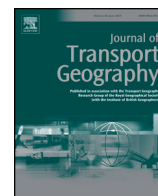




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## Rationalities and materialities of light rail scapes

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## ABSTRACT

Light rail is a modernisation of old tram systems and a popular tool in urban development strategies throughout many European cities. Light rails continue to be built despite often having poor socio-economic returns – other similar modes could provide the same transport function at a lower cost. Through a case study, this article explores the main vision and rationalities behind light rail projects in two mid-sized European cities – Bergen and Angers – and considers how this vision has materialised in various ‘light rail scapes’. The article argues that the city shapes the light rail project, but also that the light rail re-configures and shapes the urban structures, design and planning practices within the city based on its materiality and spatial interaction with it. This means that light rail projects need to be rethought as complex urban development projects instead of just simple ‘pieces of infrastructure’. Ultimately, this work seeks to shed light on a number of ideas for future light rail research and practice.

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## 1. Introduction

One important reason for the increased focus on light rail is that light rail systems, especially in mid-sized European cities, are more simple than metro systems in terms of implementation. For one, light rail often runs at street level and thus has lower construction costs than metro systems.<sup>1</sup> Moreover, the operational costs of light rail are usually much cheaper. For this reason, light rail systems have been considered in many mid-sized cities with populations down to a 100,000 inhabitants (Bottoms, 2003; SYSTRA, 2012). Prior research into decision making in terms of light rail systems has emphasised two criticisms of the typical decision-making process for light rail: the economic irrationality of the decision to put it into place and the perceived superiority of it over bus rapid transit in terms of regularity and image (Bruijn and Veeneman, 2009). Edwards and Mackett (1996) show, through their examination of the implementation of modernised British urban transit systems in the 1990s, how light rail systems have been favoured in the decision-making process in spite of the fact that cost-benefit analyses demonstrated that bus rapid transit

systems were more cost efficient. One of the main studies on performance of light rail systems, conducted by Babalik (2000) and Babalik-Sutcliffe (2002), illustrates that while a number of systems have been successful in achieving the desired outcomes, many have failed to be as successful as expected in terms of improving public transport and the urban environment. Vuchic (2000) and Hensher (2006) have also pointed out that the differences considered in the decision-making processes and the choices between light rail systems and bus rapid transit are not only a matter of technology, but also related to the type of service, its image and impact.

In research and in practice, there has been considerable debate on the choice of technology, especially regarding the attractiveness of rail over bus (see, among others, Deng and Nelson, 2011; Hodgson et al., 2013). This debate has been especially prominent in the European context, particularly in mid-sized cities where the socio-economic returns of light rail have been questioned (see earlier). However, cities have repeatedly cited the flexibility of light rail systems for their ability to meet a diverse set of goals, though light rail systems are more expensive solutions for small cities than prioritised bus systems, such as bus rapid transit. A study by Bruijn and Veeneman (2009) concluded that bus rapid transit systems seem to lack the mythical ‘allure’ often associated with light rail systems that can help mobilise various actors in support of the process (see also Wirasinghe et al., 2013; Wright, 2005; Weinstock et al., 2011).

This means that light rail in many cases has poor socio-economic returns, and other similar modes, such as bus rapid transit, could provide the same transport function at a lower cost. Yet, practice also shows that light rail systems continue to be built even though it might seem to be economically irrational. This creates an interesting paradox and makes it highly relevant to question which visions and rationalities

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<sup>1</sup> Light rail is a hybrid between a bus and a train that often runs on electricity. Unlike underground metro systems, which are highly segregated from the street environment, the light rail runs on a track at the street level on the ‘front side’ of the city and is often integrated into very central city districts. The tracks can be either segregated from other traffic in so-called dedicated ‘right-of-way’ or integrated with other modes of transport.

are associated with the specific materialities<sup>2</sup> and spatial<sup>3</sup> layout of light rail projects and how these characteristics make them valuable and relevant in a strategic urban development perspective. This article, therefore, focuses on the main idea, vision and rationalities behind light rail projects in two mid-sized European cities, Bergen and Angers, and explores the concrete design of light rail systems in order to create an understanding of the meaning of such light rail mobilities and the way in which they interact with and re-configure urban spaces and cultures. Based upon this, the article argues that the city shapes the light rail project, but light rail also alters and shapes urban structures and planning practices because of its materiality and spatial interaction with the city. This means that light rail projects need to be rethought as complex urban development projects instead of just simple pieces of infrastructure. This raises a number of considerations for future light rail research and practice, elaborated in the conclusions.

The article is organised into three sections. *Firstly*, the theoretical and methodological frameworks of the study are presented. *Second*, the article analyses the case examples of Bergen's and Angers' light rail systems. *Finally*, the main conclusions are drawn, and further perspectives for light rail research and practice are made.

