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Bodies of knowledge and knowledge of bodies: "we can know more than we can tell"

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Classic epistemological accounts, as far back as Plato, have regarded knowledge as essentially disembodied. Bodies are seen as either distracting objects or passive instruments of knowledge. In this paper I attend to the knowledge of human bodies. Using insights from Michael Polanyi and feminist epistemology, I not only argue that bodies have a tacit and habitual knowledge of their own, but I also challenge the idea that scientific knowledge is itself separable from the bodies of scientists. I focus upon the arena of environmental governance, an arena in which scholars have already challenged the dominance of scientific knowledge over other forms of knowledge. I aim to extend this challenge, by highlighting the bodily knowledge that is relevant in environmental science and policy. I do not query the value of the knowledge of scientific experts, but I show that this knowledge is always embodied. I consider, first, critiques that challenge the assumption that scientific knowledge is universally applicable and demand the inclusion of different type of knowledge in environmental governance. Second, I argue that not only local, but also bodily knowledge is relevant in detecting, understanding and responding to environmental concerns and implementing, resisting and extending policy. Third, using Polanyi I show that science *itself* is entangled with bodily knowledge. Finally, I suggest that far from undermining the value of scientific knowledge, acknowledging its corporeality may allow a reassessment of the role and responsibilities of scientists. Polanyi's ideas lead him to defend the authority of "the body of scientists". In contrast, I argue that his ideas rather compel an on-going critical attentiveness to the constitution of this body. The aim of the paper is to underline is the omission of the body from prevailing epistemological discussions, and to show that bodies are *tricky objects*, *critical subjects* and *situated agents* of knowledge.

Keywords: Polanyi, Tacit Knowledge, Bodies, Embodiment, Environmental Governance

Тела знания и знание тел: «мы знаем больше, чем можем сказать»

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Классическая эпистемология, начиная с Платона, предполагала, что знание является бестелесным. Тело виделось либо отвлекающим элементом, либо пассивным инструментом познания. В этой статье рассматривается проблема познания человеческого тела. Используя разработки М. Полани и представителей феминистской эпистемологии, автор показывает, что тела обладают своим собственным неявным знанием. Автор также пытается опровергнуть тот тезис, что проблемы научного познания не связаны с проблемами телесности. Автор особым образом рассматривает сферу экологического управления, где ученые уже бросили вызов доминирова-

нию научных знаний над другими формами знаний. Автор не ставит под сомнение ценность знаний научных экспертов, но показывает, что эти знания всегда связаны с телом. Она анализирует критические замечания, которые ставят под сомнение предположение о том, что научные знания являются универсально применимыми и требуют включения различных видов знаний в экологическое управление. Во-вторых, автор утверждает, что не только локальное, но и телесное знание важно для выявления и понимания, реагирования на экологические проблемы, а также для осуществления, расширения и противостояния такого рода управлению. В-третьих, опираясь на идеи Поланьи, автор показывает, что сама наука переплетена с телесным знанием. Наконец, автор утверждает, что признание телесности научного знания отнюдь не умаляет его ценности, а, напротив, может позволить по-новому оценить роль и функции ученых. Автор утверждает, что философские поиски Поланьи привели его к защите «тела ученых». В свою очередь, авторский тезис заключается в том, что эти идеи, скорее, заставляют критически отнестись к устройству этого тела. Автор констатирует, что проблема тела не редко затрагивается в преобладающих эпистемологических дискуссиях, и показывает, что тела являются *сложными объектами*, *критическими предметами* и *размещенными агентами* знания.

Ключевые слова: Поланьи, неявное знание, тела, телесность, политика, окружающая среда

> Our body is the ultimate instrument of all our external knowledge
>
> *Polanyi, 1966, p. 15*

> All my knowledge of the world, even my scientific knowledge, is gained from my own particular point of view, or from some experience of the world without which the symbols of science would be meaningless
>
> *Merleau Ponty, 2002, p. ix*

> But how will you look for something when you don't in the least know what it is? How on earth are you going to set up something you don't know as the object of your search? To put it another way, even if you come right up against it, how will you know that what you have found is the thing you didn't know?
>
> *Plato the Meno 80d*

Introduction

Policy makers have long relied upon the expert knowledge of scientists. One doesn't have to rally for the institution of Plato's philosopher kings to agree that experts can play an important role in policy-making. But what exactly constitutes 'scientific knowledge' and whether it has automatic authority over other forms of knowledge have, of course, been long disputed topics in the philosophy of science. In this contribution I engage with the concern that the unquestioned authority of scientific expertise can render other forms of knowledge—particularly bodily knowledge—either invisible or trivial.

