

Collaborative tools to car commuting in Brazil and China

Angélica Porto Cavalcanti de Souza¹

Abstract: Brazilians and Chinese use applications daily to meet some of their needs. Geolocation, memory, communication, entertainment and learning are some examples, but it is well known that not every moment is suitable for the use of certain technologies, and sometimes its use is even illegal. While driving a car, a person tends to keep using their phones, even though it is distracting and dangerous, but the reasons behind this use are related to trying to make travel less unproductive and unpredictable. This problem leads this work to debate the relationship between driving and the continuous interactions with technologies in the car. For this, the debate is based on findings done by Souza et al. (2019) in Recife, Brazil, applying Design Anthropology approach and the Design Ethnography method, seeking to understand how improvisations and contingencies can provide a deep understanding of the user's real needs. The results shows that, by applying this methodology, it was possible to raise many considerations about how and why people collaborate on traffic, including which applications they use and how they trust the information presented while aggregating their own personal knowledge. And, based on this knowledge, This article intends to raise hypothesis based on these findings that can be linked to China's reality, opening opportunities to future researches.

Keywords: Design Anthropology, Collaboration, Car Commuting, Latin America, Human Computer Interaction

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1. Introduction

In this day and age, we experience daily life in an already futuristic scenario. Innovative technologies have been continuously developed over the last years and nowadays are tangled with routine activities. The smartphones are one of the best examples. It not only facilitated the daily necessities, but also, as some researchers claims, it is became an extension of their owner's own bodies, developing a true relationship of dependency (LI and LIN, 2018, LAPIERRE and LEWIS, 2018, ARIF, ASLAM and ALI, 2016).

The number of mobile subscribers worldwide hitted 5 billion in 2017. Both Brazil and China have a large number citizens using smartphones and accessing internet, which

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is influencing the way people deal with different tasks (GSMA, 2017). Millions of people all around the world uses smartphones to support a wide range of tasks, such as study, listen to music, communicate, play games, order food or even use it in unsafe scenarios like driving.

The driving activity demands caution and cognitive effort, competing with technologies that also demands attention. The smartphone use in this context are linked with some usual informational and entertainment needs, however, although these uses often meets the driver's necessities, they contravene traffic legislation and can generate unsafe surroundings as the driver creates risks to himself and others (e.g., vehicles, passers-by, animals, among others).

Data that can corroborate with this subject is presented by Bo et al. (2013) that highlights the need to avoid texting while driving in China. According to CCTV news site, 60% of drivers in China confessed to get distracted by their phones while driving (CGTN, 2017), while in Brazil, 42% of drivers send text messages at the steering wheel (G1, 2016), even when, in both countries, handheld a mobile phone is forbidden by the law.

By that, it is possible to also understand the increasing dangers on the road and the frightening numbers related to car accidents. In China 700 people die per day in road accidents (SOUTH CHINA MORNING POST, 2016), while in Brazil 120 people, according to Federal Council of Medicine (G1, 2019).

Besides that, both Brazil and China faces traffic problems related to the large numbers of cars in each country. The TomTom Traffic Index (2018) points 14 Chinese cities and 7 Brazilian cities in the 100 most traffic jam in the world, which increases commuting time in 49% in Recife and 44% in Chongqing, the most problematic cities pointed in each country.

And, because of this situation, in addition to communication needs, the eagerness to access navigation data is also present in the driver's daily commutes. By applications such as Waze[®] or Baidu Maps[®], the drivers can get value information to avoid possible problems and traffic jams. The continuous search for valuable information is one of the needs identified and debated by Souza et.al.(2019) in a research done in Recife, Brazil.

This whole scenario, which includes daily driving and informational/communication needs, has proven to create a dangerous environment for

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many people. However, it is understandable that, even with prohibitive laws and all the unsafeness, the insistence on continued use of smartphones while driving shows a real need that should not be ignored.

To create applications that prohibit the smartphone use while driving, although exists, it is not the right answer to this problem. There is an evident and urgent demand to design new possibilities for a near future that can provide fluid, interconnected and secure use of the digital devices and services, especially in the context of driving.

This problem leads this research to debate the relationship between the driving activity and the people continuous interaction with technology in car commuting. The research done by Souza et.al.(2019) focused on the need to access value information about the routes and the collaborative activity in which people generate traffic information. For this, four questions were addressed: (i) how people collaborate in traffic, (ii) what applications are more commonly used for collaboration, and (iii) how they trust the information generated..

