

A Different Trolley Problem: The Limits of Environmental Justice and the Promise of Complex Moral Assessments for Transportation Infrastructure

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Abstract Transportation infrastructure tremendously affects the quality of life for urban residents, influences public and mental health, and shapes social relations. Historically, the topic is rich with social and political controversy and the resultant transit systems in the United States cause problems for minority residents and issues for the public. Environmental justice frameworks provide a means to identify and address harms that affect marginalized groups, but environmental justice has limits that cannot account for the mainstream population. To account for this condition, I employ a complex moral assessment measure that provides a way to talk about harms that affect the public.

Keywords Urban planning · Complex moral assessment · Structural ethics · Transportation infrastructure

Introduction

Harmful conditions such as public health impacts and lengthy commute times that the public endures due to municipal transportation systems are morally reprehensible outcomes. Historically, environmental justice frameworks provide much of the necessary criteria for identifying harms that the transit infrastructure causes. To a certain extent, employing an environmental justice framework to determine harm works well, but the limits common to all such frameworks hinder our ability to determine moral wrongs and accountability in all instances. To determine the conditions for such responsibilities, complex moral assessment measures that originate in structural ethics show promise for resolving such issues.

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To flesh out the views above, I provide some background details regarding the social and political nature of the current transportation infrastructure in the United States, followed by an account of the harms resulting from this history. In order to assess the character of such injuries, I refer to the environmental justice literature due to its usefulness for addressing transportation justice issues. While such studies help pinpoint how such damages affect marginalized groups and determine blameworthiness (when appropriate), we find that we cannot go beyond the inherent limits of well-established environmental justice frameworks. Having clarified these points, we gain perspective on how we can account for the harms outside of environmental justice using a complex moral assessment of transportation infrastructure.¹ This measure provides a way to talk about moral responsibility in such instances. In closing, I examine some future areas for research.

The Historical Roots of Our Transportation Crisis

Long before the ‘great streetcar conspiracy’ of the 1940’s, mass transit in the United States was unstable and episodically scandalous (Schrag 2000). New York City, for example, saw transit battles emerge in the 1920s, revealing that the tensions between bus proponents and streetcar (and tram) advocates were symptomatic of larger power struggles that often had more to do with regulation and taxes. Controversy surrounding streetcars and buses reached its highest point during the late 1940s when United States’ attorneys indicted GM and other corporations and persons involved with National City Lines, due to violations of 1890 Sherman Antitrust Act.²

United States’ attorneys accused them of conspiring to monopolize transportation and conspiring to monopolize the sales of buses and bus supplies (Slater 1997). The former conspiracy charge did not stick, but a jury convicted them of the latter charge. Despite the legal outcome, popular media in the United States continues a history of portraying the demise of streetcar transportation as the ends of a sinister plot. While the conspiracy theory holding that General Motors (GM) and other companies eviscerated streetcar systems in the United States in an attempt to monopolize the nation’s transit makes fantastic entertainment, most transportation scholars dispute such claims (Adler 1991).

They argue that overlooked factors such as the appeal of automobiles, along with economic and practical concerns, led to the combustion engine’s reign over American urban mobility. Despite popular opinion among scholars, arguments continue to surface that support the great streetcar scandal (Greenwald 2013). One could argue that such a conspiracy remains convincing because most Americans rely on automobiles, and in turn, they must endure lengthy commutes, along with physical and mental health effects. To understand how holding automobiles and

¹ There is substantial research that connects social justice with transportation concerns. For instance, see: Mercier (2009).

² 186 F.2d 562 United States v. National City Lines, Inc., et al. Nos. 9943–9953.

roadways in higher regard than other transit systems leads to the harms described above, I will outline such effects in the following section.

Roadways in the City

Having a transit system wherein roadways and automobiles are the dominant form of transit presents at least two kinds of problems.³ The first kind of problem concerns environmental justice (EJ) cases, involving minority groups or poor residents receiving some form of harm. The second category does not exclude minority groups, but it concerns the public that endures adverse effects, or “public cases.” When examining the current state of transportation in the United States, roadway systems require extensive study due to their paramount role in urban mobility, influencing numerous aspects of residents’ lives.

