1 Literacy and Climate Change Communication

Probing the Mind-Behaviour Gap

Our lives are influenced by the stories we tell and by how these stories are told. Stories are crucial for making sense and providing orientation – but it is less clear how exactly these processes play out in individuals and whether it is possible to formally design learning situations based on such highly individual processes. The concept of literacy helps to approach such questions, and it is through both literary and literacy research that we want to enter a conversation about the idea that fiction can complement and enrich climate change communication. Climate change communication is a broad interdisciplinary field of research of its own (see Holmes and Richardson 2020) and cannot be conflated with the kind of ecocritical and ecopedagogical work we are primarily concerned with. Yet, an important avenue for discussing shared concerns in both fields opens when considering the diagnosis that 'more information about climate change has not adequately addressed the chronic challenges of climate literacy, public awareness and engagement' (Boykoff 2019, 1). When Boykoff concludes that 'more creative approaches are needed to more effectively meet people where they are on climate change' (1), we suggest that literary and cultural research and pedagogy in the environmental humanities can provide valuable insights into the working of such creative communications – and to not only meet people where they are but to help them move further to explore hitherto uncharted imaginative territory.

To date, however, the dominant understanding of literacy when it comes to climate change is 'science literacy' or 'climate literacy'. Typically, these concepts are proposed as umbrella terms for the various competencies and skills needed to bridge a gap between understanding the sciences of climate change and acting on the grounds of this knowledge. The gap between the two – knowledge and appropriate behaviour – is a well-known psychological problem, variously labelled 'mind-', 'attitude-' or 'intention-behaviour gap', which, in fact, doesn't just apply to climate change (see Kollmus and Agyeman 2002; UNESCO 2017). The fact that knowing stuff does not necessarily imply a translation of this knowledge into action bugs researchers across the board. It is therefore not so surprising that, as Krista Hiser and Matthew Lynch explain in a recent study of climate literacy among college students in the US, 'concern does not always translate to action. There is a "know-do" gap that seems to keep an individual, group, or nation from moving attained knowledge into required action' (2021, 2; note the different terminologies in use – for reasons of clarity, we only use 'mind-behaviour gap' from now on). That such a gap exists is interesting; what seems equally notable is that literacy's original meaning of

referring to fundamental skills of reading and writing has been modified and come to mean 'understanding science plus individual or collective action'. This equation, also familiar in related contexts such as health literacy, however, underrates the complexity of individual and collective cultural responses to what, as argued previously, is still often framed largely as a scientific problem.

Countless psychological studies on sustainability and on risk behaviour confirm that neither purely information-based nor primarily emotional communications alone can bridge the mind-behaviour gap. The divide between what people know and think and what they will act on, ultimately, is a tricky issue on a variety of counts. What makes it even more complex in the context of climate action is that the climate crisis is both urgent and endless. It therefore requires quick *and* thorough responses while also ruling out simple solutions and the short-term gratification of a successful resolution. In fact, inquiring how to bridge the mind-behaviour gap in the case of climate change might mean asking the wrong questions altogether. From the perspective of literary education, the focus on behavioural change is based on faulty assumptions about learning and sustainability – as might be the focus on climate as such. Paradoxically, Mike Hulme notes, '[j]ust as imagining the climatic future cannot be left to *science* alone, so imagining the future cannot be reduced to *climate* alone' (2021, 228). Consequently, our discussion of climate change literacy is situated within a heterogeneous discursive field that encompasses other literacies and research related to them, including, for instance, futures literacy and global learning.

By suggesting that one of the benefits of reading literary fiction lies in experiences of socio-ecological complexities, we respond to writer Margaret Atwood's (2015) insightful proposition that instead of climate change, we should rather refer to the current and future climatic predicament as 'everything change'. Yet, how can one conceive of a specific literacy – an acquired ability – that is about 'everything'? For one, the focus needs to shift from a specific form of construing climate change – namely, a merely technical, scientific, and solutionist understanding – to a recognition of the importance of engaging with complexity and connections between seemingly disparate issues that are both natural and cultural and undercut any clear-cut separation between these two realms. In addition, it is necessary to avoid any myopic focus on information or emotion alone and instead to cherish the complex enmeshment of readers and narrative in processes of climate reckoning. For reasons of practicality and the sake of our general argument, we are leaving aside important questions regarding the acquisition and support of basic literacy here. While the ability to read and write is, of course, prerequisite to our understanding of climate change literacy, addressing this would require a different book altogether. Furthermore, while arguments about a processual acquisition of relevant literacy, starting

with basic environmental knowledge and culminating in critical response and action, have been made (for example by Stables 2006; Küchler 2017), we are hesitant to relegate critical literary understanding to the margins of advanced literacies, needed by all, but acquired by few.

