

Beyond Efficiency: How to Use Geolocation Applications to Improve Citizens Well-being

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Abstract - This paper presents a work in progress that exposes how the growing problem of urban mobility in large cities has contributed to the level of unhappiness of its inhabitants and tries to examine if the hypothesis of using geolocation applications to increase the well-being of the citizens might be a starting point for future works. A previous research concluded that people with the longest commutes are the least satisfied with life. Although some technological initiatives, such as Waze and Google Maps, tries to reduce the time wasted in traffic, the information here demonstrates that such efforts are not enough to reverse this everyday negative experience. Exploring theoretical concepts of emotional design and an experiment of Yahoo Labs, this paper argues that it is possible to work with the emotional responses of geolocation application users. Based on what was observed and collected, we argue that the use of these applications can create opportunities for positive emotions and encourage a change of attitude towards traffic problems, enabling more significant and delightful moments that potentially contribute to an increase in the feeling of well-being. We present the need of this new approach as it goes beyond current methods in its potential to make citizens smart when the city environment cannot be modified.

Keywords-urban mobility; navigation applications; emotional design.

I. INTRODUCTION

The concept of smart cities is usually linked to efficiency in the use of natural resources. Discussions about this concept have been happening between citizens and experts. The use of the latest technology is promoted to transform large urban centers into a less aggressive place to live in, yet some problems faced by citizens come from government policies and economy. Urban mobility is one of the most impacted issues.

In Brazil, a survey conducted by the National Association of Public Transportation [1] found that the vehicle fleet in major cities in the country grew more than the road structure in recent years. From 2003 to 2012, while the fleet increased 92%, the street extension grew 16%. The study compared data from 438 cities with over 60,000 inhabitants.

The Brazilian case illustrates a current scenario in large urban centers. These survey data illustrate the significant increase of the fleet, being 70% for cars and 209% for motorcycles. An increase of 5% of the fleet does not have an impact on the course of time in the same proportion, but

larger, as the relationship between flow and travel time is not linear.

A contributing factor in this scenario is the facility to buy vehicles and, in some cases, the cost is equivalent to public transportation. It is a scenario where political leaders encourage the production and car sales in the country and the institutions need a large volume of government funds to accompany the changes.

Another scenario that exacerbates those problems is the concentration of the population in large cities and in metropolitan surroundings, creating the need for daily mobility to places where there is a concentration of jobs and facilities through some means of transportation, whether public or private.

The vehicles in cities are a troubling issue in the short term. Usually, they are the result of structural problems of the cities and the necessary public policies for the alleviation of these problems compete with tax benefits granted to the establishment of the major automakers to generate direct and indirect jobs.

The experience of other countries shows that building more streets and avenues, which will inevitably be congested, is not a good solution. One example is the city of Los Angeles, in the US, where there are lots of freeways and still has slow traffic [1], leaving the discussion open on how to minimize the inconvenience caused to daily lives of citizens.

Citizens have to seek their own alternatives to live with problems derived from urban mobility caused by the economic situation and governmental choices.

In this scenario, this article begins the exploration of the subject in Section I, about the emotional consequence suffered by the people due to the excessive time wasted in traffic. Then, in Section II, we expose the rise and popularization of geolocation mobile applications, with the direct goal of reducing time wasted in traffic. In Section III, the concepts of Donald Norman about Emotional Design are introduced to allow the analysis of Waze, one of the geolocation applications analyzed in Section IV. Finally, Section V presents the case of Happy Maps by Yahoo Labs, which tested the implementation of features that aim to generate positive and emotional responses in users, such as the app to guide people displacement.

II. TIME WASTED IN TRAFFIC VERSUS HUMAN EMOTIONS

Brazilian Demographic Census of 2010 presents on the traffic travel time that only 14.8% of workers in urban areas of the country spend up to five minutes to go to work. It means 6.6 million of the 55.1 million citizens working out of home. Furthermore, 28.5 million people spend from six to thirty minutes in the displacement and more than 1 million people spend over two hours.

