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Is there such a thing as a ‘fair’ distribution of road space?

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ABSTRACT

In recent years, various reports and studies have provided quantified estimates of the distribution of road space among different transport modes in various cities worldwide. In doing so, and inspired by broader discussions on transport and urban justice, they have sought to point out the unfairness of existing patterns of road space distribution. Although intuitively tempting, this paper argues that appeals in favour of a ‘fair’ distribution of road space are inherently problematic. In order to illustrate this point, the distribution of road space in Amsterdam is measured using GIS cartography and discussed in relation to various transport-related indicators.

Introduction

The distribution of road space among different modes of transport is a heavily contested issue in many cities worldwide (Oldenziel and de la Bruhèze 2011; Jones 2014). Proposed changes in the distribution of road space frequently spur lively public debates, and elicit virulent responses from those adversely affected by such changes (e.g., Parkhurst 2003; Lubitow and Miller 2013). New bicycle lanes in major cities such as New York and London in recent years, for example, have been welcomed by many who see them as a chance to make cities more liveable, greener and safer; at the same time, they have also been a target for the ire of disgruntled taxi drivers, businesses and local residents (including Woody Allen in the case of NYC).

Over the past few years, a number of (mainly non-academic) studies have sought to quantify the distribution of road space among different modes in a variety of cities as a means of highlighting the perceived injustice of existing patterns of road space distribution. Implicitly or explicitly, all of these studies (Agentur für clevere Städte 2014; Gössling et al. 2016; Milieudefensie 2017; Colville-Andersen 2018) treat the comparison between road space distribution and local modal split as a meaningful measure of ‘fairness’: if the road space allocated to a mode is higher than its relative modal share, it is unfairly advantaged, and vice versa.

Using the city of Amsterdam as a case study, this paper argues that although arguments in favour of a fairer distribution of road space based on the imbalance between modal split and road space distribution are intuitively appealing, they are also excessively simplistic. In various respects, Amsterdam’s unique urban landscape makes it a particularly
interesting case study through which to examine this question. While the distribution of road space is a contentious issue in many cities worldwide, Amsterdam’s idiosyncrasies – including its canal-based historical centre, tourist-related overcrowding, and the prominence of cycling as a form of urban transport (with an estimated modal share of 27%) – have led to a particularly animated public debate on how best to distribute the scarce road space available in the city. Such a debate has intensified due to the continuous growth of cyclist numbers in recent years, which has led to the phenomenon of cycling lane congestion (Het Parool 16/9/2017). In addition, and building on the city’s existing cycling culture, new vehicle types – such as scooters, e-bikes, tricycles and microcars – are becoming increasingly popular, raising the question of which part of the street they belong to. While Amsterdam has long been renowned for its progressive strategies to disincentivize car use – including traffic calming, parking pricing and generally making life difficult for cars – the city has been increasingly resorting to more adventurous ideas in this direction, such as carrying out experimental traffic closures or reconverting conventional streets into ‘bicycle streets’ (Gemeente Amsterdam 2016). Given its position at the forefront of current urban mobility trends and policies, the present paper argues that the case of Amsterdam is particularly valuable in exposing the limitations of conventional ways of thinking about road space distribution.

The paper begins by providing a brief overview of existing studies in this field, and then proceeds to detail the method used for calculating the distribution of road space in Amsterdam. The discussion section puts forward three main arguments why attempts to define a ‘fair’ distribution of road space are considered to be problematic. While accepting the usefulness of comparative assessments of road space distribution, it is suggested that it might be fruitful to focus on traffic speeds as a complementary measure of urban transport justice.

Literature overview

The street as a space of (in)justice

Think of a city and what comes to mind? Its streets. If a city’s streets look interesting, the city looks interesting; if they look dull, the city looks dull. (Jacobs 1961, 29)

As the above quote suggests, a city is largely defined by the character of its streets. Streets are physical spaces, but also social and symbolic ones (Zavestoki and Agyeman 2015). It is only natural, therefore, that city streets should constitute a primary site of struggle in relation to a variety of intertwined social, transport, public space and environmental issues (Hartman and Prytherch 2015). The physical layout of a street and how it is used by different transport modes constitutes a prime example of such a struggle. As various transport historians have noted, ‘roads were not built for cars’ (Reid 2015). Indeed, it is only through a long and contested historical process that city streets have come to be seen as the natural domain of motorized traffic, instead of a shared space accommodating a variety of different uses (Norton 2008; Oldenziel and de la Bruhèze 2011).