For instance, transportation infrastructure in the United States facilitates commerce and travel needs, but highways in cities often have negative effects. This contrast gives researchers motivation to examine this mode of transit, searching for ways to maintain its strengths yet mitigate harm. One complication is that some transportation problems are part of one’s daily routine, typical consequences of urban life. Other issues count as acts of environmental injustice, and the nature of such acts varies widely.

For EJ cases, reliable transportation is one of the primary obstacles that blocks poor people’s paths out of poverty (Wachs 2010; Blumenberga and Agrawalb 2014). Surprisingly, social justice researchers neglect the topic (Martensa et al. 2012). Although the conspiracies above illustrate some moral aspects of municipal governance and ownership of transportation infrastructure, urban mobility problems have far-reaching effects for residents, and some outcomes affect minority residents while several other people benefit from such harms. For instance, suburban commuters outside Atlanta benefit from the highway system, but inner-city minority residents must endure the adverse effects from pollution (Lazarus 2001).⁴ Poor residents living near highways in the Bronx visit hospitals for asthma-related illness more than any other group (Maantay 2007). Highway projects in Los Angeles displace minority residents, forcing them from their communities (Garcia and Rubin 2004).⁵

One could argue that having roadways as the dominant means for urban mobility entails that transit engineers and planners must work around them to improve mobility. For example, adding bus rapid transit (BRT) systems in cities such as Bogotá has greatly improved urban mobility, yet bus systems elsewhere are less successful (Hidalgoa et al. 2013). In some cases, such as in Portland, Oregon, minority bus riders complain about decreases in service, fare increases, poor

³ For some background into such issues, see, Illich (1973).

⁴ It is also worth pointing out that Atlanta’s suburban commuters suffer different adverse health impacts and pollution, to a lesser degree.

⁵ It is not always the case that highways or light rails systems cause problems. On the contrary, bus systems can alleviate harmful conditions. For more information, see, Reft (2015).

treatment from drivers, and often spending several hours per day in transit, taking time away from family obligations, cultural activities, social responsibilities, personal growth, and flourishing (OPAL 2012).

What is more, minority groups that depend on inadequate transit systems lack access to several jobs, cannot access social services, or cannot partake in recreational activities due to scheduling restraints and time conflicts (Deka 2004; Fol and Gallez 2014). Despite such hardships, minority groups must also spend significant amounts of their household income on transportation expenses (Deka 2004). Although these examples above are not an exhaustive list, they illustrate the kinds of environmental justice issues related to having roadways and automobiles as the principal form of transit while lacking other means of mobility.⁶

For cases affecting the public (including poorer residents), several cities lack a feasible alternative to highways and automobiles, making roadway commuters the largest group of workday travelers. In the US, 86 % of workers drive to their jobs (Winston 2013; McKenzie 2015). While 70 % of working-age urban dwellers in the US have access to a form of public transit, 39 million lack such services (Tomer et al. 2011). For example, in Riverside, California, public transit services can only connect workers with 8 % of jobs within 90 min of travel time, and for residents in Knoxville, Tennessee, transit services only reach 25 % of jobs (*ibid.*).

Bearing the points above in mind, the impact of commuting on US residents has several drawbacks. In terms of public health, for instance, residents who commute via automobile put themselves at greater risk of obesity (Christian 2012; Hoehner et al. 2012). People who spend more than 90 min driving each day are prone to neck and back pain, along with increased anxiety and fatigue (Crabtree 2010). Perhaps one cause of worry is traffic fatalities, considering that numerous people die behind the wheel each year.⁷ What is more, commuting via personal vehicle is conducive to social isolation, disconnecting people from social and community structures (Putnam 2001; Miles et al. 2012). Aside from personal isolationism, highways indirectly serve as racial barriers that separate groups (Hardin 2015).

