Designing the Way We Move: From Navigating the Users to Users of Navigation Devices

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Abstract. This article discusses the relationship between information generated by GPS navigation applications and the appropriation and significance of urban spaces by these applications' users in large urban areas such as the city of São Paulo, Brazil. Although applications such as *Waze* make life easier for drivers in cities with dense road networks and daily commutes riddled with heavy traffic jams, they also promote a change in the perception and significance of cities' physical spaces. Hanssen [9] recalls that "what Benjamin teaches us is how sensation gets repeatedly transformed in ways that necessarily tighten the circuit binding human perception with its technical supplementation" [9, p. 63]. In this text, ubiquitous technology is interpreted as what may promote not only a transformation in human perception of territory but also a change of what Milton Santos named as used territory [16].

Keywords: Design · Philosophy · Cities

1 Introduction

The metropolitan region of São Paulo (Brazil) is one of the world's most populous areas and has a considerably large fleet of vehicles moving daily through its street-and-road network. In 2018 the Traffic Department – DETRAN [4] reported the existence of over 8.6 million vehicles in the city of São Paulo. In addition to the sum of other cars from the neighboring cities, the metropolitan area of São Paulo presented a daily average of 300 km of congestion in 2013 and the estimation of hitting around 350 km of daily congestion by 2020 [8]. In this scenario, navigation apps with geolocation systems have become almost mandatory onboard items. These devices guide "disoriented" drivers, facilitate the choice of routes and help to avoid the city's heaviest traffic areas and most congested points. Such applications are the driver's "eyes" foreseeing the way to go.

All this technological advantage offered by navigator apps can also charge a price: the perceived territory is modified. The application-mediated driver no longer needs to set waypoints along the route he travels. His attention to the cardinal points is restricted to the north on a digital map interface, and gradually he is shifted from the concreteness of the city to the virtual interaction with a screen. The resulting perceived city by the

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driver became transformed as the city itself occupies another territory, which has distinct characteristics from the one that preceded the existence of such applications. Are these changes positive or negative? Is the technology that operates on the city territory harmful to the signification of urban space? In fact, such judgment derives from a false point, since technology *per se* does not contain enough elements to re-signify the territory, as it will be discussed throughout this text.

This work assumes that new forms of interaction with the city introduce new possibilities of re-signifying the territory. Therefore, this paper does not discuss the positive or negative aspects of relations with urban space. It purely proposes a reflection concerning technology, as Bull [3] pointed out "the impact that these technologies have on the fabric of everyday urban life is complex and multifaceted both structurally and individually". From the structural point of view, as it is discussed below, a relation between systems of which the human agent is a fundamental part, not only as an observer but and mainly as the organizer and operator of these systems, must be considered. What this work proposes, therefore, is to relate navigation devices and apps to the new ways of perceiving, operating and organizing the territory and discussing the possibility to propose new meanings for used territories, considering the resources derived from navigation apps.

For that purpose, this text first presents the notion of used territories as a result of an interrelation of different systems [15–17]. In the sequence, the text presents the relation of means and purpose of technology as pointed by Feenberg [5, 6], and finally, the guiding concepts of two final projects developed by undergraduate students of a Digital Design Bachelor Program are presented, which proposes experiences of re-signifying the used territory from navigation apps.

2 Territory, Technical Systems, and Used Territory

According to Santos and Silveira [15], geographic space is the result of a set of interrelated systems. They are the systems of objects, of actions, and their hybrid forms, which are the techniques. Technical systems "include, on one hand, materiality and, on the other, its ways of organization and regulation" [15, p. 20]. Therefore, technique is understood as a set of forces that result not only in objects in which technology is embodied, but also implies the dynamics of using such technology. In other words, it implicates the purpose of the use as well as the conditions of the environment where it affects. This environment upon which technical system operates is the geographical environment, which is only constituted by means of technique operating over the geographic space. Consequently, "there is no such thing as a geographical environment on one side and a technical environment on the other. What has always been created from their fusion is a geographical environment" [16, p. 24]. Furthermore, for the authors, such techniques, or hybrid systems, are indicators of the territory's use and through them, one can reconstitute the historical context of the territory itself.

