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# Public transport renewal and car use, an early assessment of the Leman Express and its impact on cross-border commuting in the Geneva area amidst the COVID-19 crisis

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Being a dissertation submitted to the Faculty of the Built Environment as part of the requirements for the award of the MSc Transport and City Planning at University College London: I declare that this dissertation is entirely my own work and the ideas, data and images, as well as direct quotations, drawn from elsewhere are identified and referenced.

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## List of abbreviations

| | |
|---|---|
| CEVA | Cornavin (Main station) – Eaux-Vives – Annemasse, name of rail link project including 16km of newbuilt track and 5 new rail stations linking the above locations. |
| CFF | Chemin de Fer Fédéraux, French name for Swiss Federal Railways |
| cpad | Car per adult driver |
| GHG | Greenhouse gases |
| LEX | Leman Express |
| PT | Public transport |
| SNCF | Société Nationale des Chemins de Fer – French national rail operator. |

# Abstract

The automobile has become, over the years, the central element of our transport systems worldwide. Because of its negative impacts on the environment, health and on cities, it is now necessary to move towards another transport paradigm. This is however not so easy and will require a complex set of interventions, among which, the provision of efficient public transport.

This dissertation seeks to understand the effect of renewed public transport provision on car use and dependence, as well as to understand whether the COVID-19 crisis has influenced this. To this end, the case study of the new Leman Express rail system in the Greater Geneva area (Switzerland/France) was analysed. An online survey was distributed to both train and non-train users resulting in interesting quantitative and qualitative data.

Findings indicate that this new rail system is currently seen as a limited alternative to car use. It is nevertheless a step in the right direction. To achieve more significant modal shift, a wider *network* of interventions aiming to both attract drivers to alternative forms of transport and to restrict the use of cars will be necessary.

# 1. Introduction

Our planet Earth is suffering. Since the industrial revolution we have been consuming an ever increasing amount of natural resources to the point that these are dwindling. We have also been releasing our waste produce back into atmosphere under the form of greenhouse gases, leading to this dire situation we face. The transport sector is not innocent in regards to this. Indeed, in a modern industrialised country such as Switzerland, the transport sector is responsible for nearly a third of GHG emissions (FOEV, 2020), not including international air and maritime transport. Within this highly pollutant sector, individual motorised vehicles account for 74% of emissions making it the leading source of GHG emissions in the country. This scenario is similar with varying degrees across other industrialised countries with a reported global contribution of transport at 24% of all anthropogenic emissions (Sims and Schaeffer, 2014, p.603).

Given the hegemony of the automobile worldwide, it is clear that this is an area with significant potential in terms of reducing emissions to meet reduction targets. However the regulation of car use is a highly contentious topic as cars are still seen as important with many aspiring to own one (Hickman et al., 2017). The system of automobility is undoubtedly in a state of 'lock-in' (Schwanen and Lucas, 2011) and benefits from heavy advertising and strong lobbying within governments. Moving away from this paradigm will require providing high-quality alternate forms of mobility. However, providing alternatives is not always sufficient as car use is determined not only by rational mechanisms but also by more subjective emotive processes (Sheller, 2004). The recent COVID-19 pandemic brings an additional challenge as fears of contamination deter people from public transport towards individual transport.

This dissertation will seek to understand how the provision of alternative means of transport affects car use, more specifically discerning what are the attraction factors and what are the barriers to modal shift. This work will also try to grasp how the current pandemic might affect this modal shift. This dissertation will focus on commute journeys using the case study of cross-border commuting within Greater Geneva and more specifically how a new rail service has affected commuting trends.

# 2. Research questions and aims

## 2.1 – Aims

The principal aim of this dissertation is to understand the effect of public transport investment on car dependency for commuting journeys. This study will use the case study of cross-border commuters within the Greater Geneva area, a population historically underserved by public transport, having had to depend on the automobile for commuting. Further, within the context of the ongoing COVID-19 crisis, another aim of this work will be to understand the perception of public transport in light of the epidemic along concerns of risk of contamination and social distancing.

## 2.2 – Research questions

Based on the aims presented above, four research questions have been established and for which this dissertation will try to bring answers to.

**RQ1**: Has the new rail service provided an *alternative* to the automobile for cross-border commuting?

**RQ2**: What are the factors that have attracted commuters to the new rail service?

**RQ3**: What are the current *barriers* for further modal shift?

**RQ4**: How is public transport considered amidst COVID-19 and how might it affect commute mode choice?

# 3. Literature review

Automobility or the wider transport system based around the car is clearly dominant and plays a crucial role in shaping cities and urban lifestyles worldwide. The literature discussing automobility and the problems linked with its externalities as well as possible pathways to break away from this hegemony, towards other forms of mobility, has grown over the past decades. A review of this literature will be presented in this part, seeking to understand the theoretical elements behind these issues. Some further recent research on the impact of the global COVID-19 pandemic on transport will also be presented.

## 3.1 – The hegemony of automobility and its problems

Since the invention of the car in 1886, this once novel form of transport has reached all parts of the globe and is, in many places, the dominant mode of transport today. Starting halfway through the 20$^{th}$ century, the automobile would change how we move around, increasing our mobility potential and profoundly altering the shape of our cities. This hegemony of *automobility* is closely interwoven with the rising dominance of neo-liberal capitalism in our western societies. The car is a perfect example of the consumerist object heavily marketed along ideals of freedom, success and prosperity leading it to become a prominent status symbol. As such, alongside economic growth, an increasing number of people have been in a position to acquire cars leading to the rise in motorisation rates throughout the second half of the 20$^{th}$ century (Hickman and Banister, 2014). Although, there are signs showing a certain plateau being reached in the North, the rising middle-class of the Global South are now buying car *en masse* further increasing global motorisation rates.

Automobility is now the dominant transport system in many parts of the world and is in a state of 'lock-in' (Schwanen and Lucas, 2011) with much of the built environment constructed around it and benefiting from strong lobbying within governments. This state of automobile predominance has had profound effects on our society as it has a long list of negative externalities that we, as a society, seem to be willing to accept in order to obtain the ideal of hyper-mobility. First of these externalities is the disproportionately high casualty rates linked

to traffic related accidents. Every year, 1.25 Million people die in road traffic-related accidents, nearly half of which are not even car users but other road users such as cyclists and pedestrians (Hickman et al., 2017). Road accidents are indeed the fourth cause of death worldwide for active populations aged 15 to 49 (Ritchie and Roser, 2018). Another leading cause of premature deaths is air pollution which causes 4.2 million deaths annually (WHO, 2018). Although air pollution comes not only from road traffic, cars are nevertheless a primary source of pollutants for $NO_x$ and particulate matter. Other health impacts of road traffic worth mentioning are linked to the increased sedentary lifestyle which the automobile favours such as obesity and increased risk of cardiovascular diseases.