These questions were able to be answered by a qualitative, situated and deep research done directly with brazilian drivers applying the Design Anthropology methodology and it was possible to identify how people access and generate value traffic information. This article intends to raise questions and hypothesis based on these findings that can be linked to China's reality, opening opportunities to future researches.

2. China and the traffic scenario

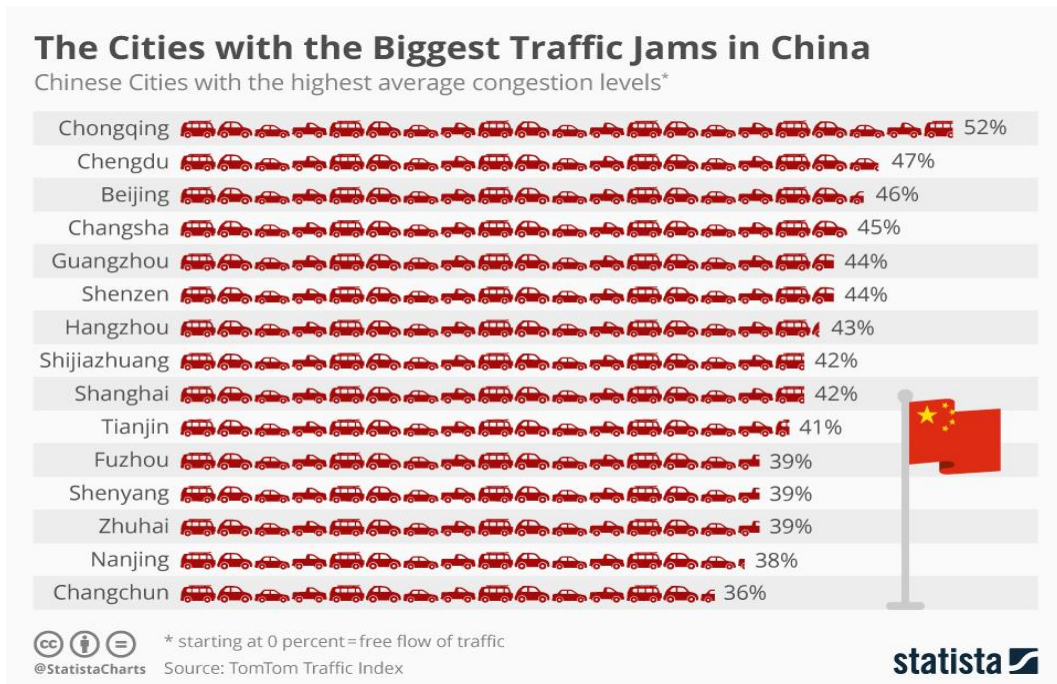
According to Professor Shengchuan Zhao (2009) "China has been experiencing dynamic urbanization and motorization due to rapid economic growth." In his paper, he shows that during the period 1980-2005, the numbers of motor vehicles and motor vehicle drivers increased approximately 18 times and 33 times respectively, and these numbers are directly connect to the GDP increase by approximately 40 times while the urban population tripled.

Those numbers indicates a huge amount of vehicles on the roads daily, that the country and the drivers needs to deal with. As mentioned, many cities in China has already some of the worst numbers related to traffic jams and this can add to negative and stressful feelings for the drivers as well as increasing their commuting costs annually.

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According to the webpage “Statista” and data brought by 2017 TomTom Traffic Index, the most congested cities in China are listed in the graphic below (Figure 1):



Source: Statista (2019).

And, on top of that, the number of accidents also increased. According to a 2015 report by the World Health Organisation (WHO), China had over 104 traffic-related deaths for every 100,000 motor vehicles, compared with 33 in the Americas and 101 in Southeast Asia (SOUTH CHINA MORNING POST, 2018). The country was responsible for 20 percent of all traffic-related fatalities globally and those are truly alarming numbers.

Although these accident numbers cannot be totally related to only distractions and technology use while driving, it is a subject discussed even in the state channel in China, the CCTV. In an article presenting the risks and consequences of phone use while driving, published in 2017,, shows that in their research, 60% of chinese citizens “confessed to drive while distracted on their cell phones”.

These data shows that China is a country that deals with so many problems concerning traffic problems that constitutes itself as a perfect place to invest in research and innovative solutions for the daily car commute.