While roadways and automobiles have significant effects on human populations, they also affect non-human animals and ecosystems. For instance, roadway construction displaces local animals and highways block migratory animals (Forman and Alexander 1998). As rainwater moves toward wastewater facilities, it picks up gasoline, oil, heavy metals, and other harmful chemicals, affecting flora and fauna (Burton and Pitt 2001). Moreover, we must also consider that the production of concrete, automobile manufacturing, and industrial processes such as oil refining affect ecosystems and non-human species. Although this list is non-exhaustive, it indicates how such harms go beyond the realm of humankind's immediate grasp.

One could argue that other systems also lead to similar if not worse effects, which is a fair criticism. Consider, for instance, that some light rail systems also displace

⁶ One could argue that the use of bicycles (cf. Beijing etc.), mopeds, motor bikes and other very cheap forms of transportation may alleviate some of the problem issues for minority groups.

⁷ For more information regarding highway related deaths, see <http://www-fars.nhtsa.dot.gov/Main/index.aspx>. Accessed 4 January 2015.

minority residents (Scott 2012). Light rail also separates racial groups, indirectly promoting racial segregation (Hardin 2015). Roadways also have several positive attributes, such as transporting people and goods, and that communities could not have efficient emergency services with them. While weighing the pros and cons of this particular transport system against other systems is an important exercise, the motivation is to illustrate some of the consequences that it brings. Making such comparisons requires that we assess such damages under established criteria or develop alternative means if necessary. To accomplish such a task, I turn to environmental justice frameworks to evaluate the consequences above in the following sections.

Identifying Injuries with Environmental Justice Paradigms

While the above mentioned damages demonstrate that harm remains inevitable for the current arrangement of roadways and vehicles as the dominant transport system in the US, no single established assessment method can adequately determine all kinds of injuries and types of responsibilities. At present, the most common way to talk about harm in transportation cases is through cost-benefit analysis (CBA). Yet, several problems come with employing this approach. First, Adler (2001) argues that CBA works as rough proxy, but that fails when it comes to the distribution of well-being. Wegner and Pascual (2011) endorse this point, yet they focus on how CBA also fails to account for several factors of well-being, along with a general neglect for complex ecological considerations, (among others). They explain that people continue to endorse CBA through using it because it seems practical, it seems democratic despite fundamentally excluding people, and alleges value-neutrality when realities prove otherwise (Wegner and Pascual 2011). In addition to these points, a rather extensive literature review from Jones et al. (2014, 400) illustrates numerous problematic aspects of CBA:

CBA has been criticized on many fronts such as its decision making process (Mouter, Annema, & van Wee 2011), its process (Beukers, Bertolini, & Brommelstroet, 2012), it monetizes non-market goods (Mackie & Preston, 1998; Niemeyer & Spash, 2011), it does not account for equity Banister & Berechman, 2000), the openness of the interpretation of its results (World Bank, 2004), its scrutiny by the public (Persky, 2001), its need for completeness and correctness (Annema Koopmans, & van Wee, 2007), its lack of being understood (Heinzerling & Ackerman, 2002), its ethics (van Wee, 2012) and its discounting of long-term environmental consequences (Ludwig, Brock, & Carpenter, 2005).⁸

Considering all of the problems associated with CBA, one could argue that, as a theoretical or practical approach, it is a total loss. As several of the researchers

⁸ It is worth pointing out the first use of the term “process” refers to CBA’s affects on decisions, while the latter use concerns CBA as a process.

above note, CBA is a forward-looking enterprise, whereas EJ assessments examine harms that have actually occurred—as the results of planners who employed a CBA!

Although it seems unlikely that we can rid all possible harm from such infrastructures, categorizing kinds of harms provides a way to approach them on a case-by-case basis, a measure that might produce better outcomes than current practices. Separating the incidents above as EJ cases and public cases suggests that we can appeal to different assessment methods for different injuries and responsibilities. EJ cases, for instance, have a lengthy history and supporting literature, ranging from academic studies to government protocols (Schlosberg 2007). We can use this research to determine specific categories of harm.

