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Geographies of expertise in the dieselgate scandal: From a politics of accuracy to a politics of acceptability?

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Abstract

Drawing on semi-structured interviews, this paper examines the geographies of environmental expertise underpinning the ‘dieselgate’ scandal as it has played out at the EU level. It begins by mapping the scandal as a conflict between two distinct ‘knowledge space-times’. The first of these—underpinned by official off-the-road vehicle emissions tests—links epistemic credibility to the ideal of experimental reproducibility. The second—underpinned by the ‘crowdsourcing’ of publicly-generated fuel economy measurements—links epistemic credibility to the ideals of empirical richness and diversity. The paper argues, however, that ‘expertise’ in this controversy should not be understood exclusively as the attribute of knowledge produced according to particular spatial or temporal logics. Indeed, the boundaries of credible expertise in this case are predetermined by an ‘anti-political’ ontology of vehicle emissions which presumes their status as a single, homogenous object of governance. Drawing on Barry’s concept of ‘metrological regimes’, the paper instead contends that the full political potential of dieselgate can only be unlocked by inventing new logics of counting and categorisation that might force us to think differently about how best to partition, label, measure, and ultimately govern the inherently messy practices from which individual acts of driving—and hence vehicle emissions—emerge in the first place.

Keywords

Anti-politics, dieselgate, expertise, knowledge controversy, metrological regimes, ontological politics

Dieselgate: A knowledge controversy about what?

In late-2015, the US Environmental Protection Agency announced that over half a million diesel vehicles being sold in America by Volkswagen had been fitted with a so-called ‘defeat device’, essentially a piece of software enabling cars to release fewer emissions while being subject to official regulatory tests than they subsequently do on the open road. The ensuing scandal, known colloquially as ‘dieselgate’, quickly escalated as it became clear that vehicles sold by a wide range of manufacturers, both in the US and elsewhere, were in fact producing greater quantities of greenhouse gases (GHGs) and air pollutants in real-world driving conditions than publics had been led to believe (Brand 2016; Skeete 2017). In the EU context, dieselgate damaged public trust in both car makers and the policy-making authorities responsible for regulating the environmental impacts of driving. While official EU tests indicate that GHG emissions produced by new road vehicles decreased by approximately 30% between 2001 and 2016 (EEA 2017), alternative sources of evidence paint a different picture. Analysis of data voluntarily uploaded by European motorists to publicly-accessible online fuel economy databases¹, for example, suggests that since 2001, GHG emissions from new cars have been reduced by less than half the amount claimed by manufacturers (Tietge *et al.* 2019; *Transport & Environment* 2016). With respect to air pollutants such as oxides of nitrogen (NO_x) meanwhile, such data suggest that some diesel vehicles are exceeding official ‘Euro 6’ regulatory limits for air pollutant emissions by between 450% and 1,200% (Baldino *et al.* 2017).

On the surface, dieselgate might appear to constitute a classic environmental ‘knowledge controversy’, in which “what we think we know or, more usually, what ‘experts’

¹ One of the most prominent sources of such data is the German database *spritmonitor.de*. As of March 2019, this database hosted over 28 million individual fuel economy measurements, uploaded by 500,000 registered users.

claim to know about something [becomes] the subject of intense public interrogation” (Whatmore 2009, 588; see also Barry 2012; Callon 1998; Jasanoff 2003). A recurring theme in social scientific work engaging with knowledge controversies has been to call for broader definitions of expertise itself, such that governance processes might be rendered receptive not only to the formal, purportedly universal knowledge claims of certified techno-scientific experts, but also to the intrinsically place-specific, experientially-derived ideas and arguments of wider ‘publics’ (Owens 2000). Opening up governance processes to permit the more even-handed appraisal of diverse knowledge claims, whether ostensibly ‘expert’ or vernacular, here serves as a prerequisite for decisions emerging from those processes not only to yield better outcomes, but also to meet basic standards of democratic inclusiveness and accountability (Fiorino 1990).