This geographic space, generated by the interaction of systems, consists the used territory which "points out to the necessity of an effort meant to systematically analyze the constitution of a territory" [15, p. 20]. If in the past the constitution of used territory was related to the production of concrete objects which physical materiality was

capable of transforming the territory itself, nowadays used territories are reconfigured and constituted not only from physical objects, but also from informational devices that affect the relationship between the territory occupant and the occupied territory itself. That is the case of GPS navigator apps, which can reconfigure the use of territory by directing a greater or lesser flow of vehicles to a particular area. Thus, used territory is seen dialectically as a whole. It is the synthesis of the simultaneous different actions and technical systems that operate upon it, just as it is a fundamental element for defining the type and quality of the actions undertaken, as "a territory conditions the location of actors, since the actions that operate upon it depend on its own constitution" [15, p. 22]. Therefore, this text follows the authors' conclusion that "territory, seen as unity and diversity, is a central issue in human history" [15, p. 20].

City's inhabitant constitutes and repositions new places on the territory whenever geolocation and navigation technologies mediate the covered territory. Besides, when making use of navigation devices for traveling, a driver, this provisional occupant of a particular urban space, is not ruled just by the materiality of the covered territory or by the information available in the mobile interface, since individually neither the informational technology nor the physical territory are able to determine and configure such places. That also implies the conclusion that, if both of them are individually unable to determine and signify places, neither are they able to impose and dictate what kind of use should be made of each territorial space.

3 Authoritarianism, Territory, and Technology

In this sense, Feenberg [6] also points out that technologies are usually seen as repositories of authoritarianism and alienation, but this is a naive vision if political intentions and government actions hidden technological developments, are not taken into account. For the author, "What human beings are and will become is decided in the shape of our tools not less than in the action of statesmen and political movements. The design of technologies is thus an ontological decision fraught with political consequences" [6, p. 03]. To those who attribute to the subject the ability to impose his will, regardless of any technological mediation, Feenberg [6, p. 63] recalls that "subjects and means are dialectically intertwined […] The army is not merely accidentally related to their weapons, but is structured around the activities they support". Santos [17, p. 59] points to the same direction when asserting that "it is evident that technique alone does not explain anything" as well as the technique linked to "organizational forms of labor, be it in space, in time, or in the domain of relations among agents" [17, p. 59] do not stand the domination relations. According to Santos [17], in addition to these two factors, it must be considered the capacity of these agents to influence the political environment outside their organization of labor and action. As they manage to influence politically in a wider environment that contains their ways of production and transformation. Thus, the author concluded, "the study of techniques goes far beyond, this way, purely technical data and demands a much deeper incursion into its social relation area" [17].

The deeper incursion in social relations was a central concern of Jacobs' [11] when she wrote in 1961 her classic The Death and Life of Great American Cities, and also of

Henri Lefebvre's in 1968, in his work The Right to The City (Le Droit à La Ville) [12], heir to the discussions engaged by the Situationists [10].

In the introduction to her work, Jacobs [11] points out a methodological concern which reflects the understanding of the city as a dynamic and clashed space. The author intends to analyze "how cities work in real life, because this is the only way to learn what principles of planning and what practices in rebuilding can promote social and economic vitality in cities, and what practices and principles will deaden these attributes" [11, p. 4]. Therefore, Jacobs does not want to discuss aspects related to the difference between planned and accomplished, but why, for example, certain public spaces change with use, while other similar spaces do not have the same destination. These dynamics of differences "are not a form of chaos. On the contrary, they represent a complex and highly developed form of order" [11, p. 222], which assists in the spatial location and identity construction of city dwellers. For Jacobs, "scenes of thoroughgoing sameness lack these natural announcements of direction and movement or are scantily furnished with them, and they are deeply confusing. This is a kind of chaos" [11, p. 224].