The negative externalities linked to the automobile have also profoundly impacted quality of life in urban spaces due to air pollution, disproportionate space requirements for parking and community severance (Hickman and Banister, 2014). Finally, automobility has also a serious impact on the environment and on climate change due to $CO_2$ emissions and consumption of depleting resources.

## 3.2 – Understanding car use and dependence

At a more individual level, understanding the mechanisms behind car use can offer further insight into the dominance of automobility. Research into individual-level agency has grown in recent years. However, a certain muddle of terms has been used by authors as different metrics within the topic. As such, car use, ownership, dependence, reliance and so on, are often cited. Before entering the topic at hand, a certain understanding of terms should be established. Car use is seldom specifically defined in the literature as it is the most straightforward understanding. Car use simply describes the usage of an automobile for a specific type of journey and can be further distinguished between car use as a driver or as a passenger. It is independent of ownership and wider considerations such as dependence. This latter term however has been coined more precisely. Jones (2011) defines car dependence as a more pronounced form of car *reliance*, a term often used in the literature to describe people, places, communities, lifestyles for which the use of the car is indispensable due to a lack of alternatives. In this dissertation both *car use* and *dependence* will be mentioned to discuss different aspects of the role of cars in commute journeys.

Schwanen and Lucas (2011) offer an interesting and broad understanding of the specificities of car use. The first argument made by the authors is that car use comes from complex processes influenced both by individual, personal considerations and external factors. These processes are also heterogeneous throughout the population with the motives and characteristics of car use varying widely from an individual to the next. The next argument presented is that car use is seldom the result of rational decision as it is human nature to spare the mental effort of having to reason objectively on which mode of transport to use for each journey. Indeed, commuting tends to be an integral part of our daily routines, making travel decisions quickly habitual and 'locked-in'. Instead, *reasoned action* will only be applied when a disruptive event takes place which changes the routine such as moving residence or changing employment or when a new travel alternative arises such as the opening of a new public transport line. Rational decision-making behind car use is also hindered by a series of subjective factors which have often been overlooked within research (Sheller, 2004). These include personal emotive factors based on the societal norms that have elevated the car to a powerful status symbol and disregarded other forms of transportation.

Car use can then lead to car dependence in a number of ways. According to Jones (2011), there are again both *subjective* and *objective* factors behind this. The former represents, as discussed above, personal preferences of modes, emotional and societal factors as well as 'locked-in' habitual patterns that push the user to temporally and spatially reproduce travel routines. Objective factors on the other hand are of two types. There are *structural constraints* which stem from the transport/land-use system such as the provision of public transport and *situational constraints* which depend on the specificities of the trip or the user. These different components thus lead car use to become dependence whereby the user is *objectively* unable to use other modes of transport or *subjectively* locked-in to his habits of car use.

The dependence on cars for individual trips can lead to adverse impacts on the lower socio-economic strata of society. The reliance on the automobile to access employment, services and education opportunities pushes individuals from disadvantaged groups into 'forced car-ownership' meaning that in order to own a car, these individuals will have to sacrifice expenditure in other essential areas such as heating or nutrition making them partially materially deprived (Mattioli, 2017). Although households who are in a state of forced car-ownership are better included in both the housing and the employment market than those that

are outright car-deprived, the level of economic stress can be higher as these tend to have unpaid debt sometimes related to the possession of their car.

Similarly, the work of Delbosc and Currie (2012) analyses the characteristics of low-car households which own a car but either chose or are economically obliged to have less cars than drivers. As such, on one hand, there are voluntary low-car households and on the other, there are involuntary low-car households. The former are households that could afford to have more cars but chose not to. Reasons behind this choice generally stem from the presence of alternatives to car use such as the existence of public transportation connections or from the location of the household in a denser urban area requiring less car dependence and favouring other forms of transport such as cycling or walking. These voluntary households thus experience no negative consequences from their low-car ownership as this status results in no inferior accessibility levels. Involuntary low-car households however face a different prospect as these tend to be located in areas of low density and poor public transport accessibility where car dependence is high. These households however cannot afford more cars and must then work around this constraint, leading to inferior levels of accessibility and to the negative consequences related to this, such as inferior access to employment or services further perpetuating their economic disadvantages.

Both studies hence suggest that among the more effective solutions to reduce the need for cars is the provision of better transport alternatives such as quality public transport as well as improved land-use measures aiming for denser and transit-oriented developments (Mattioli, 2017; Delbosc and Currie, 2012). This would in turn reduce the negative socio-economic impacts of car dependence on economically disadvantaged groups. In the following part, these solutions as well as their limits will be discussed with a particular emphasis on the role of providing better public transport.

## 3.3 – Overcoming car dependence and the role of public transport

Car use is a complex and intertwined phenomenon depending on many factors. As such, the pathways to overcome car dependence will need to address this complexity and will need to take the form of both carrots and sticks. In other words, both incentivising measures such as

providing alternate transport solutions as well as regulatory measures such as congestion charging will be necessary to achieve successful results (Jones, 2011; Weinberger and Lucas, 2011).

As mentioned previously, among possible solutions, is the provision of improved transport alternatives such as good quality public transport. However to attract car users towards public transport, serious considerations pertaining to costs both monetary and non-monetary need to be considered. Although we have discussed above that reasoned action is not systematically operated by individual actors when weighing transport alternative and that car use is also the result of profound emotive and social factors, it is admitted that changing the cost of a service is nonetheless a central instrument for initiating behaviour change (Weinberger and Lucas, 2011). Costs relevant to transport come under the form of monetary costs such as tickets costs, cost of parking or cost of gas, and non-monetary costs, most commonly *time* but also comfort, reliability or safety among others.

In terms of non-monetary costs, public transport is somewhat fighting an uphill battle since the automobile represents more instantaneous and flexible accessibility to the user making travel, at least in theory, seamless and free of restrictions (Schwanen and Lucas, 2011). In other terms, the car offers to the user a wider *time-space* potential than other modes since it is not constrained by timetable, access and egress or waiting time. Further, the cost of *waiting time* for public transport is considered particularly 'expensive' by users, considerably more than *in-vehicle time* (Weinberger and Lucas, 2011) meaning that the perceived cost of time spent sitting in a car in a traffic jam is less than that of waiting on a platform for a train.

Considering monetary costs, public transport might have more competitive potential. This is however only true if, along with making public transport cost-effective, the car is simultaneously made more costly. Far from claiming that cars are inexpensive in absolute terms, as these often represent a significant financial burden on many households, it is however true that once purchased, the costs of a car become somewhat marginal and have relatively small influence over its use (Weinberger and Lucas, 2011). The acceptance of automobility as the dominant transport system has had a clear influence on this as the *true* cost of car use is far from reflected on the driver (Taylor, 2006). Indeed there are a number of external costs to car use that stem from its impact on the environment and health. As discussed above, air and noise pollution cause every year a number of deaths and health issues that end up monetarily costing

society but which are obviously not directly reflected on car users. The *true* cost is also reflected in non-monetary ways on the environment as our climate is bearing the weight of our addiction to fossil fuels. There are a number of cost mechanisms which could be applied in order to re-internalise, at least partially, these external costs. This is in turn could help create a favourable context for public transport use. Among the most commonly discussed measure is congestion charging. This system, now widely used in cities like London or Singapore, aims to charge car use in places and at times where the external cost is greatest, or in other words, in places and at times where the roadways are most congested. Consensus is established that such measures have benefits both for society and more specifically for public transport systems (Taylor, 2006) especially if the finances of these two systems are combined.

