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## Or why new visualizations allow us to consider the city as a paedagogical space

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# A visual model for mobility practices and learnings

## Or why new visualizations allow us to consider the city as a paedagogical space

Alexandre Rigal

Renewed visualizations of urban spaces and practices could lead to a better synthesis of data, to easier apprehension of various types of information to expand research reflections and methods, and to new perception models of urban spaces.

Representations and visualizations constitute the core of scientific procedures (Latour, 1986) and more particularly of urban research (Söderström, 2000; Chapel, 2010; Devisme, 2015). Representations offer ways to perceive realities because they render certain components visible in reality. In urban studies, research on representations is necessary to present results, to outline principles related to urban theory, and to extend on research projects already under way. The intellectual technology (Söderström, 2000: 116) constituted by visualizations is essential for describing the city, for suggesting utopias, for working on future buildings, and for the composition of political collectives. Many travel networks, building plans, city maps, architects' projects and drawings exist and have been diffused. Cartographers have produced numerous documents to visualize possible pathways for mobile individuals (Farrauto, Ciuccarelli, 2011). Extending research on representations, the most advanced work on data visualization (Manovich, 2010) introduced the network as a master figure (Lima, 2011; Munster, 2013) – see the research of the Medialab of Sciences Po Paris and the tools that they proposed for building networks, such as Gephi. From Paris, Tommaso Venturini and other researchers have specialized in the visualization of controversies and their many participants (2012). Controversy maps are one of the possible uses of network visualization tools among others, especially social network analysis based on social relationship mapping (Degenne, Forsé, 2009) or the visualization of communities (Rodighiero, 2015). To reveal urban realities, fixed and moving network representations are created, with the aim of representing traveller flows, commodity flows and the data circulating in urban spaces –

see the work of the research team of the SenseableCityLab (MIT), on taxi trips in New York City in a given year of the HubCab project, or about carpooling of the Pisapoop project, as well as in many other city representations. Visualizations are a major intellectual technology for synthesizing information (Manovich, 2010), especially about urban spaces, to name but a few examples. Network visualizations, and visualizations in general, create a space for reflection about the data and situations represented (Söderström, 2000), and finally, visualizations are evocative and possess an often-neglected artistic value[1]. In this article, I use the three properties of visualizations sequentially to visualize the effects of dwelling practices.

However, in the visualization field, dwelling practices and their effects remain neglected, aside from the work of artists (O'Rourke, 2013). Urban space cannot only be considered an aggregate of roads and cable networks, flux, and digital data circulation. Few graphical representations of dwelling practices seem available. Moreover, even more problematic is that, most of the time, practices are reduced to punctual uses, with no account of their less directly visible effects on dwellers. Visualizations are often present oriented, without actual past or potential futures. However, the resulting transformation of a practice counts as one of its most important properties. To illustrate this idea, a simple example can be useful. Nicolas is a cyclist whom I interviewed for a research project about mobility in urban space. I present him in the following paragraphs. The information comes from the interview. For the last two years, Nicolas has ridden a bike to go to work, although he declares himself not to be particularly athletic. He has attained a certain ease, and he enjoys the everyday travel despite its many hills. However, for family reasons, he had to move to another location within Lausanne. Henceforth, he lacks the feeling of effort when he rides his bike because, from his new location, his route to work is flat. How can we visually represent part of the effect of the repeated use of the bike, that is, the body capacities that Nicolas has learned? It is clear that a simple geographical map linking the origin and destination points is not sufficient to describe the changes that he experienced. Practices in and with space result in experiences and learning, that is, the development of capacities. From a visual point of view, practices are punctual and renewed daily, in contrast to the capacities attained through repetition and continuity of learning. Immersed in spaces, practices generate learning and the growth of capacities – riding a bike without effort even on a hill – that cannot be visualized with current visualization models, even with simplification. Spaces are produced and, in return, influence the practices of urban dwellers (Lefebvre, 1974) and the development of specific capacities. They can be said to be paedagogical.

Visual indifference to dwellers' learning can find its source in a lack of data. More perniciously, it introduces a bias into urban research and further into urban policies, which have their origins in existing visualizations (Söderström, 2000: 9, 11, 26). Visual documents are political because they affect the definitions of collectives, issues and related policies. Dweller invisibility is harmful to the incorporation of data about their practices, experiences and learning into urban design. Political representation is partly based on visualizations: visualizations play roles in rendering issues and groups public and in the definition of their limits (Rigal, Rodighiero, 2014). More precisely, representing the city without the practices lived and the learning occurring in it render difficult both to respond to the question of the necessary urban capacities needed to live in the city and to recognize the city as a space of learning. How can we visualize the city as a paedagogical space influence urban design processes?

