



Short trips and central places: The home-school distances in the Flemish primary education system (Belgium)



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A B S T R A C T

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This paper examines the extent to which home-school trip length in northern Belgium is influenced by the spatial distribution of the school sites, and to what extent this distribution contemporarily functions according to propositions of central place theory. Furthermore, from a sustainable mobility perspective, it is evaluated if the primary school network's density supports a daily urban system based on short distances. The results indicate that the overall system's density meets the requirements of a non-motorized system, while the distribution confirms central place mechanisms. The majority of the pupils live within walking or cycling distance from their school, while opportunities exist to further reduce this distance by choosing an alternative school. However, depending on the structure of the concerned settlement, school accessibility varies considerably. Finally, the results suggest that recent increases in school trip length and motorization are mainly caused by non-spatial factors.

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Introduction: short trips and central places

A considerable literature describes the relationship between the built environment and mobility patterns, in which the working hypothesis invariably assumes that a properly designed spatial structure can steer people's travel behaviour in a more sustainable direction (Banister, Watson, & Wood, 1997; Stead & Marshall, 2001; Van Acker and Witlox, 2010). High residential density and thorough spatial mix of housing, amenities and jobs are usually considered spatial features that lead to less car use and shorter daily trips. Therefore, a high degree of spatial proximity is associated with a more sustainable form of daily mobility (Boussauw, 2011, p. 19).

However, the impact of spatial proximity on trips is highly dependent on the type of destination. The more specialized the trip end is, the greater the distance one is willing to cover and the less likely one wants to or will be able to exchange it for a similar destination closer to home (Berry, Parr, Epstein, Ghosh, & Smith, 1988). In Flanders, in the north of Belgium, for example, the average one-way commuting distance today amounts to 19 km

(Janssens, Cools, Miermans, Declercq, & Wets, 2011), while travel to less specialized destinations such as schools (primary, secondary and higher education combined: 9.5 km) or shops (3.5 km) is associated with shorter trip lengths.

These findings suggest that local, more or less generically available, services continue to play an important role in how daily urban systems are structured. The proximity to daily amenities such as supermarkets, bakeries, nurseries, schools and cultural and sports facilities, but also green space or transport network access points, largely determines the attractiveness of a particular residential precinct (Reginster & Goffette-Nagot, 2005). Additionally, the availability of proximate convenience amenities such as child-care or primary schools becomes more important as dual career households engage in ever more complex work-life balance puzzles (Karsten, 2007; Van Diepen & Musterd, 2009).

The spatial influence of these daily amenities on travel behaviour is traditionally gauged through Central Place Theory (CPT), as developed by Christaller (1933[1966]). CPT provides a framework for an urban subsystem based on the relation between the specialization of central functions and the spatial reach of these functions. Central functions have a range consisting of a lower limit, which denotes the minimal size of the complementary area for the function to exist, and an upper limit, which indicates the maximum average distance a consumer wants to travel to procure a central function (Christaller 1933[1966], p. 22). Christaller (1933[1966], p. 20) took into account that what is considered a central function,

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as well as their respective upper and lower limits differ according to spatial and temporal context. Indeed, as individual transport became cheaper, people became more inclined to travel to alternative central places, further from their home, in order to have access to goods, services, or jobs better meeting their individual preferences (Lambooy, 1969). This observation made Hall (2002) to argue that the three lowest levels in the hierarchy of Christaller would no longer exist today altogether.

The work of Berry and Garrison (1958) made the applicability of CPT within expanding conurbations in the form of sub-centres in growing or grown residential areas around the traditional core city explicit. This approach was gradually incorporated in transport geography, where the term “polycentricity” was introduced to argue that sub-centres decrease aggregate car use (Cervero & Wu, 1997). Subsequently, further cultivation of these sub-centres in terms of urban planning is regarded a sprawl-curbing urban development strategy (Bontje, 2004). The principle whereby spatial proximity is organized on the basis of an intra-urban polycentric structure is illustrated by Bertaud (2004) in his so-called “urban village” model. Bertaud acknowledges that this builds on the improbable hypothesis that people prefer the nearest available location to procure their central functions. In practice agglomerations often contain sub-centres, although consumers do not necessarily visit these in order to minimize their travel, a vision supported by the research of Krizek (2003), among others. Structures like the urban village model offer opportunities to strengthen spatial proximity between a number of services and the gravity centre of the residential area. For example, the presence of a range of schools in a suburb of a larger city will increase the likelihood that residents will not send their children to the city centre. When these facilities are clustered in sub-centres, it is likely that trips will be organized more efficiently (Cervero & Duncan, 2006). In the example, picking up the kids from school may be combined with a visit to the nearby supermarket. In contrast, a strong spatial distribution of facilities, without clustering, will also indicate a highly dispersed spatial structure that is associated with crisscross (car) traffic covering relatively large distances.

