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The Algorithmic Construction of Space

Epistemologically experiencing space is not a purely sensual act. Rather perception is an act of construction. As Kant demonstrated in his "Critique of Pure Reason", the mind is not a purely receptive vessel conditioned by the world, but has an active role in structuring and organizing it, providing at least some of the conditions needed to make our experience possible. Digitalisation increasingly substitutes human spatial perception through algorithmic models, thus replacing the individual and social construction of space, which works through the active appropriation of the physical world. But experimental evidence has shown that the development of spatial perception is preconditioned on the active bodily exploration of the environment.[1]

In Bertolt Brecht's play "The Caucasian Chalk Circle", obedience is connected to space. Two women are fighting for the same child. To determine who the real mother is, the judge places the child at the centre of a chalked circle and asks the women to remove the child from the circle. She who succeeds in taking the child is the real mother. Grusha, who refuses to pull the child out of the ring for fear of hurting it, wins the case. Disobedience against the judge's demand proves the true love of a mother. A rational rule, could be learned from this example, does not necessarily cover the complexity of human behaviour. Obedience (literally "listen to," from ob "to" (see ob-) and audire "listen, hear") in human behaviour is often directly linked to space, to boundaries and borders. Disobedience, on the other side, in all societies is meant to be prohibited by spatial measures, i.e. incarceration or surveillance.

Algorithms per se demand obedience, as they are instructions. Due to their nature, this obedience is twofold: towards the instruction itself and towards the reality, on which the instruction is based. As space is increasingly captured through digital methods, the resulting data have to be processed by algorithms. These therefore not only reorganize, but define and produce space and new forms of boundaries. Obedience also has a relationship to human intelligence, as a large part of learning is coupled to following and repeating instructions or staying within certain boundaries. But specific parts of creative thinking are equally bound to challenging rules and instructions or the transgression of borders.

1 Held, Richard; Hein, Allan: Movement-Produced Stimulation in the Development of Visually Guided Behavior. In: The Journal of Comparative and Physiological Psychology, 1963, p. 872–876.

Construction and Reconstruction

In expansion of Lefebvre's dictum, space is no longer only produced, but constructed, through the replacement of human perception as well as through an algorithmic cartography based on a multi-stage process of recording and filtering.[2] The algorithmic construction of space is developing along two lines. On one side as a digital re-construction of the analogue world (e.g. Google-Earth), which, in stark contrast to traditional cartography, uses information gathered from outside our planet. The global positioning and continuous surveying of the surface of the earth is conducted by a network of satellites, circling at a distance of 40.000 kilometres in orbit. But digital reconstruction also leads to the zoning of a city into equidistant areas for services of the platform economy. It is followed by an algorithmic construction of space, if these zones can be switched on and off to block the reception of digital information and thus services, a technique known as "geofencing".

In space algorithms demand obedience through acceptance of the constructed reality they provide (e.g. Google-Maps) and in the instructions (e.g. wayfinding) derived from this construction. "Because the thought turns into the solution of assigned tasks, the unassigned is also treated according to the scheme of the task."[3] Human disobedience takes this into account. Visual representation, for example, is based on pixilation, which is a harsh geometrical abstraction. Hence resolution is a critical issue and can become a source of rebellion against image-recognition. Artistic interventions like Hito Steyer's "How Not to Be Seen: A Fucking Didactic Educational. MOV File 2013" propose ways in which individuals can resist being captured visually by digital technology.[4] Her video projection plays with the notion, that, "resolution determines visibility; whatever is not captured by resolution is invisible", as the voice-over announces. Steyerl juxtaposes analogue aerial surveillance through the cameras of spy planes with the techniques of contemporary digital technology to identify objects and people. In one sequence, three individuals try to camouflage themselves by wearing pixel-like boxes in an attempt to become smaller than a pixel.

2 See: Lefebvre, Henri: The Production of Space, Blackwell Publishing, Oxford 1991 (1974)

3 Adorno, Theodor W.: Minima Moralia, Frankfurt a.M. 2001 (1951), own translation p. 374.

4 Steyerl, Hito: How Not to Be Seen: A Fucking Didactic Educational .MOV File, 2013, www.tate.org.uk/art/artworks/steyerl-how-not-to-be-seen-a-fucking-didactic-educational-mov-file-t14506 (September 28, 2020).

Map

Originally maps were static material objects made of parchment or paper, with a tangible scale and edges that intuitively defined the limits of the terrain. The word 'map' encapsulates these qualities. It originates from the Latin mappa mundi, literally "sheet of the world". Maps provide an overview and a grasp of the territory's totality. From the map reader they demand skill, expertise and the ability to actively construct space by relating abstraction and real-world experience. Navigating with physical maps enhances the reader's understanding of the environment and spatial proficiencies. With digital technology, satellite imaging, GPS and GIS, the 'sheet of the world' has become the world itself. The Indoor Positioning Systems extends this survey to smaller and smaller scale, invading homes, multi-story buildings, alleys, parking garages and underground locations. Not by extra-terrestrial machinery but by seemingly benign and often personal devices already deployed indoors: smartphones, WIFI routers and Bluetooth antennas, smart speakers and digital cameras with a projected overall accuracy of two centimetres.