Consider, for example, that the United States Environmental Protection Agency's (2015) (EPA) definition of environmental justice requires that people receive just treatment, regardless of skin color, nationality, economic situation, or when developing, implementing, and enforcing laws, regulations, and policies that deal with the environment. Such definitions provide a means to identify basic harm. The EPA's definition holds many of the early ideas from EJ pioneers. For instance, Phillips and Sexton (1999) examine several definitions that EJ researchers such as Robert Bullard, Bunyan Bryant, Paul Mohai, and Richard Hofrichter develop, pointing out that the top definitions of EJ have five central dimensions. These accounts define fairness, identify dangers, examine unfairness, locate injured groups, and question the roots of unfairness (Phillips and Sexton 1999).

Despite such benefits, such definitions lack an extensive conceptual framework for comprehending or dealing with additional entailments pertaining to EJ cases. Looking at how EJ frameworks advance over time exhibits that they take on new dimensions, keeping pace with developments in EJ studies and the EJ movement (Schlosberg 2007, 2013). For instance, David Schlosberg (2007, 2013) examines the conceptual frameworks found throughout EJ studies. He demonstrates how several EJ scholars have established positions that go beyond the initial definitions above, making room for identity and political recognition to varying degrees (Schlosberg 2007). Schlosberg (2007) points out that Robert Figueroa is the only person working in EJ who directly studies recognition as an integral aspect of an EJ paradigm.

Figueroa (2005) maintains that abstract redistribution-versus-recognition arguments within justice theory distract us from the concrete lesson that EJ issues teach us about the realities of justice. In turn, EJ studies and policy requires a bivalent approach that includes the practical features of justice theories that can get the job done. One could argue that this element within Figueroa's work allows his paradigm to address more kinds of EJ cases than other approaches, giving its scope an advantage over earlier frameworks (Figueroa 2006).

Figueroa's position holds that when dealing with certain kinds of EJ cases, definitions such as those above cannot cover all of the relevant and necessary concerns for environmental policy decisions. EJ usually deals with distributive justice, the equal distribution of environmental risks, but it also concerns the people who get to make environmental policy decisions (*ibid.*). According to Figueroa (*ibid.*), we are dealing with an act of environmental injustice when people with power exclude minority groups from decisions about the policies and practices that affect them. Figueroa's paradigm focuses on aspects of distributive justice and

political recognition; requires that group and individual identities remain respected; and appreciates traditional beliefs, knowledge, experience, and heritage (*ibid.*).

To include more topics under the heading of EJ, Schlosberg (2013) puts forth an approach to expand the kind of cases that we can address under such frameworks. Schlosberg's position includes dimensions covered in Figueroa's paradigm, such as equality in distribution, recognition, and participation. Yet, Schlosberg goes beyond Figueroa, including consideration of the environment itself. He points out that early conceptions of EJ had to justify arguments for urban environmental problems because such issues did not occur in the wilderness, the kind that most people might refer to as "natural." He reminds us that environmental organizations had a tendency of neglecting this point (*ibid.*).

Schlosberg (*ibid.*) notes that overcoming narrow conceptions of environment for EJ cases did not exclude consideration for the non-human world, holding that the EJ movement respects indigenous relationships between the human and non-human worlds (*ibid.*). Citing the developments at the First National People of Color Environmental Leadership Summit in 1991, a meeting that included African American and rural Native American activists, Schlosberg (2013, 39) notes: "the very first principle of environmental justice affirms the 'sacredness of Mother Earth, ecological unity, and the interdependence of all species.'" To bolster this claim, he references Julian Agyeman's work that reconciles the interests of the natural world with environmental justice to move toward a conception of just sustainability (*ibid.*).

Adding another layer of complexity, he brings in the capabilities approach to account for the basic needs, capabilities, and functioning that gives the approach its appeal and utility (*ibid.*). In order to draw support for his pluralist position, he exhibits how EJ founders engage in pluralistic approaches within EJ (*ibid.*). Other researchers use the pattern of EJ arguments to defend EJ cases on a global level, holding that the pattern of oppression in textbook EJ cases lends itself to the way that certain nations oppress other nations (*ibid.*). Further, Schlosberg (*ibid.*) demonstrates how researchers in climate and food justice rely on the long-standing history of EJ to reinforce arguments. Clearly, he makes a convincing case that researchers can employ the principles of EJ to address a great number of issues.