Beyond cost considerations there are also spatial considerations that influence transport choices. Newman and Kenworthy (1996, 1999), among others, have demonstrated that there is a clear link between urban density and car use and public transport use respectively. Sprawling, low-density residential areas, built around CBD-like concentration of employment and commercial centres leads to much higher car use rates as public transport cannot efficiently and economically serve such low-density areas. Undoubtedly, the automobile is historically among the principal culprits in creating this sprawling urban form in the first place, which in turn leads to more automobile dependence. As such, aiming to densify cities into smaller hub-like centres, dispersed along corridors can clearly favour public transport (Newman and Kenworthy, 1999).

Integrating multiple measures to reduce car use seems to be necessary as research has shown that providing public transport alternatives alone have less than satisfactory effects on shifting people from cars to public transport. In a study on Manchester's (UK) *Metrolink* light rail system, Senior (2009) found that although ridership levels overall were high, many users had come from other public transport modes such as the bus. Car users also use the light rail system, albeit at much less frequent rates. As such, the effect of the *Metrolink* on road congestion in Manchester has been inferior to expectations, also due to the absence of other car restriction policies.

Overcoming car dependence will thus require a complex set of mechanisms aiming at addressing the complexity of factors behind car use. These mechanisms will have to address the cost advantages of the car by supplying answers in both monetary and non-monetary ways

in order to provide alternatives to the car that can truly compete. To this end, planning authorities will need to coordinate efforts to provide integrated policy packages. Meanwhile, it will also be necessary to address the inconsistent approach, commonly applied today, of developing alternate means of transport whilst simultaneously continuing to expand road capacity (Taylor, 2006).

## 3.4 – COVID-19 and its impact on public transport

Meanwhile, the recent COVID-19 crisis has pushed our world into unprecedented and uncertain times and is now posing an added challenge to the modal shift from cars to public transport. The transport sector has been hit hardly by the consequences of the pandemic. It is clear that we are yet to measure the extent of the disruption on transport and we can still only hypothesise on what the future may look like. Nevertheless, some trends have emerged and give an image of challenges to come.

As lockdown measures came into place, whole swathes of the population found themselves working remotely from home or were put on furlough. As such, the demand for travel dropped considerably. In Switzerland, where lockdown measures were less restrictive than in neighbouring countries, travel dropped by over 60% (MOBIS, 2020). The transport landscape has thus been profoundly altered. As lockdown measures eased and mobility slowly picked up, there has been a distinct preference for private modes as fears of contamination and concerns of social distancing remain prevalent. Among the biggest 'winners' of this unprecedented situation is the bicycle which has seen an increase in use in Switzerland of up to 120% in comparison with pre-COVID-19 rates (MOBIS, 2020). Similar figures in other parts of the world have been recorded, such as a 150% increase of bike use in Philadelphia (USA) (Schwedhelm et al., 2020). Although other modes of transport saw drastic decrease in use since the beginning of the pandemic, the drop in car use has been considerably less prominent than that of public transport with car use having now almost returned to its pre-COVID-19 levels whilst public transport still dwells at 40% of normal ridership levels (MOBIS, 2020).

As such, it is clear that at least for now, an extra hurdle lies in the way of the car to public transport modal shift. Nevertheless, experts warn that cities should not accompany this trend

by reducing public transport service provision such as reducing frequencies and capacity as demand falls. Instead, they should actively seek to continue boosting public transport and limiting car use in order to avoid falling into the dire situation which increased car use would lead to (Tardivo et al., 2020).

This literature review has shown how dominant the system of automobility has become and how, at a personal level, the mechanisms behind car use and ultimately car dependence are multiple and complex. Although literature in this field is extensive, there are, nonetheless, some topics in which research may be still pushed further. There is of course, much research opportunity surrounding the topic of COVID-19 and transport. Additionally, understanding mechanisms to break down the strong societal image of the car as a status symbol is a field that is yet to be fully mastered. Current research has nevertheless shown that actions to limit car use will have to address this complexity. These actions will primarily have to address the cost issues, monetary and non-monetary, behind travel mode choice, the car having long had distinct advantages for the user in terms of cost since its *true cost* is ultimately paid by society at large as well as the environment. Providing alternate transport solutions such as quality public transport can be an effective tool, but it is not always successful when implemented alone. An additional challenge lies today in the current COVID-19 pandemic as 'trust' in public transport has fallen in favour of private modes dues to concerns over personal health and social distancing. There is much uncertainty about what even the near future may resemble, however, uncertain times also provide opportunity for disruptive change such as the one that is badly needed to break the dominance of automobility.

# 4. Case study and context

## 4.1 – Geneva, a cross-border metropolis

Geneva is an interesting case study as it has the characteristic of being almost entirely surrounded by France, a foreign country, with only a narrow *hinterland* of its own. This has historically been of little relevance, however, as prosperity grew at different rates across the border in the second half of the 20th century, employment opportunities in Geneva have attracted many residents of neighbouring *Haute-Savoie*, *Ain*, and other *départements* of contiguous France. As Geneva grew as a cross-border conurbation, the problems linked to the governance divide both sides of the border increased. Attempts at establishing a coherent metropolitan governance have since multiplied with relative measures of success. In Geneva, strong regionalist sentiments have led to a rising sense of '*anti-cross-border commuter'* attitudes which have often barred the way to projects aimed at improving cross-border transport (Vuilleumier and Duc, 2020). CEVA, the rail link discussed below was also heavily opposed. Meanwhile, in France, a relative lack of regional devolvement coupled with much transport investment being focused on major urban centres has left little space for proactive measures in the Geneva area.

This complex governance situation has had a clear impact on the provision of public transport which has historically been poor on the French side of the border (Kaufmann et al., 2019) with only limited regional rail and bus services. Whilst public transport actually crossing the border has been limited to a small number of bus lines. This lack of attractive transport alternatives has contributed to creating car dependence for most cross-border commuter journeys. Prior to the opening of the new rail service discussed further, car modal share for cross-border commuters was over 65% compared to 34% for commuters within Geneva (Kaufmann et al., 2019). Overall, Geneva has a higher car modal share than other cities of Switzerland (Corpataux and Danalet, 2015) and according to Tomtom's (2019) traffic index, Geneva is the most congested city of the country.