But the world as a whole is only known by the digital system which concentrates on relaying routes between points to its user. In the name of comfort, which has become a major motivator in late modern societies, obedience to the directions of navigational systems replaces individual orientation. It is a change from finding or even constructing a route, making errors and learning from detours and deviations, to the blind surrender to navigational orders. The system often does not even hide its authority, using penetrant voices and signals.

In digital maps the sense of scale is lost, a meaningful overview impossible. This superimposition of world and map has forced an important consequence: a perspectival shift from the whole to the personal. "'You are here' no longer needs to be said. We are by default the centre of the world. Our surroundings emanate from us, from a little blue dot that sits on the screen. It's perhaps the single most important change in how we view the city. Around this blue dot stem not only cafes and banks but our own experiences, our pictures and tweets."[5] The map is no longer abstract but immediate and immersive. It itself has become the territory as anticipated by Lewis Carroll in his

5 McMullan, Thomas: How digital maps are changing the way we understand our world. In: The Guardian, 02.12.2014, www.theguardian.com/technology/2014/dec/02/how-digital-maps-changing-the-way-we-understand-world (October 28, 2020).

novel 'Sylvie and Bruno concluded' : "'What do you consider the largest useful map?' I asked. 'Well, we got to six yards to the mile. Then we tried a hundred yards to the mile. And then came the best idea of all! We actually made a map of the country, on the scale of a mile to the mile! ' exclaimed Mein Herr. 'Have you used it?' I enquired. 'It has never been spread out' said Mein Herr."[6] Today, as reality is gradually replaced by its model, its users increasingly depend on it. Spatial awareness withers and as a malleable projection it is open to manipulation and external control. The denizens of this constructed space obediently follow its algorithmic logic when navigating through the city. The urban surroundings are reduced to a narrow corridor, zoomed in on the user tracing from position A to position B while the world outside the line of direction drops off the edge of the phone's screen.

Position

In the early stages of algorithmic space an abstract replication of the existing and the instructions based on this reconstruction leads to a reversal of agency: the environment dictates on how to deal with it. Resistance, creativity, innovation are no longer initiated by individuals, but depend on algorithmic interventions. The functionality of algorithmic space "[...] highly depends on adapting the behaviour to the environment data, not the other way around [...]"[7] On a global scale this can lead to absurd phenomena. The global positioning system GPS, like so many technological innovations, is a product of the arms race after the Second World War. Launched in 1973 by the U.S. Department of Defense, it was originally limited to military operation. Since an executive order by Ronald Reagan in 1983, the System was opened for civilian use. Although accuracy at that time was only in the range of a few meters, since the 1990s the United States have used their authority over the system to downgrade its quality through a program called "Selective Availability". This seems to be an adequate summary for many algorithmic activities, which increasingly depend on positioning systems. In the beginning, digital cartography of the world lay in the hands of one political and

6 Carroll, Lewis: Sylvie and Bruno concluded. In: Green, Roger Lancelyn (Ed.): The Works of Lewis Carroll, London 1965.

7 Borries, Christian von: The Disappearance of Architecture and Society in the Algorithm, Conversation with Olaf Grawert and Arno Brandlhuber. In: Arch+ The Property Issue, Politics of Space and Data, 2020, p. 12.

military power, which held a decisive advantage over all other states. During that time, the government of the United States could not only downgrade its Global Positioning System, but also deny whole regions access. Such an early case of large scale "geo-fencing" happened to India in 1999 during the Kargil war. This initiated the first act of disobedience of a whole state in that context, as the Indian government in response started the production and installation of its own satellites.[8]

The precision of a position lies in the power of the operator of such a system. In the year 2000, when the "Selective Availability"-program was ended, the accuracy of GPS lay within a five-meter range. Nowadays this has been brought down to within thirty centimetres. Noone knows if this development is depending on technological progress, or if algorithmic distortion to impede potential enemies continues to be effective. Today China not only disenables the use of most Western digital services (Google, Facebook, Instagram etc.), but in a mixture of refusal and secrecy, uses algorithms to systematically distort geographical data produced by GPS. This case of state disobedience against the monopoly of a positioning system is called the China "GPS shift problem". The latter is based on a coordinate system called WGS-84. Due to national law, all maps of China must use the alternative GCJ-02 coordinate system, which additionally produces an obfuscation effect on GPS-data. There is speculation, that a special algorithm creates the offset towards the WGS-84 coordinates, leading to applications like Google maps mismatching satellite photographs and Chinese maps. The offset cannot easily be corrected, as it is random in any direction and seems to vary between 50 and 500 meters. Any independent mapping done in China, trying to overcome this obfuscation, is persecuted. The case of students from Imperial College London being questioned and fined is proof for this policy.[9]

Until the twentieth century cartography could only map the movement of people, resources, weather etc. a posteriori. Today algorithms can process all physical movement in real-time and the complexity of flows (and thus life) is reduced to patterns and regularities. Digital space is increasingly based on an autopoietic cartography, a circular, independent self-production of a mul-

8 Srivastava, Ishan: How Kargil spurred India to design own GPS. In: The Times of India, 05.04.2014, https://timesofindia.indiatimes.com/home/science/How-Kargil-spurred-India-to-design-own-GPS/articleshow/33254691.cms (October 15, 2020).

