



Passager marchant sur le quai de la station Javel (RER C), Paris
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The multimodal walker.
Potentials for combining walking and public
transport at the agglomeration scale.

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Conference paper STRC 2009

STRC

9th Swiss Transport Research Conference
Monte Verità / Ascona, September 9. - 11. 2009

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September 2009

Abstract

Recently major transport operators such as Transport for London or RATP in Paris developed an interest for walking issues, and seek to promote walking as an integrated part of their transport offer.

This paper draws from two case studies being carried out on behalf of these operators. It will explain in which context this interest has risen, what are the motivations behind the development of a walking-friendly network (focusing on its hubs, their attractiveness and accessibility as well as their relations to other attractors), and how targeting the walker as a potential client for public transport can be achieved.

The paper will show how walking and public transport enhance each other as they enrich the realm of possibilities regarding both mode choice strategies and route strategies. It will also explore walking's pivotal role in associating public transport with individual modes of transport. Walking performance is decrypted as a vital factor in developing full-fledged multimodal trip-chaining capacities, especially when linked with on-demand modes of immediate and free access, such as vélib' and autolib'.

A typology of walking facilitators and hindrances will be brought forth to describe both optimal and suboptimal conditions within the exchange nodes and interfaces themselves as well as beyond into the public realm.

This paper will also describe the advantages and the shortcomings of a certain number of design principles aimed at promoting walking, for instances active frontage that facilitates navigation, pedestrian interfaces that fulfil pedestrian-specific needs, and the weaving of over & underground spaces into a continuous walkscape.

Finally, this paper shall deal with the crucial notion of which are the optimal scales to develop an operating walking network in order for walking to be truly efficient, not just by itself but especially in combination with other modes. The paper outlines the idea that the multimodal walker is at its best at the agglomeration scale, and goes on to give some groundbreaking arguments on why this is so.

Keywords

multimodality – walking – public transport – trip-chaining – navigation – active frontage

1. Public transport operators shift to position themselves as multimodal mobility providers

In the last few years major transport operators such as Transport for London or RATP in Paris developed an interest for walking issues, and now seek to promote walking as an integrated part of their transport offer, which at the same time expands to integrate both the bicycle and the car in shared mode. Operators thus take upon the notion of multimodal mobility as key to city dwelling and strive to make their offer compatible with the growing portion of such modal choices entailing more complex trip-chaining and interfacing between modes.

While walking promotion may seem a little farfetched and remote from the PT operators' primary concerns, there are in fact several good arguments in favour of a joint promotion of walking and public transport, as we shall see. In this paper we uphold the notion that walking and public transport enhance each other as they enrich the realm of possibilities regarding both mode choice strategies and route strategies.

Besides being always used in combination with every other transport mode – even if just for a few dozen meters, and more often than not for distances up to a few hundred meters – walking is at the core of every transfer from a mode to another. Therefore walking plays a crucial part in the smooth interfacing between modes and is a facilitating factor of multimodal behaviour, although it becomes in fact most times a hindering factor due to a lack of adequate infrastructure, poor or inadequate signage and overall difficult environmental conditions.

Despite these inadequacies, walking performance, when brought to its full potential, has the dynamics to become a vital factor in developing full-fledged multimodal trip-chaining capacities, especially when linked with on-demand modes of immediate and free access, such as *vélib'* and *autolib'* in Paris, that are aimed by nature to passersby usually on foot or transferring on foot from public transport means. Walking therefore plays a pivotal role in associating *mass* transit with *individual* modes of transport, and this role will increase in the future as demand for more flexible on-demand kinds of usage will continue to climb for all transport modes, especially within large urban areas. We thus believe promoting walking, and improving the conditions in which walking happens, is the way to go in promoting multimodal behaviour.

2. The underlying motives behind walking promotion

2.1 Walking time is a significant share of total time allocated to travel, especially when trip-chaining

In public transport trips especially, walking is ever present and usually takes a rather large share of the time allocated to the overall trip. Say that over an average urban commuting trip lasting from 30 to 45 min, 10 to 15 min will be consecrated to walking, around a third of the time. This is hardly negligible, and the user will take into account any improvement in optimising both walking time and comfort. Furthermore, the percentage of time devoted to walking and its counterpart, waiting, may climb to almost half of the total time, depending on how many transfers are being considered. Thus interfacing conditions are crucial to the perception that the transfer is successful. The higher the number of transfers, the more walking and waiting conditions in between modes become important to the overall acceptance of the system. Thus by optimising the possibilities of combining walking and public transport in the same trip, PT operators are actually enhancing the performance of both modes, therefore augmenting the chances of people using more public transport in their daily routines.