## 4.2 – CEVA and the *Leman Express*, a long-awaited megaproject

As such, solutions to Geneva's automobile problems have slowly come about under the form of investment in public transport. The tram network, once the most extensive of the country, cut down to a single 9km line by 1969, has since been extensively redeveloped. The most recent extension was that of line 17 across the border to the town of Annemasse and is the first of three tram extensions across the border into neighbouring France (Canton de Genève, 2017).

Meanwhile, projects had also been drawn to revive a 1912 plan to connect the main Geneva station, situated on the Lyon (France) to Lausanne railway line, to the regional rail lines of Haute-Savoie, to Evian, St.-Gervais and Annecy (Vuilleumier and Duc, 2020). Whereas this modern project was drawn along the idea of creating a cross-border regional rail network, its origins at the beginning of the 20th century were on a much larger scale. The idea was to create a concurrent transalpine line from Paris, through a tunnel crossing the Jura mountains north of Geneva, and on to Milan via a tunnel under the alps south of the city, making Geneva a central location on Europe's railway map. However this project was late at the party of transalpine rail routes, the Simplon to the East and the Fréjus to the Southwest having been inaugurated around this time. The tumultuous years to follow would seal the fate of this grand project, as well as the short cross-city link through Geneva.

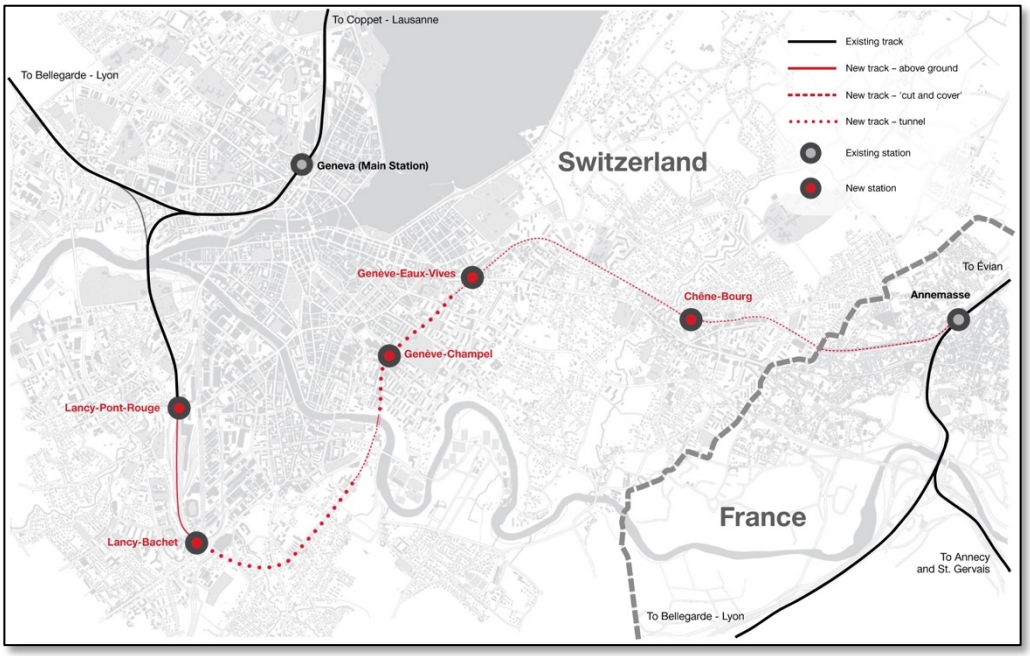



*Figure 1: Map of CEVA. Source: ceva.ch, edited.*

Towards the end of the same century, as the car dominated the transport scene and as its negative impacts became increasingly blatant, plans were revived to bring rail back to the front of the scene. Zurich inaugurated in 1990 its own extensive regional rail network with a new underground rail link through the city which resulted in successful outcomes in terms of attracting car users to public transport (Newman and Kenworthy, 1996). It was not long before Geneva wanted a similar project for its metropolitan area. However, whereas Zurich needed only three actors involved (city, regional and federal government), Geneva would have to involve many more across two very dissimilar governance systems. As such, it would take years before any concrete was poured, not only because of governance issues but also due to significant resistance by some citizen groups around Geneva which fought the project up the judicial system and through a referendum.

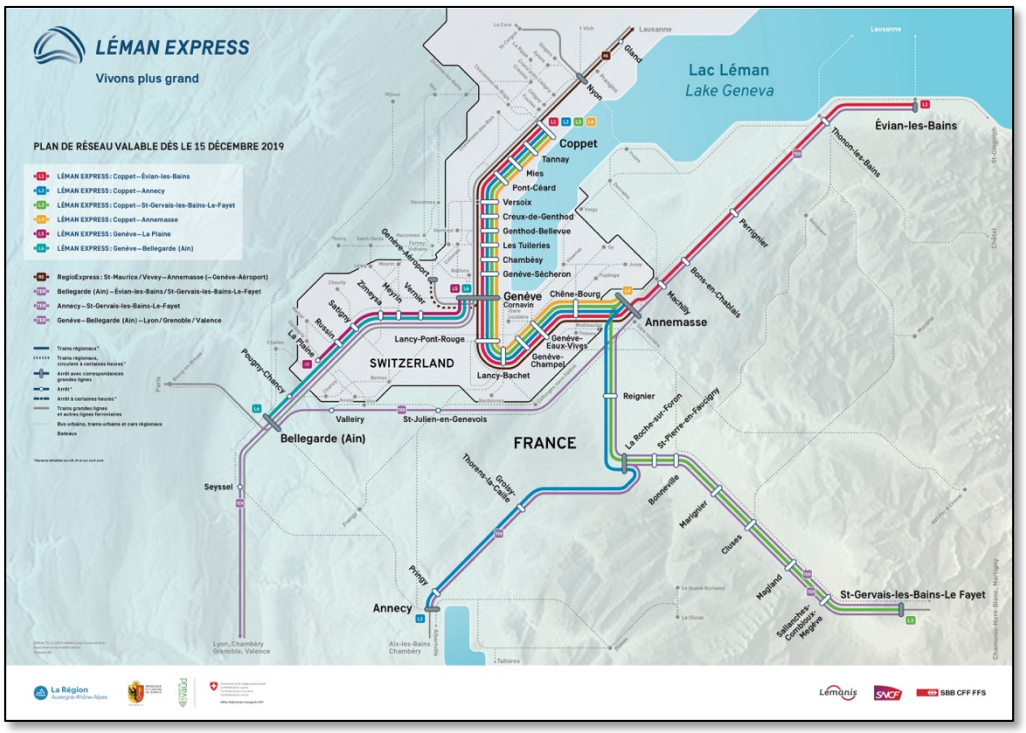



*Figure 2: Leman Express system map. Source: lemanexpress.ch, edited.*

Nevertheless, it happened. On 15 November 2011, the first stone was laid in this construction project, dubbed CEVA[1], and which would inaugurate, nine years later 16km of double-track, mostly underground and 5 brand-new stations. Alongside this project, the two national rail companies, CFF (Switzerland) and SNCF (France), would seal an agreement to create an international integrated regional rail network which would later be called *Leman Express* after

[1] See list of abbreviations, p.2

the French name for Lake Geneva. This network is the most extensive international regional rail network (Vuilleumier and Duc, 2020).

