Elsewheres of AI

Global supply chains, data work, and the social counter-imaginaries of autonomous driving

Fabian Namberger

It is sometimes the propertied classes themselves – or, in fact, their managerial proxies – who come up with rather striking images of the instrumental violence inherent to capitalist production, both then and now (Fletcher 2020). In an online presentation given to an audience of data engineers, computer scientists, and other interested followers, a staff member of Sama – one of the world's leading corporate providers of data annotation services in the context of autonomous driving and beyond – starts his talk via an anecdote of Henry Ford's 1913 visit to a Chicago meat packing house. There, among the half-opened carcasses of slaughtered cows and hogs, Ford discovered that the most time-effective way of dismembering animal bodies was to hang them from overhead meat hooks and to let them glide swiftly from one human dissembler to the next via a system of moveable carriages. What Ford took away from the episode was not so much a humbling lesson about the human and animal devastations wrought by the early 20th-century US meat industry, but – in the affirmative words of the Sama executive presenting – "an opportunity to speed up his car production" (Sama 2024). Shortly after his visit to Chicago, Ford introduced the principle of the moving assembly line to his Detroit car factories, thereby allowing him "to produce more cars faster and more efficiently as the demand was growing" (Sama 2024).

There are two aspects that I want to highlight vis-à-vis this brief vignette. First, it is as revealing as it is disturbing to see how the instrumental violence of Ford's entrepreneurial gaze – guided, more than anything else, by age-old capitalist imperatives of cost reduction, time efficiency, labor control and so forth (Toscano and Kinkle 2015, 202–203) – is able to serve, by way of historical analogy, as a justification and jubilatory prequel of Sama's present-day business services in the realm of AI training data annotation (Dachwitz and Hilbig 2025, 19–37). Today, as the presenter continues with an eye to the field of autonomous driving, "data is the main ingredient that drives this revolution, and we need to find new ways – or *hooks* – to see how we can use the data more efficiently and in a better way as the demand is growing"

(Sama 2024, n.p.). We will return to Sama and its central role in data annotation for autonomous vehicles (AVs) below.

Second, and despite its questionable historical references, the example given above contains a valuable methodological lesson for present-day critical social research into Artificial Intelligence (AI) in general and autonomous driving in particular (Crawford 2021; Schmidt 2022). Crucially, as the presenter notes, after Ford introduced the moving assembly line to his factories, "the car he built did not change; what changed was *the process behind it*" (Sama 2024; emphasis F.N.). Clearly, this line is not meant as a tacit nod to Karl Marx's (1976, 163–177) famous chapter on the commodity fetish and its emphasis on the deceptive self-sufficiency of the commodity as a finished, market-ready thing (Jameson 2014, 43–44). Nevertheless, we might very well take it as an unintended, albeit paradoxically helpful, clue towards the important difference between *either* approaching the phenomenon of autonomous driving from the perspective of its commodity end product: 'the' AV increasingly populating urban spheres of circulation in select cities of the Global North and beyond (Cugurullo et al. 2021; Dowling et al. 2023; Stilgoe and O'Donovan 2023) *or*, and possibly guided by a variously more radical desire to 'see it whole' (Toscano 2012), approaching the AV phenomenon from the viewpoint of its own global production process, including the highly uneven, exploitative, and deeply racialized social relations that pertain to this process (Schmidt 2022; Tsing 2009). Such a shift of perspective – from product to process, local consumption to global production – is one of this chapter's aims.

As such, it stands in considerable contrast to parts of the existing literature on autonomous driving in urban geography and Science and Technology Studies (STS) (Cugurullo/Kassens-Noor 2023; Marres 2020; Stilgoe 2018). Following a broader urban-scholarly interest in 'socio-technical experiments,' in 'living labs,' and in similar local setups of real-world social testing and piloting (Bulkeley and Castán Broto 2013; Evans 2016; Karvonen and van Heur 2014), urban scholars have approached the phenomenon of autonomous driving, first and foremost, from the viewpoint of the 'AV experiment', that is: those urban sites, typically located in investment-rich metropolises of the Global North and other privileged regions, that are currently serving as real-life AV testing grounds and that might be turned into operational sites and markets for publicly or privately-run AV services in the foreseeable future (Dowling et al. 2023; Hopkins and Schwanen 2019). Such forays into 'actually existing AV experimentation' have, without doubt, produced valuable insights. For instance, Jack Stilgoe and Cian O'Donovan (2023) have helpfully characterized recent AV trials in the UK as instances of strongly PR-oriented public demonstrations, rather than real experiments, given that the possibility of failure was often eliminated from such settings (similarly, Hopkins and Schwanen 2019, 88–89).

These and other welcome findings notwithstanding, the strongly localist purview of the 'AV experiment' literature has stopped short of more encompass-

ing scholarly investigations into what we could call, following Anna Tsing (2009), the global AV supply chain. Proposing Tsing's account of supply chain capitalism as an alternative methodological starting point for critical research into the AV phenomenon and into similar AI-driven, yet deeply labor-dependent technologies (Altenried 2023; Pasquinelli 2023), I argue that recent cultural productions, often emerging from beyond the institutionalized academe, already prefigure a valuable reorientation towards an analytically more holistic and politically more partisan methodological standpoint vis-à-vis an emerging global AI industry (Toscano 2012). I pursue this argument in terms of discussions of two cultural productions that problematize the supply chains of autonomous driving and the highly labor-intense production processes of AV training data annotation: first, the co-research investigations and video documentaries of the Berlin-based Data Workers' Inquiry (DWI) project on outsourcing companies specializing in AI training data annotation in the Global South; and, second, by way of Nicolas Gourault's short film *Their Eyes* (2025), which provides detailed insights into the everyday workflows of AV data labelers in Kenya, the Philippines, and Venezuela.