3. The Design Anthropology approach

Such a delicate subject demands a deep understanding about all the driver's journey, activities, necessities and even feelings involved in a car commuting experience. To do that, Souza et.al.(2019) choose a methodology that combines two social fields, Design and Anthropology. Consolidating both in academia and industry (AGAR, 2014; PINK, 2014; SEGELSTROM, HOLMLID, 2015), this approach combines the techniques of the Anthropology field considering complex, holistic and cultural scenarios, with the Design necessity to understand the public and generate products with true value to users.

This approach made it possible to comprehend how improvisations and contingencies^{II} can provide an understanding about the role, meaning and user's real needs in car commuting. This methodology is already been used in current research involving car scenario (PINK, FORS, GLÖSS, 2018) and offer opportunities that allow an engaged and participative view, where participants collaborate with researchers, amplifying the potential to comprehend people's behaviors and the connection between technology and environment.

Within Anthropology, the ethnographic method allows an in-depth and detailed understanding of people's behavior and daily life. The ethnographic techniques have a role in many stages of product design being recognized as a suitable approach, building the comprehension of people's real social practices at an appropriate level (YLIRIS, BUUR, 2007).

Pink (2014) says that the differential brought by Design Anthropology is making it possible for designers to intervene and modify the future by understanding the improvisations and contingencies of the present.

In this article, we present the contingent circumstances of how people behave while driving and how they improvise to fulfil their needs, focusing on how collaboration^{III} makes the driving experience less unproductive and problematic.

4. Method

By raising new opportunities to replicate a similar research with Chinese drivers, it is important to understand the method applied on Souza's et. al (2019) article.

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The research had a two step data collection with an explorative approach. The first step intended to understand the car commuting activity in Recife (Brazil), by applying re-enactment interviews (PINK *et al.*, 2018) and observations, chosen in order to discover gaps in people's everyday life. And the second step used two ethnographic interviews techniques: situated and narrative, to deep the information and gather details about specific moments on people's practice. The narrative interview, together with an episodic technique, was used to collect the data when it was not possible to use the situated interview technique.

A sample of 19 Brazilian participants from 23 to 50 years old was used. The participants were invited based on previous researcher's contacts in order to facilitate the empathy and comfort while collecting data, in a way that the researcher presence wouldn't influence in the participants normal behavior.

The interviews were conducted based on semi-structured questions, aiming to know which apps are usually used while driving in everyday routine. Using this technique, it was possible to discover pain points and how the drivers get information about traffic in everyday drive routines.

The main patterns and key findings were interpreted and synthesized in narratives according to the contingent circumstances and different kinds of improvisation. Is important to highlight that the participants' names were changed in other to ensure their privacy.

5. Findings

Souza's *et al.* (2019) findings showed that citizens in Recife need to constantly deal with traffic jams and tend to use digital tools to avoid or get out of traffic. Those findings expose that mobile maps applications are commonly used to aid in route decisions by offering value information in real time by indicating routes to avoid traffic jams or other possible problems such as accidents, floated streets, etc.

The data collected in 2018 showed two geolocation applications unanimously cited by the participants to provide traffic information and optimize time in Brazil: Waze[®] and Google Maps^{®IV}. Both can offer less problematic routes suggestions based on the

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information collected by tracking the position and speed of the registered users on the platforms.

These applications also display the distance to be travelled for each suggested change in the route (e.g. 300 meters, turn right), the remaining time (in hours and minutes) and the specific estimated time of arrival at the predefined location.

One of the extra functions from Google Maps[®] is related to the possibility to offer useful information for other means of transportation besides the commuting by car. Metro, bus, bicycle or even on foot, are the possibilities offered by the application as alternatives for commuting, expanding the user profile that covers different needs.

And, concerning Waze[®], a positive aspect emphasized by participants was the possibility to add more collaborative information. It uses what is known as “collective intelligence” which states that, in groups, collectively, not only it is possible to solve problems together, but also work for the benefit of an individual (COSTA, 2005). That possibility of communication and access to specific detailed traffic information makes Waze[®] one of the most used applications within the research sample.

