frames, values and deliberation. *Journal of Risk Research*, 24(1), 28–46. Available from: https://doi.org/10.1080/13669877.2020.1749118

Pidgeon, N., Groves, C., Cherry, C., Thomas, G., Shirani, F. & Henwood, K. (2021) A little self-sufficient town close to the beach: Local energy system transformation through the lens of place and public things. In: Wade, F., Webb, J. & Tingey, M. (Eds.) *Research handbook on energy and society*. Cheltenham, UK: Edward Elgar Publishing, pp. 299–316.

Roberts, E., Thomas, M., Pidgeon, N. & Henwood, K. (2021) Valuing nature for wellbeing: Narratives of socio-ecological change in dynamic intertidal landscapes. *Environmental Values*, 30(4), 501–523. Available from: https://doi.org/10.3197/096327120X15916910310635

Royal College of Physicians (RCP). (2016) *Every breath we take: The lifelong impact of air pollution. Report of a working party*. London, UK: RCP. Available from: https://www.rcplondon.ac.uk/projects/outputs/every-breath-we-take-lifelong-impact-air-pollution

Schwela, D.H. & Haq, G. (2020) Strengths and weaknesses of the WHO global ambient air quality database. *Aerosol and Air Quality Research*, 20(5), 1026–1037. Available from: https://doi.org/10.4209/aaqr.2019.11.0605

Shapiro, N. (2015) Attuning to the chemosphere: Domestic formaldehyde, bodily reasoning, and the chemical sublime. *Cultural Anthropology*, 30(3), 368–393. Available from: https://doi.org/10.14506/ca30.3.02

Stewart, K. (2011) Atmospheric attunements. *Environment and Planning D: Society and Space*, 29(3), 445–453. Available from: https://doi.org/10.1068/d9109

Thomas, G., Cherry, C., Groves, C., Henwood, K., Pidgeon, N. & Roberts, E. (2022) "It's not a very certain future": Emotion and infrastructure change in an industrial town. *Geoforum*, 132, 81–91. Available from: https://doi.org/10.1016/j.geoforum.2022.04.003

Tripathy, P. & McFarlane, C. (2022) Perceptions of atmosphere: Air, waste, and narratives of life and work in Mumbai. *EPC: Society and Space*, 40(4), 664–682. Available from: https://doi.org/10.1177/02637758221110574

Verlie, B. (2019) 'Climatic-affective atmospheres': A conceptual tool for affective scholarship in a changing climate. *Emotion, Space and Society*, 33, 100623. Available from: https://doi.org/10.1016/j.emospa.2019.100623

Wakefield, S., Elliott, S., Cole, D. & Eyles, D. (2001) Environmental risk and (re)action: Air quality, health, and civic involvement in an urban industrial neighbourhood. *Health & Place*, 7, 163–177. Available from: https://doi.org/10.1016/s1353-8292(01)00006-5

Wakefield, S. & McMullan, C. (2005) Healing in places of decline: (Re)imagining everyday landscapes in Hamilton, Ontario. *Health & Place*, 11(4), 299–312. Available from: https://doi.org/10.1016/j.healthplace.2004.05.001

Walesonline.co.uk. (2018) *Black dust from Port Talbot steelworks is covering people's houses, cars and pets*, 20th July 2018. Available from: https://www.walesonline.co.uk/news/wales-news/black-dust-port-talbot-steelworks-14927371 [Accessed 3rd May 2022].

Walker, G., Booker, D. & Young, P.J. (2022) Breathing in the polyrhythmic city: A spatiotemporal, rhythmanalytic account of urban air pollution and its inequalities. *Environment & Planning C: Politics & Space*, 40, 1–20. Available from: https://doi.org/10.1177/2399654420948871

World Health Organisation (WHO). (2016) *Ambient air pollution: a global assessment of exposure and burden of disease*. Available from: http://apps.who.int/iris/bitstream/10665/250141/1/9789241511353-eng.pdf [Accessed 22nd June 2020].

How to cite this article: Roberts, E., Groves, C., Thomas, G., Shirani, F., Cherry, C., Pidgeon, N. et al. (2023) Attuning to ambiguous atmospheres: Currents of air, discourse and time in a steel town. *Transactions of the Institute of British Geographers*, 00, 1–18. Available from: https://doi.org/10.1111/tran.12631