For the most part, existing debates on transport justice have focused on the social equity implications of urban-scale issues such as accessibility, travel times and large-
scale transport investments (e.g., Lucas 2004; Martens 2016), rather than on street-level issues. In recent years, however, a growing number of authors have sought to explore the link between street-level mobility and urban transport justice. Gössling (2016), for example, highlights the centrality of space distribution to transport justice, discussing its relation to the issues of area use, access and infrastructure provision. Building upon existing work on public space and the ‘right to the city’ (Lefebvre 1968; Mitchell 2003), and influenced by the ‘mobilities’ turn and calls to explore the ‘politics of mobility’ (Cresswell 2010; Sheller 2018), geographers have also taken an interest in the relationship between street-level mobility and social equity. Hartman and Prytherch (2015), for example, have attempted to define what constitutes a ‘just street’ based on principles of access, inclusivity, fellowship and equal rights for all. As they note, a just street should not merely constitute a space for transportation, but rather a shared public and social space which accommodates a variety of different uses.

To some extent, these ambitions have been taken up by the Livable Streets and Complete Streets movements in the US, which campaign for ‘streets for all’. Complete streets seek to provide a safe and comfortable environment for all transport modes, including pedestrians and cyclists; in doing so, they typically entail a redistribution of road space which seeks to redress the power imbalance between motorized and non-motorized transport modes. However, such initiatives have been criticized by Zavestoki and Agyeman (2015) as suffering from a ‘mobility bias’ which ultimately reduces people to their mode of transport. In reality, urban streets function both as corridors of movement and stationary public spaces, and we ought to be aware of both of these dimensions when thinking and planning for them (von Schönfeld and Bertolini 2017). In addition, initiatives inspired by the Complete Streets movement often pit different transport modes against each other as mutual competitors for road space, thereby ignoring the possibility of a shared use of space (Lee 2015).

Measuring the distribution of road space

Despite the growing volume of literature highlighting the connection between the distribution of road space and issues of urban and transport justice, academic articles seeking to explicitly measure the existing distribution of road space remain scarce (Gössling et al. 2016). Indeed, determining the precise allocation of road space between transport modes has traditionally been thought of as primarily the domain of traffic engineers and modellers (de Vasconcellos 2004; Jones 2014). From a traffic engineering perspective, the allocation of road space is typically geared towards the optimization of congested networks to maximize flow (e.g., Zheng and Geroliminis 2013), and justified through economic discourses such as cost-benefit analysis (e.g., Currie, Sarvi, and Young 2007).

However, as various authors have pointed out, the use of technical and engineering-based discourses frequently acts as a mask for what is ultimately a political choice to prioritize motorized traffic over other forms of transport (Norton 2008; Hartman and Prytherch 2015). In recent years, a growing number of reports and studies have sought to quantitatively measure the distribution of road space among different transport modes in order to emphasize the perceived injustice of current practices of road space allocation. Perhaps the best-known example comes from the popular blog Copenhagenize by self-proclaimed bicycle planner Michael Colville-Andersen, who coined the term ‘arrogance of space’ to refer to the mismatch
between the amount of space given to different transport modes and their relative modal split in a variety of cities (Colville-Andersen 2018). However, his analysis only looked at specific streets/intersections rather than a wider area (see Figure 1), and was based on rough calculations, making it more of a provocative piece of bicycle advocacy than a rigorous form of analysis.

A more comprehensive effort can be found in a report by the Agentur für clevere Städte (2014), which measured the distribution of road space across 200 streets in Berlin, and reflected on the unfairness of the existing distribution from the perspective of pedestrians and cyclists as compared with that of motor vehicles. More recently, a similar report has been published by the Dutch environmental organization Milieudefensie in the Netherlands, which assesses the distribution of road space in the 20 largest municipalities in the Netherlands using GIS cartography (Milieudefensie 2017).