Although, to contrast the benefits, an aspect widely criticized by participants were the dangerous routes occasionally suggested by Waze[®]. Since it's system is programmed to offer preferably the fastest routes, it is possible that sometimes the app leads the driver to unsafe places, which can also lead to tragedies. Some interviewees reported that, thanks only to their previous knowledge of the city, they were able to avoid danger by refusing to follow some of the suggested routes; however, others decided to abandon the platform and exchange it for the direct competitor. Google Maps[®] users in the sample said that the app, unlike Waze[®], keeps its route suggestions always on the main roads, thus avoiding unsafe places.

In China, Baidu Maps[®] and Gaode Maps[®] are two of the most popular local map apps. Their system have similarities to the ones used in Brazil, providing the same real time information, and by that, making it possible to hypothesize some similarity between those two countries. But it is necessary to understand and compare features between all of the four apps while considering also the cultural differences and daily necessities.

And presenting in the following sections, Souza's et al. (2019) findings concerning three main situations concerning the driver's informational needs and preferences: information dependency, safe information share and empathic information.

5.1 Information dependency

It is understood that the daily use of these applications is not necessarily related to routes indication, since knowing the daily routes is already part of each driver's common knowledge.

Considering the recurrent problems in Brazilian commuting, the route information has been verified as resources widely daily used in both geolocation apps. However, Waze's collaboration feature has created in some users a true dependency relationship, once it provides detailed traffic information. With more information, the driver can leave a state of unawareness "limbo" and feel less anxious about unexpected traffic jams.

Thus, the collaborative application system is a "two-way street". As users tend to collaborate with new information, they also expect others to do the same, believing that this information helps the app to constantly offer the fastest route available.

This kind of "dependency and trustful relationship" was specially identified in some of the statements collected during the interviews. "Waze[®] knows more than I do. I am 100% dependent, and without it I am 40% blind" was one of the strongest examples shared by a 30 year old dance teacher.

However, although the detailed information is one of the bests features offered by Waze[®] the many screen layers and screen touches necessary to actively mark a specific problem on the app is too difficult (also unsafe and illegal to do it while driving) but, for many users, it is still worth it.

5.2 Safe information share

It is important to understand that avoiding heavy traffic will not always be possible, but there is a lot of gain to avoid or lessen negative feelings while stuck in a traffic jam, improving the experience even at a troubled moment. A type of controlled and private way to share personal information (such as localization sharing) was identified as an improvisation done for reduce anxious feelings, while, at the same time, bringing a sense of security and making the driving activity safer.

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Information such as arrival time, problems along the way and specific location can be comfortably shared to specific contacts without the need to interact with the cell phone and be distracted at all.

A 36 years old physiotherapist participant explained that to be able to choose who can have access and tracking him along the way it is an useful resource for meetings or, as he uses daily, for people that are waiting for his arrival, such as colleagues that he can give a ride or even his wife at the end of the day.

Summarizing, by preventing direct interaction with the cell phone, even while sharing important information, it avoids the “competing activities”, keeping the driver focused on the road and, at the same time, decreasing the anxiety feeling that can appear when people are waiting.

5.3 Empathic information

Unlike the specific application uses for acquiring route information described above, one of the improvisations identified for accessing value information happened unexpectedly by instant messaging applications. This direct contact presents itself as a more specific, empathic and detail-rich form that occurs among people who have previously met. In the research sample, the use of the WhatsApp[®] was congruent to all Brazilian participants. It was unanimously cited as the App most used for instant messaging via internet.

This type of collaboration was characterized as a "facilitated" way of requesting directly relevant information, but it depends on some specific prior knowledge about the people involved (such as the access to people's private contact and knowledge of the daily route of third parties). This exchange and request for information can happen both through private and group messages and results on an even more detailed and trustful information when in comparison to Waze[®], although less graphic.

As an example, one of the participants told that when he deals with contingencies that can cause inconvenience or delays, he improvises through WhatsApp[®] a way to acquire useful information. To access valuable information, a 28 years old professor had two different ways, using the same instant messaging tool. The first way involves trying to speak directly to specific people he knows that are on the same route as him, and the

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second involves the use of a WhatsApp[®] group created by his friends' which use is exclusively for sharing specific detailed and easy traffic information.

In China, WeChat[®] is a “super app” that not only offers instant messaging features, but also includes different services, like the possibility to share live location to specific contacts. And, again, these kind of similarities raise opportunities and questions relate to understand also how chinese citizens uses WeChat[®] to improvise solutions to daily commuting needs.