To some extent, European policy responses to the dieselgate scandal *have* sought to diversify the forms of knowledge and evidence used to monitor improvements in the environmental performance of new road vehicles. Official emissions tests have been overhauled to try and better replicate real-world driving patterns, and regulators have also introduced a new, so-called ‘Real Driving Emissions’ (RDE) test, to be conducted on actual roads using exhaust-mounted Portable Emissions Measurement Systems (European Commission 2017). That said, there are important limitations to the role that RDE data will play in enforcing regulation², and there are currently no plans to take account of emissions data derived from other real-world driving situations, including those voluntarily uploaded to publicly-accessible online databases by car owners themselves.

² Vehicles will be able to emit up to 168mg/km of NO_x in the RDE—more than double the ‘Euro 6’ limit—until January 2020, and up to 120mg/km until 2023. There are no plans for the RDE to be used to monitor GHG emissions.

From one perspective, dieselgate can therefore be interpreted as a ‘knowledge controversy’ which revives longstanding debates in the geography of science, and science and technology studies, about the contrasting forms of knowledge which can be generated in *in vitro*, laboratory-like contexts on the one hand, and in *in vivo*, field-based contexts on the other (Latour 1999; Richards 2011). European regulators clearly retain a preference for emissions data that is (in theory at least) reproducible, particularly data derived from standardised tests conducted indoors, over data derived from the ‘open road’, where driving situations are inherently messy and dynamic. While this paper will begin by reflecting on the contrast between these two broad ‘space-times’ of knowledge production in the dieselgate scandal however, its main argument departs from the epistemological question of how to measure vehicle emissions *accurately*, or indeed how to reconcile (or at least account for) diverse, potentially incommensurable definitions of accuracy within a more open and participatory governance regime (see Palmer and Schwanen, 2019). Instead, the key questions which the paper seeks to address are ontological: How are vehicle emissions rendered into a coherent ‘object of governance’ to begin with, and what roles might be played by different forms of expertise in challenging dominant understandings of the kind(s) of socio-environmental problem that vehicle emissions ultimately represent?

The remainder of the paper draws on sixteen semi-structured interviews conducted with representatives of the European Commission, the car manufacturing industry, environmental campaign groups, and independent environmental consultants based in Brussels. Drawing on Barry’s (2002) concept of ‘metrological regimes’, the paper contends that efforts to confine the dieselgate scandal to questions of epistemic accuracy must be recognised as part of a broader strategy, being deployed especially by car makers, to divert attention away from normative questions about the *acceptability* of vehicle emissions generated in diverse circumstances in the real world. The paper thus concludes by suggesting that the full political potential of

dieselgate can only be realised through efforts to invent new logics of counting and categorisation which actively seek to highlight the varying acceptability of vehicle emissions, regardless of the accuracy of the data used to monitor them, as they emerge from diverse lifestyles, socio-cultural contexts, and political-economic systems.

Competing ‘knowledge space-times’ of dieselgate: From ‘laboratory’ to the open road

Under the European Commission’s (2009) ‘Cars and CO₂’ regulation, emissions produced by all new road vehicles going on sale in the EU are measured using a standardised test, wherein a predictable ‘cycle’ of demands is placed upon a vehicle’s engine, under highly-specified conditions (including precise criteria for the rolling gradient, ambient temperature, and the amount of mass added to the standalone weight of the vehicle during the test). The original version of this test, known as the New European Drive Cycle (NEDC), can be traced back as far as 1970 (EEA 2016), having originally been designed to measure vehicles’ carbon monoxide emissions. Several interviewees were at pains to highlight a significant degree of ‘mission creep’ in the regulatory status of the NEDC at the EU level since this time. For instance, according to one independent environmental consultant:

“It was a universal test which all cars would be able to do, including the very little ones with feeble engines. But the thing is more and more was bolted on, more pollutants were added. Then it came to be about CO₂ and then it came to be the basis for the actual fuel economy figures which are on the label. That's a million miles from where that test started off.” (Interview, 2013).