In addition, dweller invisibility is even more damaging because shared paradigms in urban research are focused on daily practices (Lefebvre, 1958; Lofland, 1973; De Certeau, 1990; Lynch, 1996; see: Matthey, 2005 and Macherey, 2005). Practices and their effects are still not visible due to a lack of research on visualizations of the entangled combinations of the environment and dwellers' lives. With this article, my aim is to propose a range of data visualizations to render the effects of practices visible. By creating visual representations of dweller learnings, I can obtain a better view of urban spaces and their effects (Söderström, 2000: 26, 57; Rigal, 2013).

The article is composed of three parts: the first part addresses the translation of a practice concept into a visual pattern; the second part of the text therefore considers a visual method and data visualizations of mobility learning; and finally, the last part extends the uses of data visualization to represent the city as a paedagogical space. Data visualization has evocative powers for understanding urban spaces anew and for imagining urban symbols. Starting with the elaboration of a method of visualization, I propose both a theoretical inquiry of urban spaces based on visual urban research and an evocative representation of the city based on the effects of practices.

## Practice, a processual notion to visualize

In this article, I attempt to offer, through data visualization, a possible answer to the representation of practices and their effects on the urban dweller. The first step is to describe why urban visualizations matter and how it is possible to turn a concept practice into a visual pattern representing learning throughout life.

Visualizations offer greater clarity for communicating a complex set of data (Latour, 1986: 15). They are reductions, compared to most textual commentaries. In visualizations, information is better filtered and highlighted (Aigner, Miksch, Schumann, Tominski, 2011: 5). Visualizations render comparisons and explorations of data easier through the recognition of patterns (Moretti, 2011: 2). Visual problems and visualizations are tools to start research, to raise questions, to form hypotheses, and to perceive urban spaces in new manners. Visualization not only can be a way to communicate research results, but it also can enhance the perception of pertinent information to produce novel interpretations of urban spaces.

I felt the need to use the strength of visualizations to represent the effects of practices because of research that led to the project to imagine Switzerland without the car. The general project is an inquiry into the necessary changes for abandoning cars and the opportunities that we can find and imagine if the car disappears in Switzerland, from economic, architectural, technological and social points of view. Inside the general project, the more focused question of my own research is: How and when do people learn new habits and new capacities to move to stop using their cars or even to unlearn past capacities? To attain this objective, I must translate the definition of mobility practice into a visual pattern and render it compatible with mobility studies, which is the field of research of the inquiry.

Mobility studies were created with the aim of deciphering travels and their effects on individuals and on social relations in general (for a broader view of the field of study, see the journals Mobilities and Applied Mobilities and the Web site of the Mobile Lives Forum ). Mobility not only transforms spaces and social relations, but it also deeply transforms

the urban dweller. Mobility is not exhausted by travel practices (Urry, 2000; Kaufmann, 2002) because travel results in new experiences, learning processes, and capacities. Sheller and Urry proposed taking processes as a point of reference to study dweller practices, instead of traditional static concepts and methods (2006). I follow the research perspective that they introduced by envisioning capacities as the results of urban learning. Moreover, I extend their aim by creating visualizations of non-static realities, *i.e.,* the growth, cessation or decline in the capacity to travel. Mapping mobility is possible using mobile maps or interfaces, as mentioned. This process is also possible with fixed maps representing practices and the related processes engaged in their performance.

How can I use a theoretical definition of practice compatible with mobility studies, leading to an operationalization of data visualizations? To perform this task, it is useful to integrate Tim Ingold into the urban and mobility research fields because of his extensive work on social practices, skills, environments, and the dwelling dimensions (2011a; 2011b). In particular, he is attached to the use of visual metaphors for the description of the variety of practices that he observes and theorizes (2007; 2015). Tim Ingold defines practices in a processual manner (Ingold, 2011a: 215). Through the interrelations of perceptions and gestures inscribed in an environment, the dweller learns (Ingold, 2011b: 20). By prolonging the definition, Ingold enunciates that most interindividual and cultural variations that can be defined as learning variations (Ingold, 2011b: 5). Consequently, we can define urban mobility practices as gestures performed in a specific environment that produce learning processes and the building of new capacities. To provide an image of his definition of practices, Ingold even proposes that: "*the growth and development of the person ... is to be understood relationally as a* movement along a way of life" (Ingold, 2011b: 146). For this research, these definition imply that learning and capacities can be studied throughout the life of each dweller and that biographical interviews are particularly suited to the task. By introducing the *line* pattern, Ingold starts to operationalize a visual metaphor (Ingold, 2007; 2015). However, his use of visualizations is limited to the construction of thought images. He exploits images to develop his argumentation and to illustrate abstract concepts, for example, in the comparison of networks with meshworks (Ingold, 2007: 82). The work that I present in this article is an attempt to maintain a conceptual definition and a related empirical investigation owing to visualizations.

The crossing of the line pattern with a procedural definition of practices leads us away from an overly simple representation. Using Ingold's studies, it becomes impossible to be satisfied with the visualization of a journey from point A to point B; that is, Ingold shares the perspective of mobility studies on practices, based on processes and transformations. These mobility capacities can include having a valid driver's license strong legs, and good knowledge of city places, knowing how to read maps, etc.