6. Conclusions and expectations

To comprehend people's needs and improvisations brings possibilities to improve different experiences. The Design field is still learning that understanding the public and their daily challenges in a deep and holistic way, raises opportunities to solve problems and create innovate solutions. In order to better understand how people face their problems and fulfil their needs while dealing with the commuting unpredictability, the five following themes will be discussed: **Cognitive effort and technological interconnectivity; Collectivity and Social Support**, helping with the sharing of meaningful information; **Empathy as an incentive for collaboration; Privacy control** and; **Security and Social Context**.

In terms of pain points and needs, as people uses the smartphone in a distracting way, the present analysis comprehends the **cognitive effort** generated by the excess of competitive activities to the complex act of driving. In order to use connectivity and lessen the negative feelings generated by uncertain commuting, drivers deal with demanding clicks and the need to focus their sight on their smartphone screen. The use of different tools needs to be coordinated by the driver through unsafe ways.

This can be seen when the driver interact by touching the screen without any fluidity between the simultaneous activities. In this way, it is important to research if Chinese drivers deal with this cognitive effort and how.

Another theme moves away from the specific and individual driver's vision and amplifies it to understand the collective events between those involved in the same contingencies. Using the available connectivity, the community improvises to communicate, **collaborating among each other** to optimize time and decision making.

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It is noticed that in collaborative processes, in “virtual communities”, users jointly contribute with relevant information to the system and also help directly other users, who tend to appreciate and trust in the content received.

In Brazil, the example in which this collaboration became clear was related to the of some of the participants usual uses concerning Waze[®]'s collaborative feature. It is interesting to investigate if Baidu Maps[®] or Gaode Maps[®] allows this kind of social support (and how Chinese drivers uses it, or collaborates without it).

Although, it is important to stress that on Waze[®] the users do not necessarily know each other, but some of them still collaborates while driving in a “sense of community” kind of help. For that matter, one of the hypotheses that can be raised concerns the driver's perception of “value” on posting collaborative information for unknown “faceless” people, especially considering that it is a risky activity that demands cognitive effort especially behind the steering wheel. In this sense, the third point of investigation is related to understand if Chinese drivers deals with or even if there is interest in this specific kind of collaboration while driving.

However, in contrast to the “faceless kind of collaboration”, data sharing can often be motivated by the **relationship of intimacy** between those involved, and for this, people need to have **control over what information is public or private** and also have prior knowledge of third parties daily routes. One example of this, can be see when a driver releases his location track to private contacts in order to decrease the anxiety feeling.

Consequently, knowing exactly who has access to their location can also provide to drivers a security feeling. This happens because of the Brazilian city's social issues, where people can have their physical and material integrity at risk. In this way, it is interesting to create questions about the feelings and how drivers deals with them in their daily journey, as well as what can change in the sharing of detailed information activity by changing the faceless community to well-known friends.

And also raising our fourth point of investigation concerning if Chinese drivers have this kind of anxiety issues while driving, how they usually deal with this and how they collaborate with friends and colleagues about traffic information.

Lastly, when comparing the geolocation in Waze[®] and Google Maps[®], the **security issue** was highlighted as a critical point for the decision to adopt or abandon a platform. That is noted when participants reported that Google Maps[®] maintains

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suggestions on main streets, unlike Waze[®] which, do not consider this aspect. That can lead people to lose confidence in the application itself, once they are exposed to insecurity situation caused by using the app.

The urban violence is present in Brazilians daily life and needs to be considered when thinking about technologies for Latin America. Thus, we aim to investigate if Chinese drivers face a similar problem, looking for design solutions and what trust relationships are like with geolocation apps.

And concluding, as discussed, these findings about the Brazilians daily commutes, by itself, raises opportunities to improve the driving experience and innovate with value solutions for the problems identified. And since Brazil and China deals with similar traffic issues, these same findings can work as hypothesis to compare and possibly create new possibilities for better scenarios.

Notes

^I Professora na UPE e Doutoranda em Design pela UFPE. E-mail: aportocs@gmail.com.

^{II} Contingencies are understood as the eventualities that lead to situations.

^{III} In this paper we define collaboration as described by D'Amour et al. (2005) as a dynamic process related to sharing, partnership, interdependency and power.

^{IV} Both data collection and the analysis concerning Google[®] and Waze[®] applications were done in 2018. Currently (2019) the apps have undergone through some updates, even adding new features.

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