Rhythms and temporalities of city usage generated by mobility

Rythmes et temporalités des usages de la ville engendrés par la mobilité.

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Summary. The city has been considerably influenced in its development by successive forms of mobility. The construction of urban functions is dictated by the criteria of accessibility and time. This proposal describes the cause and effect relationship between the city and mobility. Through theoretical concepts of metrics and systems, it speculates on relative temporality of usage of the city by different forms of mobility. The aim of this contribution is to propose a representation of these temporalities in the form of a spatial anamorphosis.

Résumé. Dans son évolution, la ville a considérablement été influencée par les mobilités successives. La construction des fonctions urbaines est dictée par les critères d'accessibilité et de temps. Cette proposition fait état du rapport de cause à effet entre ville et mobilité. Au travers des concepts théoriques de métrique et de systémique ; elle émet l'hypothèse d'une temporalité relative des usages de la ville par les mobilités. L'objectif de cette contribution est de proposer une représentation de ces temporalités sous la forme d'une anamorphose spatiale.

Introduction

From walking to driving a car, humankind has never stopped seeking a faster method of travel. In the 19th century, the advent of the steam engine and industrialisation were accompanied by a huge rural exodus. Under this demographic weight, towns and cities grew in size along transport routes, railways and tramways. After World War II, cars became more accessible, supported by strong economic growth and cheap oil. Population movements reversed, and the accessibility of new locations with the same travelling time caused a massive peri-urbanisation of cities (Beaucire, 2006).

Beaucire (Beaucire, 2006) and Lhomet (Lhomet, 2013) show the influence of faster travelling times on the city. Lhomet evokes changes in civilisation since walking, from steam power as the decisive factor in the construction of the railway to the abundance of oil as the driving force for development of the motor car. These transitions in energy and changes in mobility inevitably lead to transformation of the city itself. Beaucire transposes this increased speed to place. The motor car has given us the freedom to access new places in the same travelling time. This time-distance relationship becomes the criterion for construction of a new urban form. It causes a "deconcentration" and "fragmentation" of the city. In other words, a "de-densification" of the city centre and a suburban sprawl in outlying areas. Beaucire concludes that "speed is thus more

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universal than density" (Beaucire, 2006). However, would the criterion of speed allow the definition of city models as described by Newman and Kenworthy (Newman and Kenworthy, 1991)?

A cause and effect relationship links mobility to the rhythm of the city. Various consecutive methods of transport are thus integral to the city. They are both the source and the material. The history of the city can be written through the evolution of mobility (Paquot, 1996). In a city created by diachronic evolution of transport, it is the space-time pairing that is relevant. Human activities influence travel needs and vice versa.

Mobility is not merely technical; it cannot be considered as merely a system of movement. It is the link between different parts of the city. It provides access to different spatial realities that are distant in space and in time. With the "inter-accessibility" of a place making it accessible by different means of transport, it is the user who must decide which method to use, that of a temporality of the city created by mobility. Which brings us to the hypothesis of relative temporality of the usage of the city through different forms of mobility, influencing space-time pairing.

How has the evolution of the city been influenced by transport? Have the successive forms of mobility had a qualified impact on the link between space and time in the city? Is the rhythm of the city consistent with the rhythm of different transports?

Through the contributions of various research projects on the subject, we now have the objective of representing the temporalities of city usage, relative temporalities according to the form of mobility. These representations highlight ways for the user to understand the city according to his/her choice of travel method.

Definitions and development

We will first define the space-time relationship and the influence of forms of mobility on the city. By referring to a number of authors, we will develop the concept of relative temporality of usage of the city by mobility. This reflection will lead to the construction of a territorial intelligence tool within the overall context of our research. To finish, we will present a systemic method of representing relative temporalities applied to our case study of Mons and Valenciennes.

The city changes and its rate of change matches the increase in speed (Beaucire, 2006). The city thus enters into new urban paradigms influenced by the evolution of relationships between space and time. The crucial measurement between two places is no longer distance, but time. More so than proximity, it is accessibility that takes priority in the construction of the city (Dupuy, 1999).

Wiel (1999) emphasises the role of speed in the construction of urban forms through mobility (Wiel, 1999). In his work La transition urbaine ou le passage de la ville pédestre à la ville motorisée, Marc Wiel discusses the reciprocal relationship between transportation and urban growth. Accessibility determines the choice of settlement as much as the presence of an activity influences the need for new mobility (Gallez and Kaufmann, 2009).

Orfeuil defines mobility as the act of moving from one place to another (Orfeuil and INRETS, 2001). This movement is a response to the needs of business or other activities, and may be achieved by one or more means of transport connecting the two places to each other. Mobility is therefore a response to the need to travel related to an activity.