We see meaningful connections between calls for greater climate change literacy and research on the challenges of literacy in other realms, such as in health (risk) literacy. During the past two years of the COVID-19 pandemic and struggling vaccination campaigns, this form of literacy has received even more public attention than before (see Hoydis 2021, 94). Here, too, literacy means a multidimensional understanding of both scientific fact and critical reflection as well as individual forms of agency and behaviour. The COVID-Health Literacy Network defines it as the advancing of understanding about health, of 'a critical tool to navigate information, sources and services', and the translation of 'knowledge into practical action' (COVID-HL Network 2021). In pre-COVID times, a team of researchers around Christina Zarcadoolas described health literacy similarly, if even more sweepingly, as 'the ability to understand scientific concepts, content, and health research; skills in spoken and written, and online communication; critical interpretation of mass media messages; navigating complex systems of health care and governance; and knowledge and use of community capital and resources, as well as using cultural and indigenous knowledge' (Zarcadoolas et al. 2006, 53). Immediately, one is struck by the complexity of such a definition of literacy, which arguably connects knowledge and understanding of facts with multimodal ways of communication as well as demands on critical evaluation and the integration of different, potentially incommensurate forms of knowledge. Meanwhile, the fact that the first step in accessing and processing the required information (usually print or digital texts) essentially means *reading* and *understanding narratives* is, for obvious reasons, rarely mentioned.

One encounters an equally broad mix in established concepts of climate or science literacy, which all seek to connect knowledge of facts and appropriate attitudes and behaviours, hinging on fuzzy notions of 'action', as a brief review of studies and materials shows: The US Global Research Program 2009, *Climate Literacy: The Essential Principles of Climate Science*, for instance, defines climate literacy as an 'understanding [of] essential principles of Earth's climate system, assessment of scientific information; meaningful communication about climate change; making informed and responsible decisions with regard to actions that may affect climate' (2009, n.p). This conception occurs in many, only slightly varying formulations across websites of governmental science and educational agencies of the past decade. A similar link between comprehension and action underlies the notion of climate literacy, as formulated

by Daniel Shepardson, Anita Rouchoudhury, and Andrew Hirsch, who commit to transforming 'students' conceptualisation of global warming and climate change, such that they become informed decision makers' (Shepardson et al. 2017, ix; see Hufnagel 2017, 43). A third suggestion, this time from the humanities and aimed at sustainability rather than climate as such, defines sustainability literacy as '[t]he ability to take steps towards building a more sustainable self and society' and is interested in nothing less than the 'skills, attitudes, competencies, dispositions and values that are necessary for surviving and thriving in the declining conditions of the world in ways which slow down that decline as far as possible' (Stibbe and Luna 2009, 10). The reliance of these (and other) literacy concepts on individual agency and the ability to change or 'transform' simultaneously self, society, and climate is remarkable (see also Schneidewind 2013). To us, it seems a tall order indeed for individual learners, and one that potentially occludes the political dimension of an ecological transformation that calls for stronger stuff than sustainable consumer decisions (see Stengers 2015, 31; Ideland 2019; Bartosch 2020). Most importantly, by linking a fact-based understanding of climate and the normative dimensions of appropriate response and action, these suggestions painfully ignore the role and potential of imaginative thought as a key component of (climate change) literacy. Current psychological research on perception and decision-making (Klöckner 2020) indicates that the imagination does play a key role indeed – but this role might be different than the one assigned by science- and action-oriented intervention research.

Before turning to the role of literary reading, a brief note on a conception of agency is in order that is useful to develop the fuzzy notions of responsible action in debates of climate (science) literacy. Also writing about scientific literacy, Karen Barad notes how this concept is called upon for a great number of rationales, including the promotion of rational thinking, individual decision-making, *and* democracy, or as a condition for cultural literacy. And yet, what exactly being 'literate' in all these contexts means beyond 'knowing facts' is unclear (Barad 2000, 225). She also cautions that, even though it 'is called upon to perform a host of vital tasks concerning the future well-being of the nation and its individuals, by any of the standard measures, it remains an illusive goal' (225). Clearly, the same goes for most conceptions of literacy in relation to climate change. While Barad's argument, based on her own teaching experience, reiterates that the successful transmission of (factual) knowledge remains a challenge, it also promotes a framework for what should follow from it: responsible action in the real world. In her understanding, this 'intra-action', which she terms '*agential realism*', is made up of both material and discursive phenomena and includes learning how to analyse, imagine, and understand

practices and possibilities (235; 237). This is part and parcel of the engagement with literary fiction. In this sense, climate change literacy does entail but also transcends knowledge of facts about climate change and methods of literary and cultural analysis. This ability of 'knowing how to intra-act responsibly within the world' – rather than taking specific action like, let's say, recycling after reading a novel about waste and finite resources – might go some length in circumventing the mind-behaviour gap, redefining what counts as responsible *action*. It might help to prepare 'future generations to meet the challenges that lie ahead' (246), although this endeavour must inevitably cut across curricula and disciplines.