The definition offered by Tim Ingold creates inseparable entanglement of practice with transformations of urban dwellers. Further, this definition of practice combined with learning processes and building capacities is compatible with the mobility studies field. Consequently, the lines to represent this definition are not only travel lines but are also learning lines (Ingold, 2007: 90) arising from mobility. However, travel lines are the main elements drawn on territory and network maps. We use lines of another type, which we can call learning lines. We lack visualizations of learning, especially in mobility studies, which is one reason why this article is focused on the visualization of mobility practices. In the next part, I describe the research methods I followed and the data that I gathered

more precisely to construct synthetic and comparable visualizations of learning from mobility practices.

## A visualization method for urban practices

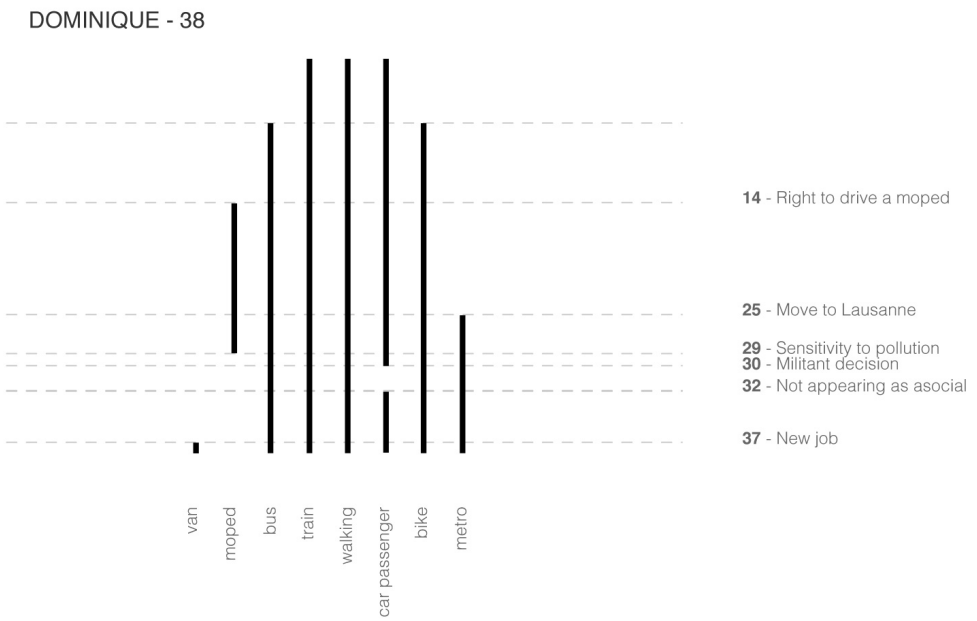
Now that a visually representable concept of practice has been introduced owing to the crossing of mobility studies outcomes with the work of Tim Ingold, I can start translating the visual pattern of the line into data visualization. This translation will help to define travel mode changes in the lives of the inhabitants whom I interviewed. As a result of the visualizations, change processes will be easier to compare and understand. Using visualizations, I will start to reflect on mobility practices.

Dweller portraits are presented through their mobility practices. These portraits have the particularity of highlighting time variations. They do not have the fixity of printed territories or networks or the aridity of travel lines. To visualize dweller practices, it is efficient to ask the dwellers themselves about their lives in urban spaces. Based on biographical interviews, I first gathered audio data about the experiences of mobility practices and more generally about the urban spaces of Swiss dwellers. Qualitative biographical interviews are a method for obtaining numerous data qualified by complexity. I conducted 53 individual interviews, approximately one hour in length each. The interviewed persons were chosen to cover a diversity of travel practices. Moreover, the residence areas were various: the city centres and peripheries of Zurich, Geneva, and Lausanne, as well as small localities and Alpine villages. The interviewed persons were selected through the “snowball” effect. The interviews were conducted within the PostCar World project, in collaboration with the whole project team. Each interview implied an exploration of the past, present and future mobility of the interviewed person. The most important criterion for the selection of the interviewed dwellers was having a rather intense relationship with mobility, such as being a car aficionado, having difficulties driving, being impaired, collecting cars, refusing to ride in cars, being an amateur bicyclist, etc. Some of the interviewed inhabitants were chosen because they prefer bicycling and walking instead of cars due to lifestyle motives. The intensity of the relation with mobility practices was chosen as a criterion because it is usually linked to better reflections about the practice (Hennion, 2009). After the transcriptions of the one-hour-long interviews, my first need was to summarize the textual biographies into visualizations that I could easily recognize and compare.