9 Spencer, Richard: British students fined for 'illegal map-making' in China. In: The Telegraph, 05.01.2009, www.telegraph.co.uk/news/worldnews/asia/china/4125477/British-students-fined-for-illegal-map-making-in-China.html (October 15, 2020).

tiplicity of worlds, based on recording and interpreting positional data. Reality as a whole is turned into virtuality even before any simulation begins. The physical infrastructure of the algorithmic space is predominantly disguised or invisible, constructing the illusion of immateriality and ephemerality. The satellites of the positioning systems are not only out of view, but also far beyond comprehension. Data centres are hiding in faceless boxes. The superimposition of the digital and the old analogue city, as we know it, therefore can be seamless. Mobile phone antennas are everywhere, but are not identified as the centres of cellular territories, handing mobile phone users from one to the next. The constant surveillance is presented to the operators of smart phones only as the benefit of identifying their position. Whereas in reality, it is used in many cases as a permanent tracking and monitoring of all movements. One of the first (and probably irreversible) steps of government control during the Covid-crisis was to pass legislation that assured unlimited access to the data of movement of their citizens.[10] The only escape from this new mapping of the world is to not use smart-phones. Criminals like drug dealers are either using encryptive methods or old mobile phones that cannot be tracked.

Platform

Digital platforms are in themselves emblematic of what algorithmic space is about: the spatial term "platform" is used to camouflage a virtual, hybrid market-place organised by algorithms, which has neither location, nor architecture and—officially—no workers. But the operations of the platform, which attempts to repaint dependent work into self-employment, have increasing repercussions with the real world. Besides being operated from new building typologies like server farms and data centres, the platform economy extensively uses public space for its services. Their "independent contractors" or workers with their bikes, scooters, cars and vans are already taking up a large amount of inner-city traffic. This supports one of the few options for disobedience, as strike actions of delivery workers cannot only be easily organised by switching off apps, but achieve high public visibility, as their

10 Al-Youssef, Muzayen; Anders, Theo; Schmid, Fabian; Weiss, Stefan: Die neuen Gesetze zur Bekämpfung der Corona-Pandemie. In: Der Standard, 20.03.2020, www.derstandard.de/story/2000115935419/die-neuen-gesetze-zur-bekaempfung-der-corona-pandemie (April 20, 2020).

workplace is the street. In this way, the system can be turned against itself, as the strikes by food delivery workers in Great Britain in 2016 showed. Uber Eats drivers not only logged out in a coordinated manner via WhatsApp, but also ordered food using a promotion that promised five pounds for each new customer. In this way, they not only had almost free food delivered to the picket lines, but also managed to convince other riders to join the strike.[11]

In China Alibaba, the equivalent to Amazon, has transformed "Singles Day" on 11.11. into an online shopping event, exemplary for the production of consumption created by the digital industry. "Singles Day" is constantly growing and produces a surge in demand for services around the delivery of parcels. This peak workload causes backlogs in the delivery-chain and late deliveries. Due to the logic of platform-contracts, any delays have to be compensated by the delivery drivers or riders. Around "Singles Day" last year, unrest accelerated. Many of the small intermediate companies could not handle the sudden increase in traffic, which led to chaotic scenes: "Workers in Hunan Province went on strike last month for more than $45,000 in back wages, leaving orders of hairy crab to rot in their boxes. In Shenyang, a city in the northeast, abandoned packages were dumped in an empty field last week. Internet users have joked that their packages are going on vacation, posting screenshots of tracking details that show their orders meandering across the country as they are redirected to functioning courier stations."[12]

On September 8th, 2020 Renwu[13] one of China's most widely read magazines, published a research into the working conditions of delivery workers under the title "Delivery Riders, Trapped in the System"[14]. One of the key findings of the Renwu report is the fact that riders in China using the two main platforms Meituan-Dianping and Ele.me register what they call "the disappearance of time"[15]. Rides that had been calculated by the platform's algorithm for 50 minutes where in some cases over the years reduced down

11 See: Shenker, Jack: Strike 2.0: how gig economy workers are using tech to fight back. In: The Guardian, 31.08.2019, www.theguardian.com/books/2019/aug/31/the-new-resistance-how-gig-economy-workers-are-fighting-back (November 12, 2020).

12 Wang, Vivian: On Singles' Day in China, Couriers Clamor for More. In: New York Times, 11.11.2020, www.nytimes.com/2020/11/11/business/alibaba-singles-day-couriers.html (November 15, 2020).

13 人物, "People".

14 Chuang: Delivery Workers, Trapped in the System, 12.11.2020, https://chuangcn.org/2020/11/delivery-renwu-translation/ (November 12, 2020).