A survey pointed out that people living in São Paulo, the largest city of Brazil, waste about one month per year in traffic jams, with an average time of 2.4 hour/trip per day.

Another striking statistic is the number of people studying or working in different cities from the ones that they live in. From 2000 to 2010, this number grew 93.9%. The explanations for the increase are related to population growth, increase in the number of formal jobs, acceleration of the metropolization and urban development process of inner cities as well.

In a study conducted in Canada [2], it has been discovered that traffic jams are in the top of the list of reasons why commuters experience increased stress. People who spend most of their time on the road experience higher levels of stress because they constantly feel hurried. The study discovered a direct link between commute time and welfare [3]. The findings concluded that people with the longest commutes have the lowest overall satisfaction with life. The commute lengths are usually linked to a sense of time pressure, people experience higher levels of stress because they constantly feel hurried and worried about all the activities they are missing.

Although there are a lot of evidences linking commutes to negative feelings, some researchers found out that a longer commute may benefit people. Reports of studies [3] found out that the key to an enjoyable commute is using the time as an opportunity to create a mental shift between home and work. If the time is used as a break from other appointments and responsibilities, the driver may become more relaxed. When reducing the driving time is not an option, some activities as using the journey to listen to music, enjoy the landscape, or simply being alone with the thoughts can change the commute to leisure time.

III. RISE OF NAVIGATION APPLICATIONS

Focusing on reducing time in the traffic, navigation applications are increasing their participation on the daily life of citizens in large urban centers. As a way to help reducing the inconvenience caused by urban mobility problems, mobile applications, such as Waze and Google Maps, intend to help people avoid the frustration of being stuck in traffic jams by offering alternative routes to their destination and much more information. Some of those are warnings about accidents, hazards, roadblocks, police and other events.

Even though a few minutes could be saved in some cases, such efforts are not enough to sufficiently improve this mobility experience in large cities. Many times it is simply impossible to avoid the traffic jam and information that would help drivers like ETA (Estimated Time of

Arrival) ends up working backwards, increasing their levels of stress.

Currently, these applications do not propose motion to its users [8]. Routes are created to show only shorter or faster paths, but it does not provide and stimulate emotional pleasure to users. However, the application based on geolocation can use the data generated to propose a more randomly improvement in the relationship between individuals and cities, without a formal request [7].

A Canadian study reported that [2] commute lengths are linked to a sense of time pressure. Many people spend much of their time on the road worrying about all the activities they are missing, further enhancing the feeling of unhappiness.

IV. EMOTIONAL DESIGN

According to Norman [4], humans are the most complex of all animals; he suggests that emotions are related to three levels of brain processing: first, the "automatic layer", as a visceral level of call; second, the part that contains the brain processes that control everyday behavior, called behavioral level; and third, the contemplative part of the brain, the reflective level.

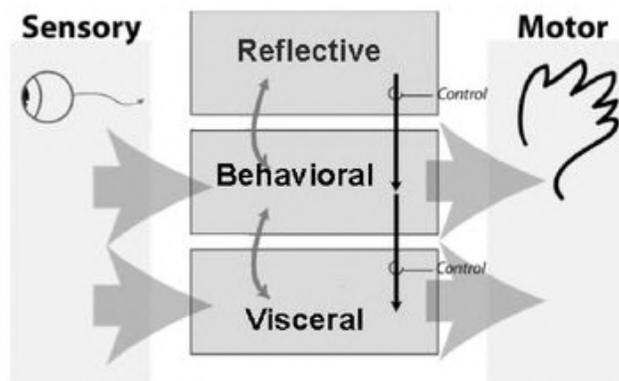


Figure 1. Three levels of processing: Visceral, Behavioral and Reflective [4].

Each level has a different role in the functioning of people and requires different design strategies. An explanatory figure about the three levels is shown in Figure 1. Each of the three processing levels will be discussed separately, with their respective design strategy.

A. Visceral

The strategy to design at this level is the appearance. Although this level corresponds to the earliest part of the human brain, it is sensitive to a variety of conditions.