Furthermore, the obtained visualizations do not have the function of mimicking actual pathways between pre-localized points. Here, the principle of non-similarity between the spaces of practices and the spaces of representation is considered an opportunity to test new visual models (Drucker, 2011). Learning induced by mobility practices is not always easily visible -- even if cycling can give the legs a very muscular appearance. For this reason, the following visualizations do not attempt to mirror the reality of learning processes because they are not directly observable. In contrast, the visualizations are not self-evident, but they are visual expressions of real, but barely visible, processes, which is why the visualization is not superimposed on a map, as if it were a reproduction of a visible process with precise spatial coordinates. The visualizations that I constructed possess a specific space of representation. Furthermore, the data gathered are necessarily partial because of the subjectivity of the interviewed dwellers, their lapses in memory, or the ambiguity of some of the questions. In particular, the absence of data about

frequencies resulted from having a qualitative survey and the long descriptions of the pasts of the dwellers being in a declarative mode. Moreover, the practice frequency is not visualized because learning increases the capacity of a dweller to move but does not mean that the dweller moves with high frequency, which is the action potential resulting from fruitful learning that I must represent. The potential for action induces the formation of habits. Habits can be repeated frequently or not (Schwanen, Banister, Anable, 2012). Above all, habits are defined by the ease of realizing a task because of growing skills (Ingold, 2011a: 60; Ingold, 2011b: 5). In the present article, the capacities of interviewed dwellers are questioned in relation to mobility practices. Consequently, the visualizations that I construct omit the traditional frame of the topographical map and even the geolocalized or topological frame. Only lines of learnings are visualized.

**Figure 1. Learning lines of a dweller**




*Vertical lines*: Figures are composed of vertical lines, defined above as variations in learning. Each right directed below exposes the mode of transport experienced by the dweller. The duration of the learning process is described by the length of the line.

*Frequency*: The lines do not indicate frequency, which is why they are rectilinear and not repetitively curved.

*Horizontal lines*: In contrast, horizontal dotted lines highlight key moments of birth and the end of the learning of transport use. The dotted lines cut and inscribe on the visualization the differentiation of a dweller in the mobility field.

The same legend is used for the first figure and for the other figures.

The first example is a synthesis of one interview: a summary of the mobility practices of a thirty-eight-year-old man named Dominique. What capacities did Dominique learn from travelling? In his childhood, he learned to walk, to ride a bike, and to take the bus. Later, he obtained his moped license, before his driving license, and developed the habit of taking the metro in Lausanne. Today, he very frequently using a bike and has developed good muscular capacities: he feels fit, and he is proud of his calves. What skills did Dominique learn without exercising them? Dominique was the member of a moped club, but after becoming sensitive to pollution, he decided to quit the club and the moped that he enjoyed riding. This decision was his first direct refusal to use a transport mode. A

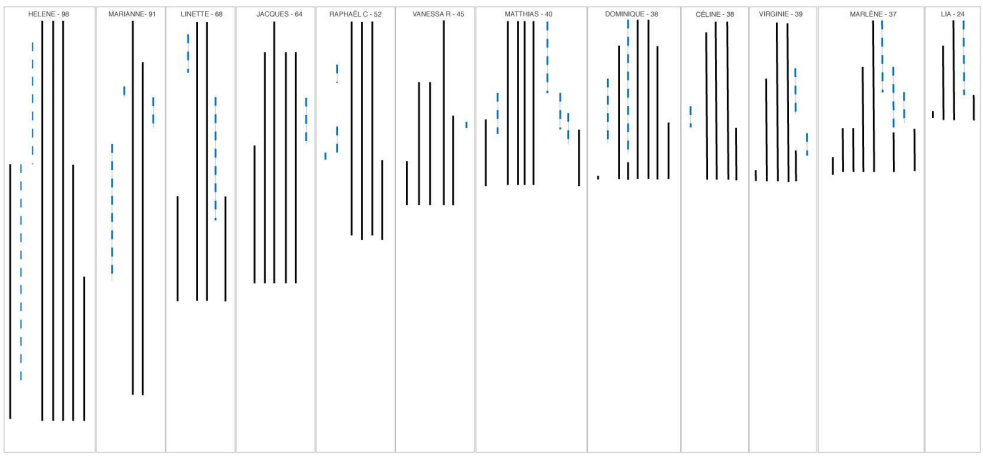
second and more indirect refusal concerned the car. Although Dominique obtained a driving license, he did not buy a vehicle. After the development of his ecological convictions, partly because of the pollution emitted from his own moped, his indirect refusal to drive a car became direct and justified. Because of his anti-car activism, he even refused to be a car passenger. However, his driving license is useful today: he had been unemployed, and for his new job, he must drive a van. With the summary of the mobility practices and learnings of Dominique, we can precisely define three type of refusal to learn about:

- The refusal to further exercise a practice already learned;
- The refusal to learn a mobility practice; and
- The absence of learning of a mode of transport as an implicit refusal.

The dimensions of the refusal to use a transport mode should be studied with precision to understand the possible pathways towards a post-car Switzerland. More generally, the refusal to exercise one practice, learned or not, is one key to ecological politics aimed at reducing the consumption of toxic goods and means. If certain industries prevent consumers from learning the effects of their practices – the tobacco and oil industries in particular (Proctor, Schibinger, 2008) -- ignorance can also be a quality for car-free lifestyles. Not having a driving license is the easiest way not to drive a car.