2.2 Walking allows for discharging an oversaturated network

The main reason that motivated operators to start thinking about walking promotion as an integrated part of their offer is the congestion of the public transport system itself. This phenomenon is caused mainly by the rise in population on the agglomeration scale and the subsequent rise in distances travelled; the share of passengers-kilometres grows evenly as more people coming for further afar make longer journeys.

Congestion becomes worse as the trains approach the inner perimeter of the dense city, since they become clogged with short-haul users that take the metro for just a few stations, or even just a single station. This is a suboptimal use of the subway system, given the fact that usually surface trips would be faster and more comfortable to the users. The reason this happens is ingrained in the fact that people usually possess a fairly good mental map of the metro network, but a rather poor spatial representation of the surface maze of streets they are supposed to navigate to reach their destination. This misrepresentation of surface travel options induces them into thinking that on foot they will not reach their destination neither easily nor rapidly, and thus into preferring the metro, that seems faster and more direct, even though in reality this may no be so at all.

With both London and Paris underground systems becoming increasingly saturated, especially on the main lines within the city centre perimeter, where walking is usually a task performed rather at ease due to relatively favourable environmental conditions and a dense walking-friendly surface network, it was only a matter of time until operators started to think of ways to de-saturate the network that were feasible without much ado, and walking appeared as just the right means to do that. For without the possibility of enlarging the network except at a prohibitive cost and within a rather long timeframe, it makes sense to try to motivate metro users to take to the surface for those segments of the trip which can easily be done on foot. If only a fraction of 10% to 15% of the users would switch to walking instead, carriage capacity would gain a zest of much needed flexibility to compound with the ever-increasing number of passengers and unforeseen eventualities.

Accidents and maintenance works are other cases where walking could be very efficient in discharging the system's overloads. Traffic disruptions usually mean trains being stuck at stations for a delay that could last anything from a couple of minutes to an hour or more. For delays of more than 15 minutes, walking becomes quite competitive to reach the next station when in London, and up to three stations when in Paris. Therefore walking alternatives are the best for those users with relatively short connections. If these users can be convinced of taking to the surface instead of waiting at the station, freed quays would gain more room for passengers awaiting long-haul connections.

However, such a transfer to the surface demands confidence in one's walking and orientation abilities and sufficient knowledge of the area being trodden on foot. This is the reason why RATP has started a program for its agents to act as information and itinerary providers to users willing to walk in case of a disruption. With the aid of maps of the sector, the agents listen to the project of the users and try to provide them with the best solutions according to their needs and expectations. The added-value of such an initiative lies in the fact that thus the users not only feel they don't need to waste any time waiting, they can gain time and actually expect a pleasant experience from venturing to the surface.

This initiative can further be optimised by going further than counselling passengers in case of delays, and expanding the role of the agents to fulfil the passengers' everyday needs regarding itineraries and services. Agents must be proficient in the specifics of pedestrian metrics. They should be able to propose, beyond an expertise of the nearby surroundings of each sector, a thorough understanding of the catchment area each person defines for daily activities. These catchment areas tend to become larger and more complex as people tend to overlap multiple sorts of activities as well as diverse transport modes within the whole of the agglomeration. Agents are at their best when capable of giving advice on how to take advantage of the level of integration of the transport system at the whole of the agglomeration scale, in particular its multimodal connectivity. Each station's surface potential is thus

enhanced as it becomes part of the general network of places each individual practices in his daily life.

To complement the work of the agents, it is also possible to implement at the stations wireless information pods allowing users to reschedule and rethink their itineraries on the fly. This is a useful complement to plans usually conceived before leaving home or office. Quite a few cities now offer this kind of electronic service integrated to their transportation system, and the fast-paced diffusion of phones and other handheld devices connected to the Internet greatly facilitates this kind of re-computing on the go.