Thus far we have observed how approaches to climate literacy ignore the potential of the humanities, literary studies and literature pedagogy in particular, although, strangely enough, research on literacy is part of the disciplinary DNA of these fields. We therefore want to reclaim some authority on the notion of literacy and complement conversations on literacy in the context of climate change and are convinced that such a move is both rewarding and necessary. A more diverse notion of climate change literacy speaks to demands in climate communication research for more creative forms of communication and engagement. It also underlines the importance of empowering readers to other, arguably more productive forms of reception: based on literary and aesthetic experience, an awareness of narrative complexity and the affordances different media – novels, but also short stories, plays, poetry, films, and video games – have to offer.

That information and emotional engagement have so far dominated the debate of what climate fiction can 'do' is hardly surprising if one sees in this preoccupation an echo of the age-old notion that literature and narrative's main concern is to be useful and to entertain: the Horatian formula *prodesse et delectare* has featured prominently in historical debates on the role and function of fiction, in Europe and elsewhere (see, e.g., Grabes 2008; Kössinger and Wittig 2019). It now makes a forceful new entry through debates on the usefulness and entertainment value of fiction in the context of climate action. It doesn't suffice, however, to emphasise the advantage of more entertaining forms of communication or informative fictions at the expense of more complex concerns with aesthetic reception and experience. We address such simplistic attempts of conceptualising literacy by identifying two fallacies that we term the cognitive and the sentimental fallacy. (The latter term might evoke the New Criticism's concept of the affective fallacy – from which we will ultimately move away, as will be clear herein.) We substantiate our claims about the influence of these two fallacies with references to communication and reception studies from a variety of fields, including psychology, film studies, and empirical or cognitive ecocriticism.

Returning to what was said at the beginning of this section, we are re-adjusting the argument about literary fiction and its powerful grasp, because the debate about whether or not behaviour can be modified by means of knowledge and understanding concerns literature education and climate change communication alike. And in both fields, it is far from settled. In an insightful review of research on the mind-behaviour gap, Anja Kollmus and Julian Agyeman write: 'Numerous theoretical frameworks have been developed to explain the gap between the possession of environmental knowledge and environmental awareness, and displaying pro-environmental behavior. Although many hundreds of studies have been done, no definitive answers have been found' (2002, 240). This humbling assessment notwithstanding, literary theorists and educators entertain an unwavering hope in the ethics of reading and that reading fiction might, in some way or other, lead to more sustainable behaviour, to responsible decision-making, and 'better' attitudes. Myren-Svelstad identifies an 'altruistic paradigm of ecocritical pedagogy' underlying this hope and criticises this assumption about behavioural functions and literature for several reasons. Not only is it far from certain how the transfer from knowledge to action can be modelled on literary writing; more importantly, such a functional understanding is selling short fiction's capacity to deal with complexity and uncertainty. Indeed, one might argue that its main function is to foster ambiguities rather than actions. On these grounds, Myren-Svelstad points out that 'using imaginative literature as a way of relaying information on the environment seems to rest on an "information deficit model" of environmental action' and concludes: 'even if readers did develop knowledge of, and caring attitudes towards, the environment by reading literature, it is not obvious that this would lead to more sustainable practices in the real world' (2020, 3).

So, what do readers stand to gain by engaging with climate fiction? Like Myren-Svelstad, we seek to promote the potential of literature in educational contexts by focusing on questions of complexity and ambiguity to make a better case for the importance of literacy in climate and environmental education. This requires rethinking what literature can and what it shouldn't be expected to do. As Garrard recounts in a reflection of his own experiences of teaching novels and short stories to sustainability students, 'I tried to dissuade the students from seeing the selected climate fiction as evidence for or against any of these explanations [of climate change], but rather as *dramatizations* of the cultural processes by which climate change becomes cognitively and emotionally legible' (2017, 122). His conviction that 'narrative technique functions as a *cognitive technology* that shapes our comprehension of climate change' (122) suggests a more nuanced understanding of the working of literature beyond simple cause-and-effect schemas. Arguing along the same lines,

Alexandra Nikoleris, Johannes Stripple, and Paul Tenngart underline specifically the function of climate fiction to explore complex scenarios as 'learning machines', 'not "truth machines"' (Nikoleris et al. 2017, 308).