## 4.3 – A difficult beginning to the Leman Express service

The CEVA and the Leman Express (LEX) were put into revenue service as expected at the yearly timetable change on 15 December 2019. In France however, that month was marked by strikes protesting against pension reforms announced by the Macron government. Several sectors were severely disrupted, including the rail sector. As such, at first, LEX trains were stopping short of the border with few services extended to Annemasse, the first French town after the border. Nevertheless, further towns such as Thonon-les-Bains or Cluses remained simply unserved by the LEX until full service was re-established on 22 January 2020 (Leman Express, 2020a).

The period following the uptake of regular service was however far from without problems. A variety of technical issues with the rolling stock as well as with the availability of personnel resulted in overwhelming delays and cancellations. These issues are also worsened by the characteristics of the train lines on both sides of the core section which tend to be single-track and signalled by antiquated manual-block style signalling on the French side, leading any single problem to cascade down the entire network (Leman Express, 2020b). Coupled with an overall success in terms of ridership levels, this resulted in overcrowded trains, with users quickly becoming sheerly enraged by the low quality of the service provided (Géneux, 2020).

The final blow to the LEX was, of course, the COVID-19 crisis. As soon as the technical issues started being resolved, the scale of this pandemic began to be apparent, leading to unprecedented lockdown measures as well as travel restrictions and closing of borders. The LEX was impacted as service was drastically reduced and cut back to the Swiss-side with only rail replacement bus services running in France. At time of writing, regular service has yet to be fully restored with plans aiming at restoring service on 24 August 2020.

## 4.4 – COVID-19 and its impact on transport around Geneva

As discussed above, the COVID-19 crisis has had a profound impact on transport. Public transport services such as the LEX were cut back as demand fell. Although lockdown measures resulted in many people working remotely, many 'essential workers' continued to travel to work in person. Many of those working and living on separate sides of the border were allowed across as borders closed and passage became restricted but were constrained to do so by car as cross-border public transport was halted (Wagner, 2020). As only a select number of border crossings remained opened, those who continued to commute had to bear with long traffic jams at border posts. Those who are car-deprived clearly suffered most from this situation as no alternative solution to the car remained operational through the lockdown. Borders have since reopened and public transport has partially resumed normal operations.

# 5. Research method

Now that theoretical elements have been established and the research context for this dissertation explained, the following parts will focus on the methodology and results of the research. The aim of this dissertation is to understand the impact of the renewed public transport provision on car use for cross-border commuting. To this end, data was collected through an online survey distributed via social media. A consecutive sampling method was used whereby individuals were retained in the sample based on some conditions. These were essentially based on residential and work locations, namely living in neighbouring France and working in Geneva but also living and working in France. These conditions were set as it is this region that benefited most from the new public transport provision.

The survey was organised into four sections. Section one aimed to collect general information such as age, place of residence, etc., as well as information related to car ownership such as how many cars per adult-driver (cpad) the respondent's household has. Sections two and three asked questions related to the first three research questions. Section two aimed to understand commuting habits after the LEX entered service but before the start of the COVID-19 crisis whereas section three aimed to understand commuting habits before December 15$^{th}$, before the LEX entered service, in order to understand if the user had made any change to his travel habits. Section four aimed at understanding the new perception of public transport after COVID-19, thus seeking to answer research question RQ4. Most data was quantitative, however, the survey also presented some open-ended questions encouraging respondents to expand resulting in qualitative data as well.

To this end, data was analysed in multiple ways based on the research questions. Quantitative data was analysed using mainly descriptive statistics either at sample level or based on user groups (car users, train users, etc.). When this was the case, a further analysis of variance (ANOVA) was carried out in order to understand whether the answers were statistically significant based on the affiliation to a user group. ANOVA was performed when looking at a single factor and was carried out on Excel. When analysing multiple factors based on user groups, a multivariate analysis of variance, or MANOVA, was performed on SPSS. Although these analyses give a series of information about the data, statistical significance testing was

the only information retained. This was systematically tested for a confidence level of 95% (p-value <0.05) as this is deemed sufficiently accurate for the analysis at hand.

Qualitative data meanwhile was analysed using the *Thematic Analysis* model proposed by Swain (2018) whereby the comments left by the respondents are grouped *a posteriori* by themes. As such, 10 themes were established as follows, in no particular order:

- *Reasons for using the train*
- *Convenience of the car*
- *Reliability and operation issues (with the Leman Express)*
- *Communication in case of disruption*
- *Timetabling and infrastructural issues*
- *Lack of station amenities*
- *On-board facilities*
- *Pricing of tickets and passes*
- *Car dependence for late-night and early-morning shift workers*
- *COVID-19 impact on service provision*

These themes will be presented under each relevant research question in the following part.

## 5.1 Research ethics

This dissertation used primary data collected through a survey and as such runs risks associated with this type of data collection. Measures were taken to mitigate these risks. First of all, no personal identification was asked of respondents. In other words, they were not required to provide their name nor were they required to provide personal contact information such as email addresses or mobile phone numbers. Personal information such as age, gender and residential postcode was collected. However, as mentioned, this was not only collected anonymously but also stored anonymously by the software used for data collection.

# 6. Results

## 6.1 – Sample characteristics

The survey sample is composed of 175 individuals, of which 58% are men, 41% women. Men are overrepresented in this sample, as men make up 53% of the active population (OST, 2017). In terms of age, the sample follows closely the characteristics of the active population.

*Table 1: Sample characteristics*

| | **Sample** | **Active population** (OST, 2017) |
|---|---|---|
| Female | 41% | 47% |
| Male | 58% | 53% |
| Age<25 | 11% | 10% |
| Age 26-59 | 83% | 82% |
| Age>60 | 5% | 8% |
| **Mode used for commuting** | **Sample** | **Mode share** (Corpataux and Danalet, 2015) |
| Car (driver and passenger) | 53% | 65% |
| Train | 28% | 22% |
| Other public transport | 14% | |
| Walk or cycle | 5% | 11% |

Next, the modal share of the survey sample differs from that recorded by Corpataux and Danalet, 2015 and indicates that public transport users are overrepresented in the survey sample. However, these modal share statistics date back to 2015 and considerable changes may have occurred since. More recent reliable mode share statistics were not found.

In terms of access to a car, the large majority of all respondents are car owners (82%) or have regular access to a car (7%) whilst 5% have no access to a car at all. The proportion of people without access to a car is however considerably higher for train users (18%). Considering ownership, most survey respondents live in a household where there are at least as many cars owned as adults with a driving license (77%). Meanwhile, 17% live in low-car households as defined by Delbosc and Currie (2012) whereby there are more adults-drivers than cars and 6% live in a household without a car. Of these low-car households, 69% indicate that the expenses related to owning a car represent a financial burden or at least a significant proportion of yearly finances, suggesting that these may be involuntary low-car households whilst 31% see the cost

as acceptable. For households having one car per adult-driver (cpad), the proportion of households seeing the cost as acceptable or no problem at all rises to 54% whilst for households over one car per adult driver, this proportion is 73%, clearly demonstrating the link between wealth and car ownership.