15 Ibid.

to 35 minutes within which the driver had to arrive at his or her destination. This is partly due to policies of the platform owners, who are handing "speed up" notifications to their stations, which pass them on to the riders. But Renwo indicates, that it also might be a result of machine-learning, which takes the shortest instances of deliveries over a certain distance as a measure for its learning. "For the system's creators, this is a praiseworthy advancement, a real-world embodiment of the deep-learning capacity of AI."[16]

Meituan's slogan is "Send anything fast", aiming at an average delivery time of 28 minutes. The machine learning of its algorithm seems to continuously consume delivery time, which, according to the logic of service and consumption, is considered the most important metric in the system. As the contracts between platform and its alleged entrepreneurs accumulate all responsibilities connected to the quality of the service on the delivery riders, these are left with only one option: to increase their speed. This application of machine-learning forces drivers and riders to violate traffic laws, e.g. to run lights and ride against oncoming traffic. In respect to the way the delivery times are calculated, Sun Ping, assistant researcher at the Chinese Academy of Social Sciences describes the delivery riders' disobedience of traffic rules as a direct reflection of the dispatch logic: "Riders who have long been under the control and management of the algorithm have no choice but to use this labour practice. The direct result of this 'inverse algorithm' is a sharp rise in the number of traffic accidents involving delivery riders."[17] To use the term "inverse" in this context accentuates the built-in obedience of algorithms. In reality, the disobedient behavior triggered by machine learning and algorithmic management could be interpreted as a sign of a power shift from social and legal rules to those incorporated in digital codes. Obedience to the delivery-algorithm makes disobedience towards existing rules mandatory. This leads to the question of legitimization—whereas traffic rules are part of a legal structure that is the result of a democratic process of law-making, algorithmic rules are the clandestine product of private interests. Nick Seaver's anthropological interpretation of algorithms seems to fail in the case of the delivery system: "There is no such thing as an algorithmic decision; there are only ways of seeing decisions as algorithmic. In other words, algorithms are not autonomous technical objects, but complex sociotechnical systems. As I

16 Ibid.

17 Chuang: Delivery Workers, Trapped in the System, 12.11.2020, https://chuangcn.org/2020/11/delivery-renwu-translation/ (November 14, 2020).

have argued elsewhere, this change in framing reverses many of algorithms' supposedly essential qualities: if the idealized algorithm is supposed to be generic, stable, and rigid, the actual algorithmic system is particular, unstable, and malleable (Seaver 2013)."[18]

Following Seaver's argumentation, algorithmic practices are principally social practices. In the case of delivery platforms, the relevant practice is the exploitation of human labour. But the algorithms do not merely reflect or translate social practices, but transform them. Their actual implementation, e.g. as a dispatch system, is not intended to operate under human influence. They have to follow the limitations of coding and its execution through application. The effect might be compared to that of mechanization and the change from craft to industrial production in the 18th century. Machines, although invented, produced and maintained by humans, through their repetitious manipulations caused alienation among the workers. This could only happen through their agency as an objective mechanical device. The shift today is from the mechanical and material to the digital and immaterial—and it is only possible through a radical abstraction of culture into mathematical algorithms and the replacement of human by algorithmic management.

Adversarial Algorithms

Five years ago, the Chinese delivery service Meituan reorganised their delivery management algorithm around machine learning. "Super Brain" is an artificial neural network system performing in-depth sensing and problem analysis to manage complex real-world situations, quickly making decisions, and generate accurate predictions. Artificial neural network algorithms are open malleable structures with the ability to learn, but no functionality initially embedded in the code itself. Only after supervised training with large quantities of semantically labelled datasets, the algorithms learn to perform specific tasks. The same algorithm can be applied to a diverse variety of assignments such as optimising delivery routes, attempting to achieving high customer ratings in relation to rider time efficiency. Empirical data for real-world rides, traces left behind by rider or other motorists, costumers' ratings and traffic patterns are used as training sets. In the environment of Big

18 Seaver, Nick: What should an Anthropology of Algorithms do? In: Cultural Anthropology, Vol. 33, Issue 3, 2018, p. 385.

Data, the rise of machine learning is inevitable. Not only is this technology best equipped to process enormous quantities of data, recognising and making sense of patterns and autonomously triggering actions. But at the same time the learning algorithm consumes the data to improve its own functionality, becoming, at least in a very narrow sense, more intelligent.

In image-recognition, the algorithm takes large quantities of pixels with all the information such as RGB value, and creates a multidimensional space which is called 'latent space'. "Typically, it is a 100-dimensional hypersphere with each variable drawn from a Gaussian distribution with a mean of zero and a standard deviation of one."[19] In the process of learning classifiable features that, for example, belong to road signs and differ from other features belonging to car, people or buildings are shifted within the latent space to particular positions in such a way that a definitive multi-dimensional boundary can be created between areas occupied by traffic sign features and all other recognised features. Activists and artists searching for ways of subverting machine learning for surveillance systems, have developed two tactics: poison attacks and adversarial attacks.