From the user's point of view, the choice of transport is decisive. It has impact on our daily lives. We no longer calculate our journeys in terms of distance, but in terms of time or cost. "The need to travel taking time from our Time". Time devoted to travelling is thus in competition with Time for work, leisure and business activities, etc.

The need to travel is therefore related to different types of activity, creating different temporalities in the life of the user. A relative temporality if the user has to make a modal choice. In the first place, and for the most part, the motor car. It offers unequalled freedom of movement. Contrarily, the use of public transport is regulated by a strict and fixed timetable. Nevertheless, public transport cannot be reduced to a single action of movement, leaving time for the user to pursue other activities (work, reading, resting, etc.). More so than the car, public transport provides the user with a sort of temporal duplicity or 'doubleness'. This ambivalence also exists between the user and the city. It refers to different usages of the city influenced by mobility, which we will consider under the concept of metrics.

Lévy defines a metric as a "method of measuring and processing distance" (Lévy, 2003). A metric "is [also] a mode of transport and all that goes with it" (Lévy, 2004), in other words, as much the technology as the spatial situation or even the stakeholder strategies (Lévy, 2006).

This dual interpretation of the term 'metric' as both content and the measurement of content is not entirely unreasonable. It comes from the observation that distance in societies is plural. There are an infinite number of ways to measure, understand and apply distances and movement (Lévy, 2006).

This plurality is amplified between each mode of transport and in accordance with the user. The idea of distance is expressed by measurement, time and by comparison with speed. "Time cannot be universal". It will be different for each user, the journey appearing to be longer or shorter in accordance with a number of factors. Time passing more quickly or more slowly depending on our mood, the weather or even the reason for travelling.

More specifically, Lévy distinguishes two types of metric: pedestrian metrics and automobile metrics. Pedestrian metrics include walking and cycling; but also public transport systems. According to Lévy, the distinction between pedestrian metrics and automobile metrics lies in the privatisation of space. When using public transport, the user remains in multi-sensory interaction with his/her environment, with the space of the city surrounding the transport system. A car, on the other hand, privatises the space. It creates interruptions in the urban environment in the form of roads and motorways. It divides the street space into metric sectors (Lévy, 2004).

The word 'metric' therefore brings us an inclusiveness, through the understanding of complexities caused by the space-time relationship, revealing an important interaction between different modes of transport; mobility and territory (flow and shape), movement and user. Complexity, interaction and inclusiveness all form part of the basic concepts of the systemic approach, a key factor in this research project.

Within the space-time relationship, there is a certain power play between city and mobility; decisions made by the user are decisive. The user, as we have already seen, wants to meet his or her travel requirements by using existing modes of transport. Mobility choices are more influenced by temporal criteria of than those of distance. More so than city space, it is the concept of city rhythms through different forms of mobility that we wish to bring to users.

The overall goal of our research is to create a territorial intelligence tool with regard to the city-mobility relationship. In this proposal, we will therefore spend some time looking at the representation of temporalities of the city created by mobility.

Territorial intelligence is a "territorial information and communication approach" intended to develop consistency between stakeholders and territories for a territorial development process (Bertacchini and Oueslati, 2003).

The planned tool must satisfy this interaction by means of an all-encompassing mechanism for multi-disciplinary understanding, with a view to creating territorial information contents. In this case, we propose time as a comprehensive mechanism. As we have shown, time is relative. It varies according to the user and the mode of transport. Its flexibility gives rise to a new complexity that supports our theoretical and methodological choice concerning a systemic approach to the city.

Theoretical concepts

In this section, we present the theoretical and methodological concepts enabling us to develop our own exploratory method appropriate for relative temporalities.

To represent temporalities of the usages of the city related to mobility, we are developing a modelling tool using systemic methods, in particular the systemic triangulation of Durand and Nunez (Durand and Nunez, 2002), and the systemic modelling theories of Le Moigne (Le Moigne, 1994). The concepts of the systemic approach are consistent with the objective of our study. The interactive relationships between time, space and the modes of transport available to the user and travelling habits (Offner, 1996) endow it with a level of complexity. This is also the case with numerous research projects on the subject, which rank the components of the city using the systemic approach. Like Bonnafous and Puel (Bonnafous and Puel, 1983), who put forward the hypothesis according to which "the city may be interpreted as the dovetailing of three sub-systems […] that fit together according to complex causal relationships. The three sub-systems are as follows: the localisation system, the mobility system and the social relations system." According to Bassand and Brulhardt (Bassand and Brulhardt, 1983), "understanding a type of mobility involves taking account of the globality of the system […] different forms of spatial mobility can be explained by a systemic model". Gallez and Kaufmann in aux racines de la mobilité en sciences

sociales (Gallez and Kaufmann, 2009) discuss a systemic approach "linking, in a given territory, individual behaviours and the full range of modes of transport".