In addition to these reports, the online platform 'What the Street!? provides an online resource that calculates road space distribution for a number of cities worldwide based on OpenStreetMap data. This resource has been discussed in a recent article by Szell (2018); given the crudeness of its calculations, however, its intention is not to provide accurate results but rather to offer a playful visualization to generate debate on the subject of road space distribution.

As far as could be established, the only existing academic article seeking to measure the distribution of road space is to be found in Gössling et al. (2016), who measured road space distribution in a series of neighbourhood areas in Freiburg (Germany) based on the manual processing of satellite imagery. As a result of the labour-intensive nature of the process, their study was unable to measure the distribution of road space across the whole city.

As mentioned in the introduction, all of these reports and studies seek to compare the distribution of road space with local modal split as a means of pointing out the...
‘unfairness’ of the existing distribution of road space. Gössling et al. (2016), for example, note that cyclists in Freiburg are the most disadvantaged since they are only allocated 1–4% of road space despite constituting almost one-third of all trips; the report by the Agentur für clevere Städte (2014) reaches a similar conclusion in Berlin. In doing so, these studies share the underlying assumption that we can define a ‘fair’ distribution of road space based on modal split. This line of reasoning is commonly used by advocates of active transport modes to argue for the reduction of space for motor vehicles, which typically occupy more road space than their relative modal share. This assumption, this paper argues using the case of Amsterdam as an illustration, is inherently problematic for a number of reasons.

Calculating the distribution of road space in Amsterdam

In order to measure the distribution of road space among various transport modes across the whole of Amsterdam, the Basic Largescale Topography map of the Netherlands (Basis Grootschalige Topografie – BGT) was used. In this respect, this study mirrors the recent Milieudefensie (2017) report, which is based on the same data source and uses a similar method to the present paper. The BGT service was launched in 2016, is publicly available in digital form and represents the most detailed cartography of the Netherlands to date. The BGT has a scale of 1:500–1:2000, a positioning accuracy of 30 cm, and contains a variety of vector GIS layers. Each road layer is formed by individual polygon objects, making it easy to accurately calculate total road surfaces (see Figure 2).

Total road surfaces were calculated using the open source GIS software QGIS, and subsequently processed in R and Microsoft Excel. In order to explore differences in road space distribution within Amsterdam, the city was divided into 22 areas based on the aggregation of 4-digit postcode boundaries (excluding rural and industrial port postcodes within municipal boundaries) – a scale used by the city of Amsterdam itself to provide statistical data.

Based on the layers available in the BGT map, the distribution of road space was measured across the following categories:

- **Roads** (motorized traffic), split into:
  - Highways
  - Primary roads
  - Secondary roads
- **Pedestrians** (incl. footpaths, pedestrian areas, squares)
- **Cycle paths** (dedicated infrastructure exclusive to cyclists)
- **Tram/bus lane** (incl. exclusive lanes and mixed with motorized traffic)
- **Parking** (on-street car parking)

It is important to note that while the above classification divides all road space into separate modes, in practice certain categories might accommodate more than one mode. While the ‘highway’ and ‘cycle paths’ categories are respectively exclusive to motorized traffic and cyclists, the category ‘secondary roads’, for example, may be used by both private vehicles and cyclists. Similarly, the category ‘tram/bus lanes’ includes both lanes restricted to public transport and lanes shared with private vehicles. In this
sense, the above categories are based on the dominant mode across each type of road space, even if they are occasionally shared with other transport modes. Given the way layers are classified in the BGT database, it is impossible to divide road space into alternative or more detailed categories than the ones used. In addition, a small number of additional layers which proved difficult to assign to any of the above categories (such as overpasses, transition areas and horse trails) were excluded. The surface covered by these layers is minimal, meaning that their inclusion/exclusion is unlikely to have had any meaningful impact on the results.