In an article published in Le Monde Diplomatique, in 1989, Lefebvre [13] points out that the modern city corresponds to the deterioration of social relations, and that "since the end of the 19th century, cities in most developed countries have experienced an extraordinary growth, kindling considerable hopes. But, in reality, city life has not produced entirely new social relations" [13, p. 203]. This concern was present on Lefebvre's critical horizon in 1968, when he published Le Droit à la Ville. What is new in the 1989 text is the concern with new outlines of social relations scattered in the city due to new technologies that had already been presented in a dramatic and accelerated way, and whose emergence "leads simultaneously to new ways of organizing production and new ways of organizing urban space. The latter interact in ways that are mutually detrimental rather than beneficial" [13, p. 203]. It should be remembered that Lefebvre died in 1991, about two years after the original publication of the article. So, the author did not experience the advent and popularization of the Internet, and even less the Internet of Things – IoT ubiquity.

Digital technologies, ubiquity and IoT have changed the experience of territory occupation. But were they in fact totally and *per se* prejudicial to the urban experience and the territory's occupation? Would not Lefebvre be aligned with what Feenberg [5] called technological determinism? Maybe technologies have widened the possibilities of appropriation and significance of urban space by the inhabitants of large cities? Even further, do such technologies also embody the political elements which determine and exert authoritarian power over the meaning of urban space? In cities like São Paulo, strongly marked by individual motorized transportation [14], how do navigation applications interfere with and signify (or not) urban spaces?

When we take a look at the cities and at the way their inhabitants deal with the formation of these small and large agglomerations of people on a piece of land, it is inevitable to remember that urban agglomerations have been the subject of most varied authors and have been present in texts since the classical period [7]. But two periods of time call attention to the impact of these changes on recent history. The first one comprises the time that ranges from the mid-nineteenth century to the mid-twentieth century, after the two World Wars. Throughout this period, new technologies have

directly interfered with urban life and the skyline of big metropolises. The liberal city of the nineteenth century, as Benevolo [2] named it, was well marked for the numerous infrastructure works, such as gas, electricity and mass transportation, apart from the new technologies and building materials that made it possible to erect buildings much faster and reaching heights that had never been seen before. On the other hand, the period between wars was marked by rationality in the architectural and urbanistic projects, which resulted in large functional urban spots as an expression of the modern city [2].

To all this technological domain as well as to the policies of territory occupation during that period – which set the conformation upon urban space and promoted new arrangements of its use - corresponded a series of counter-movements warning to a curtailment of the individual before the collective. An imposition of private desires disguised as universality [6, p. 33]. The period after World War II had the role of discussing the consequences of technology that operated on urban territory, thus, evidencing the conflict between the individual and the collective, the totality and its parts. From the Situationist texts to Jacobs' and Lefebvre's classics [10–12], urban life and city conformation were marked not only by technology but also by the clash between planned area and inhabited area, built space and experienced space, domination and freedom. This clash of forces reveals not only the struggles within the built-up cityscape but a dynamic system that reacts to imprisonment. Opposed to what a simplistic view suggests, leading to technological determinism, it is through the dynamism of conflict that the city reacts and shapes itself. Used territories, as seen before, is built by clashes, as a living body that reacts to being stimulated. A body as alive as the society that inhabits it, dismantling, renovating and rebuilding the territory and its meanings.

4 Navigating the Used Territory: Navigation Devices and Their Modes of Organization and Regulation of Territory

If there is an authoritarian and hegemonic sense in used territories, it must and can also be perceived in its condition of transience, which is the constitution of a totality condition. Harvey points out that it is not necessary to wait for "great revolutions" to constitute new spaces [10, p. 22]. They are in everyday life, in the fabric of the perceived, observed and reflected life. Such spaces must be recognized in a city where not only the inhabitants are moving, but also where there is intense mobility of information [20] that constitutes new types of occupations and relations with used territory. The mobility of information draws to a possible autonomy in the face of the city physical structure. The information circulates over the built city dimensions, determining routes, establishing parameters of consumption and delivering goods. The city dweller, stand and still, physically gains in space and mobility through his connectivity with social networks which then bring in new experiences of territorial occupations and which, in their turn, were generated by technical informational environment [16]. These environments, as previously explained in this text, are hybrid,