Both cultural productions add to the formation of what I call 'social counter-imaginaries of autonomous driving.' These counter-imaginaries clarify two important ambitions. First, they effectively challenge the deeply tech-centric AV imaginaries of dominant corporate players, such as Waymo, while equally questioning the often strongly technocratic and 'implementation-centric' perspectives on AVs adopted by state institutions and transport planning departments in the Global North. Second, on a scholarly level, they point beyond existing debates about AV experimentation by foregrounding those social relations of unevenness, exploitation, and racialization that make possible the end-user product of the self-driving car in the first place.

From local to social truths: beyond autonomous driving as an urban experiment

Recent studies in the field of 'AV experimentation' have produced at least three valuable insights that provide empirically grounded material for further thought and investigation. First, explorations of AV testing have produced noteworthy 'mappings' of diverse sites of AV experimentation, testing, and piloting in different urban regions worldwide. While such an emergent 'cartography' of AV testing and implementation certainly deserves further examination (especially with regard to places *beyond* the North-Atlantic zone's core countries), it has helpfully brought AV test sites into view such as, inter alia, London's Olympic Park (Stilgoe and O'Donovan 2023), the University of Michigan's *MCity* test field (Dowling et al. 2023, 29), or the UK nationally-funded AV experiments in Oxford and in the London Borough of Green-

wich (Hopkins and Schwanen 2019). Second, such overarching mappings of AV test sites and implementation zones have been analyzed along increasingly differentiated typologies. Hence, Dowling et al. (2023) have offered the four useful ideal types of 'on-road trials,' 'testbeds,' 'precinct trials,' and 'AV Living Labs'. Finally, many of the studies mentioned were able to reveal profound differences between outward-facing public narratives about ongoing AV testing efforts on the one hand, and the (often rather modest) achievements of these experiments on the other (Hopkins and Schwanen 2019).

As noted, debates about urban experiments and living labs have had a strong influence on recent urban-scholarly examinations of the phenomenon of autonomous driving (Bulkeley and Castán Broto 2013; den Hartog et al. 2018; Evans 2016). While a fuller engagement with this overarching literature is beyond the scope of this chapter, what I aim to question in this section is the deeply engrained *localism* of many of these studies (Dowling et al. 2023; Hopkins and Schwanen 2019; Stilgoe and O'Donovan 2023). I will do so by, first, critically probing some of the key assumptions within Andrew Karvonen and Bas van Heur's (2014) informative article *Urban Laboratories: Experiments in Reworking Cities* and, second, by contrasting Karvonen and van Heur's STS-inspired 'experimental' urban research agenda with Anna Tsing's (2009) diagnosis of what she calls global supply chain capitalism.

Making the heterogenous field of STS their analytical starting point and by arguing for urban laboratories as experimental catalysts of "situatedness, change-orientation and contingency" (2014, 381), Karvonen and van Heur are helpfully explicit about some of the key differences between their STS-driven approach of urban experimentation on the one hand, and Marxist urban scholarship on the other. As they write,

> "one of the strengths of the STS literature is its situational focus and its insistence on analysing practices *in situ*. Whereas much of the political-economy literature too easily assumes the structuring of particular places by broader scales, territories and networks […], STS urges us to make a closer, more detailed examination of what is actually happening on the ground. This by no means implies a celebration of heterogeneity and 'openness', but on the contrary an interest in the ordering capacity of emergent practices through the development and use of specific categories, standards, techniques and concepts (such as 'urban laboratory' and 'experimentation')" (Karvonen and van Heur 2014, 380).

It is not hard to imagine and has been proven time and again that an STS-inspired urban-scholarly agenda, oriented towards empirical detail, local situatedness and radical contingency, is able to glean valuable (yet sometimes frustratingly fragmented) insights into a plethora of urban phenomena, including in the ongoing testing and uneven implementation of self-driving cars in select urban regions.

What is incomparably harder to envision, however, is how Karvonen and van Heur's rather excessively localist perspective – equally present throughout the existing literature on 'AV experiments' – might generate an intellectually satisfying answer to a question posed, not too long ago, by Anna Tsing. Against the historical background of what she calls the 'human condition under supply chain capitalism,' Tsing asks: "how can we imagine the 'bigness' of global capitalism (that is, both its generality and its scale) without abandoning attention to its heterogeneity" (2009, 150)? Tsing finds her shorthand answer to this question in the concept of global supply chains:

> "Supply chains offer a model for thinking simultaneously about global integration, on the one hand, and the formation of diverse niches, on the other. Supply chains stimulate both global standardization and growing gaps between rich and poor, across lines of color and culture, and between North and South. Supply chains refocus critical analysis of diversity in relation to local and global capitalist developments" (Tsing 2009, 150).