While the NEDC may have served as a level playing field for comparing the CO₂ and pollutant emissions of different manufacturers’ vehicles, however, its ability to provide an *accurate* estimate of such emissions in the real world had been called into question long before dieselgate (Mock *et al.* 2014). Indeed, from 2007 onwards a working group of the United

Nations Economic Commission for Europe (UNECE) had been seeking to develop a new test—known as the Worldwide Harmonized Light Vehicles Test Procedure (WLTP)—with the aim of ensuring greater correspondence between official data and real-world emissions. Vehicle manufacturers have themselves championed this new test as a “more accurate basis for measuring a vehicle’s fuel consumption and emissions” (ACEA 2017a: no pagination). Following the dieselgate scandal, the EU’s implementation of this new emissions test was accelerated, coming into force initially in 2017, and applying to all new vehicle registrations from the end of 2018 onwards.

Despite their differences—the WLTP subjects vehicles to a longer, more complex set of engine stresses, takes place at a higher average speed, and includes “more dynamic and representative accelerations and decelerations” than the NEDC (ACEA 2017b: no pagination)—both of these official emissions tests are inextricably part of the same ‘knowledge space-time’ of vehicle emissions. According to the logic of this regime of knowledge production, before a vehicle’s emissions can be measured accurately, the vehicle itself must first be “abstracted from the complexity of the relations within which it exists at other times” (Barry 2002, 274). Normal driving interactions with “a whole series of other entities including other cars, traffic lights, fog, rain, speed cameras and policemen” (*ibid.*, 274) are therefore replaced, in official emissions tests, with tightly-regulated conditions whose spatial and temporal dimensions are premeditated, controllable and repeatable. This knowledge space-time is underpinned, in short, by the ideal of *in vitro* laboratory knowledge (cf. Callon 2009), and specifically by the attendant promise of experimental reproducibility. According to one industry representative, for example, the main advantage of the official test—very simply—is that:

“It is a test which gives a figure which can be compared with one vehicle against another under roughly standardised conditions.” (Interview, 2014)

Similarly, for a European Commission official, even despite the widely-acknowledged shortcomings of the NEDC, its standardised form remains vital to the functioning of the EU's 'Cars and CO₂' regulation: "You need a certain test cycle which is very reproducible" (Interview, 2014).

Knowledge about vehicle emissions derived from real-world fuel economy measurements, voluntarily uploaded by car owners to publicly-accessible databases—such as *spritmonitor.de* in Germany and *honestjohn.co.uk* in the UK—conforms to a starkly different space-time than knowledge emerging from official tests. Whereas official emissions tests seek to abstract cars from the complexity of the driving conditions in which they normally exist (a complexity partly produced by drivers themselves), crowdsourced fuel economy data are unavoidably produced *out of* that complexity. Taken on its own terms, each measurement of fuel economy uploaded to such databases represents the unique, one-off product of a specific driving moment whose precise conditions are unverifiable, and thus impossible to reproduce. When taken collectively, however, these data underpin a second knowledge space-time which recognises that fuel economy—and hence vehicle emissions—always constitutes the product of emergent, place-specific relations between vehicles and their drivers, other road users, road infrastructure, and wider environmental conditions. According to the logic of this regime of knowledge production, since even ostensibly identical car journeys can generate significantly different levels of emissions (Hu *et al.* 2017), only 'crowdsourcing' of data generated in myriad spatial and temporal circumstances could ever, theoretically at least, account adequately for driving's inherent indeterminacy (Wynne 1992). In short, rather than being underpinned by the ideal of experimental reproducibility, this second knowledge space-time is underpinned by the ideals of empirical richness and diversity.