An especially suitable example for examining the controversies over the authority of scientific knowledge, is provided by the arena of environmental governance. Environmental concerns such as climate change and biodiversity loss pose unique challenges to policy makers who must depend upon scientists to provide data on environmental hazards and risks, to present possible future scenarios, to proffer potential solutions in the form of innovative technologies. Scientific knowledge thus wields an indisputable authority in this policy arena.

As various scholars have noticed, however, non-scientists can make important contributions to environmental governance too; residents of a particular region may be able to offer important insights on how a particular policy or technology may or may not work in a particular context, and what obstacles and opportunities it might face. While often dismissed as passive and interchangeable ignoramuses in need of educating, lay citizens can also be understood to be "full-blooded cognitive agents" capable of critiquing expert knowledge claims and of providing their own [Jasanoff, 2005, p. 271]. There have been widespread demands for the incorporation of different types of knowledge alongside scientific expertise into policy making [Fisher, 2000; Diver, 2017]. Local, indigenous or 'lay' knowledge and 'know-how' are asserted as important forms of knowing that may complement the contributions of scientists working at a global and abstract level [Irwin, 1995, p. 6].

In this paper I aim to extend this critique by discussing *knowledge of bodies* in environmental governance. Knowledge is often presupposed to be disembodied. Plato himself regarded knowledge as the enterprise of the soul and was bracketed off from bodily appetites. Following him, much epistemology overlooks the bodily processes and lived experience that are integral to the production of knowledge and yet are disavowed [Grosz, 1993, p. 187]. The concern is that the living, breathing, suffering, desiring, willing, reproducing bodies of human beings, which constitute the very subjects of knowledge and the objects of environmental governance, are rendered invisible. I not only argue that the bodily knowledge is highly relevant, but I also challenge the idea that scientific knowledge is itself separable from the bodies of scientists. Using particularly the work of Michael Polanyi, and feminist philosophers such as Elizabeth Grosz and Donna Haraway, I show that bodily knowledge functions tacitly, but crucially, in engendering and guiding scientific research. Bodies are the *tricky objects*, *critical subjects* and *situated agents* of knowledge.

I consider, first, critiques that challenge the assumption that scientific knowledge is universally applicable and demand the inclusion of different type of knowledge in environmental governance. Second, I argue that not only local, but also bodily knowledge is relevant in detecting, understanding and responding to environmental concerns and implementing, resisting and extending policy. Third, using Polanyi I show that science *itself* is en-

tangled with bodily knowledge. Finally, I suggest that far from undermining the value of scientific knowledge, acknowledging its corporeality may allow a reassessment of the role and responsibilities of scientists. Polanyi's ideas lead him to defend the authority of "the body of scientists". In contrast, I argue that his ideas rather compel an on-going critical attentiveness to the constitution of this body.

What is at stake here is not only the formation of effective, legitimate and democratic environmental governance and the destabilization of any easy assumption regarding what constitutes an environmental hazard and what constitutes a legitimate response. What is also crucial to underline is the omission of the body from prevailing epistemological discussions.

Scientific Knowledge

Science plays a crucial yet contested role in environmental policy making [Fisher, 2000; Grundmann & Stehr, 2012]. This is most evident, perhaps, regarding the issue of climate change, which is a highly abstract phenomenon, unknowable without scientific data and scientific models [Stehr & Machin, 2019]. The most authoritative scientific body in climate change politics is the widely cited Intergovernmental Panel on Climate Change (IPCC). Created by the United Nations Environment Programme and the World Meteorological Organization in 1988, the IPCC reviews and assesses the relevant scientific literature and data regarding climate change, from thousands researchers, and is understood to establish a valuable knowledge base for environmental governance [Hulme, 2013, p. 3]. Its website states: "the IPCC embodies a unique opportunity to provide rigorous and balanced scientific information to decision makers".[1] The fifth and latest IPCC assessment report explains that it is clear that anthropogenic climate change is occurring [2014, p. 40], and it confirms that even if greenhouse emissions are reduced today, climate change will persist for centuries [2014, p. 73].