While Schlosberg extends EJ to cover cases beyond initial conceptions, there should be some reservations about endorsing such a bold maneuver. Through adding considerations for the non-human world, Schlosberg inadvertently smuggles in a complication that I call the *fragmented interest* problem. The basic idea behind the fragmented interest problem holds that developing an EJ framework to account for several dimensions other than justice for minority groups distracts from the essential character of EJ.

Here is a recent analogy from the Black Lives Matter movement. The pattern of thinking behind this analogy helps identify the problematic conditions regarding the manner wherein Schlosberg extends EJ to include nature. For instance, saying "Black Lives Matters" spotlights the problem about violence against African Americans (Butler and Yancy 2015). Protestors who counter this slogan with "All Lives Matter" diminish the spotlight on African American lives that police haven taken through broadening the scope to include lives that are not subject to the same

injustice, appealing to a humanitarian notion instead of directly zeroing in on a serious race issue.

Schlosberg's argument follows a similar pattern. Through including considerations for the non-human world under an EJ framework, he discounts the importance of EJ for the sake of harmed groups. Minorities, then, must share the stage with flora and fauna. In turn, one could argue that such matters lose some of the urgency behind particular charges of environmental injustice. This notion is why the problem is an issue of fragmented interests. We must divide the focus between the interests of injured people and the (anthropocentrically perceived) interests of harmed non-human life or ecosystems.

One could object to this point, arguing that the harmed groups could have an interest in protecting the interests of nature, a view that Schlosberg endorses (2013). Although I agree with Schlosberg and other EJ pioneers that issues pertaining to cities require consideration under established EJ criteria, such considerations do not always entail that the environment requires consideration. Earlier, I mentioned that Schlosberg argued that indigenous peoples hold the natural environment in high regard, and, in turn, the natural world deserves consideration under an EJ framework.

Although some indigenous people maintain such views, such beliefs are merely coextensive qualities that coincide with an act of environmental injustice. It very well could be the case that an act of environmental injustice could violate indigenous people's culture or heritage, but we must assess such situations on a case-by-case basis, considering that such a condition does not correlate with all cases. For example, are we to assume that all minorities or indigenous groups hold the environment in high regard? Such a position rests on a generalization wherein all minorities or indigenous groups are the same, a statement that is simply false.

It does not seem plausible that one must consider the "sacredness of Mother Earth, ecological unity, and the interdependence of all species" when arguing about dangerous levels of auto emissions in the Bronx harming minority residents (Schlosberg 2013, 39). Holding that such a proviso belongs within an EJ framework designed to address all EJ issues suggests that minority residents who do not have such beliefs as part of their heritage, culture, or traditional knowledge are now subject to such considerations. Determining if such a proviso belongs within an EJ assessment depends on if it correlates with heritage in the context of a group's environmental identity. For such instances, notions of environmental identity within EJ justify the tedious nature of approaching such issues one case at a time, rather than focusing on the adherence to broad criteria. Figueroa (2006) defines environmental identity as a combination of cultural identities, practices, norms, habits, and perceptions of self that connects the group to a place. If we can determine that a policy decision disrespects this identity, making a case for environmental injustice regarding a particular occurrence stands on solid ground. In other such instances, however, adhering to this criterion remains dubious.

If the argument presented thus far is convincing, we should see that the limits of environmental justice stop short of including considerations of the non-human world, unless such considerations are inextricably linked with a group's environmental identity. The reason why we should not include considerations of the non-

human world in EJ cases suggests one reason why we cannot include the public cases listed in the previous section. Let us see what happens if Schlosberg were to replace “nature” with “the public.” He could easily include the public, arguing that indigenous groups hold the public in high regard, along with nature, and that we *ought* to include the public in an EJ framework. If one considers that including elements that do not directly support efforts to prevent or mitigate harm against minority residents lessens the possible impacts of such frameworks, one could argue that such provisos ironically favor injustice.