The distribution of road space across various categories for the whole of Amsterdam is shown in Figure 3. Motorized traffic (‘Roads’ in Figure 3) and pedestrian zones take up by far the most space, with 41% and 40% of the total share, respectively, followed far behind by car parking (10%), cycle paths (7%) and tram/bus lanes (2%). If the results are presented across 22 geographical areas rather than for the city as a whole, moderate differences can be found in the amount of road space allocated to different forms of transport (see Figure 4). The amount of space allocated to pedestrians and motorized traffic, in particular, varies considerably, with both categories taking up approximately between 30–50% of the whole depending on the neighbourhood considered. The amount of space allocated to pedestrians is approximately inversely correlated with the amount of space given to motorized traffic: in central areas of the city pedestrians tend to be given more space than motorized traffic, while the opposite is true in more peripheral neighbourhoods.
Discussion

Using the findings from Amsterdam as an illustration, this section puts forward three main reasons why the idea of a ‘fair’ distribution of road space is considered to be problematic. Each reason provides the heading of the corresponding subsection. Subsequently, the paper briefly puts forward the case for a comparative perspective on road space distribution, and tentatively proposes to focus on traffic speeds as a complementary measure of justice.

**Discussion**

Using the findings from Amsterdam as an illustration, this section puts forward three main reasons why the idea of a ‘fair’ distribution of road space is considered to be problematic. Each reason provides the heading of the corresponding subsection. Subsequently, the paper briefly puts forward the case for a comparative perspective on road space distribution, and tentatively proposes to focus on traffic speeds as a complementary measure of justice.

_Pleas for a fair distribution of road space do not always advance a progressive transport agenda_

How fair is the existing distribution of road space in Amsterdam? Following the line of previous studies (Agentur für clevere Städte 2014; Gössling et al. 2016; Milieudefensie 2017), answers to this question might be sought by comparing the distribution of road space with the city’s modal split. Table 1 presents a comparison between modal share\(^5\)
and road space distribution in Amsterdam, together with the difference between two figures. Note that for this table (as well as the following ones), the percentage of road space occupied by cars is based on the addition of the ‘Roads (motorized traffic)’ and ‘parking’ categories.

This is an intuitively appealing comparison, and apparently provides an easy way of deciding whether the existing distribution of space is ‘fair’ or not. In the case of Amsterdam, it can be seen that cyclists are given 20% less space than they ‘deserve’: given the large contribution of cyclists to keeping the city moving, why should they not be rewarded with more space? Similarly, it can be seen that cars occupy 19% more space than warranted by their modal share, ostensibly providing a good argument for reducing the amount of space allocated to motor traffic.

However, the case of pedestrians illustrates the fundamental problem behind this comparison. Adhering to the same logic, one reaches the conclusion that pedestrians occupy 22% more space than their fair share. Does this mean that they deserve less space? Given the currently dominant sustainable transport paradigm (Banister 2008), few would be in favour of such a move. Although the comparison between space distribution and modal split is frequently used by sustainable transport advocates, it would seem that this argument is only used selectively in cases where the modal share of active modes is larger than the relative amount of road space they occupy. In car-dominated geographic contexts, however, applying the same reasoning leads to the strengthening of the car-oriented status quo. In a city where 80% of trips are made by car, for example, does this mean it is fair to allocate 80% of road space to motor vehicles? This may be a hyperbolic example, but it clearly shows that entreaties for a fairer distribution of road space based on modal split do not always advance a progressive transport agenda. Moreover, there is no universally agreed definition of modal split: in practice, modal split estimates vary widely depending on the geographic scale and range of trips considered, and are frequently based on data which ignores trip chains and undercounts short trips (Clifton and Muhs 2012).

As an alternative to modal share, Gössling et al. (2016) put forward the possibility of comparing road space distribution with total distances travelled per mode (their study of Freiburg was unable to make such a comparison due to data unavailability). The argument here is that total distances travelled per mode provide a better indicator of overall transport volumes (because mode shares do not take trip lengths into account), and therefore a better measure to compare against road space distribution.

In the case of Amsterdam, this paper uses the average number of kilometres travelled per person per day (avg. km/person/day) – expressed as a percentage of the total for each transport mode – as an approximate indicator of total distances travelled. This is arguably a somewhat inaccurate proxy, but it is good enough to illustrate the point which is trying to be made. As shown in Table 2, if road space distribution is compared

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### Table 1. Comparison of road space distribution and modal share in Amsterdam.