Tsing takes "powerful theories of capitalism" to task here for their conjunctural obliviousness to "gender, race, national status, and other forms of diversity" (2009, 151). Nevertheless, Tsing's simultaneous insistence on the historical concomitance of global capitalism's 'bigness' *and* its local diversity helpfully subverts Karvonen and van Heur's implicit assumption that "a Marxist political-economic discourse of socio-spatial inequalities, exploitation and instrumentalization" (2014, 380) would more or less automatically disqualify itself for the task of searching out 'the' system's more fine-grained empirical strata, conflictive tendencies, and diversely situated phenomena. Against such a restrictive policing of the borders between 'big' conceptions and 'small' perceptions (Wark 2020, 5) combined with an intra-scholarly division of labor that would assign the former to Marxism and the latter to STS, one could retort, as Alberto Toscano has done *contra* Bruno Latour, that "the theoretical desire for totality is *not* incompatible with a painstaking attention to traces, objects and devices" (2012: 70; emphasis F.N.).

Far beyond any (long-held) debates about the differences, but also possible synergies, between STS-inspired urban research and Marxist urban scholarship (Wachsmuth et al. 2011; McFarlane 2011), Tsing's foregrounding of supply chains and their constitutive practices of "subcontracting, outsourcing, and allied arrangements" (2009, 148) opens up an alternative methodological compass for urban-scholarly work on the AV phenomenon, one that points beyond the *local truths* of the AV experiment in (often self-proclaimed) tech cities, innovation hubs and testbeds (Gieryn 2008), and, instead, refocuses on the deeper *social truths* of planetary AV commodity chains, including the myriad of spatial, material, cultural, legal, and other mediations that traverse them at the local – or in fact any other – scale. What

comes into view from the angle of the AV supply chain, in other words, is not so much the self-driving car's already foreseeable localities of end-user *consumption* (its current sites of experimentation and testing), but also its 'digital factories' of *production* (Altenried 2023).

Social counter-imaginaries of autonomous driving

Some words of clarification might be advisable prior to delving into a deeper discussion of some examples of what I call the social counter-imaginaries of autonomous driving. In possible tension to a more constructivist literature on socio-technical and other urban imaginaries (e.g., Jasanoff and Kim 2015; Sadowski and Bendor 2019), I hold it to be one of the fundamental truths of our social universe that imaginaries – or, in the *positive* sense: ideologies as such (Jameson 1988, 353) – historically emerge *from* and are dialectically bound up *with* wider material processes of economic production, serving – while certainly not always consciously – as our mental shortcuts to real-world phenomena (global capitalism, for instance) that are simply too vast to be captured by the limited reach of our individual sensory and cognitive apparatuses. In this sense, what I discuss under the name of the social counter-imaginaries of autonomous driving below should not be taken as isolated cultural artifacts, but rather as representational shorthands or even 'cognitive maps' (Jameson 1988), however limited, of a newly emerging and globally distributed production process of autonomous driving, a phenomenon itself embedded in a still wider reconfiguration of global capitalism shifting gears under the weight of new AI technologies.

Unionizing against AI: on the Data Workers' Inquiry project

Against the grain of today's ubiquitous infatuation with AI technologies, the Data Workers' Inquiry (DWI) project – founded on May Day 2024 – provides a refreshingly partisan, decidedly labor-centric counter-standpoint of radical social analysis and bottom-up political work. As such, the DWI has not only taken inspiration from Marx's (1997 [1880]) original call for a *Workers' Inquiry*, but is also tied to a renewed interest, at least in radical quarters, in questions of class composition and practico-militant research (Ovetz 2020). Essentially, the DWI is an attempt to channel the inherited analytical tools of the workers' inquiry towards today's "phenomenon of data workers who are both essential for contemporary AI applications yet precariously employed – if at all – and politically dispersed" (DWI 2025a). Accordingly, the DWI was initiated, in the words of its project lead Milagros Miceli, "not as a study or a research project, but as an act of refusal. I didn't want to speak *for* or *about* data workers anymore. I wanted to build a space where they could tell their own stories,

and where research was a form of collective thinking and organizing, not extraction" (DWI 2025b, n.p.).[1] Informed by a strong ethos of collective worker agency, the co-research projects on the DWI's website comprise a rich variety of materials, ranging from textual analysis to video work and comic strips, across countries such as Brazil, Germany, Kenya, and Syria.

One of the DWI's co-research projects focuses on a data work facility owned by the aforementioned AI outsourcing company Sama in Nairobi (Mathenge 2024). Located in a bland business park not far from the city's Jomo Kenyatta International Airport, this is where Sama runs its largest so-called 'delivery center' on the African continent: an open-plan office for more than one thousand data workers.[2] These workers help to process AI training data for Sama's big-tech corporate clients such as, among many (unknown) others, Google, Meta, Microsoft or Open AI (Dachwitz and Hilbig 2025, 10; Lee 2018). They are deliberately recruited from Nairobi's various slums. One of Sama's showcase ventures is the annotation and labelling of AV training data, as indicated by an extensive section on its official website. Contrary to widespread narratives of AI-induced automation, human labor has been indispensable to producing those high-quality AV training datasets that are required to 'teach' self-driving cars the difference between, for instance, a toddler and a plastic bag (Sama 2024). Sama's (2024) own (rather disparaging) term for the persisting centrality of human intelligence in its data-processing workflows is "the human in the loop." It is estimated that Sama employs several thousand 'humans in the loop' at its Nairobi facility (Lee 2018).