once they are constituted both by the materiality and by the organization and regulation modes [15]. Today we follow the impacts that the hybrid environments' updates cause in the fluidity of used territories. Santos [15–17], who died in 2001, did not fully experience the organization and regulation modes of hybrid environments associated with their ubiquitous condition and their materiality associated with information networks through IoT. These new technical informational territories are hybrid in a double sense. First, because the organization and regulation mode is not detached from the system of objects, but embodied in the object itself. The geographic space is miniaturized in the very object that is organized and regulated by algorithms. Second, because the other agent of transformation involved in changes that reconfigure the territory - the human agent - became part of the variables operated by software algorithms embodied in the objects.

Supported by satellite geo-referencing (GPS) systems, and on mobile data hubs loaded into the system by users themselves, navigation devices have the potential to constantly reconfigure used territories. One *Waze* user, for example, establishes navigation parameters for many others whose route, designed by the application, passes by the same point that is occupied by him. Data, which remain available in the geolocation coordinates and act on the algorithm system variables, constitute an used territory, even in an ephemeral way, and allow "to think of territory as an actor and not only as scenario, that is, territory in its active role" [15, p. 11].

Ideally, this condition provides data so that the involvement in occupying the territory through these applications becomes a rich experience in transience since data is continually changing. However, it is possible to observe that the system eventually establishes a recurrence of information generated by the user's routine, which, in a way, is addicted and interdicts significant changes in the algorithm calculations of these routes. It is also possible to observe that the human agent, who relates itself with the system's interface, experiences time and space through the new scenario of used territory formed from the hybridization of the physical object, the physical environment, and data available in the navigated coordinates. This new experience may abandon the physical territory as the primary geographic space. In this case, with the eyes stuck in the navigator app interface, the user risks approaching the experimentation of city space as the chaos of a "thoroughgoing sameness", using Jacobs' words [11]. Navigating through the cell phone interface makes building facades, shops, and corners differences vanish away. Gradually the cardinal points and the spatial references are reduced to the verticality or horizontality of the application interface. Routes are determined by algorithms that guide the user through the paths that have already been contemplated by others or by his own routine. There are no longer discoveries, surprises or even curious looks towards the urban landscape. The inhabitant displaces himself from the city as he dominates it in a touch of fingers on the screen. Thus, the constitution of new used territories and the idea of territorial fluidity become jeopardized.

5 *Waze* and the Used Territory

The occupation of metropolitan space by vehicles in a city like São Paulo is not only mediated by technology but also produced by the interaction link comprising users, physical territory and technology. Another element to consider remains in the fact that systems such as *Waze* are powered by mobile hubs of information that are generated and distributed amongst users as they travel throughout the city. This information network that overruns the physical space of the metropolitan territory would shape the way that city is occupied, significantly changing the flows and concentration of automobiles in different city areas.

According to data released by *Waze* [19], there are now more than 90 million active users of the app in the world, spread across 185 countries. Data sent to and collected from the system make the application much more than a navigation aid interface. *Waze* is a social network based on information flow that spreads from physical space to digital interface, through geolocation points provided by the users themselves, along with data of speed, direction and time of movement. The interrelationship of these different "spaces" forms a peculiar hybrid territory, with its specificities and own mode of territorial occupation. With the proposal of facilitating the movement through the road-and-street network of large urban centers, the application quickly established also a strategy of selling advertising space by using travel data collected from users. Information ranging from traffic situations to data that increases traffic in certain areas may support the expansion of local commerce [1]. As an example, in Brazil, between May and June 2015, Adidas took about 7,000 customers to their stores through ads on *Waze*. Remarkably, the increase of ad recall for the brand during the same period hit 295% [18].