<table>
<thead>
<tr>
<th></th>
<th>Space distribution</th>
<th>Modal share</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cars</td>
<td>51%</td>
<td>32%</td>
<td>+19%</td>
</tr>
<tr>
<td>Pedestrians</td>
<td>40%</td>
<td>18%</td>
<td>+22%</td>
</tr>
<tr>
<td>Bicycles</td>
<td>7%</td>
<td>27%</td>
<td>−20%</td>
</tr>
</tbody>
</table>

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with total distances travelled, it can be concluded that it is cars, rather than pedestrians or cyclists, which have the lower hand within the existing arrangement: they are responsible for 71% of all kilometres travelled, but only occupy 51% of the road space.

Here once more, it becomes evident that appeals for a ‘fair’ distribution of road space do not necessarily favour sustainable transport modes. The problem with this comparison is that by focusing on distances travelled by mode we are inherently privileging longer trips over shorter ones – and thereby transport modes which can easily cover long distances. In principle, there is no reason why longer trips should be seen as more valuable than shorter ones; indeed, from the perspectives of environmental sustainability and accessibility-based planning, it rather seems that the opposite should be true (Bertolini and Clercq 2003).

**Different transport modes have fundamentally different characteristics**

Both the comparisons with modal share and total distances travelled by mode ignore a seemingly trivial, yet crucial point: different transport modes take up a different amount of physical space (see Figure 5). Indeed, this very point is a main premise for the argument that the existing distribution of road space is unfair, since it tends to reward the most spatially inefficient modes. From a purely physical perspective, however – think about traffic engineering and flow theory – this means that achieving an equitable distribution of space between transport modes is a manifest impossibility: that a moving car takes up 70 more times more space than a pedestrian is a fact which simply cannot be ignored.

Taking this point to the extreme, the argument can even be twisted around: from a purely physical perspective, it can be claimed that the most just outcome is for each transport mode to occupy the road space proportional to its modal share and its relative physical size. By multiplying the mode share of each transport mode by the amount of

<table>
<thead>
<tr>
<th>Space distribution</th>
<th>Avg. km/person/day</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cars</td>
<td>51%</td>
<td>7.5 km → 71%</td>
</tr>
<tr>
<td>Pedestrians</td>
<td>40%</td>
<td>0.8 km → 8%</td>
</tr>
<tr>
<td>Bicycles</td>
<td>7%</td>
<td>2.2 km → 21%</td>
</tr>
</tbody>
</table>

*Table 2. Comparison of road space distribution and total km travelled per mode in Amsterdam.*

*Figure 5. Relative amount of space occupied by different modes of transport (car space usage is based on 1 occupant at 50 km/h; bicycle space is based on 15 km/h). Source: Municipality of Amsterdam.*
space it requires – thereby creating a ‘weighted’ score based on the combination of mode share and space requirements (and transforming the scores into relative percentages) – one obtains the results displayed in Table 3.

In other words, this would mean that cars should be given 96% of road space (45% more than at present) given their relatively large size, while pedestrians and cyclists should have enough with the remaining 4% as a result of their vastly superior spatial efficiency. Of course, it is ridiculous to pretend to treat cars in the same way as pedestrians: we expect cars to pile up at junctions, but not pedestrians to pile up on sidewalks in an identical manner. However, this hyperbolic example illustrates how it makes little sense to judge all transport modes using the same measure, thereby ignoring their fundamentally different intrinsic characteristics. The advantage of cycling, for example, lies precisely in its spatial efficiency, flexibility and ability to move large amounts of people in a reduced space; accordingly, it makes little sense to treat cyclists’ space requirements as similar to those of either cars or pedestrians. In the case of pedestrians, walking is often not just walking, but also talking, daydreaming, observing or even sitting: for these reasons, one may argue, the pedestrian realm needs to be much more generously sized than for other transport modes. Cars, meanwhile, tend to privatize space by laying exclusive claims to it. As written by Mercier (2009, 150), the enjoyment of driving derives from the feeling that ‘what I have, others don’t have … As an ego-enhancing medium, the automobile disrupts the balance between the public sphere and the private sphere, in favor of the latter’. The spatial inefficiency of cars also means that congestion is almost inevitable, and this very fact helps limit the total number of car trips within the city. In brief, because of the varied sizes, speeds and characteristics of different transport modes, their road space requirements cannot be seen as comparable or even commeasurable.

