**Density of opportunities for accessibility in the 15-minutes neighborhood: range and feasible values**

Antonio Paez, [paezha@mcmaster.ca](mailto:paezha@mcmaster.ca), McMaster University

**Extended Abstract**

Walking has been the primary form of personal transportation for as long as humans have been humans (Roberts, 1998). From prehistoric migration to the dawn of populated settlements, the space-time constraints of walking have funda mentally determined how far interactions with the environment and other humans were feasible. It took tens of thousands of years for humans to walk out from their original African niche to eventually settle every nook of the planet.

The dominance of travel by foot faded within the span of a few decades. Several revolutions contributed to this. Technological innovations in the 19th and 20th centuries led to the internal combustion engine, smooth paving surfaces, and systems to transport. Concurrently, socio-technological innovations (e.g., Fordism) created the basis for mass production and consumption. The pioneer in this respect was of course the auto industry; many decades later, whole economic systems are still dominated by this sector (Jane Jacobs famously quipped that “[t]he purpose of life is to produce and consume automobiles.”) Early in the automotive era cars were seen as an ideal solution to many urban ills (Brown, Morris, and Taylor 2009), which contributes to explain their enthusiastic reception. In the second part of the 20th century, motorized mobility rose to become the dominant form of transportation in cities and regions around the world. The automobile replaced walking as the key determinant of how far settlements could grow, and cities grew to accommodate this form of transportation, often with unfortunate single-mindedness, that is now being challenged by the realities of a changing climate and deleterious effects on day-to-day quality of life.

For years now, work has aimed to grow a consensus about the importance of communities that better serve all their residents, and not only their vehicles. The 15-minute neighborhood (15MN; Pozoukidou and Chatziyiannaki, 2021) is among a handful of ideas to emphasize movement at a human scale, in environments that accommodate a wide range of capabilities throughout the lifespan, with the aim of improving livability and health in ways that automobility can no longer promise, let alone deliver. A challenge faced by 15MNs is the legacy of decades of auto-centric planning. Streetscapes are key parts of the hardware of cities, not only for what is evident at surface level (e.g., sidewalks, pavements), but also due to other accessory but hidden infrastructure, both physical (e.g., water, sewage, power) and social (e.g., property rights, right of ways). In addition, suburban developments in North America are often implicitly or explicitly designed to discourage through-traffic through predominantly meandering, poorly connected streetscapes, in conjunction with single use development. Alas, this form of development cuts both ways, the lack of meaningful destinations to discourage through traffic means that residents also need to go elsewhere to satisfy even their most quotidian needs.

A relevant question concerns the density of opportunities needed to realize 15MNs. To address this question, we investigate the current accessibility situation in parts of Canada’s major metropolitan region. The analysis consists of two parts, with positive and normative characters. 15-minute walking neighborhoods are studied, and their accessibility levels assessed (positive analysis). Optimal opportunity landscapes are then used to simulate equivalent opportunity landscapes throughout the region. Accessibility is then reanalyzed from the normative perspective of the provision of opportunities. The results of this analysis are finally correlated to neighborhood network attributes, including connectivity, centrality, and clustering. The results of this investigation provide valuable information about neighborhoods, their morphology and potential to support the aspirational goal of providing opportunities within 15-minute walks for their residents. This information can help to identify target neighborhoods for planning interventions, as well as neighborhoods for whom the 15-minute ideal of walking trips could be little more than wishful thinking.

**Keywords:** Networks; network analysis; accessibility; 15-minute neighborhoods; walking

**References**

Brown, J. R., E. A. Morris, and B. D. Taylor. 2009. “Planning for Cars in Cities: Planners, Engineers, and Freeways in the 20th Century.” Journal Article. Journal of the American Planning Association 75 (2): 161–77.https://doi.org/10.1080/01944360802640016.

Pozoukidou, Georgia, and Zoi Chatziyiannaki. 2021. “15-Minute City: Decomposing the New Urban Planning Eutopia.” Journal Article. Sustainability 13 (2): 928. https://doi.org/10.3390/su13020928.

Roberts, Ian. 1998. “A Short History of Walking.” Journal Article. Nature Medicine 4 (3): 263–64. https://doi.org/10.1038/nm0398-263.