It is therefore important to be wary of master narratives about the ethical or behavioural effects of reading that do justice neither to individual and diverse reading responses nor to the complexity of meaning as it evolves. Facile claims about the ethical value of fiction, Myren-Svelstad reminds us, might reflect a desire 'to justify literary studies by their supposed ethical effects' (2020, 3). While it seemingly offers a relatively easy way for literary scholarship and education to safeguard the relevance of allegedly 'soft' skills such as reading and hermeneutic interpretation, and to claim their value vis-à-vis the hard sciences, it partially misses the complexities – and therefore the unique potential – of literature and the 'unpredictability in reactions of readers' (3–4). Consequently, what follows is not another defence of literary studies but a suggestion how to better deal with the myriad ways in which literature engages with climate and other complexities – after probing a little deeper why putting all bets on cognition and emotion might be a bad idea.

The Cognitive Fallacy: Why Facts Aren't Enough

In theory, it's simple enough: There is a looming catastrophe; there are facts to prove it. Still people don't act as they should to avoid catastrophe – although they could, and there's data and facts to rely on in the process. This, as we have seen, sums up the conundrum of the mind-behaviour gap. What follows, then, is that either the facts aren't clear, or that they need to be communicated better: the latter option brings us back to the struggle of communicating climate change or any other enduring crisis, such as the global COVID-19 pandemic. If people only *knew* and *understood* their house was on fire, wouldn't they start running or fetching buckets of water or at least phone someone to help fight it? This has been the logic behind what is known as the information-deficit model of climate change communication (Boykoff 2019, 54–64). Information must be transmitted, and if the desired effects fail to materialise, it must be transmitted more effectively. After all, as a much-loved myth insists, humans are rational creatures and act upon knowledge and conviction – or so many still like to believe.

The so-called gateway-belief model from psychological and communicative research contains one of the most powerful articulations of such hopes concerning rational choices (van der Linden et al. 2017). Linking poor choices with deficits in knowledge suggests more knowledge as the logical way to arrive at better choices. However, as has been demonstrated time and again by crisis and risk experts struggling to convey complex (climate) knowledge to the general

public, if the knowledge cannot be processed and applied, the remaining option is to have faith that people will still trust it. The hope that people will trust and understand *eventually* is why scientists should not tire informing the public about scientific consensus on the issue of climate change – a consensus, which is, in fact, impressive (see Oreskes 2004). Still, it appears to not quite do the trick. The hope behind the gateway-belief model is that consensus messaging and the perceived scientific consensus will increase individual worries about climate change, rendering support of public action the only logical outcome.

Research has shown that repeated exposure to consensus messaging is indeed conducive to greater levels of support (van der Linden et al. 2017). Yet this effect occurs only if people trust science in the first place. It moreover simplifies the concerns over climate change by way of turning it into a matter of science only, something we are arguing against throughout this Element. In addition, such an understanding of scientific consensus cannot do justice to the complexities of climate change denial and inaction, as one of the much rarer studies of climate change scepticism points out (Garrard et al. 2019). And, as a group of researchers around sociologist Warren Pearce have maintained, the notion of producing proof by way of consensus messaging overlooks important aspects – of ideology and value as much as of the normative dimensions of global policy challenges: 'Climate science is complex and findings often contradictory and, most importantly, do not tell us anything about what to do about climate change' (Pearce et al. 2017, 725). This means that even if consensus leads to worry about and belief in anthropogenic climate change, support for public action can only work either in a very abstract or specific sense. In an abstract sense, it means an awareness of urgency and relevance – without direct implications for right forms of action. The specific sense includes measures of dealing with a local effect of climate change. Yet the fact remains that science can only show that current and future levels of greenhouse gases in the atmosphere have dangerous effects, and it cannot offer solutions in the sense of whether it is best to go solar, nuclear, or something else entirely, whether one should become vegan, stop having children, or simply wait to see what happens. In other words, the *cognition* of climate change doesn't translate easily into a *rational* or *normative* response. Instead, it might produce cognitive dissonance, especially if people notice that their immediate surroundings or the world at large do not support and even counteract any attempt to act responsibly on what they know. This whole debate also cannot ignore that, while there is consensus about scientific facts, the question what constitutes a rational response or responsible behaviour will produce very different answers depending on peoples' location on this planet.