People are programmed to react positively, for example, to the smell of flowers and fruits, as they represent food. In most cases, the cultural differences are important because conventions about what is desired are usually defined by society.

Working with visceral design is to understand the automatic emotional responses like shape, feeling and texture.

B. Behavioral

The design is totally linked to the use itself. Appearance and rationality are not important in this case, only performance. Perhaps this is the most widespread approach in the current mobile applications.

Professionals who focus on usability are used to this kind of reasoning. While making the product work may seem obvious, the needs of people are not as obvious as they may seem.

Norman [4] points out that many products fail because designers and engineers are often self-centered and believe to dominate the answers to usage issues. The behavioral design, on the other hand, should be people-centered, i.e., on users, when designing a project.

C. Reflective

It is a quite broad design; it covers message, culture and meaning. It works primarily with self-image and memory [4], which is why the task of designing must be based on the understanding that users have over all elements related to the artifact. There is nothing practical, biological or automatic in buying, for example, an expensive car or a famous brand; answers to these questions would be cultural.

Usually, the results of blind tests show much "confusion" among consumers who cannot distinguish, when blindfolded, between products of common brands and their "famous" preferred.

V. EVALUATING WAZE THROUGH EMOTIONAL DESIGN

The functionality and appearance of navigation applications are very similar and are usually composed by the map of the area where the user will travel, a suggested main route, and alternative routes to the destination point of the user. Currently, Waze app includes all the standard features of navigation that most of the popular applications contains, and it provides additional functionality as well; therefore, it will be used such in a way that the features can be analyzed at the behavioral level of the theory of Norman [4] about Emotional Design.

There are some features available for the user associated to the display or control of the distance to be traveled and time efficiency, and for each of them we can analyze the possible emotional stimulus.

The first feature is the set up of the route; it is possible to view the estimated time of arrival at the final destination. During the trip the user receives updates of the prediction that shows the worsening or improvement of the traffic. We can deduce some of the emotions or feelings that can be stimulated by this information:

- Security, which is a positive feeling, for being able to view the amplitude of information that would not be available without the application aid;
- Integration with the community, due to its characteristics of a social network, Waze can stimulate the culture of sharing and a sense of belonging through the exchange of information between users;

- Anxiety, a negative reflection of anticipating information about events along the way that cannot be avoided and may cause delay on the journey;
- Insecurity, in cases where the fastest route contemplates a deviation through a dangerous area.

Throughout this paper, it could be perceived that each feature can generate a number of both positive and negative emotional stimuli, although there is no data survey to consider whether there is a greater tendency for people to have (or not) feelings that favor their well-being while using the application functionalities. Still, it was not possible to consistently realize the existence of a strategy to reach the reflective level of emotional design and intentionally generate positive emotions.

Taking studies about emotions generated by problematic situations of urban mobility as a database, we can only infer that these applications are not reducing or acting to sufficiently reduce feelings of discomfort, as mentioned above, caused by the traffic context.

VI. THE DRIFT THEORY AND THE HAPPY ROUTES EXPERIMENT

Psychogeography is the science that analyzes and deciphers the relationship between humans and environmental contexts and evaluates the effects of the environment on the affective behavior of individuals [8].

Through the relations of the inhabitants with the place and elimination of the censorship imposed by conditioning, proposed by the optimization of time, the cognitive system and the appropriation of urban spaces are analyzed.

Based on the knowledge of individuals about cities, psychogeography and the theory of drift proposes that the individual should walk without a set destination letting the urban environment create the suggested path and then for each path created, the motivation needs to be pointed out. [7].

Using this theory as one of the working basis, in August, 2014 researchers from Yahoo Labs developed a GPS algorithm that allowed users to choose a route between two points based on beauty, for example, rather than time or distance [5].

The Shortest Path to Happiness [6] sought to offer "emotionally pleasant" routes using data from a crowdsourcing platform. The goal is a mapping application that presents the most enjoyable routes, taking into account not only what looks appealing, but also what sounds, or smells appealing and even the memories people attach to a place.