The DWI's video inquiry into Sama's Nairobi 'delivery center' is led by Kenyan data worker Richard Mathenge (2024). More than anything else, Mathenge's inquiry provides much-needed insights into the everyday hardships, but also into growing acts of resistance by data workers at Sama. This is how Mathenge (Figure 1) introduces the aims and scope of his video:

> "In this documentary, I describe the working conditions of content moderators and data annotators at the subcontracting company Sama in Nairobi, Kenya. […] Many data workers in the AI supply chain are exploited and their work is never acknowledged. What is often overlooked is that without us, there is no AI. In this film, which features actual workers and their own words, I aim to show the world what really goes on behind the scenes. I also hope to show other workers in Africa and

1 In line with this mission statement, my extensive usage of some of the DWI's material in this section aims to foreground the voices of data workers themselves. As such, this chapter can hardly live up to the requirements of a 'non-extractive' form of scholarship, as outlined by Miceli.

2 Sama runs similar data work offices in Costa Rica, India, and Uganda and exclusively targets low-wage countries in the Global South (Dachwitz/Hilbig 2025, 20).

around the world that if we unite, we can collectively fight for our rights" (Mathenge 2024).

Figure 1: Richard Mathenge was the leading community researcher of the DWI's project Data Workers Organizing.

Credits: Image reproduced under creative commons rights with kind permission by the Data Workers' Inquiry Project (Mathenge 2024).

Figure 2: The data annotator Maureen as featured during an interview in Richard Mathenge's workers' inquiry. Data workers at Sama, as Maureen explains, are primarily recruited from Nairobi's various slums.

Credits: Image reproduced under creative commons rights with kind permission by the Data Workers' Inquiry Project (Mathenge 2024).

Another data worker featured in the film is Maureen (Figure 2). Among other insights, her interview provides a helpfully detailed account of Sama's recruitment strategies, which specifically target workers from Nairobi's slums:[3]

> "I'd quote one thing that one of the project managers said. […] He made it clear to us that, one, Samasource[4] employs the unemployable. That is why their target population is from the slums. So Kibera for example, Mathare, Kariobangi, Kawangware. Actually, the funny thing, when you're applying to join Samasource, they have a dropdown [menu; addition F.N.] for those targeted areas. So, in case you're not from that area, you'll not be picked to work at Samasource. So, you have to either pick one of those, even if you're not from that. But that is the main thing for you to be considered to join Samasource" (Mathenge 2024).

Once inside the Sama complex, workers soon run up against a managerial system of strict productivity standards and individualized performance metrics that leave little space, if any, for workers' needs, such as sick leaves or self-chosen vacation days. As Maureen continues,

> "at Samasource, once you are at the 'agent's' level, you have no say. One, you can't complain about anything. Secondly, your opinion doesn't matter, no matter how much you complain. If they wake up tomorrow and they say 'if you've not reached your target, you won't go home,' you will not go home. Even if it means you work for twelve hours, you'll have to stay there until you reach your target" (Mathenge 2024).

Confronted with these and other hardships, data workers at Sama and other AI outsourcing companies started to exchange their individual frustrations as well as their collective needs. It was from these early exchanges, initiated in WhatsApp chats, that the African Content Moderators Union emerged.[5] As Mophat, a data labeler and content moderator based in Nairobi, explains:

> "So, content moderators in Kenya, across Africa, we experience same challenges and we have the same complaints. So, we started hearing complaints from our colleagues who were working for Meta, […] our colleagues who were working for OpenAI. When we heard these complaints, they were the same across the board.

3 Nairobi's population has been estimated to be 4.4 million (KNBS 2019, 7). According to estimations, more than half of this population live in one of the city's various slums (Amnesty 2009, 3).

4 Sama was known as Samasource before being renamed in 2021.

5 Despite its name, the African Content Moderators Union not only represents the interests of content moderators, but also of data workers more generally, including those working on AV projects (Mathenge 2024, n.p.).

> And we started that we can do something about it, because this work was really killing us and killing our future. So, we decided to come together as content moderators and we started by making a WhatsApp group with the few people and then, through that connection, *the* [addition F.N.] WhatsApp group *became* [addition F.N.] real big; and in that WhatsApp group we discussed challenges that are affecting us in different companies […] and we started to […] what we can do to address these challenges so that our fellow Africans, our fellow Kenyans cannot pass through the same things we are passing through during that time. So, it's during that time that we started to have a gathering and that gathering happened on 1 May 2023; and then it's in that gathering that we had a discussion as content moderators and we started to come up with a union to have a political bargaining; and it's also in that meeting that we decided to name our union to be called African Content Moderators Union, because it's an African affair. So that's when the union was formed and in that meeting we were about 150 content moderators and the union has now grown to about 500 members" (Mathenge 2024).

Notably, these members are not only from Kenya, but from a range of African countries including Ethiopia, Nigeria, South Africa, and Zimbabwe (Mathenge 2024).