This notion supports the idea that the scale used to determine what counts as an EJ case cannot, and *should not*, change. For an EJ framework, we cannot go beyond the limits of scale or ratio: the quantitative relation between the minority groups receiving harm must be considerably smaller than the mainstream population. EJ definitions and frameworks can only apply to marginalized groups, a notion that is common to all EJ definitions and frameworks examined above that precede Schlosberg’s position.

Public cases involving urban transit systems violate this scale. In turn, we cannot use environmental justice paradigms to support cases having a significant affects on large segments of the population. To address this concern, recent developments in structural ethics, namely complex moral assessments, provide the necessary structure that allows us to account for the normative impacts of the transportation infrastructure. I focus on making this point in the following section.

Complex Moral Assessments of Transportation Infrastructure

During the introduction, I argued that employing an EJ framework to determine harm works well, but that the limits of such frameworks impede our ability to determine moral wrongs and accountability for several cases. In the previous section, we saw that EJ has limits, and respecting these limits reminds us why such cases are matters for justice: the fundamental nature of transit systems concerns how we ought to live together under a larger governing body that specifies certain conditions of our social arrangements.

Moving beyond these circumstances, we are no longer exclusively dealing with justice. We are assessing actions, and all actions remain subject to moral scrutiny, including the use of transportation infrastructure. For this topic, there are two forms of inquiry. The first kind is for planners and engineers: what type of infrastructure should I design, build, implement, consider, or support? From the residents’ position, the question is: ‘what kind of transportation should I use?’ The most relevant conversation in the literature for addressing the former question comes from philosophers of technology who debate the moral agency of artifacts.

For instance, most philosophers of technology hold that artifacts have a kind of moral agency (Latour 1994; Franssen 2006; Brey 2014; Verbeek 2011, 2014). Maintaining this view is problematic because it involves other philosophic disputes such as intentionality and the scope of agency (Brey 2014). Recent advancements, however, take the conversation in a new direction, providing a way to talk about human responsibility for technology that bypasses the need to deal with such topics

(Pitt 2014; Brey 2014; Epting 2015). From this approach, structural ethics emerged (Brey 2014; Epting 2015). It focuses on how the applications of technologies play a moral role by producing moral outcomes, but responsibility ultimately rests with humans (Brey 2014; Epting 2015).

Bearing in mind that 86 % of US residents drive to work, often enduring lengthy commutes that have negative impacts on health, the structural ethics approach makes it possible to label such results as immoral or moral outcomes. Roadways and vehicles are not moral or immoral devices, but the combined use of them under certain circumstances (too many vehicles driving at the same time) leads to immoral effects. Planners who alleviate such harm produce moral outcomes. Although structural ethics is in an embryonic stage, it shows promise for delivering the kind of assessments that benefit humanity now and in the future. While EJ frameworks work well in specific instances, approaches within structural ethics can cover the cases that Schlosberg wants to include but cannot, such as considerations for the non-human world.

For example, if there is a need to assess a complex moral case wherein planners or engineers must deal with a multifaceted transportation issue such as implementing sustainable transit, they require a moral system capable of complex assessments. A specific approach that emerges from structural ethics, complex moral assessment (CMA), holds that we can make moral assessments of infrastructure as they affect humans, non-human animals and ecosystems, and future generations (Epting 2015). While referring to CMA as a moral system would not be a mistake per se, it makes more sense if it is thought about as a *metasystem*, a term that has become useful in the realm of information technology (IT) (Djavanshir 2014).

For a definition, Djavanshir (2014, 4) explains: “I define the metasystem as a large scale distributed system whose components are enterprise systems that are networked together, by the metasystem’s governance mechanism, to accomplish a shared strategic goal.” Contextualizing this term for CMA, the pattern behind the above definition shows how a moral system such as deontology works with a subsystem such as sustainability to assess a transportation infrastructure’s moral outcome, the shared strategic goal. For CMA, the governance mechanism is the human who puts the moral system and the subsystem together to make a CMA rubric. Considering that each CMA will differ, a person (i.e. engineer, planner, philosopher) must customize the CMA metric.