In so called poison attacks the aim is to intentionally contaminate the deep learning algorithm's memory with erroneous inputs. Machine learning is only as good as its training sets are and when fake information enters their database, reliability will be compromised. The American fashion label adversarial fashion for example uses textiles with license plate patterns to subvert the A.L.P.R. (Automatic license plate recognition), a mass surveillance system that intrusively collects thousands of plates, tracing the vehicles locations and movement patterns. The label's website states: "The patterns on the goods in this shop are designed to trigger Automated License Plate Readers, injecting junk data in to the systems used by the State and its contractors to monitor and track civilians and their locations."[20] Wearers of these t-shirts become identified as motorcycles or cars from specific states, even indicating vehicle-colour and other information. To be effective this method requires large numbers of adopters wearing adversarial patterns to trigger multiple automatic detection sequences. This could, at least in theory, render the whole system useless, which controls vehicular movement in public space.

19 Brownlee, Jason; How to Explore the GAN Latent Space When Generating Faces. In: Generative Adversarial Networks, 03.07.2019, https://machinelearningmastery.com/how-to-interpolate-and-perform-vector-arithmetic-with-faces-using-a-generative-adversarial-network/ (November 22, 2020).

20 See: Adversarial Fashion, website, https://adversarialfashion.com (November 22, 2020).

Other tactics work on single instances. In adversarial attacks so-called adversarial images are placed on real-world objects to confuse the deep learning algorithm. Faces and object such as road signs can become invisible or are mistaken for something else. As Tom Goldstein of the University of Maryland portrays machine-learning algorithms: "They have weaknesses that occur in the interactions between feature maps and artificial neurons. There are strange and exploitable pathways in these neural networks that probably shouldn't be there."[21] It is not easy to find adversarial images, but they appear to work with most other recognition algorithms as well. "This 'transferability' enables attackers to fool systems in what are known as 'black-box attacks', where they don't have access to the model's architecture, parameters or even the training data used to train the network."[22] Activists, like the Berlin based artist Adam Harvey have developed various types of adversarial tools, T-shirt, stickers, glasses or patches that can be worn or applied on objects making people disappear from the algorithm's view, or turn stop signs into speed limit signs. Software engineers are working to repair their networks by training them with adversarial images, so far with limited success.

Machine-learning algorithms are opaque, black boxes, and although the mechanics are clear, their inner workings, like that of the brain, are little understood. They are difficult to manipulate; their structure can only be altered in limited ways and the resulting behaviour is not easily predictable. The algorithm's functionally can be subverted with greater effect at the level of input and output as the process of training is neither objective, nor impartial. On the contrary, it is open to deliberate manipulation or unintentional bias. The type of training data will stir the algorithm towards certain results. In the example of the "inverse algorithm", if for the improvement of efficiency data sets on delivery routes are used and the highest ranked routes are achieved only by traffic code violations, then this becomes part of the system's normative knowledge. It will reinforce unlawful behaviour of the recipients of the algorithm's instructions, because the training parameters exclude traffic code as an explicit set of rules. They are only inscribed implicitly in the collected data. Once the algorithm is trained sufficiently it can autonomously

21 Seabrook, John, Dressing for the Surveillance Age. In: The New Yorker, 09.03.2020, www.newyorker.com/magazine/2020/03/16/dressing-for-the-surveillance-age (November 22, 2020).

22 Jain, Anant: Breaking neural networks with adversarial attacks. In: towards data science, 09.02.2019, https://towardsdatascience.com/breaking-neural-networks-with-adversarial-attacks-f4290a9a45aa (November 22, 2020).

manage responsively large numbers of requests in the management of deliveries. For example, as soon as a customer places an order, the system begins to locate the closest riders with the shortest route between his or her own location, restaurant and customer location. For maximum efficiency the system will start to match further orders before assigning them to a rider. The rider always has to perform two tasks per order: picking up and delivering. The machine learning algorithm has to resolve what is known as the "Traveling Salesman Problem". From a path of 10 points, it will calculate, generate and compare around 11,000 possibilities before selecting the optimal route for delivery.[23]

Situational parameters like the weather are not yet part of "Super Brain's" calculations. Although heavy rain immediately increases consumer demand because people prefer to stay at home, the conditions for drivers are getting worse. The same route takes considerably longer. Late delivery is immediately penalised by the dispatch programme. This for the riders leads to extreme stress, accumulating a considerable number of extra hours on an unusual high number of orders, with the total salary being less than on a normal day due to penalties. The performance of riders, stations and their managers are measured against the number of orders, the rate of late orders, the amount of bad reviews and complaints. As complaints mainly result from delayed deliveries, the speed at which the riders fulfil their orders is crucial. If certain benchmarks are not reached, first the salaries are cut for both rider and manager and finally a station is closed. Delivery workers are driven into depression by the consequences of the algorithmic organisation of their work and it is only the shared disobedience not to the algorithm, but to the law, that offers relief: "He said that when he and his fellow riders are all going the wrong way at once, he is even able to feel at ease."[24]

As the machine learning in the delivery dispatch system seems to be based on a restricted number of parameters (the most important overall being the meta-algorithm of profit maximisation) manual overruling has to take place in special situations. During extreme weather or on important holidays, dispatch managers take over from the machine. This is due to the fact that an accumulation of irregularities cannot yet be compensated by the programmes. But human interference is not meant to alleviate work for the riders, rather simply to replace its algorithmic management by the human

23 See: https://chuangcn.org/2020/11/delivery-renwu-translation/ (November 12, 2020).

24 Ibid.

capacity to cover complex situations.[25] The final option is the manager becoming a worker himself again and delivering orders he cannot assign to riders.