And yet the robust claims of such authoritative scientific reports have been met with a generally anaemic social and political response [Lorenzoni et al., 2007]. Why is this? One popular belief is that this lack of engagement with the issue is a result of a combination of misleading campaigns by climate sceptics, a general distrust of climate scientists and, above all, a lack of public knowledge and appreciation of climate science. For example, *The Union of Concerned Scientists* (UCS) in the United States express their aims of "setting the record straight" and of "developing and distributing clear, accessible information to help the media and the public

[1] http://www.ipcc.ch/organization/organization.shtml

understand the science behind our changing climate".[2] But would better-informed political representatives, an educated media and a more scientifically literate public, propel coherent, coordinated and consequential environmental policy? Can it be assumed that knowing the implications of climate change and responding to its challenges is a matter of improved scientific knowledge?

According to this conventional 'information deficit' account, the general public can benefit from a firmer grasp upon scientific arguments and methods, and that all that is needed to achieve this is a commitment to better communication by scientists to educate the public and policy makers [Jasanoff, 2005, p. 252]. As Shelia Jasanoff notices, it has been conventionally assumed that science can be taken as "unproblematic, universal, and invariant, equally understandable in principle in all places and at all times" [ibid., p. 249]. Jasanoff challenges this account, for it does not engage with or help explain the disparate ways in which societies connect scientific knowledge up with "locally situated knowledges, values and preferences" [ibid., p. 255]. Alan Irwin, too, has pointed out the inadequacy of this account, highlighting "the role which lay groups can play not only in criticizing expert knowledge but also in *generating* forms of knowledge and understanding... citizen knowledges can be at least as robust and well-informed as those of experts" [Irwin, 1995, p. 112]. Jasanoff and Irwin, amongst others, thus point to an alternative understanding of both science and of citizens: "lay citizens may be better than experts at making room for the unknown along with the known" [Jasanoff, 2005, p. 254]. Irwin describes, for example, the knowledge that farmworkers have that could not be found in scientific papers: knowledge of the variety of conditions and the circumstances for the operation of spraying pesticides [Irwin, 1995, p. 113].

The relevance of traditional ecological knowledge in environmental policy making has been increasingly emphasised. As the IPCC report itself notes, the causes of greenhouse gas emissions and the capacity to respond to a changing climate vary widely [IPCC, 2014, p. 17]. In a section on adaptation strategies it states:

> Recognition of diverse interests, circumstances, social-cultural contexts and expectations can benefit decision-making processes. Indigenous, local and traditional knowledge systems and practices, including indigenous peoples' holistic view of community and environment, are a major resource for adapting to climate change… [IPCC, 2014, p. 19].

There are numerous obstacles, however, to bringing together different forms of knowledge: power asymmetries and cultural differences [Diver 2017, p. 2]. Moreover, by challenging the conventional account of the universality and authority of scientific knowledge, the proponents of the

[2] https://www.ucsusa.org/our-work/global-warming/science-and-impacts/global-warming-impacts#.WtRf5tXFIfE

role of local or indigenous knowledge do not simply wish to replace one simplified depiction with another. Just as we should be wary of a romanticised trust in 'contextual understanding' [Irwin, 1995, p. 115] so should we reject a simplistic binary categorisation with 'lay knowledge' on the one side and 'expertise' on the other [Jasanoff, 2005, p. 270]. In other words, we should privilege neither 'lay' nor 'scientific' understandings, and nor should we assume some clear-cut distinction between them. The point is rather "to note the diversity of knowledges which seem relevant to risk/environmental issues" [Irwin, 1995, p. 115].

My argument resonates with this emphasis on local knowledge by emphasising the role of *bodily* knowledge. As I go on to argue, not only local but also scientific knowledge is embodied and bodies contribute a valuable form of knowledge to environmental policy and to science itself.

