

Shifting densities

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In this paper, the author adopts a time-geography approach to examine the temporal variation of urban density by analysing spatial load changes at different times of the day at the communal and community level. The evolution of means of transport coupled with the abandon of the notion of direct proximity to the urban dwelling place provide the basis for this new approach to the study of urban densities. The shift towards spatial specialisation within cities has led to radical changes in the forms of urban mobility. In just a few generations, cities, formerly highly concentrated centres of population, have evolved into diffuse urban expanses. As a result, the intangible bonds between the dwelling place and the city have progressively disappeared giving way to a temporally-biased perception of urban space determined by existing methods of transport. Density variations have thus been used to measure urban mobility and transport requirements.

KEYWORDS: City, Nycthemeral rhythm, Mobility, Shifting Densities, Temporal variation.

This work stems from both my university background and my own personal experience. As a geography student, I was confronted with the notions of city, mobility and perceived space. My work experience includes time spent at the Agence d'Urbanisme de Lille (the Lille Town Planning Agency), as well as some experience gained during an informal visit to the University of Oakland, which provided me with an insight into the American city. Most importantly though, the concept of shifting density arises out of a dissatisfaction with the tools conventionally used to study mobility in light of recent advances in GIS (Geographic Information Systems) technology.

The "city" is a difficult concept to grasp due to its evolution both in space and time. Human societies have gradually learned to adapt themselves in order to better master the natural conditions of their existence. This was how the first cities appeared. Thucydides' Athens was a city that was profoundly anchored in rural ways before the Peloponnesian War. The war brought about a drastic change in this situation and turned the city into what was probably one of the first modern western cities. Indeed, the war caused the Athenian citizens to take a decision that would break the link between city and its natural surroundings, making the city first and foremost a market place, a community of people. The fact that Sparta and its Allies occupied the surrounding countryside in no way hindered this urban activity. The town's merchant navy and its relations with its Empire and its allies made it less reliant on its immediate environment. In this sense, the city is characterised by a break with the surrounding natural environment and its influence. This is even more the case today. The emergence of new urban forms linked to advances made in the field of transport further contributes to this reality. Peri-urban and urban phenomena pose more of a problem as to their reality in a declining rural world. How can the everyday reality of urban densities be grasped considering its complex nature and the emergence of a fully motorised world? The initial idea of a typology of urban behaviour to create a point of reference that could predict movement - and hence densities - proved unrealistic as the behaviour of city-dwellers also varies according to their proximity to city centres and trans-

port networks. We have therefore chosen a simpler approach to the study of daily mobility.

The study of urban evolution cannot be disassociated from the study of city-dwellers' lifestyle patterns. However, the scope of such a study is vast and would be further complicated by the problem of access to unlimited and varied information sources. Initial focus was thus directed at the evolution of urban structures before considering the influence of city-dwellers' lifestyle patterns on densities. Finally, the limits and perspectives implied by this approach were taken into account.

The city evolution

The notion of the city has indeed evolved. To paraphrase M. Wiel (1999), we are witnessing an urban

transition, not unlike that of the shift from a pedestrian city to a motorised one. This can be distinctly felt. Whereas the typical 19th-century French town was tightly hemmed in by its city walls, a century later, urban developments have spread out to include outlying areas so that former neighbouring rural districts are now inhabited by city-dwellers. The city has taken on a new scale.

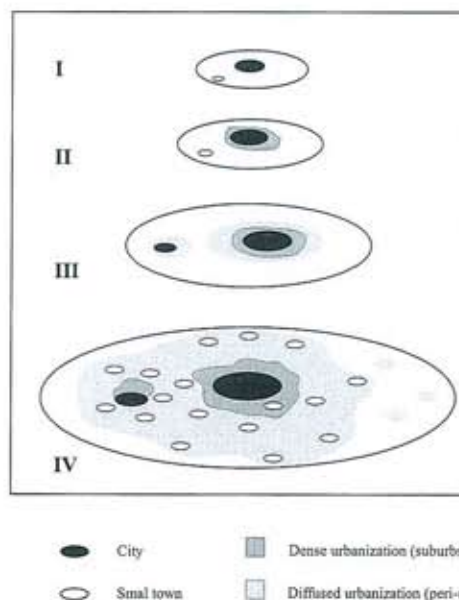


Fig. 1 - The urban transition

1. Initially, the city was hemmed in by its city walls creating a sharp divide between the rural and urban environments. Such was the typical configuration of the European city before being exposed to the effects of demographic transition. The growth of the city was the result of the progressive integration of adjoining towns.
2. Suburban districts – the fruit of demographic and industrial development – then appeared. However, the city still remained very much pedestrian in terms of size: the absence of means of individual or public transport meant that people and their activities were restricted to narrowly circumscribed areas.
3. The emergence of railway networks was accompanied by the development of small towns located on the outskirts of major urban centres. The development of new towns for the purpose of regulating the phenomenon of urban concentration exemplifies this trend. At this stage, suburban dwellers were still largely dependant on public transport systems.
4. Finally, with the advent of the automobile, the city-dweller was no longer bound to his immediate environment. The resulting spreading out and concentration of populations gave rise to new urban forms.