Human Behaviour

Many problems result from a deficiency in refined navigation. The systems used at the moment, whether on purpose or out of a lack of advanced technology, advise riders to drive against traffic or often indicate wrong distances. As rider Xiao Dao told the researchers of Renwu: "'There are some places where there is no shoulder or sidewalk where I can drive against traffic. If there is an overpass, the navigation system will direct me to go over the overpass, even if it is an overpass that does not allow electric scooters. If there is a wall, it will tell you to go directly through the wall.'"[26] Often walking directions are used for motorised vehicles like the delivery-scooters, as they do not have to distinguish direction or type of traffic. In addition to time as an equivalent of money replacing space, walking is used not as the slow way of movement that it is, but because digital orientation can thus cancel traffic restrictions in its calculations. The resulting distance is considerably shorter and applying the speed of a vehicle a earlier delivery time is set. Of course, it is the capitalist who owns the platform who sets the framework for its programmes and thus the algorithms. But the inflexibility of rules that are non-negotiable in daily interactions adds new rigidity to the organisation of work.

> "At the end of 2017, in an article introducing optimizations and upgrades to the platform's intelligent delivery system, Meituan's technology team also mentioned cost. The article explains that algorithm optimization reduces the platform's capacity loss by 19 percent: Delivery volumes that previously needed five riders can now use only four."[27]

Algorithmic space does not only reconstruct a city's network of streets, roads, pathways and public transport lines, but captures even small infra-

25 See: ibid.
26 Ibid.
27 Ibid.

structures like elevators. "In an interview with tech media platform 36Kr, Meituan's delivery algorithm team lead He Renqing emphasized elevators' role in delivery time: Meituan's delivery algorithm specifically accounts for the time riders take to arrive at a certain floor, even to the point of investigating the speeds at which riders can go up and down elevators in tall buildings."[28] Many office-buildings in China do not allow delivery riders to use staff elevators and often there is only one service-elevator. Human routines and irregularities mean delivery is depending on too many parameters to make any reliable calculation for its duration. As a response, delivery riders under stress press the "delivered"-button before they actually deliver. This disobedient behaviour is countered by the platform through an escalation of surveillance, a seamless automatic monitoring of the position of recipient and rider through GPS. Any violation automatically triggers a hefty deduction of wage.[29]

Although the system aspires to become increasingly more intelligent through learning, especially preparation time for the meals is depending on too many factors to predict. "The system continually improves itself in the name of 'intelligence', repeatedly shrinking the time allotted for food pick-ups—but shopkeepers' slow pace in getting food out the door has always been an issue. In a public article, Meituan's senior algorithm expert Wang Shengyao explains that even after analysing the history of completed orders it is still very difficult to accurately predict how long it will take a shop to prepare an order. As long as the predicted preparation time is not correct, the food delivery ecosystem will continue to contain a random variable."[30] As the Renwu report found out in its interviews, the problem of slow preparation and delays are countered by the riders through a variety of measures. They try to develop personal relations to shop-keepers and restaurant staff, some of their activities bordering on bribery. Quite often the stress drivers are permanently exposed to through digital management leads to verbal or physical abuse and violence, escalating even into fights with lethal outcome.

28 Ibid.

29 Li ,Tangzhe: Feeding the Chinese City, 12.10.2020, https://progressive.international/wire/2020-10-12-feeding-the-chinese-city/en (November 23, 2020).

30 Chuang: Delivery Workers, Trapped in the System, 12.11.2020, https://chuangcn.org/2020/11/delivery-renwu-translation/ (November 12, 2020).

Algorithmic Apparatus

In the end, the platform economy depends on one device: the smart phone. The whole process of orders, navigation and communication with customers or station runs through the algorithmic apparatus, the embodiment of digitalisation. This little handheld machine dictates the life and the relationship of service-worker and customer. The influence of the time-based programmes that structure everybody's daily life is increasingly all-encompassing. Aiming at just-in-time, the inability to tolerate any waiting time or unquantifiable moments in life does not only rule the work of the delivery rider, but also that of his or her client. Nervously counting down the minutes, the hungry recipient of a fast food meal is unable to focus on anything else whilst waiting. The growing influence of consumers in the service industries leads, as the Renwu report indicates, to the use of algorithms to construct a power hierarchy between worker and customer.[31] As demand is pushing for ever shorter delivery times, the dispatch programmes begin to spread divergent schedules between rider and customer. To please the latter, the arrival-time of his or her order is set earlier than the delivery time for the rider. But what is meant to appease customers, is on the contrary increasing tension, as the rider will inevitably arrive late given that he can hardly keep the steadily shrinking delivery times.