There is evidently also a link between the proportion of cars per driving-adult and the mode used. Only 27% of persons living in households with >1 cpad use public transport, all modes combined versus 38% for 1 cpad households and 49% for <1 cpad households.

## 6.2 – The Leman Express as an alternative to car use (RQ1)

20% of respondents indicated to have changed mode of transport for their commuting journeys on or around the 15th of December 2019, when the LEX entered service. 11.4% of respondents switched from the car to the train (labelled C-T) whilst 5.14% changed from other modes of public transport to the train (PT-T) resulting in a total of 16.6% of respondents having moved to the train. The remaining 3.4% having switched between other modes of public transport. These results indicate that the modal shift from car to the train was relatively limited. Moreover, it is necessary to point at this stage that the mismatch between the 16.6% of respondents having moved to the train and the 28% modal share of the train presented above stems from the fact that the other cross-border train line from Bellegarde had been operating prior to being branded in the LEX system.

In terms of travel satisfaction, most C-T users (60%) reported an increase in their travel satisfaction, whilst 10% reported no change and 30% reported a decrease in travel satisfaction. Interestingly, 67% of PT-T users, reported a decrease in travel satisfaction. We have discussed above the operational difficulties the LEX experienced in the first few months of its operation and it is probable this has affected travel satisfaction of train users. The ANOVA analysis gives a p-value of 0.014 indicating that these results are statistically significant.

Next, all respondents whether having changed modes or not were asked if they perceived PT provision to have improved overall in their area. 57% of respondents report a perceived increase in PT provision in their area whereas 43% report no tangible change. These results

were then analysed based on mode used. Car users reported at a slightly inferior rate that PT provision had increased. ANOVA analysis here indicates that results are however not statistically significant thus showing that mode used does not influence perception of PT provision change.

Finally, given the new LEX service, survey respondents were asked whether they might consider giving up one of their cars. 72% answered not really or not at all, whereas 20% answered yes maybe or yes absolutely. Unsurprisingly, car users were overrepresented in the former whilst train users were overrepresented in the latter, however ANOVA analysis indicated no statistical significance based on user groups.

The qualitative analysis of the open-ended questions of the survey showed that many respondents indicated the fact that it was impossible for them to use the LEX for commuting as they worked early morning, late evening or night shifts and that there are simply no trains running at those times.

*"I work at Geneva airport at 04:00am. I would like to change modes but the train doesn't run at those hours, that is why I don't use the Leman Express. It's a shame as many people work very early and would be interested in changing modes" – Female, 34*

*"As a nurse, how can I use the train when I finish my shift at 10:30pm and the last train to Thonon is at 10:01pm? It's impossible!" – Male, 24*

It is thus unclear the extent at which the LEX has risen as an attractive alternative to the car. Indeed, only 11% of respondents transferred from the car to the train. Although, most car users having transferred to the train indicated an increase in travel satisfaction, others indicated that due to work patterns, it is impossible for them to use the train service. In the next part, the factors that have attracted people to use the train will be analysed.

## 6.3 – Factors of attraction to the Leman Express (RQ2)

Finding reasons that attracted users to the train service is no easy task as a majority of responses about the train service are either negative or neutral. Nevertheless, when survey respondents were asked to indicate reasons behind their modal choice, most train users stated that comfort (57% of train users) was an important consideration, followed by cost (53%) and by environmental reasons (45%). For car users, in contrast, a majority (65%) indicated that the car was the only available option followed by travel time (45%). This confirms the previous finding that the train is not even considered an alternative by many car users. However, as described by Jones (2011), this does not necessarily indicate that the car is *objectively* the only available option, instead there might be *subjective* considerations as well as lack of information over available transport options.

*Table 2: Reasons behind transport mode choice*

| **Mode used / Factor** | Economical | Fast | Only option | Comfort | Healthy | Enjoyable | Luxurious | Environmental |
|---|---|---|---|---|---|---|---|---|
| **Car** | 10% | **45%** | **65%** | 20% | 0 | 16% | 3% | 0 |
| **Train** | **57%** | 37% | 18% | **53%** | 22% | 35% | 0 | 45% |
| **Other PT** | **75%** | **38%** | 13% | 25% | 0 | 0 | 0 | **38%** |
| **Walk or Cycle** | **100%** | 44% | 0 | 44% | **100%** | 89% | 0 | 89% |

Further in the survey all respondents were asked to rate statements (from 1 to 5, where 1 is strongly disagree and 5 is strongly agree) about the LEX regarding various aspects, whether they are users or not. These statements are presented below. A MANOVA statistical analysis was done in order to seek whether mode used influence the various statements. Most were statistically significant. Many car users responded “I don’t know” as they may not have accessed or tried to access information about the train service.

*Table 3: Rating of statements regarding LEX service*

| N° | Statement | p-value* | Score Car** | Score Train** | Score Other PT** | Score Walk or Cycle** |
|---|---|---|---|---|---|---|
| 1 | "Service frequency and operating hours are sufficient" | 0.002 | 2.47 | 2.84 | 2.80 | 4.33 |
| 2 | "Reliability of service is high" | 0.000 | 2.52 | 1.88 | 3.00 | 4.11 |
| 3 | "Cost of service (tickets and passes) is too expensive for what it's worth. | 0.366 | 3.06 | 3.27 | 3.33 | 3.67 |
| 4 | "Leman Express is/seems easy to use" | 0.002 | 3.65 | 3.55 | 4.67 | 4.33 |
| 5 | "Travel time is/seems satisfactory" | 0.000 | 2.35 | 3.73 | 3.00 | 4.33 |
| 6 | "I have sufficient information about the Leman Express service" | 0.110 | 2.85 | 3.52 | 3.00 | 3.00 |
| 7 | "The Leman Express doesn't go where I need to go" | 0.000 | 3.52 | 1.67 | 3.67 | 1.67 |
| 8 | "I have no interest in taking the train" | 0.000 | 2.38 | 1.18 | 3.00 | 1.67 |
| 9 | "Facilities at the train station are sufficient" | 0.767 | 2.88 | 3.00 | 3.33 | 3.00 |
| 10 | "Connectivity with other modes of PT is poor" | 0.158 | 3.04 | 2.48 | 2.67 | 2.67 |
| 11 | "Cycling facilities on-board and at stations are sufficient" | 0.133 | 3.15 | 2.64 | 3.33 | 2.67 |

* cells highlighted in grey when values are statistically significant for a $\alpha$=0.05 confidence level.

** cells highlighted green when group average score is in *agreement* with the statement by a 0.5 point margin, cells highlighted red when group average score is in *disagreement* with the statement by 0.5 point margin.