Knowledge of Bodies

The body has commonly been constructed as something distinct from, even opposed to, scientific knowledge. Desires, appetites and emotions seem to distract from the cold hard objective fact. The body has been 'othered' as an object that is necessary for the mind to exist, but which also threatens to overrun and overrule it [Alcoff, 1996, p. 15]. Indeed, consider Plato's approach to the question *what is knowledge*, in the *Theatetus.* Socrates makes a revealing comparison between the skill of midwives and his own role in helping others give birth to ideas. He remarks that only women who themselves have given birth can become a midwife because "it is beyond the power of human nature to achieve skill without any experience" [149c]. This would imply, then, a connection of bodily experience to knowledge. However, this sort of 'skill' is not considered by Plato to count as 'knowledge'. Socrates, who is helping men labour with the definition of knowledge, firmly declares "my concern is not with the body but with the soul that is in travail of birth" [150b]. Knowledge then, is bracketed off from the body and is a matter for the soul, which "piloted by intellect, rises up in intellectual assent to achieve true knowledge" [Buchan 1999, p. 8]. Women, whose embodiment impede the rational capacity of their souls, are incapable of attaining real knowledge [ibid.].

Following Plato, conventional epistemology has construed knowledge as purely cognitive not inevitably embodied; disinterested not committed; public not private. There has been a strong tendency towards somatophobia running throughout the history of Western Philosophy in which, as Linda Martin Alcoff observes "the body was conceived as either an unsophisticated machine that took in data without interpreting it, or it was considered an obstacle to knowledge in throwing up emotions, feelings, needs, de-

sires, all of which inferred with the attainment of truth" [1996, p. 15]. Yet some thinkers have indicated that bodies should not be regarded as either containers or obstacles of knowledge, for they also have a knowledge of their own. Maurice Merleau-Ponty, for example, observes how our bodies are constantly carrying out everyday activities without conscious thought. Through ongoing interaction in the world, the body gains 'habits'—a pre-reflective 'know-how'. He gives the examples of typing and dancing as activities that involve 'habitual knowledge' of the world [Merleau-Ponty, 2002, p. 95]. Bodily knowledge helps us function smoothly in day to day existence, allowing us to ride a bike, turn a key, brush our teeth, without consciously attending to these everyday activities.

Our bodies 'incorporate' familiar material objects—pens, forks, telescopes—that we learn to use without conscious involvement. When we are learning to use these objects we have to focus intently upon them, but once we have acquired habitual knowledge then it has become part of our body: "Anyone using a probe for the first time will feel its impact against his fingers and palm. But as we learn to use a probe, or to use a stick for feeling our way, our awareness of its impact on our hand is transformed into a sense touching the objects we are exploring" [Polanyi, 1966, p. 12]. Polanyi describes how these objects help us attend *from* the tool *to* something else; in writing a note I do not consciously focus upon the pen I am using, but rather the words I am writing with that pen: "we incorporate it in our body—or extend our body to include it—so that we come to dwell in it" [ibid., p. 16]. And this, as Merleau-Ponty emphasises, is not simply a matter of robotic programming, each writing utensil is different, and yet I can unproblematically use any of them without conscious effort. Bodily knowledge is thus not passive conditioning but contains an "element of creative genius" [Merleau-Ponty, 2002, p. 50].

Bodies 'incorporate' not only objects but social norms and cultural patterns [Zeiler, 2013; Malmqvist & Zeiler, 2010]. Bodily knowledge allows us to behave in a socially acceptable way, and thus reproduce the 'common sense' of society, heavily influenced by "the memory of the community of thinkers" [Merleau-Ponty 2002, p. 46]. Our bodies learn what to do and what not to do. Common sense and social norms do not *determine* the body, but nor are they simply a matter of voluntary adherence. At times, however, bodies simply do not conform to social norms, they might be unable embody the social order, becoming rather a source of disorder [Zeiler, 2013, p. 82]. Bodies can conform but they can also be rebellious [Peile, 1998, p. 49; Machin, 2015].