Tailoring a complex rubric, then, means employing a moral system (deontology, utilitarianism, virtue ethics, care ethics) and extending its criteria for what counts as moral or immoral outcome to systems such as sustainability (resilience thinking) because they include ecosystems, human populations, and future generations.⁹ Each city will have a unique set of circumstances surrounding transportation

⁹ One could object, holding that focusing on moral outcomes commits one to consequentialism. In turn, one cannot employ deontology or other approaches that are not consistent with consequentialism. This is not a problem for structural ethics because one can stipulate the conditions for what counts as a moral outcome. For example, a deontologist could declare an action to have a moral outcome only if it does not conflict with the principles of deontology. I discuss this issue at some length elsewhere. See Epting (2015).

infrastructure that affect the community (including minority groups), non-human animals, and ecosystems, and that will affect future generations.¹⁰

Yet, when considering the moral outcomes of an infrastructure, planners and engineers must include aspects such as the environmental impacts of used materials, fair labor considerations when collecting and processing such materials, and possible effects for future generations (Epting 2015). Through thinking about transportation as an issue that requires CMA, accounting for the moral roles that a transportation infrastructure plays in terms of ecosystems, non-human species, and urban populations is a complicated yet achievable goal.

While this position shows promise, it has challenges. For instance, how does one design a CMA measure that leads to a moral outcome? While a fully fleshed out answer is beyond the scope of this paper, the brief answer is that certain harms arise due to transportation infrastructure. Eliminating such harm is an interdisciplinary undertaking that requires experts from several fields. Consider, for example, the public health problems from earlier that roadways and vehicles cause (i.e. depression, obesity). Mitigating such harm requires knowledge from fields such as medical anthropology, environmental science, and engineering. While conclusions reached through interdisciplinary engagement yield insights regarding a particular transit system, CMA provides guidance for moving toward a moral outcome.

The problem with using a complex moral assessment is that no such ready-made rubric for evaluation exists, and people might resist an approach wherein flexibility is an asset rather than a liability. While one could argue that lacking an established metric presents a serious challenge for CMA, the absence of such a metric is necessary. Prefabricated assessment measures go against the nature of complex arrangements. Considering that no two transportation systems are identical, it does not follow that there could be a one-size-fits-all system of moral measurement. For instance, each city has different features such as topography, cultures, weather conditions, geology, political structure, and history. Every transportation infrastructure will require a customized CMA measure to optimize positive outcomes.

Another challenge for structural ethics and CMA is how to pinpoint culpability. In cases wherein a planner or engineering firm misleads the public for financial gain, they are blameworthy. In most other instances, however, planners and engineers are dealing with numerous elements that make assigning blame unnecessary. Their job is to alleviate problems. While it might sound fair to some people, blaming planners for creating highways that have led to social and ecological damage is challenging due to other forces involved in planning decisions such as those elements listed above. One could blame conspirators in the great streetcar scandal for the automobile's reign, but their actions were part of a much larger social and political atmosphere, making 'full-bodied culpability' next to impossible to prove. Instead of engaging in blame, properly categorizing the problem provides a way to understand the moral role that transportation infrastructure plays in urban mobility.

¹⁰ Such cases allude to the difficult problem of determining culpability due to elements such as individual and group responsibility. While a proper examination is beyond the scope of this paper, I address such issues elsewhere, see, Epting (ibid.).