**Table 3.** Comparison of road space distribution and modal share weighted by space requirement for each mode.

<table>
<thead>
<tr>
<th></th>
<th>Space distribution</th>
<th>Mode share x space requirement</th>
<th>Weighted score</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cars</td>
<td>51%</td>
<td>32% x 140m²</td>
<td>96%</td>
<td>−45%</td>
</tr>
<tr>
<td>Pedestrians</td>
<td>40%</td>
<td>18% x 2m²</td>
<td>1%</td>
<td>+39%</td>
</tr>
<tr>
<td>Bicycles</td>
<td>7%</td>
<td>27% x 5m²</td>
<td>3%</td>
<td>+4%</td>
</tr>
</tbody>
</table>

**Dividing road space between transport modes ignores the role of streets as shared public spaces**

Quantitative estimates of the distribution of road space encourage us to see road space as a commodity to be divided among different transport modes. As Lee (2015) argues speaking about New York, the competition for scarce road space ultimately promotes the ‘neoliberal privatization and subdivision of street space as it helps pick winners and losers in mobility’ (87). Indeed, the rigid classification of road space into different uses is unable to cope with the existence of concepts such as shared space (Hamilton-Baillie 2008). In the case of Amsterdam, the road categories used in the present paper were determined by the ‘official’ categories available in the BGT data; in practice, however, such categories are rarely clear-cut. As noted in the introduction, the blurriness of these categories is particularly pronounced in Amsterdam, where the existence of a large
number of cyclists and the far-reaching nature of traffic calming measures mean that that the clear distinction between ‘car space’, ‘cycling space’ and ‘pedestrian space’ frequently breaks down. A large number of secondary roads in Amsterdam, for example, are mainly used by cyclists rather than car drivers: in some cases, these roads arguably even offer better cycling facilities than unprotected cycling lanes along main roads. Cyclists also frequently make use of nominally pedestrian areas, while certain quiet residential roads provide suitable playing spaces for children. On the other hand, cars often temporarily make use of pedestrian sidewalks for loading purposes.

As these examples illustrate, dividing road space into a series of distinct functions does not necessarily match the existing situation on the ground, but rather replicates a car-centric imaginary which forces us to see road space as exclusive to a single mode of transport. Although certain uses (e.g., highways) are exclusive to some forms of transport, in reality there is a large spectrum of road space which permits some degree of mixed use across two or more different transport modes. Indeed, it can be argued that seeing different transport modes as competing among each other in a context of road space scarcity promotes an antagonistic way of thinking, and that alternative conceptualizations of road space and mobility as a ‘commons’ might provide a more fruitful conceptualization of urban mobility (Nikolaeva et al. 2019).

More fundamentally, dividing road space areas among transport modes tends to implicitly assume that streets are little more than the physical stage for transportation. In reality, however, the allocation of road space is just as much about public space as about mobility: streets function not only as spaces of movement, but as places in themselves (Mehta 2015; von Schönfeld and Bertolini 2017). This is particularly true in the case of pedestrian spaces, which perform a range of functions (social, aesthetic, economic, etc.) which are unrelated to movement. This means that, ironically, arguments in favour of a ‘fairer’ distribution of road space among different modes by sustainable transport advocates end up unwittingly reproducing the traffic engineering mentality they are seeking to criticize (Mehta 2015).

**A comparative take on road space distribution**

While it may be impossible to define an ideal distribution of road space, this certainly does not mean that estimates of road space distribution are of no use. Echoing Amartya Sen’s (2009) argument in favour of a comparative idea of justice, it might be argued that a comparative understanding of road space offers more promise than an absolute one. Although it might not be possible to define an ideally fair distribution of road space, in practice we often have a good sense of whether a specific distribution is *fairer* than another. In this sense, intra- and inter-city comparisons of road space distribution in space and time can offer a valuable and insightful contribution to existing debates on urban transportation, liveability and sustainability.

For example, one might compare road space distribution across various cities. Methodological differences between studies, however, mean it is necessary to be cautious with such comparisons. In Table 4, the present findings for Amsterdam are compared with those from Freiburg (Gössling et al. 2016) and Berlin (Agentur für clevere Städte 2014). Despite the existence of significant differences among the three cities, the percentage of road space occupied by each category is of a similar magnitude. Given the
largely shared urban/transport structure of contemporary (European) cities, it is not surprising that the inter-city variance of road space distribution appears to be relatively limited. Nevertheless, important differences between the three cities are also visible: the total of 7% of road space allocated exclusively to bicycles in Amsterdam might not seem extremely high, but it is more than double the amount of space allocated to cycling lanes in Berlin and Freiburg – two cities which in an international context are also considered bicycle-friendly. In this respect, the preponderance of cycling as a form of transport in Amsterdam is echoed in physical space: few cities outside the Netherlands or Denmark are likely to allocate such a relatively high amount of space to cycling lanes.