The implication of this for environmental governance is that living sustainably within a socio-ecological system is a matter of embodying certain practices. Changing unsustainable behavioural patterns and social norms is not only a cognitive choice but also a matter of habitual bodily knowledge. We can, of course, consciously decide to alter our bodily hab-

its, this might be difficult and frustrating, but usually our bodily knowledge eventually accommodates cognitive instruction [Peile, 1998, p. 47]. Living and working and sleeping without air-conditioning, for example, demands a change in bodily habits. And bodies may take time to adjust or may simply be unable to adjust or may adjust in unpredictable ways.

At the same time, bodily knowledge may not just be an object but a subject of environmental policy-making. As work on 'environmentality' has revealed, in contrast to the common assumption that actions always follow beliefs, this can work the other way around: knowledge and beliefs can rather emerge through processes of living within an environment and interacting with others and experiencing and resisting power relations [Agrawal, 2005, p. 163]. Bodies are continually reforming within their material environment as they shape and respond to that environment [Peile, 1998, p. 49] and knowledge arises from that interaction: "knowledge is the product of cooperative human interaction with an environment… the nature of that interaction… will have a substantive impact on the knowledge produced" [Alcoff, 1996, p. 23].

As Polanyi observes, new skills are not acquired through isolation and analysis of their component parts: in order to "catch the knack" we must grasp the integration of these parts and no teacher can do this for us: "we must rely on discovering for ourselves the right feel of a skilful feat" [1961, p. 126]. Knowledge of sustainable farming or fishing practices may be difficult to convey in words for policy discussions and governmental reports.

Consider again the IPCC report, which presents a range of possible adaptation and mitigation measures [IPCC, 2014]. It suggests, for example that "Emissions can be substantially lowered through *changes in consumption patterns (e.g. mobility demand and mode, energy use in households, choice of longer lasting products, dietary change and reduction in food wastes*" [IPCC, 2014, p. 100. Emphasis added]. But these sorts of recommendations are entirely vacuous without a more substantive engagement regarding what, for example, 'dietary change' may actually entail, what food sources are being replaced and how, what repercussions this may have for health and labour, who this empowers and who it does not. Such recommendations have little meaning for real, live, human beings. They render invisible not only the local level, but also the human bodies that must eat to survive. What are the corporeal implications of a switch to vegetarianism or veganism? What are the physical challenges and benefits of planting crops in different ways, of cycling to work, of using cloth nappies, of switching off the air-conditioning?

Understanding the possibilities and implications of an energy or transport policy cannot only involve scientific expertise. But nor is simply including the knowledge of 'local experts' into existing decision-making procedures enough. Local, indigenous or traditional knowledges are often difficult to communicate through conventional methods and contexts.

Researchers and policy makers have understood that traditional environmental knowledge is situated and embodied [Diver, 2017, p. 9]. But it is important to remember here that all knowledge is embodied. The danger in emphasising the embodied nature of indigenous knowledge is that this reproduces a binary: scientific fact on the one metaphorical hand, and local knowledge on the corporeal other. But, as I go on to consider in the next section, scientific knowledge is itself enfleshed in the bodies of scientists.

Bodies of Knowledge

As Robert K. Merton explains, the institutionalised 'ethos of science' internalized by the scientist includes imperatives of both 'universalism' and 'disinterestedness': "The acceptance or rejection of claims entering the lists of science is not to depend on the personal or social attributes of their protagonist" [1973, p. 270]. When Merton refers to 'disinterestedness' here, he is contrasting it with the self-interestedness of scientists lacking in integrity, a self-interestedness that might be motivated by competition between scientists and the quest for a sort of academic glory.

But, as philosophers of feminist epistemology emphasise, the biases and interests of a scientist are not necessarily always deliberate and self-indulgent. Feminist epistemology has drawn attention to the corporeal situation and social status of the knowers [Alcoff & Potter, 1993, p. 1; Grosz, 1993; Haraway, 1988; Parviainen, 2002]. The "conquering gaze from nowhere" is revealed as an illusion, or as Donna Haraway names it, "a god trick" [1988, p. 581]. Where there is knowledge, there is *somebody* who knows. Scientific knowledge is indubitably valuable for environmental politics, but it cannot be disconnected from the social, historical, cultural, spatial position of the knower [Parviainen, 2002, p. 12].