Polls and other forms of research in educational contexts on the impact of information on student behaviour have also underlined that such translation

from knowledge to action is indeed difficult (see Hall 2015, 2–3; as well as studies on the 'Enlightenment myth' of rational choice and forms of denial by Norgaard (2011); Cohen (2001); and Lakoff (2004)). Matters only get worse once literary fiction enters the stage: what, if any, facts can be deduced from reading novels, and what do we do with such facts once we know that they don't necessarily benefit processes of rational choice? Despite these far-reaching questions, 'knowledge' remains a principal concern in concepts of climate or sustainability literacies and related competences, as does the assumption that knowledge (often sold as 'awareness') will eventually result in 'action' – this is precisely what we call the cognitive fallacy.

The Sentimental Fallacy: Why Emotions Aren't Enough

The preceding discussion doesn't call into question that stories include facts or that storytelling helps memorise and make sense of facts. But if literature's status as intricate make-believe is taken seriously, great care is warranted when talking about the learning of facts from fiction. It thus might be a safer bet to focus on fiction's ability to move us. Art and aesthetic experience have a lot to do with affect, and undoubtedly art's capacity to move people plays a large part in drawing audiences to it. So, as with the cognitive fallacy, our point of contention with the sentimental fallacy is one of simplistic reasoning. While idealist educators continue to proclaim that reading literature makes us more empathetic and emotionally mature human beings, it is much harder to say how this process works, let alone how it might be tested and designed in educational processes. As Milkoreit concludes, such aspirations are often 'fuelled by hope rather than observation' (2016, 177). This doesn't contradict research, especially in affective ecocriticism and cognitive literary studies, that offers tools to explore in depth the emotionalising strategies of specific environmental narratives (see Weik von Mossner 2017a). It rather calls into question the idea that such strategies necessarily bring about the desired emotional, attitudinal, and behavioural effects.

What is more, the discussion around fiction and climate action began by largely building on an idea that has proved equally difficult to sustain: that mostly terrible and terrifying stories, inciting negative and fearful emotions, might lead to better and more sustainable behaviours by shocking people into action. This is an awful idea especially when it comes to young learners and prospective readers. It also rests on the flawed assumption that emotional response can be used in this way at all. As any behavioural psychologist can tell us, powerful and overwhelming emotion does not have to lead to 'productive' action. Accordingly, the next bet, especially in the environmental

humanities and within climate change communication, was therefore on inspiring optimism and hope, rather than fear (Mauch 2019). This is driven by 'a mounting body of literature' indicating, as Matthew Cole explains, 'that attempts to marshal urgency through fear lead to denial, disillusionment, and apathy rather than action' (2022, 136). But this doesn't imply that more optimistic scenarios work any better.

The problem we see is that both approaches (seeking to inspire fear or hope) share the underlying assumption that powerful emotional storytelling can make readers more climate literate by moving them to action. Implicitly, scholars and educators thus tend to conceive of emotions as a switch that can be turned on or off for a specific effect. Be it in the positive sense (when stories provide role models or model successful forms of climate action and sustainability transitions) and in the negative (when gloom-and-doom apocalypses are expected to change our ways because cautionary tales help us to understand the reasons for decline and demise). Only things aren't that simple, once again. As Daniel Chapman, Brian Lickel, and Ezra Markowitz explain, '[t]he bifurcation between "go positive" and "go negative" simultaneously oversimplifies the rich base of research on emotion while overcomplicating the very real communications challenge advocates face by demanding that each message have the right "emotional recipe" to maximize effectiveness' (2017, 852). One might try and insert 'teachers' here for 'advocates', and accept that switches and recipes don't exist when it comes to teaching literature either.

Still, it appears tempting, and common-sense really, to focus on 'heartfelt stories of personal motivations to active engagement', as Boykoff (2019, 145) writes. Empirical research might give us pause though: heartfelt stories do not necessarily sustain engagement and values but have only short-term effects. As Schneider-Mayerson and his colleagues in the empirical ecocriticism project have shown (see Schneider-Mayerson et al. 2020), issues of empathy and emotional engagement might even produce the opposite effect. Taking readerly responses to the depiction of climate refugees in Paolo Bacigalupi's SF novel *The Water Knife* as his example, he notes in an interview with Amy Brady: 'Authors and critics might hope that portraying a dystopic cautionary future will scare readers into engaging in progressive politics today, but it might not work out that way. A vivid depiction of desperate climate migrants engaged in a self-interested and violent struggle for survival can backfire, since even liberal readers might not empathize with climate migrants, but fear them' (2020, n.p).

Current empirical research on readerly reception is helpful not only because it challenges facile notions of behavioural change based on literary experience. It also calls for the development of better understandings of key concepts by which we identify such reaction in the first place. For example, it makes sense to