The systemic approach is particularly well suited to the study of urban phenomena. It is built around the concept of systems. Joël de Rosnay defines a system as "a group of interdependent elements linked together in such a way that if one of them is changed, all of them are changed, and consequently the whole group is transformed". (de Rosnay, 1975) The systemic approach thus concerns both the importance of the system's constituent parts (the subs-systems) and the relationships that govern them. "The problems of system [are] problems raised by a large number of interrelated variables" (Bertalanffy, 2012). For this study, it is the interrelationship between space and the time influenced by mobility that will give us a better understanding of the system, i.e. of the city.

Our expanded knowledge of a system refers to systemic triangulation as a tool for observation and understanding of complex processes. It views the idea of the system from three different, but complementary, angles: structural, functional and historical aspects of the system.

In its introduction à l'approche systémique (Certu, 2007), CERTU[2] presents a systemic approach to the city. It defines the functional aspect as "the use of energy and the elimination of waste; production, consumption and administration; culture and leisure, information; communications and transportation" (de Rosnay, 1975). Structural organisation realises each function in the space of the city: "housing, businesses, communications networks, energy distribution systems, etc." To finish, an historical analysis is indivisible from the functions and the structure of the city. It is indeed its very origin. It is by understanding where the system comes from that one may deduce where it is going (Durand and Nunez, 2002).

In his definition of validation by triangulation, Alex Mucchielli refers to the three dimensions of time, space and people (Mucchielli, 2009). Le Moigne modelizes the systems by simultaneously taking account of the structure, the activity and the development (Le Moigne, 1994). For this research, we are transposing the concepts of function, structure and history into activity, spatiality and temporality.

This contribution will therefore pay some attention to defining the concept of relative temporality, while keeping in mind that it is part of a comprehensive triangulation model of the city. The suitability of this concept will enable us to disprove or prove our hypothesis, according to which relative temporalities of the city created by mobility have an impact on space-time pairing.

Pratical methodology

The development of theoretical concepts and their transposition into our methodological contributions have enabled us to construct an exploratory approach that we will apply to our case study.

To do this, we will work at several levels of spatial and temporal analysis, which we will call:

- diachronic temporal spatiality of the usage of the city by mobility on its development
- synchronic temporal spatiality of the usage of the city by mobility on the user

In this way, we distinguish between two relative temporalities. The temporal spatiality of the city created by mobility and of its development over time: diachronic. The temporal spatiality of the city created by mobility at a specific time (past, present or future) and its effect on the user(s) of the city created by forms of mobility: synchronic.

From a diachronic perspective, as we have seen in the introduction, different modes of transport have accelerated construction of the city. The quest for speed had a strong impact on the criteria of distance and time. In their development through transport systems, cities came closer together in terms of both time and geography. However, in some specific cases, such as cross-border regions, temporal spatiality of the cities of Mons and Valenciennes, developed through mobility, experienced substantial fluctuation. A number of factors (political, economic, technical, etc.) caused these fluctuations.

Our proposal concerns the cross-border cities of Mons and Valenciennes and the metrics shared over time: the railway line, the national road and the historical tramway. In the 1970s, the E19 highway between Mons and Valenciennes was constructed on the bed of the old canal. Railway line 97 was closed down because of a lack of passengers and the tramways dismantled. Today,

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Valenciennes, like numerous cities in France, has regained its tramway. Mons is building a new station to link the two parts of the city: the historic centre and the extension of the Grands Prés shopping centre.

In the field of public transport, spatial temporality was at its peak with the introduction of the railway and its cross-border opening, only to decline when it closed due to increased use of the motor car. Consequently, this diachronic fluctuation gave rise to a synchronic temporal spatiality of the usage of the city related to mobility on the user.

At the beginning of the 20th century, a one-hour train journey connected the two cities. It now takes more than two hours using several pedestrian metrics (train, bus and walking) to cover the 32 km separating them, and just 30 to 40 minutes by car.

We have chosen, among other things, the anamorphosis to represent these temporal fluctuations. A spatial anamorphosis consists in this case of the graphic representation of the temporal distortions of mobility on a territory. Its transposition over several periods of time enables the objectivisation of the diachronic changes of the city created by mobility.

It is for this purpose that we have also constructed several synchronic spatial models of the cities of Mons and Valenciennes according to existing modes of transport. A time distortion occurs between the pedestrian metrics and the automobile metric. This temporal discontinuity is accompanied by a discontinuity of space, which, in the case of the automobile metrics, privatises the space. This is the same motor car space that itself encourages the process of peri-urbanisation of the city, and of the spread of a unimodal urban form.