At this point, we have a method to summarize an individual biographical interview of one hour or more and to engage in an analysis based on practices and learnings, owing to the use of the visual pattern of the line. Is it possible to compare and to draw conclusions about different life biographies with the same visualization? One of the simplest ways to sort the lines is to propose a ranking by age and then to distinguish among cut, absent and continuous lines. The representation is also a method to test the diversity of the interviewees' mobility lives and the capacity of the visualizations to depict the diversity of practices.

Figure 2. Comparison of lines of learning and unlearning per dweller

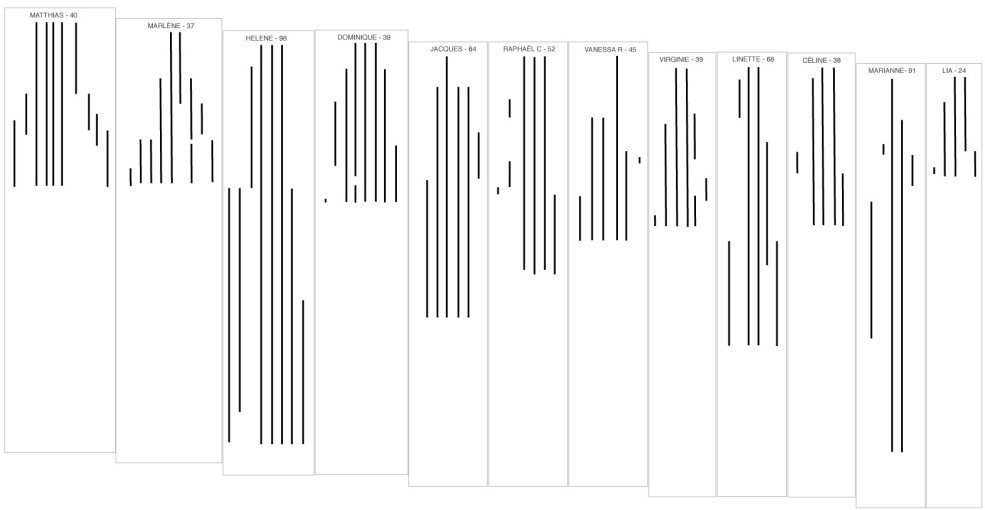



The blue dotted lines represent stopped practices and the undefined refusal to continue learning one mode of transport. The black lines are the potential practices that the dweller can still engage. The first result is that we can read that, at some point in his or her life, each dweller abandoned the potential of taking a mode of transport. The information that is even more interesting is that few dwellers are represented on the visualization. We can note that the actual practices of a dweller are the results of past

learning, and what is often forgotten are the refusal to learn and voluntary or involuntary abandonment of the potential to act. However, we will not go deeper with this explanation. The aim of the article is to present a method to visualize practices and learnings, not to explain in detail how one stops using a car.

With figure 3, the evolution of mobility practices and learnings can be distinguished per dweller. The visualization makes it possible to engage in several directions for further research and to study more easily the stability of and changes in mobility practices. This is a major aim for urban research today, when so many practices are supposed to change and become sustainable. Why do some dwellers have more capacity to move, represented by more learning lines, than others, although they are younger than other dwellers? Marianne is 91 years old and Lia only 24, yet both women have learned to use the same number of transport modes during their respective lives. They use the smallest number of transport modes of all of the interviewees. Other links can be envisioned: What is the role of the car in the quantity of modes that one learns? Starting with these first results, hypotheses can be expanded into interrogations of the full-text interviews and the scientific literature.

Figure 3. Comparison of lines of learning and ranking by quantity of learned skills per dweller




The dweller can possibly lose or gain capacities and a variety of learning, depending on whether he or she starts or ends practices or whether he or she is not able to pursue a habit with its positive effects on the growth of capacities. It is also possible to flee the key moment, in other words, the trial. With the depiction of trials, I can easily discover how a mobility life is composed (Latour, 1984: 178; Nachi, 2006: 56). The most interesting trial for my research is probably that the refusal to take a transport mode can be studied with precision to understand the possible pathways to a post-car Switzerland. Trials can be studied individually, with each individual visualization. They can also be read collectively. With a representative set of interviewed dwellers, it will be possible to visualize the evolution of mobility practices by age.

In this part of the article, we show that visualizations can be synthesized from interviews more than one hour long. Visualizations are also very helpful in starting an inquiry and in developing hypotheses directly from the data gathered and represented, attempting to recognize and interpret patterns. Further, in contrast to territories and networks

(Venturini, 2012: 50), the learning lines are sufficient to render as images a life narration (Rigal et al. 2016), in other words, a biography. The mobility biography is based on quantities of learning, absence of learning and refusal to learn. In the above visualizations, the work concentrates on the depiction of mobility practices. I show how I can translate a demanding concept of practice into a visual pattern and how it can work. The effects of the visualizations are two: first, empirical results can be produced, which I do not develop further here; and second, renewal of urban perception can emerge.