Researchers used a website that asks users to choose between photos of areas in London and Boston they found to be most aesthetically pleasing in order to determine the most "beautiful, quiet, and happy" journeys.

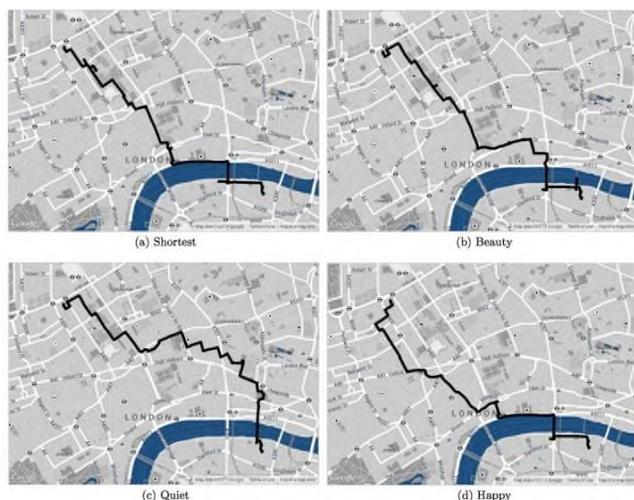


Figure 2. Route suggestions based on the "Shortest Path to Happiness" study [5].

"Based on a quantitative validation, we find that, compared to the shortest routes, the recommended ones add just a few extra walking minutes and are indeed perceived to be more beautiful, quiet, and happy," the study reads. "Web and mobile mapping services currently fail to offer that experience as they are able to recommend only shortest routes." Yahoo researchers hope to apply this feature to other cities without crowdsourced ratings by using Flickr metadata [5].

It may seem controversial that applications typically focused on the efficiency of time and distance can be used to generate emotional experiences as happiness. Considering all negative experiences reported previously, caused usually by daily commutes, the Happy Maps experiment serves as a counterpoint to open a new range of features that can enhance the experience with the traffic. The beginning of the discussion of how the location-based applications, that are so present in the lives of citizens nowadays, can be a powerful tool to enhance well-being.

VII. CONCLUSION AND FUTURE WORK

The goal of this initial investigation was to identify the potential of navigation applications to improve the well-being of people when commuting, especially in situations where there is no way to reduce their time of driving in the traffic jam, and use it as a valid starting point for further work.

In situations like this, the key to effectively improve well-being is not by changing the environment, such as increasing the number of large roads, but in the attitude of the citizens. It is directly related to the way they perceive and experience the moment, so it is necessary to create opportunities for a change of attitude towards the traffic problems. The citizen can use this shift range as a break from other commitments and responsibilities, engaging in pleasurable activities such as enjoying the cityscape. According to the Canadian study [2], enjoying the cityscape, listening to music or just staying with your own thoughts is

the most suitable way to experience time in traffic as something beneficial.

Given the popularity of geolocation applications in commuting between home-work-home, a especially critical moment of the day, they can be used not only as important tools to reduce the time in the traffic, but also as channels to stimulate positive emotional responses associated to the displacement experience, creating opportunities for this new perception.

By questioning current approaches and studying new ones for the situation, such as Happy Maps - the experiment developed by Yahoo Labs, we confirmed that it is possible to offer features via a GPS application with the clear intention of generating a change of perception, promoting positive emotional responses. This new approach also shows that there are many hidden opportunities to offer pleasurable activities through these applications, stimulating emotional responses through leisure and sense of productivity. The case of Happy Maps is a clear use of the reflective level of emotional design, which results directly in the improvement of the well-being of citizens and their relationship with the city.

Since our focus is to help citizens change their attitude and transform the city environment into a less aggressive place to live, we intend to develop a long-term research project by expanding the use of emotional design in the development process of geolocation applications. The key to the next stage is the identification of other activities that can be done in commutes in order to develop some further features. We also intend to use the results to enable the use of technology to help people with their personal attitude and, consequently, the meaning of moments.

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