From accuracy to control? 'Metrological regimes' and the making of vehicle emissions

In the aftermath of the dieselgate scandal, the second ‘knowledge space time’ outlined above has gained significant visibility, both through the publication of assessments of real-world emissions data (such as voluntarily-uploaded fuel economy measurements and data collected by company car ‘fuel card’ schemes), but also through the increased use of Portable Emissions Measurement Systems by a range of organisations, including independent consultancy firms and national government agencies (Tietge *et al.* 2019). The first ‘knowledge space time’ outlined above, by contrast, has suffered declining credibility. Not only have some vehicle manufacturers been forced to admit their complicity in certain practices designed to actively influence the results of official emissions tests; European regulators have also been perceived (at least in some quarters) as lacking the necessary willpower to address this issue in the first place (Neslen 2015). Perhaps tellingly, many interviewees in this study chose to depict the situation prior to dieselgate as an inevitable part of the regulatory ‘game’. One EU policy-maker, for instance, insisted that “it’s not cheating, it’s exploitation of the flexibility within the official test procedures” (Interview, 2013). An expert representative of an industry-sponsored research consortium, meanwhile, explained that:

“As in any regulated industry you look at the regulation and you say: “That’s how we’re being measured. How do we get the best possible numbers from that cycle with the technology we have?”” (Interview, 2014)

Despite the damaged credibility of official off-the-road emissions tests however, EU policy responses to dieselgate have in many respects continued to privilege a logic of knowledge production underpinned by the ideal of experimental reproducibility. The accelerated introduction of the new WLTP test has thus been heralded, by both policy-makers and car manufacturers alike, principally on the basis of its ability to yield more accurate emissions measurements without compromising the existence of a *fair* basis on which to draw comparisons between different vehicle models, especially those produced by different

manufacturers. Some interviewees even explicitly evoked the site of the laboratory in defending this standpoint, as in the following quote from a representative of the car manufacturing industry:

“[The new test] will be far more dynamic but also the procedures—how you set up the car and how you run the test in the lab—will be changed and strengthened.” (Interview, 2014)

Even so, the introduction of a new ‘Real Driving Emissions’ (RDE) test, to be conducted on actual roads, has unsettled the dominance of regulatory knowledge based strictly on the ideal of experimental reproducibility. Car makers, perhaps unsurprisingly, have been quick to highlight the challenges of ensuring that such an ‘on-the-road’ test offers a level playing field for the comparison of emissions produced by different vehicles. The necessity of this test being conducted by a human driver, for example, is highlighted as problematic, particularly because—as one interviewee explained—the potential influence of driver behaviour on a vehicle’s emissions increases as vehicles themselves become more efficient:

“As we’ve continuously improved fuel economy, the numbers that you get out are becoming far more dependent on how you drive the vehicle. So a very inefficient vehicle will give you similar numbers really quite independently of how you drive it.” (Interview, Industry-Sponsored Research Consortium Representative, 2014).

That the RDE relies fundamentally on a driver to test vehicle emissions in a range of conditions (including driving on urban roads, rural roads and motorways, at low and high altitudes, uphill and downhill, and at a range of temperatures), can therefore be pinpointed as a potential source of regulatory inconsistency, particularly when compared to ‘off-the-road’ tests which effectively seek to abstract cars from relations with human beings altogether (Barry, 2002).

Further issues are presented by the innate variability not just of the real-world conditions within which the RDE takes place, but also of Portable Emissions Measurement

Systems equipment itself, which is not standardised and can be supplied by different manufacturers. The possibility that the results of any given RDE test might have been influenced by extreme driving conditions, or by the idiosyncrasies of specific measuring instruments, therefore, cannot be discounted. Collectively, pointing to these various issues has enabled manufacturers to welcome the RDE as a mechanism for generating additional knowledge about new vehicle emissions, while at the same time arguing that its results should be subject to less stringent forms of regulatory enforcement than those of the WLTP test, as noted in the introduction.