## On the effects of the visualizations on the urban perception as a paedagogical space

In the previous sections of the article, I attempted to show the extent to which practices and learnings are entangled with urban daily life. Thanks to a visualization model based on the use of lines, I can represent the biographies of dwellers through their mobility practices. The visualizations show the utility of visualizations. They allow for the consideration of the importance of the refusal to learn a practice for urban design and policies. Moreover, visualizations can help in depicting changes in potential mobility practices. Consequently, in the first two parts of the article, I presented two properties of visualization: they afford the opportunity to synthesize information and to stimulate the construction of hypotheses about urban practices and spaces. In the last part of the article, I bring to light the evocative potential of these visualizations to renew some of the perceptions of urban models. Neither territorial maps nor networks can represent policies over time, but learning lines can.

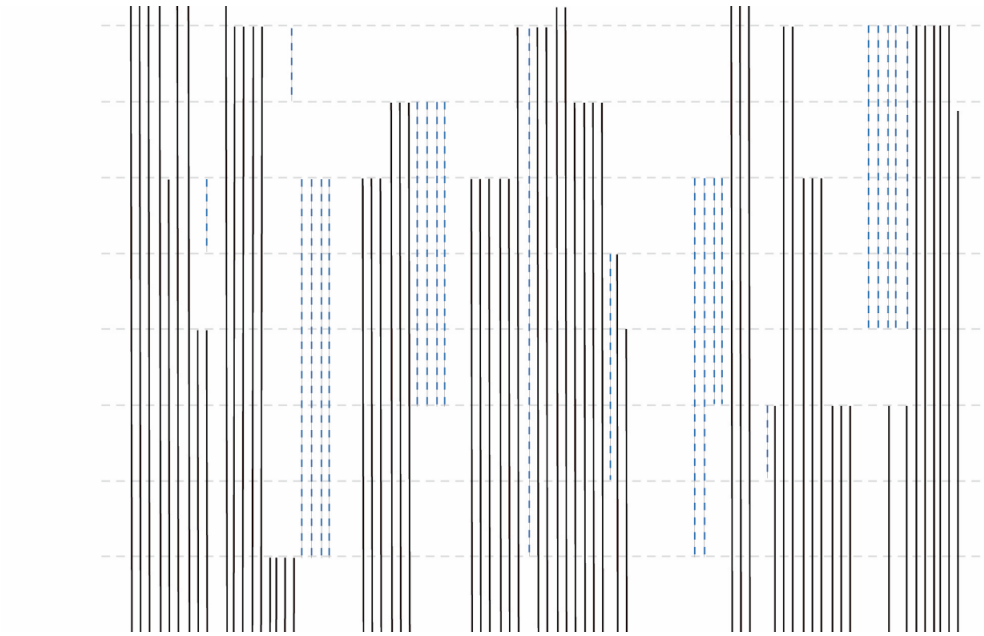
One important lesson that we can identify from the first visualized learning lines is that urban practices and urban spaces are both invitations to learn practices, invitations not to learn practices, and non-invitations to learn practices. That is, one can define the urban space as paedagogical in the sense that it is a space influencing learning and influenced by learning. How can we envision, perceive and visualize the city as a paedagogical space to influence urban design processes? Now that I have drawn the portraits of urban dwellers, how can I envision portraying urban spaces starting with variations in learning? Visualizing urban spaces through the perspective of learning practices is a means of conceiving renewed urban models.

As noted above, the model of the territory and the model of the network can be misleading because of the lack of practice representations. Questions about borders, centralities and peripheries are raised through the use of the territory model. The network model effect is a different perception of urban space. Territory visualizations are composed of the unity of figures. In contrast, networks tend to be heterogeneous. Territories and networks are two urban models for visualization based on centrality. The territory is centrifugal; the network is centripetal – and often opposed to the territory. Territories and network maps are also based on non-temporality, signifying the absence of change representations. Most territory and network visualizations are fixed, except on some online interfaces. How is it possible, then, to conceive urban visualizations not based on centrality?

With lines of learning, it becomes possible to compose representations of urban learning practices. Following the portraits of urban dwellers, I can elaborate an alternative definition of the urban space. An urban environment is composed of a set of spatial

propositions to act (Gibson, 1979) and consequently of a set of propositions to learn. Feedback loops circulate in all directions to transform urban dwellers of all types (Latour, 2015). Consequently, urban space can be defined as a space composed of numerous and heterogeneous processes of learning. However, learning can be refused, forbidden, censored or individually inhibited (Proctor, Schibinger, 2008). In addition, cognitive limits on learning processes must be inquired about; learning everything is impossible. From a reverse point of view, urban space can also be defined as a space composed of numerous and heterogeneous processes of refusal to learn. Urban spaces vibrate with numerous selections of learning processes: learning to walk for a baby; obtaining a driver's license for a young adult; and jogging, walking, and attempting to maintain physical strength for older adults.