Against the backdrop of these broader developments and struggles, another co-research project by the DWI – Wilington Shitawa's (2024) inquiry *Click Captives: The Unseen Struggle of Data Workers* – provides some insightfully sharp observations about the deeply alienating effects of an AV supply chain that, in its global hunt for labor cost reductions, sources data workers from Kenya (and other low-wage countries in the Global South) to label AV training data from far-away Germany. Presented as a comic strip, one of the inquiry's images shows the two young data labelers, Wilington and Edwin, sitting at their workstations with their eyes firmly set on their computer screens. The ensuing dialog runs as follows:

> Wilington: You know, Edwin, sometimes I feel like I know the streets of Hamburg better than the people who actually live there.
> Edwin: Right? We spent so many hours labeling those German streets for that one project. It's surreal.
> Wilington: That's what data annotation is all about. Labeling countless images, drawing bounding boxes, and identifying objects for hours on end (Shitawa 2024).

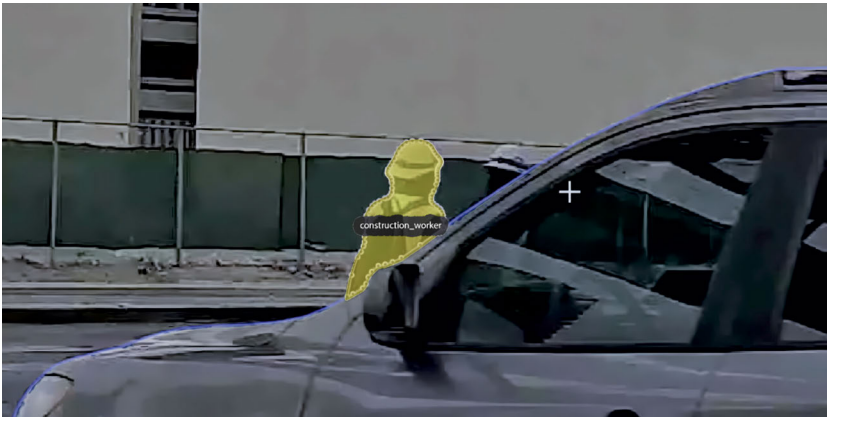
Taken together, the testimonies of Richard, Maureen, and Mophat, as well as Wilington and Edwin render visible, the highly uneven social relations of globally distributed AI supply chains with much-needed acuteness as they connect end-user products at one end of the globe with workers' hardships and labor struggles at the other. In this context, one of the DWI's co-research investigations' greatest strengths is that the individualized privations of data workers are affirmatively re-

cast as springboards for collective worker action, unionization, and cross-sectoral solidarity.

"We need to annotate everything": on the short film 'Their Eyes'

Nicolas Gourault's short film *Their Eyes* (2025) is a 20-minute long, detailed, and insightful work about the everyday workflows of data annotators that segment and label urban street-scene footage for the training of self-driving cars.[6] True to its name, *Their Eyes* repeatedly features the first-person perspectives of its data-worker protagonists, showing – for the most part of the work – their immediate views of zoomed-in computer screens, image-editing work surfaces, and digital toolbars. These screens are mostly filled with urban street scenes that the annotators are requested to visually break down, sometimes in pixel-level detail, into the discrete visual units of vehicles, pedestrians, traffic lights, street signs, vegetation, and so forth. Such annotation tasks are usually accomplished by neatly retracing the contours of each object in the image until every pixel can be allocated to a pregiven label (Figure 3).

Figure 3: Film still taken from Nicolas Gourault's short film Their Eyes showing the workflow of AV data annotation. The contours of the half-hidden construction worker (in yellow) have been outlined and the according label has been attached.

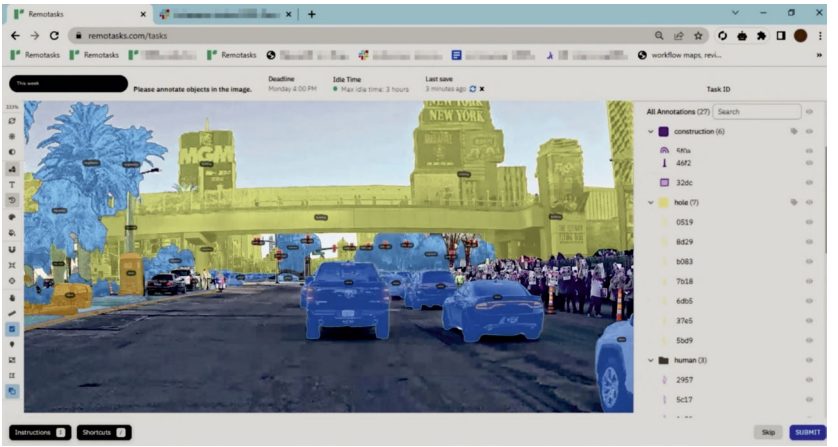


Credits: Image reproduced with kind permission by Nicolas Gourault.

6 Many thanks to Melis Günay who made me aware of the film.

While also likened to the pastime activity of drawing a picture while listening to music by some of the annotators, the deeply monotonous nature of many AV labeling tasks marks one of the film's most strongly accentuated themes. Accordingly, its opening scene is accompanied by the fittingly repetitive words of a worker's voiceover: "We need to annotate everything. We need to annotate people, we need to annotate vehicles. We annotate the road, even the road markings. We annotate everything. Even the vegetation and the buildings, even the sky. We need to annotate everything" (Their Eyes 2025).[7]

Figure 4: Film still taken from Nicolas Gourault's short film Their Eyes showing the work surface of the annotation platform Remotasks. The codes on the right-hand side denote already-labeled objects, such as vehicles or pedestrians.