Train users rated the statement about travel time the highest. This is however in disagreement with some comments left by other respondents presented later on and probably depends on which train line is used. Next, information about the service is deemed satisfactory followed by general ease-of-use of the system.

Finally, qualitative analysis indicates that motivations behind using the train are of two main types. On one hand, avoiding the time consuming and expensive hassle of finding parking in the city and on the other hand, respondents have identified that taking the train is far more relaxing than driving. These two motivations confirm the high scores of cost and comfort.

*"Using the train enables me to avoid driving into an ever more car-restrictive city" (Male, 51)*

*"I avoid driving if I can, now that public transport is a bit better, I no longer hesitate to take the train." (Male, 52)*

All in all, there are currently few distinguished attraction factors to the train service with comfort taking the lead, followed by travel time and cost considerations. In the next part, barriers currently hindering more people from using the train will be analysed.

## 6.4 – Factors of deterrence to the Leman Express service (RQ3)

Analysing current barriers to a further modal shift from the car to the train and looking at factors of deterrence for usage, both quantitative and qualitative data will be used. As presented above, respondents were asked to rank 11 different statements from 1 to 5.

Statement 2 regarding the reliability of the LEX is the worst rated especially by train users who will have experienced the issues first hand. Although as reliability of the LEX has been discussed in the press extensively, car users might also be aware and have rated this statement negatively as well.

Car users then gave a low rating to the statement about travel time, indicating a perceived inconvenience of using the train. This perceived inconvenience was also seen in the car users' relative agreement to statement 7, "*The Leman Express doesn't need go where I need to go*" confirming the advantage of the point-to-point model offered by the car. Car users also were in relative disagreement with the statements about sufficient frequency and operating hours, somewhat underlying the comments discussed in part 6.1 about commuters working early or late shifts.

*A posteriori* analysis of the qualitative data from the survey resulted in mainly negative comments about the train service and about the inability to use it. The relevant *a posteriori* categories will be each presented below.

**Reliability and operational issues** – As discussed multiple times throughout this work, reliability has been a serious issue and as such has been mentioned greatly in the comments area of the survey. As presented in the context part of this dissertation, respondents have also commented about the multiple train cancellations and delays, sometimes related to technical issues with rail vehicles, other times related to staffing issues.

*"Obviously, the reliability is catastrophic and has forced me to reluctantly use my car as the bus line I previously used has been cut" (Male, 39)*

**Timetabling, service levels and infrastructural issues** – In this category, respondents widely criticised the service provision levels, mentioning that higher service frequency should be introduced on the French side of the border. As this generally stems from the rail infrastructure, mentions have also been made that better infrastructure, such as doubling of tracks should be developed. One particular mention is the train line to Annecy which is known to be particularly slow, tortuous and indirect. Finally, respondents criticised the use of rail-replacement buses used at certain times to augment service provision, claiming that these are widely unattractive as they are slower and less comfortable.

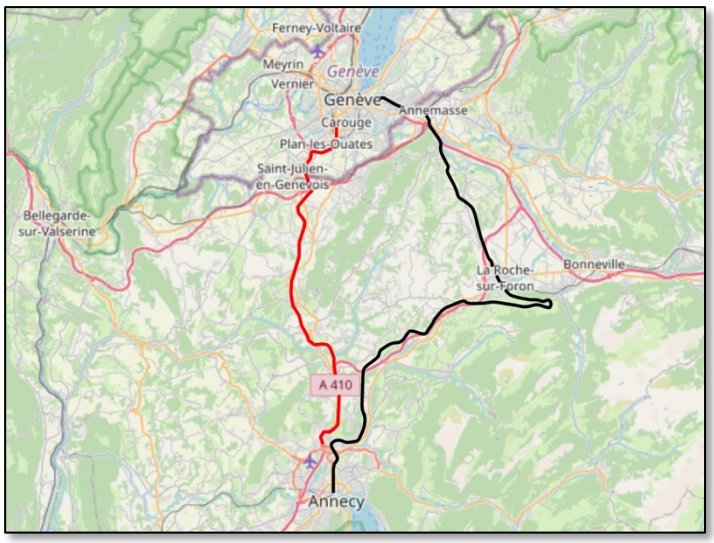
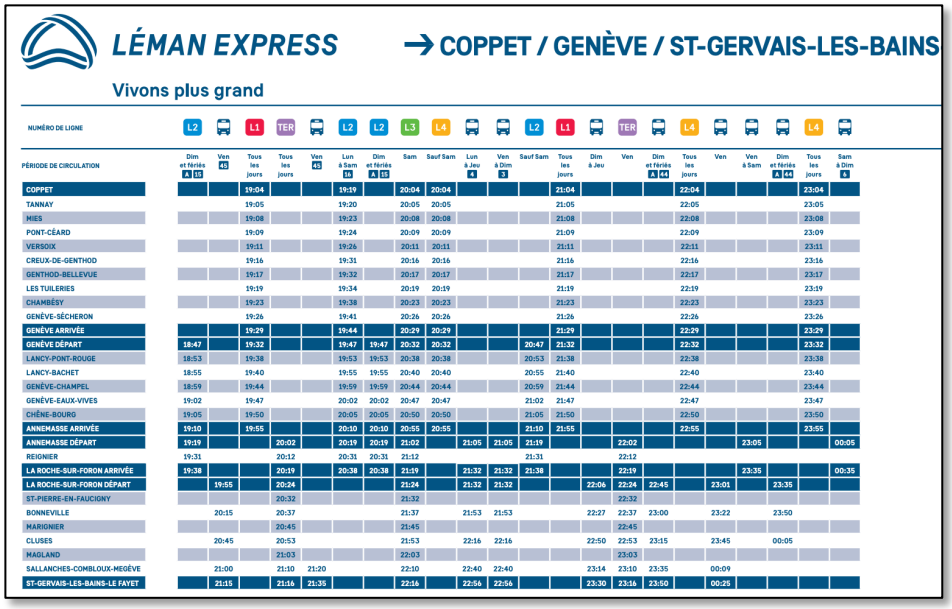



*Figure 3: Map showing the train line (black) vs. the motorway (red). Source: openstreetmap.org, edited.*

*"We need a more direct Annecy-Geneva line! If I were to use the train, it would take me nearly 2 hours door-to-door whereas by car, it takes me about 45 mins" (Man, 33)*

*"Replacing most trains with buses on Sunday is an insult to those who try to make an effort not to use the car!" (Woman, 42)*