As a complement to comparisons between cities, measuring the historical evolution of road space distribution within a single city might also provide an interesting form of visualizing and assessing changes in urban form, transport networks and the usage of public space. While historical data is likely to be limited in many cases, this will almost certainly be less of a problem in the future. Repeating the present study in a number of years – 5, 10 or 20 – and assessing how much the distribution of road space has changed compared to the present, for example, might offer a valuable indicator of the historical evolution of transport priorities in Amsterdam.

### From the distribution of space to the distribution of speed

While comparative assessments of road space distribution are useful in highlighting geographical or historical differences in how space is distributed, they are still based on a logic which pits different modes of transport against each other. As a means of avoiding this form of thinking, the present paper would like to tentatively suggest that it might be promising to focus on the distribution of traffic speed as a complementary measure of urban transport fairness. As contended by Illich in his well-known *Energy and Equity* (1974), true social equity is only possible with low levels of energy consumption per capita: in the realm of urban transportation, energy essentially equals speed (multiplied by mass). This means that ‘high speed is the critical factor which makes transportation socially destructive’ (Illich 1974, 12). Once traffic speeds exceed approximately 15 mph (24 km/h), roads become the monopoly of motorized traffic, effectively excluding other users such as pedestrians and cyclists. Greater traffic speeds also require a much greater quantity of road space, thereby constituting a major contributor to the scarcity of space. In addition, they lead to a form of spatial development which forces people to depend on motorized transport, eventually creating commuting dependency and increased time scarcity. Finally, there is abundant evidence that higher speeds increase the risk of traffic accidents, and the likelihood of pedestrian fatalities in particular (Ewing and Dumbaugh 2009). For all these reasons, Illich (1974) concludes that ‘free people must travel the road to productive social relations at the speed of a bicycle’ (12).
Therefore, measuring the distribution of street speed limits at a city-wide or neighbourhood level might potentially offer a simple but useful measure of equity between different forms of transport: a priori, a given area is more equitable the lower its street speed limits are. Following this logic, a city dominated by shared spaces at low speeds might be more equitable than a city with high levels of traffic segregation, even if the second gives more exclusive space to cyclists and pedestrians.

The distribution of speed limits for a given city could be summarized in the form of a histogram, allowing easy comparison between different cities. While citywide databases of street speed limits do not always exist (e.g., in the case of Amsterdam), such data are increasingly available in open data repositories. In some cases, there might also be a discrepancy between nominal speed limits and observed traffic speeds. However, the increased availability of real traffic speed data based on GPS tracking might allow us to measure the distribution of real as well as legal traffic speeds, and be used to highlight differences between both. In the case of the Netherlands, for example, the company Spotzi provides information on average real traffic speeds based on data from navigation company TomTom (unfortunately at a significant cost – see Figure 6).

To focus exclusively on speed is admittedly a crude measure: there are a lot of critical related issues beyond speed limits which cannot be easily measured, such as tacit traffic conventions, priority and right-of-way (Prytherch 2012). Indeed, the simplistic focus on a single indicator – in this case speed – arguably suffers from the same reductionist logic this paper has sought to criticize in relation to road space distribution, albeit replacing one dimension (space) for another (speed). Accordingly, the proposal to focus on speed

Figure 6. Map of average traffic speeds in central Amsterdam. Source: Spotzi.
needs to be understood not as an appeal to replace one simplistic indicator of fairness with another, but rather as a tentative call to combine different indicators to obtain a richer, even if inevitably imperfect, means of assessing urban transport equity. If nothing else, the focus on speed offers a starting point for thinking differently about road space. By putting the emphasis on speed rather than on the distribution of space between transport modes, such a measure helps us move from a mentality of competition between modes towards the idea of a mobility commons (Nikolaeva et al. 2017). To quote Illich (1974) once more, motor vehicles need not always be a source of exclusion: at low speeds, ‘motors can be used to transport the sick, the lame, the old and the just plain lazy’ (68). Focusing on speeds rather than individual transport modes also makes it possible to bring various emergent types of vehicles into the debate (e.g., electrical scooters, tricycles, Segways, rickshaws).