Algorithmic space today is based on a disavowal of the human body as a located conscious organism, as it coincides with a technical device, mainly the smartphone. If obedience is connected to maintaining a defined position, then this primitive identification of body and device is simple to undermine. Examples of disobedience could be seen during the Covid pandemic in South Korea, where mobile phones were left at home to simulate the presence of the quarantined individual to escape the rigid digital tracing system. The necessary consequence for algorithmic space is the fusion of device and body, through ankle-monitors, implanted microchips or improved body-recognition. Until the latter is reliable, there will be variations of the disobedient operation of the "phonebody", as the Berlin artist Simon Weckert has demonstrated, who used a local, mobile concentration of phones to simulate traffic congestions on public streets. By placing a number of switched-on phones in a handcart and pulling it along Berlin's main roads, Google maps interpret-

31 See ibid.

ed this information as a concentration of vehicles which led to warnings for heavy traffic being fed into their navigation-system.[32]

As the smartphone merges with the body and its position in space, in the United States correctional system ankle-bracelets are now replaced by apps which demand regular interactions with parole officers, as reported by the British newspaper "The Guardian": "Once a month, Keck would open up the Shadowtrack app and speak his answers to a series of questions so that a voice-recognition algorithm could confirm it was really him. He would then type out answers to several more questions—such as whether he had taken drugs—and the app would send his responses and location to his parole officer."[33] What seems like a simple change from one mode of digital surveillance to another, has wide-ranging consequences due to the use of intelligent software. The control is so pervasive and the panoptical feeling of being permanently watched so penetrating, that some offenders would prefer incarceration to the psychological stress caused through the app. "'It was cool to not have to report to a probation officer, it was cool to not have to take drug tests any more, Keck says. 'But that peace of mind, of not having somebody track your every move … it was like being locked up again.'"[34]

But the "Shadowtrack"-system does not only seamlessly monitor every movement of its user. It increasingly implements behavioural predictions through algorithms and machine learning in what the companies call "experimental predictive analytics", which could lead to wrong arrests for violation of probation laws.[35] Shadowtrack's voice-recognition algorithm claims to be able to detect the use of drugs or alcohol by a person, combining slurs of speech with other parameters. Another system, called "SmartLink" follows movement-patterns of the smartphone user to predict his or her likelihood of absconding or any approach to what the system qualifies as "risk locations".[36]

32 See: Hern, Alex, Berlin artist uses 99 phones to trick Google into traffic jam alert. In: The Guardian, 03.02.2020, www.theguardian.com/technology/2020/feb/03/berlin-artist-uses-99-phones-trick-google-maps-traffic-jam-alert (April 20, 2020).

33 Feathers, Todd: 'They track every move': how US parole apps created digital prisoners. In: The Guardian, 04.03.2021, www.theguardian.com/global-development/2021/mar/04/they-track-every-move-how-us-parole-apps-created-digital-prisoners (April 20, 2020).

34 Ibid.

35 Ibid.

36 See: ibid.

All the companies behind these applications are private, most of them connected to the correctional industry of the USA. By using smartphones, which are increasingly the equivalent of a person's identity, their business potentials seem without limits. "The next generation of monitoring technology promises to go even further. Researchers at Purdue University in Indiana, funded by a federal grant, are combining tracking apps with devices that monitor the user's cortisol levels and heart rate as markers for stress. That biometric data, along with location histories and other information collected through apps, will be fed into algorithms to determine whether a person is engaging in risky behaviour that could lead to reoffending, potentially sending an automatic alert to a parole officer."[37] All this is happening in what could be called "digital capitalism", and the revenue for companies thus even extends to pulling vast amounts of biometric data from people being convicted by the state to use these apps. As minorities and people of colour are overrepresented in the incarceration system, the bodies of black individuals and their space are turned into commodities.[38] Where two hundred years ago, with the change from physical punishment to workhouses the manual labour of the prisoner was exploited, now his body dissolves into data and this information is not only used against him, but also marketed by private companies.

Proximity equals time and saving time is one of the highest preferences in a capitalist service-economy. The recent example of delivery-drivers hanging smart-phones in trees next to shops in the USA shows their despair to satisfy the algorithm.[39] This applies not only to the delivery-times, but also the response-time of riders working in delivery trying to get jobs. Therefore, the dispatch-algorithm has a preference for drivers as close to the pick-up point of the delivery as possible. The closer a driver is, the higher the probability to be the first to receive the order. But due to the logic of the identification of an individual with its smartphone, the simple logic of the delivery dispatch algorithms can be tricked by the use of multiple devices per person. As the phones are among the most expensive possessions of many of the riders, locations difficult to reach are used to expose their multiplied identities. Hanging high up they are waiting to be detected by the delivery-app, equivalent to a small queue of identical people. "Someone places several devices in a tree located

37 Ibid.

38 See: ibid.

39 Soper, Spencer, Amazon Drivers Are Hanging Smartphones in Trees to Get More Work. In: Bloomberg Quint, 01.09.2020, www.bloombergquint.com/business/amazon-drivers-are-hanging-smartphones-in-trees-to-get-more-work (November 12, 2020).