Once the navigation app has its monetary income tied to demands of advertisers' interests, it would come as no surprise if at least in part, the routes suggested by the algorithms would consider stores' location data linked to advertisers, or some other element strange to the objective of merely avoiding traffic and quickly taking the user to a particular destination. Thus, the indicated routes might not be precisely the result of hybridization in which the user is conscious of his own routes' options. Again, the user can easily be exposed to the "sameness" observed by Jacobs [11] or, as Feenberg pointed out "technologies is thus an ontological decision fraught with political consequences" [6, p. 3] or economic consequences.

6 Overcoming Sameness and the New Used Territories

Within the context, of opposing users to the sameness or to the heteronomy which determines the routes and occupations of territories, two final undergraduate projects from Digital Design students at Anhembi Morumbi University (São Paulo, Brazil) were proposed. The idea behind the projects was to destabilize the navigation apps users' looks, launching them into a proposal of resignification and new territorial occupations enabled by geolocation data. Without losing the goal of the user's territorial movement from one point to another. What the projects propose, therefore, is a re-conquest of the urban territory.

The first of these projects, produced in 2015, is called Tangled (*Emaranhado*) (see Fig. 1). In this project, from the moment a user establishes its starting point and intended destination, the application searches for previous record of the same origin and destination pair selected by the same user. If there is a previous record, the application calculates and suggests a new route within a certain perimeter, but different from that one previously traveled by the same user. Thus, a routine journey, such as moving from home to work or study, would be systematically altered without compromising the starting and finishing points. The user would move through different routes within a given area, both consuming and generating data for different occupations of territories, thereby promoting discoveries and occupations of the environment.

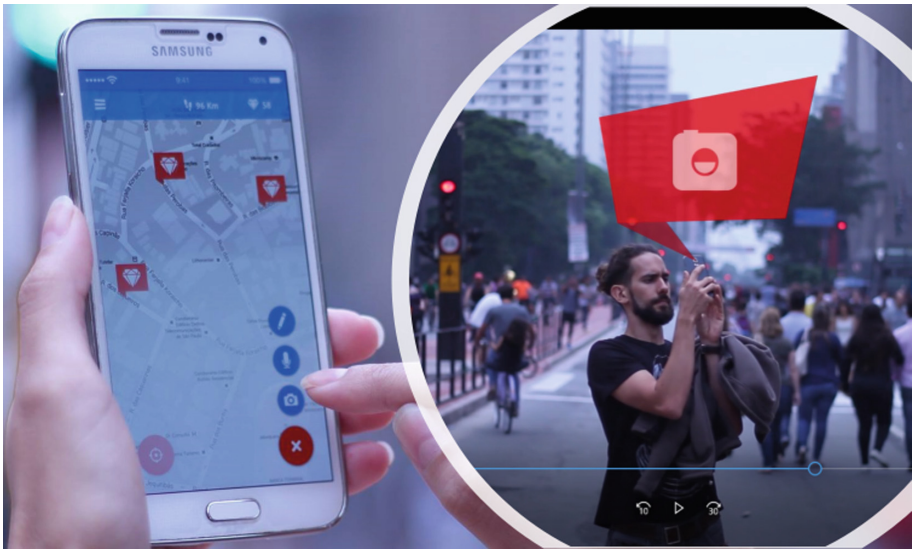

Fig. 1. User of the app "Tangled" (*Emaranhado*), image composite made from material provided to the examining board of group thesis available on *Behance*. https://www.behance.net/gallery/32001331/Emaranhado-(TCC)

The second project named Revisit (*Revisite*), was produced in 2018 and proposed a reorganization of the boundaries and limits of neighborhoods, having as starting point the experiences of city dwellers with their own visited and reconsidered spaces. Once again, the origin and destination intended by the user are respected, but what is intended is to establish a geographic division of the city based on the areas of interest and of territory's re-significances proposed by the user. The boundaries established by the political-administrative divisions of districts are used as a reference in order to match the searching criteria of destination intended by users (see Fig. 2). The user profile will display a specific city map, resulting from places the user has passed by and occupied. Records of such occupations remain as data available to new users, from the moment they also get to these territories, and become able to collaborate with images and readings about that environment too, whereas constituting, over the same space, their own territory.