In acknowledging that some degree of variation in real-world measurements of vehicle emissions is inevitable, car makers have effectively sought to argue that while the quantity of CO₂ or NO_x generated by a particular vehicle may never be *precisely* fixed, it should still—in most circumstances at least—remain within the bounds of relatively confined, stable limits. Following Barry (2002), this admission of a limited degree of indeterminacy in vehicle emissions might be seen as part of a broader process of sustaining a dominant ‘metrological regime’ around vehicle emissions. The power of this regime is not strictly to be found in its ability to prescribe specific epistemic practices for measuring vehicle emissions accurately, so much as in its ability to constrain debates about those emissions to questions of accuracy alone. In so doing, the metrological regime effectively prefigures vehicle emissions generated by all kinds of vehicles—regardless of the nature of the journey being undertaken, or indeed the wider lifestyles, socio-cultural contexts, or political-economic systems from which those journeys emerge—as being equally acceptable, in moral and political terms. Each individual instance of vehicle emissions should be apprehended, in short, as a manifestation of the same *kind* of socio-environmental problem—a problem of the suboptimal performance of vehicles themselves.

This is not to say that real-world vehicle emissions data have not been successful in highlighting the inability of this metrological regime to “capture the complexity of objects and

practices in actuality” (Barry 2002, 275); vehicle emissions in the real world are undoubtedly more variable—and on average more significant—than they are in standardised off-the-road tests. Real-world data has not, however, managed to reckon with the ways in which *all* measurements, whether produced under theoretically-reproducible conditions, or in real-world driving situations, ultimately rely upon logics of counting and categorisation which are themselves performative of particular ideas about the nature of the problem that vehicle emissions represent in the first place. The standard unit of measurement for vehicle emissions, for example— $\text{gCO}_2\text{km}^{-1}$ —does not just reflect basic ‘natural’ facts about the atomic composition and internal consistency of exhaust gases. It also pays heed to the social presumption of the need to measure the rate of production of these gases over a standardised unit of distance rather than against, to list just a few possible alternatives, the number of passengers being carried by a vehicle, the contribution the journey makes to specific economic or social objectives (whether individual or collective), or indeed against the quantity of emissions that would have been generated if a particular journey had been taken by train, bus or bike instead. The very existence of these alternatives, I suggest, demonstrates that before they can be measured at all, vehicle emissions first have to be *made* into a single, coherent ‘object of governance’ (Lövbrand and Stripple, 2011), and that the terms of that making are in fact no less contestable than the terms of the measurement practices around which debates about dieselgate, to date at least, have been exclusively focused.

Rethinking dieselgate: Towards an ontological politics of vehicle emissions

Taken at face value, the dieselgate scandal appears to constitute a classic ‘knowledge controversy’, animated by conflicting interpretations of the roles that space, place and time should play in the production of credible forms of environmental expertise. Even as it may be helpful to diversify the roster of knowledge production practices which can contribute to

credible environmental expertise in this case however (Palmer and Schwanen 2019), the political potency of such diversification will be curtailed if it is oriented solely towards the *a priori* goal of measuring road vehicle emissions ‘accurately’. Instead, I argue that it is necessary to scrutinise the practices by which vehicle emissions are rendered into a coherent and measurable ‘object of governance’ in the first place. Following Barry (2002, 275), these practices can be conceptualised as a ‘metrological regime’ which functions not simply to prescribe techniques for achieving the accurate measurement of vehicle emissions, but also to reduce the potential space for moral or political conflict about what kind of governance object—or indeed *objects*—those emissions ultimately represent. When purchasing new road vehicles, for example, consumers do not typically enter into heated debates with car salesmen about the credibility of climate change science, or the moral defensibility of contributing to heavy rush-hour traffic on roads adjacent to local schools, because, as Barry (2002, 273) puts it, “enormous efforts have been made to make morality and politics calculable, and to make them happen in other places”.