Research question: the primary school as a neighbourhood level facility?

Unlike Hall (2002), our research departs from the hypothesis that the low levels of the urban hierarchy still have relevance as a central place. We propose that the availability of daily facilities at the neighbourhood level may offer opportunities for a more sustainable urban and regional structure that facilitates short trips. From a planning perspective, the presence of a dense network of relatively small amenities may be considered a quality of place, through which accessibility can be maximized while avoiding excess (auto) mobility (Müller, 2011). Rather than the concept of the compact city, which is today perceived as overly naive (Neuman, 2005), the principle of short distances (in German known as “Stadt der kurzen Wege”, and in French as “La ville des proximités”) encompasses that also in suburban and rural areas facilities should be present within walking or cycling distance.

We test this hypothesis within the Flemish primary school system (for ages 6–12). Doing so, we consider the primary school as a generic amenity that is indicative of the centrality of the place where these are located. We can justify this choice on the basis of Christaller's definition of a central place of level M, who viewed these as centres in a catchment area of about 3000 inhabitants. While it would be naive to believe that the exact specifications of the hierarchical levels observed by Christaller still exist today, it is striking that an elementary school in Flanders serves on average 2820 inhabitants (Flemish Ministry of Education and Training,

2013), which is very close to the catchment size of Christaller's lowest level. Of course, a central place does not consist of only one single school, and it is outside the empirical scope of this paper to relate the geography of primary schools to other central functions. However, in practice we observe that primary schools in Belgium are often part of a cluster of local amenities, usually within the contours of a former or still existing village centre or urban sub-centre. Moreover, primary schools are not entirely generic facilities: in Belgium, parents often make a choice between a Catholic or a pluralistic (‘official’, which here means government organized) school where catholic schools are the majority due to historical reasons (see Method Section).

From the general hypothesis that the neighbourhood level still matters, we put forward two research objectives:

1) To determine the extent to which home-school trip lengths are influenced by the spatial distribution of the school sites, and to what extent this distribution confirms the expectations of CPT.

2) To test whether the distribution of schools meets the requirements of a non-motorized daily urban system based on short distances, across different urban contexts in northern Belgium.

The composition of the paper is as follows. First, we provide a brief overview of the spatial structure of the education system in Belgium and Flanders, relating this to the existing literature on home-school trips and school networks. We continue by describing the central place structure of northern Belgium with a particular focus on the contrasting examples of the cities of Bruges and Genk. Then, an empirical analysis is made of the home-school distances in the study area, both viewed from the location of the school, and from the place of residence of the pupil. The data are obtained from a recent centralized dataset that links the addresses of all pupils to the schools where they are enrolled. Both observed and shortest home-school distances are calculated using shortest-path analysis (Neutens, Versichele, & Schwanen, 2010). Subsequently we compare observed home-school distances with the shortest possible home-school distances, which determine the theoretical minimum catchment area when the school is considered a central function. The ratio between these two statistics is mapped, after which the hypothetical effect of urbanization on home-school distance is tested. By comparing the cases of Bruges and Genk, we will gauge how divergent central place structures of the cities influence the home-school commute of the individual pupil.

Schools, home-school distances and spatial structure: the northern Belgian context

School consolidation and home-school distances

In many western countries, including Germany, the UK, the US, the Netherlands and Belgium, we observe a period of expansion of the school system, roughly until halfway the twentieth century, followed by a period of rationalization (De Boer, 2010, p. 1). Maximizing accessibility of education in an era when mobility was limited was the core idea behind the expansion, which in practice meant the construction of additional schools making the school net denser in a geographical sense. Rationalization, which followed expansion, introduced business management logics in the organization of the education system, combining public service provision and economies of scale. This resulted in the closure of many smaller branches. In the post-1945 United States, the number of schools was reduced by no less than 70%, while the average size of a school quintupled (Ewing & Greene, 2003). In countries where this rationalization was accompanied with a demographic surge of the school population, negative effects of school consolidation on spatial proximity and accessibility were largest.

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