Earlier attempts at labeling similar issues, however, provide little benefit for determining culpability. For example, Luciano Floridi (2003, 728) would refer to such cases as instances of “displaced morality” to identify moral actions that come from morally neutral interactions between humans, artificial agents, or a combination of the two.¹¹ While this term sounds applicable for cases in structural ethics, it maintains commitments to non-human agency and intentionality that are incompatible with structural ethics. Somewhat recently, other philosophers of technology have made good use of a phrase from political theory, “the problem of many hands,” (PMH) a theory holding that due to several actors involved in a decision, one cannot assign blame because adequately identifying the guilty party is too challenging to prove (Thompson 1980; Van de Poel et al. 2012).¹²

Although PMH supports the tenet within structural ethics holding that responsibility rests with humans, it cannot account for the affects that history, culture, political systems, ecosystems, topography, weather forces, and the accumulating effects of technology and industry, and now climate change have on transportation infrastructure and its role in moral outcomes. For such cases that involving the elements above, the term fragmented accountability works because it holds that planners and engineers working on particular projects are accountable to the public that they serve or served. Yet, considering the high number of factors involved in such projects, assigning blame for immoral outcomes is unnecessary in most instances.¹³

For today’s planners and engineers, they must build around existing transportation infrastructures to produce good outcomes (Paden 2003). For the planner and the engineer, the “different trolley problem” is building or incorporating alternative means such as streetcars or light rail systems into existing transportation systems to produce moral outcomes. While trolley cars have large public appeal, according to Jarrett Walker (2009), they face several challenges that the public and planners neglect to consider. Instead, he argues that buses are more efficient, they quickly transport people, and easily fit into existing infrastructure (Walker 2009). From an engineering perspective, Fernandez (2000) demonstrates that bus-based systems can carry more passengers and can operate for a fraction on the cost of light-rail systems. Bus-based systems, however, have a negative stigma (Hess 2012). Instead, commuters in certain instances show a preference for other systems such as light rail systems (Chinnock et al. 2013).¹⁴

¹¹ One could argue that I have committed the straw man fallacy through not explaining Floridi’s use of displaced morality. However, I am not arguing that he is wrong, only pointing out that term is not a perfect fit.

¹² A similar objection could be made here (see previous footnote), but I am not arguing against PMH, only holding that it is not best term for the case at hand. A group can be held culpable; consider a band of terrorists bent on a bombing raid.

¹³ This point does not mean that all such cases are excusable. Consider individuals who design road systems that have accident black spots in them. While arrangements are straightened out once they have been discovered, one could argue that more diligence should have been applied to prevent their emergence in the first place.

¹⁴ Bearing this point in mind, it is not only customer preferences that militate against trams/light rail systems, but it is the existence of the rails themselves that make problems for cyclists. Pedestrians and the limited flexibility can cause problems for motorists.

Despite this perception, recent studies show that if municipalities dedicate resources to implementing a BRT system that users find aesthetically pleasing, they can overcome this challenge (Hidalgo et al. 2013). Considering that limited transportation mobility plays a paramount role for poor residents working to improve their socio-economic condition, factors that contribute to the lack of transportation options carry significant weight, making this issue a concern for EJ. Yet, considering that inadequate transportation affects numerous people, if planners and engineers approach the problem using a CMA, then they could produce better moral outcomes for all residents and the environment.

At the beginning of this section, I mentioned that there were two moral questions about transportation infrastructure and addressed the first inquiry. The second question is for residents: ‘what kind of transportation *should* I use?’ While this question might seem rather naïve to some people, it reveals the significance about the restrictions in one’s choice of transit. Such limits include a transportation reality wherein roadways and vehicles are the only form of transportation, suggesting that alternative means are not a realistic option. Considering that alternatives to roadways are not feasible for most commuters, claiming that public transit is a viable possibility is a hard sell. For all practical reasons, choice in mobility does not really exist for most people in the US.

When thinking about moral responsibility for local issues such as poor air quality or wicked problems such as climate change, they are not even marginally blameworthy. Through using public transportation, however, residents do contribute to moral outcomes. This notion puts a greater significance on jobs that transportation planners and engineers undertake. They are not simply providing people with a means to urban mobility. When they provide residents with a means to efficiently travel to work and home in a timely manner, they arguably increase residents’ social mobility. In turn, transportation planners and engineers not only alleviate some of the EJ issues from earlier, but they potentially work toward creating just cities.

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