close to the station where deliveries originate. Drivers in on the plot then sync their own phones with the ones in the tree and wait nearby for an order pick-up. The reason for the odd placement [...] is to take advantage of the handsets' proximity to the station, combined with software that constantly monitors Amazon's dispatch network, to get a split-second jump on competing drivers."[40] The delivery system of Amazon can locate smartphones in a radius of four meters, which creates a pattern for the distribution of proxy-phones around the origin of orders, e.g. a supermarket of the company's Whole Foods chain. What used to be the queue of casual workers lining up outside a factory waiting for jobs, is now replaced by the phones in the hands and pockets of self-employed entrepreneurs. This rather traditional disobedience on the borderline between the physical and the virtual world is accompanied by attempts to directly tap into the technology and the code running the system. In their zeal to accumulate orders and with that income, drivers are surveilling each other by taking pictures and filming to speculate via social media, which technologies are used to receive orders faster than competitors. This also leads to informing on colleagues and reporting them to Amazon for alleged rigging of the company's delivery dispatch system.[41]

Offline

To escape the regime of algorithmic management and the space it constructs, there are attempts to bring workers together, although the platforms do not allow such organisation. The disobedience in this case is as old as it is simple: empathy, friendship and care, as the example of a rider in Shanghai shows: "Yongqiang's style is to build a face-to-face community, letting brothers and sisters participate in more activities and have more heart-to-heart conversations and social interactions. In so doing, they can strengthen their ties of friendship and de-stress. 'I hope to be able to organize offline activities within this community, such as making a community flag, organizing offline dinners where we would all split the bill, and so on. To let everyone, interact to the full and have support.'"[42] To go offline or to discard your phone seems

40 Ibid.

41 See: ibid.

42 Li, Tangzhe: Feeding the Chinese City, 12.10.2020, https://progressive.international/wire/2020-10-12-feeding-the-chinese-city/en (Dezember 10, 2020).

the ultimate disobedience to a system that dehumanises work. So parallel and in contrast to the inescapable and fake "community" of the platform, a complete retreat into the world of real communication is offering not only logistical, but also emotional solidarity and relief.

Another way is using digital means for the development of delivery driver mass channels, which are expanding rapidly in China. They even spread self-made maps, as reliable systems of numbering houses are still missing or incomplete in many Chinese cities. "Jiang Yilong is precisely the designer of the Hangzhou area 'delivery driver building number sorting map'. He rendered the residential neighbourhoods within a 5–10-kilometre radius into a two-dimensional map and then labelled it with building numbers. This has made things much easier for newly inducted delivery drivers."[43] So new maps are unfolding, parallel to algorithmic space but at the moment only filling the gaps of the system. The delivery driver media do not stop there, but offer support with providing information about "cheaper battery-powered bike rentals, lithium battery rentals, emergency bike repair, battery charging and other services."[44] Their services meanwhile also include information on affordable flats and even "delivery driver meals"[45] of healthy food at a low price. Thus, a new commons arises, if only at the level of reproduction and in reaction to existing grievances. But there is also a growing number of platform cooperatives evolving, trying to use digital methods of work-organisation to increase the welfare both of workers and customers.

Where algorithms are used in liberal market capitalism to enforce individualisation or even atomisation of the work-force and a winner-takes-it-all mentality, the workers under their regime organise to counteract against the antagonising conditions the underlying ideology produces. These new communities are based on mutual aid, communication and practical help. They are oscillating between counteracting against the regime of the platforms and mollifying the destructive effects of their business principles. "If there is anyone in the community who has come into special circumstances and cannot deliver an order on time, or if there is any need for help in life or in work, community members will encourage each other to help out."[46]

43 Ibid.
44 Ibid.
45 Ibid.
46 Ibid.

Algorithms tend to contract space, leading to paradoxical situations like navigating unlawful routes and trespassing regulations. They tend to ignore human behaviour, obstacles, weather conditions or any other aspects that are not reducible to the minimum distance between points. Algorithmic space at the moment is a flatland without places, if places are locations loaded with qualities beyond geometrical or topographical information. Digital abstraction reduces space to the geometrical distribution of positions. The complexity of what culturally, socially and architecturally is perceived as a "place" is therefore reduced to points on surfaces in a coordinate system. Place is reduced to locations between movements, to calculable positions. "This is not just a matter of nostalgia. An active desire for the particularity of place—for what is truly 'local' or 'regional'—is aroused by such increasingly common experiences. Place brings with it the very elements sheared off in the planiformity of site: identity, character, nuance, history."[47]

Obedience is no longer a conscious act, voluntarily following rules or instructions, but immanent to this construction and reconstruction of space. Disobedience can only either altogether ignore it, beat it with its own weapons, or try to critically balance it through sufficient manipulatory and social exchange with the real world. Because, as the psychologist George Herbert Mead said: "The reality of what we see is what we can handle—it is this which is congruous, it is this which is contemporaneous, it is this which may be conceived of as existing at an instant for the purposes of exact measurement, it is this which may in imagination be indefinitely subdivided without reaching a contradiction, it is this which existing at a distance has the same character as at hand [...]."[48]

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