Through producing measurements of emissions generated by vehicles whilst they are embedded in relations with “a whole series of other entities including other cars, traffic lights, fog, rain, speed cameras and policemen” (Barry 2002, 274), environmental campaign groups, independent emissions analytics firms, and indeed ordinary citizens have begun to expose the fragility of the extant metrological regime in this case. Yet, invoking Barry (2002) again, what has been overlooked in these responses to the dieselgate scandal is the “inventiveness of measurement” itself. ‘Grams of CO₂ per kilometre’ has become a taken-for-granted object of governance in debates about road vehicle emissions, yet it is not an object that existed in the world prior to the establishment of a particular metrological regime. Moreover, this object has served as a key motor of ‘anti-politics’—suppressing contestation and debate *not* by restricting the roster of actors who can legitimately produce credible knowledge about vehicle emissions,

but rather by constraining debates about vehicle emissions to the question of epistemic accuracy alone. In so doing, this apparently inconsequential unit of measurement has normalised logics of counting and categorisation within which all vehicle emissions are prefigured as equally morally and politically acceptable, regardless of the nature—or defensibility—of the driving situations from which they have emerged.

To conclude therefore, this article contends that the real political potential of dieselgate lies not in contesting the epistemic practices of measurement by which vehicle emissions are currently apprehended, but by inventing new logics of counting and categorisation that might prompt us to think differently about how best to divide up, label, measure, and ultimately govern the diverse and messy processes by which emissions are generated in the first place. This is the very business of ‘ontological politics’ (Mol 1999, 74); recognising that “there are *options* between the various versions of an object”, and thus that vehicle emissions might be performed differently. Alternative metrics to the ubiquitous ‘grams of CO₂ per kilometre’ might, for instance, seek to redefine vehicle emissions as indicators not of technical efficiency, but of transport and mobility inequalities, thereby encouraging the development of regulatory mechanisms with the capacity to discriminate between emissions that either reduce or compound transport *disadvantage*, the latter being linked closely with poverty and economic and social exclusion (Lucas, 2012). From this starting point, dieselgate might effectively serve as a launch pad for social movements and campaigns focused on highlighting the dependence of significant proportions of rural working-age populations on the perpetuation of a ‘system’ of cheap yet environmentally toxic automobility (Urry, 2004), thereby emphasising that all vehicle emissions have both structural political-economic as well as individual root causes, and that some car journeys are thus ultimately more inevitable, or even more acceptable, than others. This is of course just one possible alternative ‘ontology’ of vehicle emissions; others may prove more desirable or indeed more potent not only in exposing the fragility of the

incumbent metrological regime, but also in changing the basic terms on which the object of vehicle emissions is ‘invented’ and rendered governable—as an indicator of potentially diverse *kinds* of socio-environmental problem—in the first place.

With respect to other similar environmental controversies meanwhile, the case of dieselgate suggests that to focus solely on the contrast between *in vitro* and *in vivo* knowledges risks reproducing and reiterating an epistemic focus on accuracy which presumes agreement on the essence of what is being measured in the first place. If it is used simply to draw attention to geographical variations in individual measures of environmental ‘sustainability’ therefore, a critique of the uneven credibility accorded to laboratory and field observations (or universal and place-specific knowledge claims more broadly) threatens to serve only as a handmaiden to the continuing process of ‘rendering technical’ (Li 2007), rather than as a vehicle for the disruption or reversal of this process (since it still assumes that the goal is to ‘get the measurements right’, by taking them in more diverse settings and places). Countering the anti-political tendencies of dominant metrological regimes instead demands critiques that highlight, and where appropriate seek to recategorise, the heterogeneous entities, flows and processes which those regimes stitch together under the guise of a single object of governance. Such a task demands reconceptualising expertise, moreover, along lines which go beyond recognising proficiency in already-established fields of epistemic enquiry, to embrace inventiveness and creativity in the production of new, explicitly political accounts of the constitutive elements of complex socio-environmental problems.

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