Figure 4. Lines of learning, a model for the representation of urban spaces



From a mobility perspective alone, cities are full of learning possibilities: driving a taxi or bike to make a living, taking a taxi, riding a bike, driving a shared car, reading on a train, driving a limousine, being a passenger in a helicopter to go to work, etc. Furthermore, dense urban spaces are favourable for imitations of all sorts (Tarde, 1979: 259) and for the birth of competition between learning processes (Sloterdijk, 2012: 514). In a few words, urban space is the typification of excess (Ellul, 1975). Cities are comparable on the basis of the opportunities to learn, to not learn, and to unlearn what they offer to urban dwellers.

However, we know that crucial learning is necessary to master (see the work of Martha Nussbaum on the capabilities of and solutions to exclusion: Nussbaum, 2011) and, in contrast, that other learning is negative (in the research project in which I participate on using cars), which is why urban design and urban policies must consider the learning that they offer or the learning that they prevent. Excessive opportunities to learn, especially in the transport field, are often negative (Illich, 1973): why not walk or ride a bicycle? Where does on learn not to learn and to unlearn negative practices and capacities? In the presented interviews, some individuals declared their abandonment of car use. Some preferred other modes of transport to cars because of their sensitivity to the environment, notably, for one interviewee, sensitivity to pollution odours, which is a type

of learning process engaged by open-air practices, in this case urban jogging. Other interviewees did not want to pollute or, more precisely, attempted to unlearn their polluting habits. They used urban spaces and transport propositions (Latour, Hermant, 1998: 104) to invent alternative means of living, based on the reduction of pollution from their behaviours. Regarding visualizations, the unlearning processes are visualized through dotted blue lines and the cut of a horizontal line. Visualizations are one method to represent this type of process, but to attain a more qualitative and evocative mode of a renewed urban model, it does not seem to be sufficient. Moreover, the lack of a model, although evocative, renders the building of renewed strategies and places to cause the dwellers to unlearn very difficult. At this point, we understand, first thanks to the visualizations of the dweller learnings and second thanks to the use of various references about urban spaces, that cities are paedagogical means with a large scale. Further, we identified one problem that urban policies face: excess learning, specifically of adaptations to pollution, *i.e.,* the pollution emitted by cars. However, we lack past or new urban models to select learning by urban design. It is the role of the evocative properties of the visualization to facilitate imagining the needed models by analogy.

What could be one of the most evocative paedagogical urban models to describe learnings rigorously selected? The ancient Greek cities and some of the traditions continued in Rome had learning places covering aspects of classical education (Delorme, 1960: 9): the gymnasium. The gymnasium is not reduced to sports' activities and related health care. In the gymnasium, important intellectual activities were undertaken (Dupont, 2002: 46): first and foremost, the most famous philosophical schools (ibid: 317). Gymnasia constituted public spaces, progressively open to all men (ibid: 254, 271). Spiritual and corporeal cultures were connected (ibid: 466). The gymnasium is a model for reintroducing an imaginary configuration of conscious and mastered learning processes based on specific examinations of urban research. The gymnasium is also an opportunity to reassess the importance of examples and exemplarity for learning processes by imitation. Furthermore, the gymnasium often had high walls, notably to reduce seduction by older men of teenagers during their educational programs. High walls also had the function of focusing attention on a few selected and highly praised lessons, in contrast to the excessive and often indiscriminate learning offered by the general city. The end of childhood was supposed to be the right time to teach future citizens. The gymnasium then is a model both of the transmission of learning and of closure to prevent other opportunities. Three different levels of invitations to learn can be identified from the gymnasium: practice –playing ball; learning – integrating rules and competition in ball games; and more coherent learning programs based on general principles and coherent sets of lessons – ball games are used to the develop bodily capacity of the future soldier-citizen [2]. Paedagogical spaces are not only spaces for paedagogical activities, but they also influence the transmissions of learning by their spatial form. How would the space of a gymnasium evoke sustainability? What would the teachings of a sustainability professor be? What learning should we ban to attain sustainable cities? In this manner, the focus of urban studies and mobility studies can be brought back to ancient thoughts about the athleticism of learning (Hadot, 1993: 61-62; Foucault, 2001: 222) or, in spatial terms, about the gymnasium and paedagogical spaces.