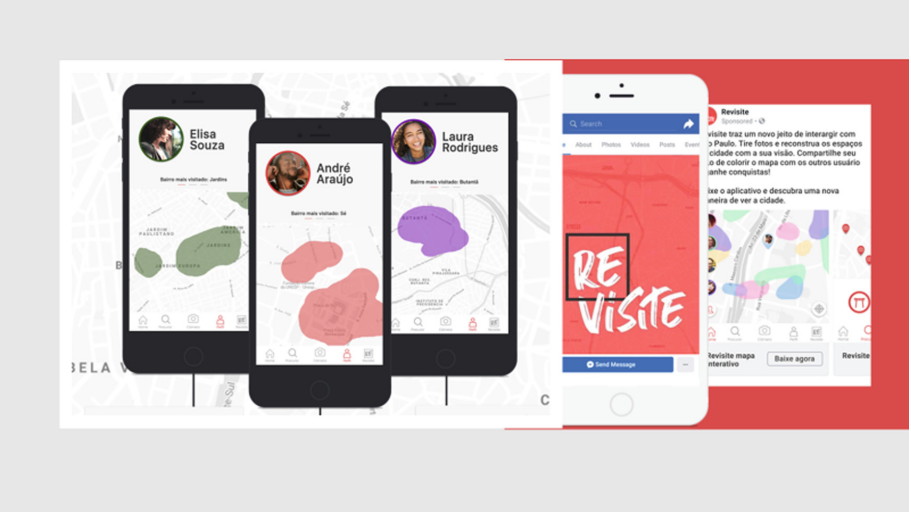

Fig. 2. Composite of images made from material provided to the examining board of group thesis available on *Behance*. https://www.behance.net/gallery/72784683/REVISITE

Both projects end up responding to concerns that are held dear in a democratic society, once they oppose the perpetuation of a dominant model which allow little space for different forms of organizing the territory.

In the specific case of navigation applications, the discourse that legitimates the indications for routes is sheltered in the logic "the faster, the better". That is the same rationality of capital and markets that justify modes of control and organization of territory according to what is good for markets and production modes. However, are lives and the most private interests of individuals actually considered by the logic and pace imposed by markets? After all, as Feenberg [6, p. 163] points out, "The question is not just who profits but what way of life is determined by the markets". If the logic coming from the markets and the rhythm of a hallucinating timing perpetuate a dominant model of space occupation and experience, a critical design "must undermine the standard of rationality that defines it" [6, p. 163].

By proposing trips that are not determined by the dynamics of an accelerated time, or by the pre-established boundaries of the dominating territory occupation, these projects collaborate to undermine the standard of rationality that defines such dominant occupations transcending dominant interests. They also promote different individual views in the collective space, providing new experiences and new used territories.

7 Final Considerations

From what was discussed so far, two aspects of the relationship between GPS navigation applications and territory can be considered from the concepts of technique as a hybrid system and used territories. The first one concerns the relationship between the

navigation applications and their circumstances regarding the setting of territorial occupations. Devices such as *Waze*, which receives a massive flow of information in areas where the app is frequently used, have the effect of determining "flows" to certain regions of the city, establishing routine routes which lead the user to focus on the instructions from the application interface, transforming what could be an experience of diversity and attention to the physical plan of the city in an experience of a relationship with a digital interface, and in so doing, it is close to the "sameness" pointed out by Jacobs [11].

The second aspect to be considered calls attention to the possibilities that the same technology, able to withdraw the user from the navigation experience around the city, can also be an experience of re-signification and occupation of territories. According to the final undergraduate projects presented, it is possible to establish contact with the city by using information streams that help in the process of territory re-signification. As it was seen, technology *per se* does not submit or free users from heteronomy experiences. Technology may leverage territory re-signification exercise and even stimulate new appropriations, once it is part of a hybrid technical system that evokes the materiality of objects, information streams, and space transformed into used territory. Not only is human perception broadened with technical systems, but new territories are created. Therefore, it is possible that technical systems also play a pivotal role in the expression and exercise of criticism on used territories.

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