This change in scale was to take place rapidly, the direct result of a change in the nature of Man's relationship with space due to the emergence of new means of individual and public transport. In this sense, any attempt to question the utility of the automobile seems doomed to failure: given the organisation of modern transport, peri-urban populations simply cannot do without this means of transport. Moreover, the emergence of commuting as an integral part of the peri-urban lifestyle works against the abandon of the automobile by its users. The automobile-free city is therefore a utopian concept. On the other hand, alternative approaches to the use of the automobile are a growing reality. Many major urban centres have developed a multi-modal approach involving the combined use of cars, trains and/or underground transport systems. We believe that such practices should be encouraged. However, the use, profitability and cost of public transport facilities account for the fact that their structures are usually centralised whereas a more flexible organisation would be more appropriate. P.H. Emangard (1998) was thus able to demonstrate that the commuter is increasingly tempted to use his own car as the number of intermodal changes he is forced to make increases. In short, given the structure of present-day transport networks and the transport needs of city-dwellers, the abandon of the car or its replacement by a means of suburban public transport is simply inconceivable.

The study of city-dwellers' lifestyle patterns

Where city-dwellers are concerned, distance, and thus the need to commute, introduces the idea of alternating periods of

presence and absence. Indeed, the notion of proximity has itself changed – encompassing a wider reality – as a result of advances in means of transport (see Figure 2).

The growing specialisation of urban centres has led to a change in commuters' perception of proximity: the notion of spatial proximity has gradually been replaced by a notion of proximity that is more spatiotemporal in nature, even if certain hazards such as strikes or inclement weather may momentarily contradict this view. The automobile is the only means by which a generalised centrifugal dispersion of populations is possible. As such, the automobile, more than any other means of transport, accounts for the transition from a local to a multi-local perception of space.

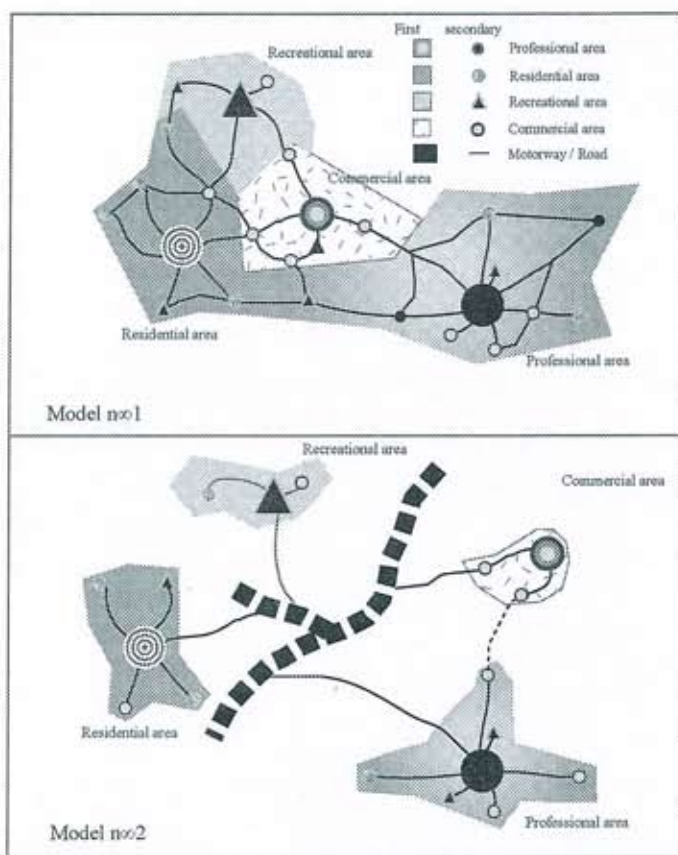


Fig. 2. The evolution of proximity

At the same time, the notion of urban densities has also evolved. The notion of resident density is less relevant today. We have thus sought to redefine the notion of density. Instead of defining density simply in terms of resident populations we have adopted a more objective approach. While V. Fournier's (1995) notion of net density constitutes a real step forward, it applies to a reality that is still much too static in nature. Thus our approach, which consists in the measurement of the populations that are actually present in a given zone at a specific time of the day. Population mobility is thus measured in terms of frequentation, i.e., the presence or absence of populations in a given area within specific, pre-defined time frames. These time frames were defined after careful analysis of daily population mobility patterns. They correspond to phases of