This means that even when scientists are genuinely orientated towards the pursuit of facts, what counts as a fact, and what counts as pursuit, is conditioned by the scientific community and social structure in which the scientist lives and works [Grosz, 1993; Haraway, 1988; Machin, 2017]. As Stephen Turner puts it: "Scientists and experts have interests. Systems of expertise have biases... expertise itself is dependent on other people's knowledge and on the systems that generate it" [2014, p. 4]. This is what puts in doubt the presentation of science as "the disembodied report of value-free, context dependent facts" [Alcoff & Potter, 2003, p. 5]. Research always occurs in an institutional and cultural context. The subjects of knowledge are not disconnected individuals working autonomously in a sterile laboratory, but citizens, students, colleagues and neighbours who have habituated the objects and norms of their environment: the laboratory, the lecture and the conference.

The ideal of disinterestedness that Michael Polanyi challenges is the ideal that scientific research can be entirely removed from any personal commitment or desire of the individual scientist and the established norms of the scientific community. He challenges what he sees as "the declared aim of modern science" which, he explains, "is to establish a strictly detached, objective knowledge" [1966, p. 20]. He says that since personal attachment is precisely what underpins science, attempting to make science entirely detached "would, in effect, aim at the destruction of all knowledge" [ibid.].

Polanyi explains that scientific discovery inevitably involves the functioning of 'tacit knowledge' that always exists alongside the operation of explicit knowledge: "all thought contains components of which we are subsidiarily aware in the focal content of our thinking" [1966, p. xviii]. It is tacit knowledge that allows a scientist to identify a problem in the first place, and tacit knowledge that allows her to identify what a solution might look like. Polanyi refers to Plato's paradox that Socrates grapples with in the *Meno*: "a man cannot try to discover either what he knows or what he does not know… He would not seek what he knows, for since he knows it there is no need of the inquiry, nor what he does not know, for in that case he does not even know what he is to look for" (80e). Socrates answer to this paradox depends upon the ability of the immortal soul to recollect knowledge. Polanyi turns, more convincingly, to the existence of tacit knowledge that is incorporated by the body. In seeking solutions to scientific problems the scientist must already have an idea of what she is looking for: "we can have a tacit foreknowledge of yet undiscovered things" [1966, p. 23], which reveals that "we can know things, and important things, that we cannot tell" [1966, p. 22].

Tacit knowledge cannot easily be formalised and put into words, for as soon as we try to do so, we risk disrupting its operation. Tacit knowledge is rather a form of bodily knowledge, allowing us to perceive the world in a particular way: "the way we see an object is determined by our awareness of certain efforts inside our bodies, efforts which we cannot feel in themselves" [Polanyi, 1966, p. 13]. Just as recognising a face and riding a bike and playing a violin are examples of skills involve tacit knowledge of our bodies, so is identifying a scientific problem and a valid solution. Polanyi draws attention to the role that our bodies play in allowing us to attend to the external world, both intellectually and practically: "Our own body is the only thing in the world which we normally never experience as an object, but experience always in terms of the world to which we are attending to our body" [1966, p. 16].

The great advances in climate science, for example, have been entwined with deeply personal commitment, emotional thirst for knowledge as well as real physical exertion. In the nineteenth century, scientists undertook difficult expeditions with unwieldy equipment to take measure-

ments from the tops of mountains and spectacular manned balloon flights. For example, it was out of his passion for the Alps as much as his passion for furthering knowledge, that in 1787 Horace Benedict de Saussure climbed the summit of Mont Blanc carrying a thermometer, barometer, telescope, compass and other instruments to discover that the temperature of the earth's atmosphere dropped with altitude [Freshfield, 1920]. Such passion and physicality belies the notion of wholly disinterested and cognitive scientific objectivity. Note that the *Union of Concerned Scientists* are acknowledging, in their very name, their emotional engagement and bodily orientation towards the issue of climate change. Its website states clearly how it has, for nearly half a century "combined the knowledge and influence of the scientific community with the passion of concerned citizens to build a healthy planet and a safer world".[3] The UCS does not relay dispassionate data but enlivened knowledge, secured and nurtured through personal and political convictions.