To illustrate the value of focusing on traffic speeds rather than exclusively on the distribution of space, consider the case provided by the redesign of the Sarphatistraat in Amsterdam in June 2016. With the goal of improving conditions for cyclists, this redesign consisted in a trial in which separate bicycle lane markings were removed and the whole roadway converted into a ‘bicycle street’, in which cars were not banned, but allowed as ‘guests’. In addition, the maximum speed limit was lowered from 50 to 30 km/h (see Figure 7).

Interestingly, the redesign actually reduced the amount of space exclusively allocated to bicycles, since the whole of the roadway became shared between bicycles and motorized traffic. Therefore, following a pure ‘road space distribution’ logic, such a change might seem negative for cyclists. Critically, however, the lowering of traffic speeds resulted in cyclists being given priority over motorized traffic – an arrangement which is mostly respected. Cyclist numbers increased substantially following the redesign of the street, and 88% of surveyed cyclists considered the changes to be an improvement on the previous situation (Gemeente Amsterdam 2016). Following the success of the trial, further similar ‘bicycle streets’ (with cars allowed as ‘guests’) are currently being rolled out in Amsterdam. While such bicycle streets can only be understood within the context of Amsterdam’s relatively low traffic volumes and prominent cycling culture, they nevertheless offer a good example of the usefulness of focusing on traffic speeds as a complement or alternative to road space distribution. Measuring the distribution of traffic speeds (and their

Figure 7. Sarphatistraat before (above) and after (below) its redesign as a ‘bicycle street’. Source: Google Street View.
evolution through time) at a city-wide level, it is suggested, might be useful in showing how small interventions such as the redesign of the Sarphatistraat can scale up and eventually lead to systemic changes in the urban mobility regime.

Conclusions

Quantified estimates of the distribution of road space between different transport modes are becoming increasingly frequent, and are typically presented as evidence of an unfair distribution of road space which favours private motor vehicles over sustainable forms of transport. Despite the appeal of this line of thinking, and using the city of Amsterdam as an example, this paper has argued that calls for a ‘fair’ distribution of road space ultimately rely on a simplistic logic which is inherently problematic. In practice, the allocation of road space is the complex outcome of political, social, technical and historically path-dependent processes (de Vasconcellos 2004); accordingly, arguments for changes in road space distribution should not be based on a single measure of road space justice, but rather follow normative and pragmatic considerations as to what type of cities we want to live in. First, pleas for a fair distribution of road space based on the relative volume of people or goods moved by each transport mode do not necessarily advance a progressive transport agenda. Second, different transport modes have fundamentally different characteristics and relate to space in different ways. Finally, thinking of road space as something to be carved up among transport modes ignores the nature of streets as shared public spaces.

All of this is not to say that we should not be thinking about how best to distribute road space among different transport modes – on the contrary. Road space distribution has enormous implications for urban, transportation and mobilities justice. We need a better understanding, for example, of the ways in which the distribution of road space relates to issues of accessibility and social equity. How do different social groups benefit from (changes in) the existing road space distribution? What are the implications of different ‘road space regimes’ for accident rates? By comparing cities from markedly different contexts (e.g., European vs. Asian vs. American), it might be possible to gain greater insight into geographical variability in road space distribution, allowing us to identify structural differences in road space distribution among different types of city. Ideally, the use of a common methodology would support this goal and allow for meaningful comparisons between different studies. Measurements of road space distribution, however, should only be seen as one of many imperfect ways of assessing the equity of a given urban mobility regime. Instead of focusing solely on road space distribution, it is tentatively suggested that focusing on the distribution of traffic speeds might offer a promising complementary measure of urban transport equity.

Notes

3. Available at https://mijn.pdok.nl/nl/producten/pdok-downloads/download-basisregistratie-grootschalige-topografie
4. See https://www.amsterdam.nl/stelselpedia/bgt-index/catalogus-bgt/objectklasse-wegdl/.

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