Credits: Image reproduced with kind permission by Nicolas Gourault.

One of the foremost aesthetics of *Their Eyes* could be described as an effectively staged 'visual Taylorism.' In historical analogy to the craftsman's holistic work process, which was split into its component parts and given over to ever more rationalized divisions of labor at the hands of industrial capital (Fletcher 2020), in Gourault's film it is the composite urban streetscape that is dissected into processable graphic units ready to be fed into the training loops of self-driving AIs at the

7 In fact, it is its knowing attention to the human-dependent work processes behind the self-driving car that sets *Their Eyes* apart from other recent AV-inspired filmic works, such as Liam Young's *Where the City Can't See* (2016) or ScanLAB Project's *Dream Life of Driverless Cars* (2015). Both of these works approach the AV phenomenon from a much more tech-centric focus on the AV's new media of sensing, surveillance, and machine vision (Parikka 2023, 177–210).

behest of present-day tech capital. What the combined tasks of image annotation, segmentation, and labeling visually amount to, then, is not only a deeply *fragmented*, but also a strangely *flat* perspective of machinic, yet human-aided vision: split into its component parts, the three-dimensional urban streetscape vanishes behind two-dimensional overlays and machine-readable labels (Figure 4).

Specifically insightful throughout the entire film are the annotators' self-reflective comments that have been included as voiceovers. These commentaries – similarly to the DWI's comic-strip inquiry above – repeatedly thematize the geographic-cum-social distances between the annotators' own lives and those of the people that they find in the footage presented to them, thereby showcasing a contradictory simultaneity of worker knowledgeability, (imposed) ignorance, and attempts to escape the latter:

> *Speaker 1:* We don't know the client. We don't know the country where the images are from. We just know that these are white people mostly. So, we just know that these images are taken from those European countries, but definitely not from Asia or Africa.
> *Speaker 2:* Every image that we receive, we are curious and we are looking for clues like street signs, the name of the buildings. We tried to research it on Google Maps. And we saw it came from California.
> *Speaker 3:* I did not go to the US, but due to this kind of work I'm familiar with it.
> *Speaker 4:* Sometimes when I work on an image, I tell myself, yeah, it would be very nice, if I could be in this place and experience it. I think about it sometimes, because you see something that you have never seen. It looks nice, it looks strange. Sometimes, I imagine being there (Their Eyes 2025).

Such themes of connected disconnectedness are taken up once again towards the end of the film when data annotators from different parts of the globe – one in Venezuela, one in the Philippines, and one in Kenya – show parts of their hometown's streetscapes, contemplating the difficulties of annotating street scenes in these sometimes drastically different urban environments (Figure 5). As a worker from Nairobi reflects:

> In Nairobi, there are many vehicles of different designs, different sizes. Many people trying to cross and they don't use specific places to cross the road. They try to cross anywhere. Nairobi drivers, they don't … they don't obey rules. It is chaotic.
> As technology advances, those self-driving vehicles may come here and then they will need to label those images from here. Yeah, it will take a lot of time to annotate compared to the images that we work on. Or maybe during that time, they may come up with other software that will label for them. Then it means people may be replaced by these robots. That's one thing that I think about (Gourault 2025).

Figure 5: Film still taken from Nicolas Gourault's short film Their Eyes showing a street scene in Nairobi, Kenya.

Credits: Image reproduced with kind permission by Nicolas Gourault.

Largely in line with these remarks, *Their Eyes* can be understood as a work not so much concerned with AI-induced automation as such, but – much more insightfully – with the highly dynamic social relations of production as well as globe-spanning divisions of labor that underlie today's AV supply chain. It is this interest in autonomous driving's often neglected dimensions of human labor and data work that bring it in close proximity to the DWI's workers' inquiries outlined previously, thereby opening up fruitful avenues for similarly partisan investigations emerging from the broad domain of art, activism, and (non-)academic scholarship.

Conclusion: Methodological localism redux?

This chapter started out by introducing a rather sharp juxtaposition of two analytical perspectives vis-à-vis the urban phenomenon of autonomous driving: studying self-driving cars from the viewpoint of their local consumption or approaching them from the angle of their global production. Given the considerable imbalance in the existing urban literature towards the former of these two analytical 'options' (Dowling et al. 2023; Hopkins and Schwanen 2019; Stilgoe 2023), I argued for a much stronger urban-scholarly engagement with autonomous driving's worldwide relations of production and, taking inspiration from Tsing (2009), the AV's global supply chains. I presented two cultural productions throughout the course of this argument that I have discussed under the rubric of the 'social counter-imaginaries of

autonomous driving': the Data Workers' Inquiry project and its various co-research investigations at outsourcing companies specializing in AI training data annotation; and Nicolas Gourault's short film *Their Eyes* (2025). Both of these works provide a methodological orientation for radical research that aims to develop a more encompassing and more politically engaged analysis of autonomous driving in particular and of a fast-evolving reality of planetary AI in general (Crawford 2021).