Underlining the existence of tacit knowledge does not, for Polanyi, make science the whim of the individual. Quite the opposite. For him, tacit knowledge of what counts as 'science' and 'method' is transmitted through participation within the scientific community, a 'society of explorers'. A scientist cannot test each and every teaching she is taught, but rather has to rely on the authority of fellow scientists, which underpins the tacit knowledge of what is 'the nature of things' [1966, p. 64]. Thus: "even in the shaping of his own anticipations the knower is controlled by impersonal requirements… This holds for all seeking and finding of external truth" [1966, p. 77].

This coincides with the claims of feminist philosophers of epistemology, who agree that knowledge is situated and embodied. Unlike Polanyi however, they do not necessarily condone the unquestioned authority wielded by "body of scientists" which, Polanyi explains: "controls… the process by which *young men* are trained to become members of the scientific profession" [1962, p. 56. Emphasis added]. Feminist epistemology challenges the exclusion from the body of scientists the other(ed) bodies with different perspectives. The aim here is not to *undermine* scientific authority but rather to *legitimize* it. Haraway, for example, demands the replacement of "unlocatable, and so irresponsible, knowledge claims" not with an equally problematic reversal of hierarchy, and an insistence of the superiority of subjugated knowledges that are themselves never innocent, but rather with "partial, locatable, critical knowledges sustaining… shared conversations in epistemology" [Haraway, 1988, p. 583–4].

Scientific research, then, should not attempt to free itself from the knowledge of bodies, but rather recognise its 'bodily roots' [Polanyi, 1966, p. 15]. The tacit and habitual knowledge of bodies plays a role in understanding environmental problems and in driving environmental

[3] https://www.ucsusa.org/about/history-ofaccomplishments.html#.Wuq8wtXFIfE

science. Identifying an environmental risk or hazard is not only a matter of measuring variables and analysing data, it also involves the tacit awareness that something is amiss, out of place, the bodily concern with the environment around us.

Conclusion

In this paper I have argued that not only do bodies have knowledge, but that knowledge is always embodied. As Colin Peile writes: "knowledge not only exists in our minds but is also enfolded in peoples' muscles and skeletons" [Peile, 1998, p. 45].

I wish to underline three points here. First, if bodies have a knowledge of their own, a knowledge that allows human individuals to interact in particular ways with human and non-human others, then environmental governance cannot be a matter of cutting-and-pasting policies from one place to another, nor of rescaling from the global to the local. Bodies are part of the ecosystems that are governed by environmental policy, and bodies are *tricky objects* of knowledge. Bodies can both exceed and resist the expectations of policy makers.

Second, bodies may be able to contribute to understanding environmental problems, or may see them as different sorts of problems, or not as problems at all. They may be able to enlarge conceptions of the most effective and legitimate solutions. Incorporating bodily knowledge into conceptions of environmental politics may open up new processes of resistance and change [Peile, 1998, p. 55]. Bodies are *critical subjects* of knowledge.

Third, if the knowledge of a scientist is always embodied, then a body of scientists, such as the IPCC or the UCS, however inclusive they intend to be, cannot presuppose that the knowledge they present incorporates all possible perspectives, let alone that it entirely transcends situated perspectives to offer a 'disembodied scientific objectivity' [Haraway, 1988, p. 576]. These bodies cannot reach into every pocket of the living world to uniformly displace corrupting myth with pure knowledge. Bodies are *situated agents* of knowledge. This means that the responsibility of a body of embodied scientists is not simply to teach citizens 'the facts' about climate change but rather to consider the ways in which those 'facts' might be meaningful from a different bodily perspective.

Indeed, one crucial question concerns the potential contradictions between different bodies of knowledge. These different forms of knowledge are entangled, but they are also often in tension; bodily knowledge(s) may contradict, challenge or disrupt scientific knowledge(s). So while science is driven by the knowledge of the body, this doesn't mean there is any easy

alignment. But by juxtaposing the different bodies of knowledge we can probe and provoke scientific research and policy-making, highlighting lacunae and exclusions and new problems for investigation.

This should not undermine the value of scientific knowledge in policy making. Rather it should allow a renewed reflection upon its situatedness and its limitations. In other words, heeding bodily knowledge might make both scientific knowledge and environmental governance more reflective, responsible and responsive.

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