More concretely, in the field of mobility, how would a project draft look as a selection of transport learning? Three different levels of intervention were identified from the exercises, lessons and injunctions related to the gymnasium: *practices*, *learning* and more

coherent *learning programs* based on general principles and coherent sets of learning assumed to be acquired by city citizens. If we start from the premise that the *practice* of the car should be reduced, it is possible to hinder car use: through city tolls, modifications of traffic leading to increased congestion, and taxes on private cars, we can generate a list of possible barriers to practices and further learning. A broader strategy would be to prevent the first learning about cars: taxing driver's licenses, taxing first car purchases, raising the level of difficulty for obtaining a driver's license, changing the age of access to a driver's license, etc. A policy to reduce advertisements for cars could also function as immaterial walls, and, in typical trials and moments in life courses, when dwellers' learning is more malleable (relocations, births of babies), it can be recognized and targeted as an incitement to practice active mobility. The strategy is not only supposed to prevent the use of a specific capacity to move but also to encourage some positive learning: increasing the number of cycle paths, bike sharing systems, and bike lessons for children and adults. The promotion of active mobility assumes a better urban design: longer and more continuous cycle paths in attractive environments and with better connections among several paths. Interventions can be difficult – building a road for bikes -- or easy – the installation of bike-sharing systems, training in physical capacities -- and even nearly immaterial – bike lessons. Thus, learning is both individual and collective and evolves over the life courses of the dwellers. Urban learning programs are to be shared collectively over the whole lives of citizens and during opportune periods in places dedicated to sustainable learning. To engage urban dwellers in sustainable learning programs, the first need is to acknowledge the excessive mobility possibilities that urban spaces offer and to discuss possible responses and preventives.

The synthetic visualizations of the interviewees present how the lives of the dwellers are composed of both learning and unlearning processes. Then, the gathering of individual visualizations is used as a tool to imagine hypotheses and start reflecting about unlearning and selective learning. The evocative face of the visualizations is another part of the article, with the aim of projecting new possibilities for urban design and policies, focusing reflection on the learning to select, to diffuse and to ban, or at least to reduce. An evocative space is necessary to historically and metaphorically represent the task faced by urban designers and policy makers today. Neither territorial maps nor networks can represent policies over time, while learning lines can, making it impossible to conceive urban spaces as spaces of learning without first attempting to create renewed visualizations.

## From visualizations of practices to urban space as a space of selected learnings

Urban policies and urban research result from implementations of urban models, which is why this article started from the premise that there is a need to construct visualizations focused on dweller practices. It will help to promote the better integration of dwellers into urban visual models and policies. To achieve this task, I attempt to create an alternative to territorial maps and networks. The aim is to consider practices over time, *i.e.,* learning. Owing to the use of examples drawn from qualitative interviews with Swiss inhabitants about their daily mobility, a method is constructed for comparisons and discoveries of patterns in learning variations about transport modes. Visualizations allow for the acknowledgement that urban practices are modified over time: some practices can

be absent in the daily mobility of an inhabitant, others are refused, and others are abandoned. Therefore, to study urban practices is to consider the learning variations of the dwellers and the richness of the learning that urban spaces offer. It renews urban models, which are too rarely based on the representation of learning, and time. What does it change to imagine an urban model based on learning? The effects are various. First, it evokes ancient urban spaces dedicated to the formation of city dwellers – the gymnasium. Second, it is a starting point to elaborate coherent and gradual policies, notably to reduce the use of cars through dedicated policy measures. Finally, thinking about the city as conceived and represented as a paedagogical space can begin. At the end of this exploratory article, an alternative model for urban research is conceived, starting from the visualization of the mobility learning of Swiss dwellers. The article shows that visualizations are tools to synthesize information, to stimulate research questions and inquiries, and even to sketch new urban models.

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## NOTES

**1.** On a Web site gathering references of artists working with networks, most of the time their mappings are not sufficiently precise and comparable: http://www.networkism.org/nw/index.cfm

**2.** With visualizations, practices are visually represented by a point, and the connection between the points forms a line of learning, while the parallel lines are the expression of a program of selected learning.

## ABSTRACTS

Visualizations of the city are necessary to lead to inquiries and for designing urban and transport policies because they are needed to synthesize information, to stimulate new hypotheses, and to evoke models. However, most of the contemporary visualization models do not consider that the major paradigms in urban studies concentrate on dwelling practices. The goal of this exploratory article is to represent the practices of urban dwellers, with the aim of elaborating a method to visualize and study the evolution of practices. For this task, there is a need to translate the concepts of practice and learning into visualization. In this article, I propose a range of visualizations to render practices and learnings visible and comparable, allowing for more visual research. The visualizations are created from data gathered during interviews with inhabitants of Swiss urban regions on their daily mobility within a research project challenging the place of the car in contemporary urban spaces. By inventing representations of dweller practices, I obtain a renewed model for understanding urban spaces and practices based on learning. Finally, visualizations are used to understand urban spaces anew and to imagine urban interventions that could be beneficial to changes in mobility practices. Policy measures to reduce car use are suggested based on the model developed with the visualizations and its fundamental principles. Starting from the elaboration of a method of visualization, I propose both a theoretical inquiry of

urban practices based on visual urban research and a definition of the city based on learning to orient urban designs in favour of more paedagogical thinking.

## INDEX

**Keywords:** urban visualization; car; mobility practices; lines; unlearning

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