It should be noted, however, that the two analytical standpoints of 'local consumption' and 'global production' are certainly not always as distinguishable in empirical reality as they were presented here for the purpose of analytical clarification. Ultimately, both of these viewpoints form part of a wider social totality of global capitalist relations in which the boundaries (if they ever fully existed) between production, distribution, and consumption have become *more*, rather than less, blurred since the establishment of global supply chains and during what some have called the logistics revolution (Cowen 2014, 102–105; Tsing 2009).

In this sense, there is certainly nothing wrong with making AV consumption 'endpoints' in North American, European, or other urban areas empirical nodes for the exploration of a more widely distributed system of autonomous driving or planetary AI (Cowen 2014, 17–18). What *is* problematic, however, and what incited much of my criticism of the 'AV experiment' literature above, is the assumption – at least not gainsaid in many of these studies – that local AV experiments *alone* would provide us with a sufficiently comprehensive picture of the multi-scalar, socio-spatial phenomenon of autonomous driving. This assumption, whether explicitly stated or implicitly accepted, takes us deep into the terrains of a methodological localism in which "the local or urban scale is taken for granted as a pregiven, relatively discrete container of political-economic processes," while "its supralocal conditions of possibility, contexts of development, and consequences are bracketed" (Brenner 2009, 121). Ultimately, whether and to what extent future explorations of the AV phenomenon will be able to more systematically consider such conditions of existence remains to be seen.

References

Altenried, Moritz (2023) *The Digital Factory. The Human Labor of Automation*. Chicago, IL: University of Chicago Press.

Amnesty International (2009) *Kenya. The Unseen Majority. Nairobi's Two Million Slum-dwellers*. Available at: https://www.amnesty.org/en/documents/afr32/005/2009/en/ (Accessed July 29, 2025).

Brenner, Neil (2009) Is There a Politics of 'Urban' Development? Reflections on the US Case. In Dilworth, Richardson (ed.) *The City in American Political Development*. New York, NY: Routledge, pp. 121–140.

Bulkeley, Harriet and Castán Broto, Vanesa (2013) Government by Experiment? Global Cities and the Governing of Climate Change, *Transactions of the Institute of British Geographers*, 38(3), pp. 361–375.

Cowen, Deborah (2014) *The Deadly Life of Logistics. Mapping Violence in Global Trade*. Minneapolis, MN: University of Minnesota Press.

Crawford, Kate (2021) *Atlas of AI. Power, Politics, and the Planetary Costs of Artificial Intelligence*. New Haven, CT: Yale University Press.

Cugurullo, Federico, Acheampong, Ransford A., Gueriau, Maxime, and Dusparic, Ivana (2021) The Transition to Autonomous Cars, the Redesign of Cities and the Future of Urban Sustainability, *Urban Geography*, 42(6), pp. 833–859.

Cugurullo, Federico and Kassens-Noor, Eva (2023) An Urbanistic Take on Autonomous Vehicles. In Cugurullo, Federico et al. (eds.) *Artificial Intelligence and the City. Urbanistic Perspectives on AI*. New York and London: Routledge, pp. 69–79.

Cugurullo, Federico et al. (2023) *Artificial Intelligence and the City. Urbanistic Perspectives on AI*, New York and London: Routledge.

Dachwitz, Ingo and Hilbig, Sven (2025) *Wie Tech-Konzerne und Großmächte die Welt unter sich aufteilen*. München: C.H. Beck.

Data Workers' Inquiry (2025a) *Data Workers Have Rights!* Available at: https://data-workers.org/about/the-method/ (Accessed July 29, 2025).

Data Workers' Inquiry (2025b) *How We Made Data Workers' Inquiry*. Available at: https://data-workers.org/about/how-to-dwi/ (Accessed July 29, 2025).

den Hartog, Harry et al. (2018) Low-carbon Promises and Realities. Lessons from Three Socio-technical Experiments in Shanghai, *Journal of Cleaner Production*, 118, pp. 692–702.

Dowling, Robyn, McGuirk, Pauline, and Sisson, Alistair (2023) Reinforcing and Refracting Automobility. Urban Experimentation with Autonomous Vehicles. In Cugurullo, Federico et al. (2023) *Artificial Intelligence and the City. Urbanistic Perspectives on AI*. New York and London: Routledge, pp. 23–37.

Evans, Joshua (2016) Trials and Tribulations. Problematizing the City through/as Urban Experimentation, *Geography Compass*, 10(10), pp. 429–443.

Fletcher, Alex (2020) Labour in a Single Shot. The Deskilling and Mechanisation of Labour in Harun Farocki, *Historical Materialism*, 28(4), pp. 139–175.

Gieryn, Thomas F. (2008) *Truth-Spots. How Places Make People Believe*. Chicago, IL: University of Chicago Press.

Hopkins, Debbie and Schwanen, Tim (2019) Experimentation with Vehicle Automation. In: Jenkins, Kirsten E.H. and Hopkins, Debbie (eds.) *Transitions in Energy Efficiency and Demand. The Emergence, Diffusion and Impact of Low-Carbon Innovation*. London: Routledge, pp. 72–93.

Jameson, Fredric (1988) Cognitive Mapping. In Nelson, Cary and Grossberg, Lawrence (eds.) *Marxism and the Interpretation of Culture*. Champaign, IL: University of Illinois Press, pp. 347–357.