stability, occurring on weekdays, that either precede or succeed phases of mobility (professional, commercial, recreational,...). They were largely established through the analysis of time curves of motorway traffic entering and leaving the cities of Lille and Paris. The varying durations of these time frames collectively reflect the reality of daily mobility patterns. With the exception of atypical working hours, working hours also tend to vary according to whether or not the job is located in the city centre and according to the type of job: a clerical employee working in a downtown location typically starts work at 9:00/9:30 a.m. while on the outskirts of the city employees in similar jobs tend to start at 8:00/8:30 a.m. Taking all of these variables into account greatly complicated our study and resulted in an "averaged out" description of reality. Nevertheless, we were able to refine our results according to the level of spatial analysis. Thus the map of shifting densities for the commune of Villeneuve d'Ascq is representative of the periodic reality of local residential areas, business parks and shopping areas while that of the *arrondissement* is more reflective of its economic dynamism. What did we observe?

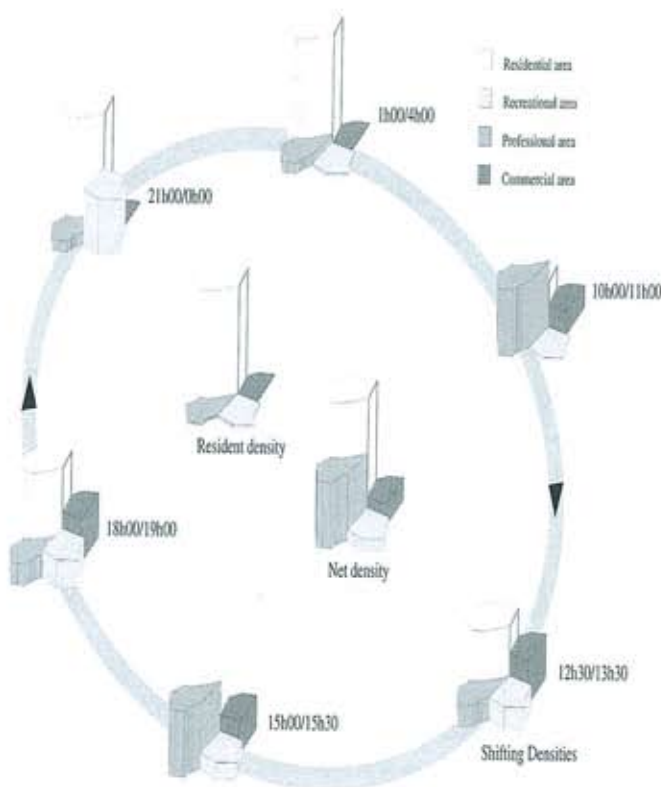


Fig. 3 - Shifting densities

- A static resident density
- Net density, i.e., the mere accumulation of employees and inhabitants in contrast with mobile populations
- In reality, densities vary in line with variations in daily human activities. Residential zones tend to empty during the day and fill up again at midday depending on the ave-

rage distance the local inhabitants are required to travel to get there. The situation is just the opposite in industrial zones, even though at night there may a significant level of presence. The frequentation of shopping and recreational zones depends on remaining available time. While children, housewives, unemployed and retired people may seem to dispose of more available time, the latter is always dependant upon existing material, sociological and physiological constraints.

The limitations of shifting densities

The shifting-densities approach is however not without limitations. The analysis of daily shifts in population densities within a city requires the interpretation of considerable amounts of information. Our approach consists in attempting to estimate the proportion of a population that is present in a given zone at a specific time of day when compared with the resident population.

Some of the limitations of this approach include :

1. Databases: the study of shifting densities requires the analysis of large amounts of information. Apart from problems of access, which are not insignificant, the difference in quality and relevance between the data provided by the 1990 census and data on the frequentation of shopping zones or on the number of business establishments poses a problem.
2. The spatial framework: the establishment of a homogeneous reference grid – the ideal solution – is difficult to achieve. For historical reasons, the geometric segmentation of the European city is, for all intents and purposes, impracticable.
3. Scale: the frequentation of certain micro-structures has little impact of density variations. The corner shop, the traditional bakery or the local sports hall, taken individually, have little or no effect on densities due to their small size when compared with the areas of the zones considered.

It is our belief that shifting densities are the expression of an "averaged out" situation. In carrying out our exploratory study we were able to apply the notion to the French city of Lille. The study of shifting densities opens up new and interesting prospects for the regulation of resources available to city-dwellers as well as their needs. Shifting densities provide the urban planner with a means of understanding how urban centres function as they undergo increasing specialisation. Policy-makers involved in the field of transport can only benefit from a tool which could be used to detect pollution zones, identify transport demands and determine how public facilities are being used.

What are shifting densities if not the expression of a new urbanity that is a direct result of the development of the automobile?

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