## 2. Theory: understanding and investigating light rail projects

Theoretically, the point of departure for this article's focus on rationalities and materialities of light rails is the emerging interdisciplinary field of mobility research within social science, being framed as the new 'mobilities paradigm' or 'mobilities turn' (Urry, 2000; Urry, 2007; Sheller and Urry, 2006; Lassen and Jensen, 2006; Adey, 2010; Cresswell, 2006; Kaufmann, 2002). Within the mobilities research, there has been a specific focus on the socio-technical production of mobility, as part of the 'material turn' within social sciences (Jensen, 2013a, 2013b). The focus on materiality and spatiality and the ways in which technologies interact with the city have previously been emphasised by Graham & Marvin: *'Infrastructure networks are the key physical and technological assets of modern cities. As a 'bundle' of materially networked, mediating infrastructures, transport, street, communications, energy and water systems constitute the largest and most sophisticated technological artefacts ever devised by humans'* (2001, p. 10). Moreover, it is argued by Sheller & Urry within the new mobilities paradigm that there has been a growing interest in *'the ways in which material 'stuff' makes up places'* (2006, p. 216) (see also Jensen, 2013a). Certain places, cultures and societies can give various forms of mobility particular kinds of meaning that may even cross cultures (Adey, 2010). This reveals that infrastructural moorings are critical components of light rail projects, creating immobile sights and corridors of mobility. The immobility that light rail tracks provide is a highly valued attribute from an investor's perspective and a user's perspective, as an investment in light rail physically manifests as a stable, long-lasting public transport solution (see also Hass-Klau et al., 2004) and, additionally, may be a powerful strategic tool in urban development.

In particular, the socio-technical approach to mobility research (see, among others, Vannini et al., 2012) makes it clear that the emergence of new mobility systems is not just a matter of creating capacity and reducing travel time. Frederiksen (1996) illustrated that the many rationalities are at play when choosing a technology for what is today known as the Copenhagen Metro. The alternative technologies considered in the process were a mini-metro, tramway and light railway. Although

these three options seem to have many of the same traits (all being rail-born modes), the decision-making process shows that very different rationalities were connected to each of these technologies. In this sense, the choice of a mini-metro has been a way to materialise the planning ideals and rationalities that went along with this mobility system. Pineda (2010) further analysed the material 'scripts'<sup>4</sup> behind the design of two large technological mobility systems: the Copenhagen Metro and the Transmilenio Bus Rapid Transport system in Bogotá (Pineda, 2010). The central point made by Pineda is that the material scripts for implementation of new public transport systems play a crucial role in the physical reorganisation of the city and the everyday lives of the citizens. These material scripts, and the rationalities linked to them, redefine space (see also Thelle, 2013).

One way of understanding the material scripts and rationalities linked to light rail projects is through the notion of 'scapes' as the theoretical framework. Marling (2013) worked with the notion of 'Bikescares', which was defined as a new urban architectural typology that represented an approach to studying spaces of mobility, like pedestrian and cycling lanes. It was described how Bikescares offer many different 'urban programmes' and possibilities for new urban spaces and materialities in this corridor. Jensen (2008) described how mobility is practised within the European 'metroscares' of Copenhagen, Paris and London. He defines metroscares as landscapes of mobilities consisting of all the software and hardware that together create it. This particular focus on how the different material and spatial orchestrations of metro systems facilitates the meaningful and mobile engagement of system, objects, humans and the city with each other. Thus, scapes also involve an element of discourse built on 'an ensemble of ideas, concepts, and categories through which meaning is given to social and physical phenomena, and which is produced and reproduced through an identifiable set of practices' (Hajer, 2006:67).

Therefore, in this article, 'light rail scapes' are understood as constituted by 'hardware' materialities, such as trains, tracks, stations, and masts, as well as politics, rationalities and metaphors (or 'software') around these systems which are equally important to understand the adoption of light rail systems by cities. Ideas about light rail mobilities are assigned significance and meaning by the actors and institutions involved with such systems, be they planners, designers, engineers, politicians, economists, interest organisations, passengers, etc. These actors have various governing rationalities and emerging cultural practices that they take into the production and practice of light rail mobilities. Light rail systems are consequently not unambiguous technological solutions; they are marked by various normative interpretations regarding what such a technology can and cannot do for the city (see Jensen et al., 2012). As is relevant in the present work, the term 'scape' then defines the visions and rationalities that have been incorporated into an object; the design and planning of infrastructure trigger certain ways of enacting the social world. A light rail holds a vision of the world that is inscribed in its material and spatial construction; a specific scape can be the colour of the light rail vehicles, or the segregation of the tracks, the placing and design of stations, or any element important to the way this infrastructure interacts with the city and its users (see also Olesen, 2014a). The aforementioned theoretical underpinnings also suggest how various local contexts shape and configure materialities of mobility systems differently. As a result, the following methodological approach also requires both a materiality and meaning.

### 2.1. Methodology: case studies in mid-sized European light rail cities

Empirically, the analyses of 'light rail scapes' are based on case studies in the mid-sized European light rail cities, Bergen and Angers. The research was carried out in the period from February 2011 to April 2013,

<sup>2</sup> In the article, the understanding of materialities draws on urban design and architecture's way of paying special attention to and having sensitivity towards surfaces, structures, volumes, and spaces (Jensen, forthcoming). Understanding the materialities of light rail thus intends to take into account trains, tracks, stations, masts, stops, train designs and colours as important components in the creation of light rail scapes.

<sup>3</sup> In the article, spatial or spatiality is understood as the physical three-dimensional areas which are stretched out between the buildings and the infrastructure in the city, including public, private and semi-public urban places, squares, parks, trails, roads, etc. (See Gehl, 1987 for a more detailed explanation).

<sup>4</sup> The term 'script' defines the visions that have been incorporated into an object; the design and planning of infrastructure trigger certain ways of enacting the social world (Yaneva, 2009).

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