3. The ticketing system at the heart of the changes towards a multimodal mobility behaviour

How does a public transport operator include walking – or any other individual mode at that - as a part of its transportation network? The question, from an economic point of view, is not such an easy one, since walking has been since the dawn of humanity a quintessential activity done for free and it would be indeed very difficult to make people pay for simply putting a foot in front of another.

Thus operators have to make a choice:

1. either they renounce the money walking could bring them and accept that trips on foot are included into their network at no extra cost for the user, and are happy with the fact that they gain (or at least do not lose) users to the overall trip,
2. or they try to make to user pay for added value services linked to walking or an improved environment into which to walk.

The first option has traditionally been used, and RATP for instances has segments of surface trips between stations where the ticket remains valid even though its owner leaves the underground and comes back in again. But to push further this integration process in order to benefit from large-scale synergies, the operator would have to think of ways of implementing a ticketing strategy that truly combines all the over & underground options within the same global network.

The latter option has given rise to an innovative range of concepts such as the pedestrian stations, points of interest situated on surface itineraries that bring together in a single space a full range of services specially aimed at fulfilling pedestrian needs and which added value can be made to be paid for. Creating segments of high added-value pedestrian itineraries officially labelled with the operator's brand and fully integrated into the ticketing system will enable the operator to create value from walking-friendly environments that are put at the disposal of its clients.

Ultimately, a ticketing system which is fully integrated in its time, spatial and social dimensions would best fulfil the needs of the users, especially when these users are also walking at times.

This is why the ticketing system must be capable of easily absorbing smooth transfer options at all times to other more individual or *à la carte* modes, in a combinatorial fashion that may change constantly its variables, composing with different ways of associating walking,

cycling, taking own/shared car, riding in another's vehicle, hopping on board of any given public transport, or any other means to displace oneself in order to reach a destination.

Furthermore, it must go beyond the individual to consider the ways the social network he belongs to interferes with his travel plans, and the increasing ways in which mobile devices allow him to play with these interferences and introduce changes to his travel plans in real-time. We call this collectively woven mobility *constellar mobility*, playing on the analogy of constellations to describe the multi-scale and complex connections that are interwoven between people as they multiply their belonging to several diverse but interspersed social networks. The important notion one should retain from this concept is the fact that a person's agenda and subsequent travel plans is not determined just by her own will and her own constraints, but by a myriad of other people's wills and constraints. Her spouse, children and close relatives, her friends, her doctor, her hairdresser, her boss, her colleagues, her sports trainer, to name but a few, may influence her mobility choices, including while travelling, in order to better adjust to a change of circumstances or priorities in the other's scheduling.

It is equally important, when an operator is considering ways to gain passengers coming from other modes, to address the *occasional user* with a dedicated offer adapted to spontaneous and sporadic use of the public transport mode. Usually the ticketing offer limits itself to either monthly or yearly subscriptions, or single-trip tickets. Some offers take time rather than distance into account, being valid by the hour or by the day. Other offers consist of bundles of single tickets for repeated use. Recent progress with digital cards such as the Oyster Card in London or the Navigo Pass in Paris allows more flexibility in that the user may decide himself how he wants to travel, according to how much money he decides to charge the card with. The Oyster system computes trips individually according to a set price by distance, while the Navigo system allows for unlimited travel within the selected zones for a given time (a week or a month, for instance). Both systems have their pros and cons. Ultimately the system should strive to allow the user maximum flexibility in the use of their navigating options, be it time or space wise. Addressing the potential user as a walker that decides for any length of time to borrow some public space from a moving vehicle that he shares with other people usually unknown to him seems to be one of the best ways to tackle this issue of the irregular use of public transport, which is bound to become essential in a context where dominant single modes that in the past took the lion's share of urban mobility, such as the car or public transport, start to give way to increasingly hybrid multimodal behaviour implying walking as a common denominator.

In such a context, it follows that public transport operators have everything to gain from developing complementarities with individual transport modes, be those active or motorised modes, since individual mobility may advantageously replace public transport at the times the latter is not available or is hindered by poor scheduling. But for smooth transfers to occur at a

large scale a truly multimodal ticketing system is yet needed that takes individual mobility fully into account.