Jameson, Fredric (2014) *Representing Capital. A Reading of Volume One.* London: Verso.

Jasanoff, Sheila and Sang-Hyun, Kim (2015) *Dreamscapes of Modernity. Sociotechnical Imaginaries and the Fabrication of Power.* Chicago, IL: University of Chicago Press.

Karvonen, Andrew and van Heur, Bas (2014) Urban laboratories. Experiments in Reworking Cities, *International Journal of Urban and Regional Research*, 38(2), pp. 379–392.

Kenya National Bureau of Statistics (2019) *2019 Kenya Population and Housing Census*. Available at: https://web.archive.org/web/20191113191208/https://www.knbs.or.ke/?wpdmpro=2019-kenya-population-and-housing-census-volume-i-population-by-county-and-sub-county (Accessed July 29, 2025).

Lee, Dave (2018) Why Big Tech Pays Poor Kenyans to Teach Self-driving Cars. Available at: https://www.bbc.com/news/technology-46055595 (Accessed July 29, 2025).

Marres, Noortje (2020) Co-existence or Displacement. Do Street Trials of Intelligent Vehicles Test Society?, *British Journal of Sociology*, 71(3), pp. 537–555.

Marx, Karl (1976 [1867]) *Das Kapital. Kritik der politischen Ökonomie*. Erster Band. Der Produktionsprozess des Kapitals. Berlin: Dietz Berlin.

Marx, Karl (1997 [1880]) *A Workers' Inquiry*. Available at: https://www.marxists.org/archive/marx/works/1880/04/20.htm (Accessed July 29, 2025).

McFarlane, Colin (2011) Encountering, Describing and Transforming Urbanism. Concluding Reflections on Assemblage and Urban Criticality, *City*, 15, pp. 731–739.

Ovetz, Robert (2020) *Workers' Inquiry and Global Class Struggle. Strategies, Tactics, Objectives*. London: Pluto Press.

Parikka, Jussi (2023) *Operational Images. From the Visual to the Invisual*. Minneapolis, MN: Minnesota University Press.

Pasquinelli, Matteo (2023) *The Eye of the Master. A Social History of Artificial Intelligence*. London: Verso.

Sadowski, Jathan and Bendor, Roy (2019) Selling Smartness. Corporate Narratives and the Smart City as a Sociotechnical Imaginary, *Science, Technology & Human Values*, 44(3), pp. 540–563.

Sama (2024) *GenAI's future among ADAS and AV data labelling best practices | Tech AD Europe 2024*. Available at: https://www.youtube.com/watch?v=8juEFvbkNzc (Accessed July 29, 2025).

Sama (2025) *We Are Now Sama: Accurate Data for Ambitious AI*. Available at: https://www.sama.com/blog/samasource-is-now-sama (Accessed July 29, 2025).

Schmidt, Florian A. (2022) The Planetary Stacking Order of Multilayered Crowd-AI Systems. In Graham, Mark and Ferrari, Fabian (eds.) *Digital Work in the Planetary Market.* Cambridge, MA: MIT Press, pp. 137–155.

Shitawa, Wilington (2024) Click Captives. The Unseen Struggle of Data Workers. In Miceli, Milagros et al. (eds.) *The Data Workers' Inquiry*. Available at: https://data-workers.org/wilington/ (Accessed July 29, 2025).

Stilgoe, Jack (2018) Machine Learning, Social Learning and the Governance of Self-Driving Cars, *Social Studies of Science,* 48(1), pp. 25–56.

Stilgoe, Jack and O'Donovan, Cian (2023) Trials and Tribulations. Who Learns What from Urban Experiments with Self-driving Vehicles? In Cugurullo, Federico et al. (eds.) *Artificial Intelligence and the City. Urbanistic Perspectives on AI*. New York and London: Routledge, pp. 38–52.

Toscano, Alberto (2012) Seeing It Whole. Staging Totality in Social Theory and Art. In Back, Les and Puwar, Nirmal (eds.) *Live Methods*. London: Wiley-Blackwell, pp. 64–83.

Toscano, Alberto and Kinkle, Jeff (2015) *Cartographies of the Absolute*. Winchester: Zero Books.

Tsing, Anna (2009) Supply Chains and the Human Condition, *Rethinking Marxism*, 21(2), pp. 148–176.

Wachsmuth, David, Madden, David J., and Brenner, Neil (2011) Between Abstraction and Complexity, *City*, 15(6), pp. 740–750.

Wark, McKenzie (2020) *Sensoria. Thinkers for the Twentieth-first Century*. London: Verso.

Videos and films

Dream Life of Driverless Cars (2015) (England, R: ScanLAB Project).

Mathenge, Richard (2024) Data Workers Organizing. The African Content Moderators Union. In Milagros Miceli/Adio Dinika/Laurenz Sachenbacher/Camilla Salim Wagner/Krystal Kauffman (eds.) *The Data Workers' Inquiry*. Creative Commons BY 4.0. Available at: https://data-workers.org/richard/ (Accessed May 31, 2025).

Their Eyes (2025) (France, R: Nicolas Gourault).

Where the City Can't See (2016) (England, R: Liam Young and Tim Maughan).