The proposed models represent the temporal discontinuities between city and mobility. By means of their comparative analysis, they take account of a temporal relativity of the city during its history, and of the user in his or her use of the city created by mobility.

Juxtaposition of the diachronic and synchronic representations shows the concept of the relative temporality of city usage related to mobility. It offers a model for understanding the city that, in our triangulation (activity, spatiality and temporality), will ultimately allow construction of a method for systemic evaluation of urban mobility.

Conclusion

The user of automobile metrics is a hostage to his or her own temporality. By comparison with pedestrian metrics, he achieves only the activity of movement. Contrarily, the user of public transport is free in terms of activity, but a prisoner in terms of movement, which is not under direct control, being subject to constraints of a timetable and the infrastructures of transport. The pedestrian is free in terms of both movement and activity, provided he or she does not enter privatised and regulated motor car spaces.

The theoretical concepts of metrics, territorial intelligence and the systemic approach have contributed to construction of our exploratory model. The proposed representations refer to relative temporalities of city usage that are influenced by mobility.

The long-term goal of this research will be, inter alia, using the criteria of temporality, structure and function to determine and represent the different modes of construction of the city by mobility. It will enable construction of urban models created by mobility and their comparison by criteria of durability, economy or even governance.

Bibliography

Bassand, M., Brulhardt, M.-C. (1983). La mobilité spatiale : un processus social fondamental. *Espace, populations, sociétés*, 49‑54.

Beaucire, F. (2006). *Ville compacte, Ville diffuse*. Présenté à 601e Conférence de l'Université de tous les savoirs, Disponible à : https://www.canal-u.tv/video/universite_de_tous_les_savoirs/ville_compacte_ville_diffuse_francis_beaucire.1463

Bertacchini, Y., Oueslati, L. (2003). Entre information & processus de communication : L'intelligence territoriale. *Revue ISDM*, n° 9, 8.

Bertalanffy, L. von (2012). *Théorie générale des systèmes*. Laszlo E., Chabrol J.-B., Paulré B. (Trad.), Dunod, Paris.

Bonnafous, A., Puel, H. (1983). *Physionomies de la ville*. Série « Initiation économique », Editions ouvrières, Paris.

Certu (2007). *Une introduction à l'approche systémique.*

De Rosnay, J. (1975). *Le Macroscope. Vers une vision globale*. Éditions du Seuil, Paris.

Dupuy, G. (1999). *La dépendance automobile. Symptômes, analyses, diagnostic, traitements*. Collection Villes, Anthropos, Paris.

Durand, D., Nunez, E. (2002). *Pour une pédagogie opérationnelle de l'approche systémique.*

Gallez, C., Kaufmann, V. (2009). *Aux racines de la mobilité en sciences sociales.* Presses Universitaires de Rennes, Rennes.

Le Moigne, J. L. (1994). *La théorie du système général. Théorie de la modélisation*. Presses universitaires de France, Paris.

Lévy, J. (2003). *Dictionnaire de la géographie*. Belin, Paris.

Lévy, J. (2004). Modèle de mobilité, modèle d'urbanité. *Les sens du mouvement. Modernité et mobilité dans les sociétés contemporaines*.

Lévy, J. (2006). *Quelle mobilité pour quelle urbanité?* Présenté à 601e conférence de l'Université de tous les savoirs, Disponible à : https://www.canal-u.tv/video/universite_de_tous_les_savoirs/quelle_mobilite_pour_quelle_urbanite_jacques_levy.1461

Lhomet, E. (2013). *Histoire des systèmes de mobilité de l'agglomération bordelaise*. Liège, Disponible à : http://dgo4.spw.wallonie.be/dgatlp/Colloque/2013_Communaute/programme.asp

Mucchielli, A. (2009). *Dictionnaire des méthodes qualitatives en sciences humaines et sociales*. Armand Colin, Paris.

Newman, P. W. G., Kenworthy, J. R. (1991). *Cities and automobile dependence.* Aldershot [u.a.] : Avebury Technical.

Offner, J.-M. (1996). Politique de la navigation à vue. *Urbanisme*, n°289, Paris, 47‑50.

Orfeuil, J.-P., INRETS (2001). *L'évolution de la mobilité quotidienne. Comprendre les dynamiques, éclairer les controverses*. Arcueil : INRETS.

Paquot, T. (1996). Ouverture-Dossier Transport. *Urbanisme,* n°289, Paris, 46.

Wiel, M. (1999). *La transition urbaine, ou, Le passage de la ville-pédestre à la ville-motorisée*. Architecture + recherches, Mardaga, Sprimont.