4. The development of a walking-friendly network

To achieve the aim of an effective walking promotion intertwined with public transport, it is important to enhance the perception, in the eyes and in the mind of the user, of a comprehensive network where walking is not only feasible but easily carried out in every circumstance, without wondering too much how to proceed along the journey. One could, and indeed this has been the course followed by more than a city over the past decades, improve single-handedly this or that particular public space, without ever achieving the coherence of a full network. Remarkably, such one-shot single-space options have never been pursued for motorised modes, which all demand, and obtain, a comprehensive network to start with, before ever even considering implementing other aspects needed to their well-functioning.

We uphold the idea that to function effectively, walking does need, as every other locomotion mode, a full network over which to deploy.

4.1 Enhancing walking conditions

In this respect it is important to consider a set of measures acting upon a certain number of factors which when combined enhance walking conditions greatly:

1. Improve the accessibility, lisibility and attractivity (ALA) of the travel route and its immediate environment, taking special care in designing parting and joining ways, and connecting destinations and en route attractors to transport interfaces allowing transfer to other modes.
2. Provide opportunities for both transit and sojourn, and smooth transitions between these walking and waiting.
3. Display intuitive signage respecting existing lines of desire.
4. Increase the number and variety of services “on the go”
5. Allow for an extended time-span for using the facilities provided
6. Favour increased socialising opportunities en route

Such a network will only work to the advantage of the public transport operator if it enjoys the improved performance gained by implementing an *iterative* network that brings together both the benefits of *connectivity*, directly linking places further afield by fast and frequent mass transit options, and the benefits of *nearness dynamics*, played out through extensive, fine-grained walking connections that cover the whole of the territory and fill in the gaps left by public transport missing links.

4.2 Interfacing palimpsest environments

We believe it is important to organise the space within which multimodal transfers take place around the unifying notion of “life hub”. A life hub is a place where all the functions and activities of daily life may concentrate and social encounters are maximised, while at the same time providing good connections for daily transportation needs, regardless of the transport mode which is preferred. Temporal accessibility, in this context, is just as important as spatial accessibility. Flexible opening hours are thus essential to ensure the dynamics of the life hub and the welfare of its users. By creating palimpsest spaces propitious to both the multimodal interfacing of transport opportunities and the complex intertwining of a multiplicity of other activities carried out whilst “on the move”, operators enrich their capital, which consists not just of the vehicles and infrastructure to move people about, but essentially comprises the universe of opportunities that people can ultimately enjoy while travelling.

To make such life hubs happen, there are a certain number of rules one can play on. We shall review some of these below:

For instance, within the life hub and in its immediate vicinity, it is crucial to favour alternating transit & sojourn dynamics. This is best accomplished by smoothly alternating breathing and bathing spaces. Breathing spaces are those where one can sit down away from the crowds and relax, enjoy the view or the incessant buzz of other passersby. Bathing spaces are those where one is immersed in the current of a vibrant, moving crowd strolling about their business, and one is immediately in touch with the happenings and opportunities of public space. For a good life hub to function properly, these two dimensions have not only to intertwine but to balance each other out.

Another important aspect public transport operators need to take into account is the need to facilitate the many transitions between the underground and the surface. This is done through multiplying well-designed and optimally located anchor points for pedestrian navigation. These can be of various sorts, such as signage (both conventional and of the more intuitive sort), pocket-size public spaces appropriate for the above-mentioned breathing and bathing movements, information distilled under diverse formats and certain types of services that also double as memory stickers (memory being especially easy to kindle in relation to specific actions accomplished in certain places) reminding the users of a particular location within the circulatory maze.

To further optimise visibility it's essential to maximise the hub's internal connective potential. Connections within a hub are essentially carried out on foot. Therefore the hub is pledged to become a most walkable environnement, and this is especially true regarding multimodal hubs, where connections between different modes and subsequent diverse environments are

all the more difficult. To ease the transitions, special care devoted to walkability is a necessary precondition.

The smooth surfaces and the multitude of mechanical devices easing and multiplying walking potentialities such as escalators and lifts, which are omnipresent in airports or commercial and leisure centres, are the surest sign of how walking is habilitated in these environments as an integral part of the transportation system, benefitting from appropriate signage where given time intervals are walking-specific. The underground realm is also such an enclosed space where walking is totally predominant. One could thus expect, also in this instance, that everything in such a setting would be thought and produced in relation to users that are first and foremost pedestrians. However, this is far from being the case, and quite a few underground territories reveal themselves to be in fact quite hostile to pedestrians. Thus operators are bound to gain a not only a more numerous but also a more satisfied clientele when they concentrate their efforts in improving the layout for walking, from ground texture to lighting to sound to signage, in order to facilitate and accelerate pedestrian movements within transport hubs.

4.3 Building intuitive itineraries

Every urban dweller has his own set of itineraries ingrained in his mind, for better or for worse. For better, because he doesn't have to reinvent the wheel each time he wants to get to work or to have some coffee at his district's favourite café: he could go there almost with his eyes closed. For worse, because apart from a few well trodden places and a few known ways to get there, his mastering of the city ways can quickly become quite limited.

The subway network, and the map that depicts it, are used somewhat like navigating in deep seas. From a point to another, everything looks quite the same, and there are no reference points to anchor one's knowledge of a given route. Walking, on the contrary, and its surface network, both require a totally different way of navigating, usually by cabotage from one interface to the other and from one attractor to the next. Such navigation, always in view of the "coastal" maze of streets and its landmarks, allows for a better orientation and a more thorough inscription in the memory of the passerby. It also encourages a better transition between intermodal nodes and between the modes themselves. A relatively easy way to help people inscribe a given way in their daily routines is to deploy intuitive guidance, using for instances the principle of active frontage. Transport for London has recently developed this concept within the framework of the project Legible London, whereby well-known cafés and iconic department stores and boutiques are marked on maps just as museums, public building and parks. Thus everyday references, exactly those people know better because they tend to visit them more often, can become totems punctuating the routes and indicating significant turnabouts or places to linger.

4.4 Designing walk-friendly cartography

A recent map of London, “Tube and walk”, represents walking as a natural cousin of the subway and indicates mixed routes composed of both walking segments and subway segments. Its added value comes from the fact it highlights how by complementing each other walking and subway both stand to gain from more comprehensive networks.

Another approach, experimented in Geneva, consists in creating a time-based representation of the routes linking main attractors all about the city. This approach is more intuitive to the pedestrian than distance-based approaches, and effectively shrinks the city in the walker’s mind to dimensions which seem much more feasible.

Other time-based techniques consist in drawing circles of equidistant places based on isochrones, such as the 5-minute and the 15-min walking distance employed in the project Legible London.

We think the most successful approach would be one that plays simultaneously on two different scales: the scale of the whole network, and the nearness scales of the neighbourhood or the immediate surroundings.

5. Conclusions

In this paper we strived to describe the pivotal role of walking in building a multimodal transportation system and in associating public transport with individual modes of transport. Based on two case studies describing the initiatives of two major European urban transit operators, Transport for London and RATP, the paper focuses on their motivations behind the development of a walking-friendly network and the levers at their disposal to target the walker as a potential client for public transport.

We have shown how walking and public transport complement and enhance each other as they enrich the realm of possibilities regarding both mode choice strategies and route strategies.

Walking connective capacity and its transitional role ensuring smooth transfers between modes and between interfaces and attractors make us see walking performance as a vital factor in the overall performance of the system. Enhancing walking potential is thus essential, in our view, to developing full-fledged multimodal trip-chaining capacities, especially when public transport is linked with on-demand modes of immediate and free access, such as *vélib'* and *autolib'*.

This paper has then proceeded to describe the advantages of a certain number of design principles aimed at developing a comprehensive and effective walking network, such as employing active frontage that facilitates navigation, promoting pedestrian interfaces that fulfil pedestrian-specific needs and weaving over & underground spaces into a continuous walkscape. All these facilitators contribute to create optimal walking conditions within the exchange nodes and interfaces themselves as well as beyond into the public realm.

We have concluded our overview with a discussion of which are the optimal scales to develop an operating walking network in order for walking to be truly efficient, not just by itself but especially in combination with other modes. Signage and cartography options are all the more efficient when they stick to the user's realm of experience and refer to their own intuitive references. We thus support the idea that introducing multimodality as a frame of reference for walking implies a change of scale is necessary in walking representation, for the multimodal walker is at its best at the agglomeration scale.

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