LÉMAN EXPRESS → COPPET / GENÈVE / ST-GERVAIS-LES-BAINS

Vivons plus grand

| NUMÉRO DE LIGNE | L2 | | L1 | TER | | L2 | L2 | L3 | L4 | | | L2 | L1 | | TER | | L4 | | | | L4 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PÉRIODE DE CIRCULATION | Dim et fériés A 15 | Ven 45 | Tous les jours | Tous les jours | Ven 45 | Lun à Sam 16 | Dim et fériés A 15 | Sam | Sauf Sam | Lun à Jeu 4 | Ven à Dim 3 | Sauf Sam | Tous les jours | Dim à Jeu | Ven | Dim et fériés A 44 | Tous les jours | Ven | Ven à Sam | Dim et fériés A 44 | Tous les jours | Sam à Dim 6 |
| COPPET | | | 19:04 | | | 19:19 | | 20:04 | 20:04 | | | | 21:04 | | | | 22:04 | | | | 23:04 | |
| TANNAY | | | 19:05 | | | 19:20 | | 20:05 | 20:05 | | | | 21:05 | | | | 22:05 | | | | 23:05 | |
| MIES | | | 19:08 | | | 19:23 | | 20:08 | 20:08 | | | | 21:08 | | | | 22:08 | | | | 23:08 | |
| PONT-CÉARD | | | 19:09 | | | 19:24 | | 20:09 | 20:09 | | | | 21:09 | | | | 22:09 | | | | 23:09 | |
| VERSOIX | | | 19:11 | | | 19:26 | | 20:11 | 20:11 | | | | 21:11 | | | | 22:11 | | | | 23:11 | |
| CREUX-DE-GENTHOD | | | 19:16 | | | 19:31 | | 20:16 | 20:16 | | | | 21:16 | | | | 22:16 | | | | 23:16 | |
| GENTHOD-BELLEVUE | | | 19:17 | | | 19:32 | | 20:17 | 20:17 | | | | 21:17 | | | | 22:17 | | | | 23:17 | |
| LES TUILERIES | | | 19:19 | | | 19:34 | | 20:19 | 20:19 | | | | 21:19 | | | | 22:19 | | | | 23:19 | |
| CHAMBÉSY | | | 19:23 | | | 19:38 | | 20:23 | 20:23 | | | | 21:23 | | | | 22:23 | | | | 23:23 | |
| GENÈVE-SÉCHERON | | | 19:26 | | | 19:41 | | 20:26 | 20:26 | | | | 21:26 | | | | 22:26 | | | | 23:26 | |
| GENÈVE ARRIVÉE | | | 19:29 | | | 19:44 | | 20:29 | 20:29 | | | | 21:29 | | | | 22:29 | | | | 23:29 | |
| GENÈVE DÉPART | 18:47 | | 19:32 | | | 19:47 | 19:47 | 20:32 | 20:32 | | | 20:47 | 21:32 | | | | 22:32 | | | | 23:32 | |
| LANCY-PONT-ROUGE | 18:53 | | 19:38 | | | 19:53 | 19:53 | 20:38 | 20:38 | | | 20:53 | 21:38 | | | | 22:38 | | | | 23:38 | |
| LANCY-BACHET | 18:55 | | 19:40 | | | 19:55 | 19:55 | 20:40 | 20:40 | | | 20:55 | 21:40 | | | | 22:40 | | | | 23:40 | |
| GENÈVE-CHAMPEL | 18:59 | | 19:44 | | | 19:59 | 19:59 | 20:44 | 20:44 | | | 20:59 | 21:44 | | | | 22:44 | | | | 23:44 | |
| GENÈVE-EAUX-VIVES | 19:02 | | 19:47 | | | 20:02 | 20:02 | 20:47 | 20:47 | | | 21:02 | 21:47 | | | | 22:47 | | | | 23:47 | |
| CHÊNE-BOURG | 19:05 | | 19:50 | | | 20:05 | 20:05 | 20:50 | 20:50 | | | 21:05 | 21:50 | | | | 22:50 | | | | 23:50 | |
| ANNEMASSE ARRIVÉE | 19:10 | | 19:55 | | | 20:10 | 20:10 | 20:55 | 20:55 | | | 21:10 | 21:55 | | | | 22:55 | | | | 23:55 | |
| ANNEMASSE DÉPART | 19:19 | | | 20:02 | | 20:19 | 20:19 | 21:02 | | 21:05 | 21:05 | 21:19 | | | 22:02 | | | | 23:05 | | | 00:05 |
| REIGNIER | 19:31 | | | 20:12 | | 20:31 | 20:31 | 21:12 | | | | 21:31 | | | 22:12 | | | | | | | |
| LA ROCHE-SUR-FORON ARRIVÉE | 19:38 | | | 20:19 | | 20:38 | 20:38 | 21:19 | | 21:32 | 21:32 | 21:38 | | | 22:19 | | | | 23:35 | | | 00:35 |
| LA ROCHE-SUR-FORON DÉPART | | 19:55 | | 20:24 | | | | 21:24 | | 21:32 | 21:32 | | | 22:06 | 22:24 | 22:45 | | 23:01 | | 23:35 | | |
| ST-PIERRE-EN-FAUCIGNY | | | | 20:32 | | | | 21:32 | | | | | | | 22:32 | | | | | | | |
| BONNEVILLE | | 20:15 | | 20:37 | | | | 21:37 | | 21:53 | 21:53 | | | 22:27 | 22:37 | 23:00 | | 23:22 | | 23:50 | | |
| MARIGNIER | | | | 20:45 | | | | 21:45 | | | | | | | 22:45 | | | | | | | |
| CLUSES | | 20:45 | | 20:53 | | | | 21:53 | | 22:16 | 22:16 | | | 22:50 | 22:53 | 23:15 | | 23:45 | | 00:05 | | |
| MAGLAND | | | | 21:03 | | | | 22:03 | | | | | | | 23:03 | | | | | | | |
| SALLANCHES-COMBLOUX-MEGÈVE | | 21:00 | | 21:10 | 21:20 | | | 22:10 | | 22:40 | 22:40 | | | 23:14 | 23:10 | 23:35 | | 00:09 | | | | |
| ST-GERVAIS-LES-BAINS-LE FAYET | | 21:15 | | 21:16 | 21:35 | | | 22:16 | | 22:56 | 22:56 | | | 23:30 | 23:16 | 23:50 | | 00:25 | | | | |

*Figure 4: Snapshot of LEX timetable on the line to St. Gervais, showing how many services are run by buses at certain times (see pictogram at the top). Source lemanexpress.ch*

**Communication** – This aspect has also been criticised with regards to the reliability as often when trains were delayed or cancelled a lack of communication was felt by users.

*"The lack of information when there are disruptions is shocking" (Man, 51)*

**Lack of station amenities** – Respondents here criticised the lack of certain amenities in train stations, generally the local stations on the French side of the border as opposed to the new stations along the CEVA. Insufficient car-parking was mentioned as well as their lack of integration within the fare system. Clearly parking in train stations is among the more interesting levers to attract people to the Leman Express, especially within a suburban context.

*"We need more Park & Ride schemes, integrated with the train ticketing system" (Woman, 41)*

There are some other interesting isolated comments mentioning for example the lack of feeder public transport systems in the smaller towns surrounding the Leman Express corridors. Other comments mentioned the price of the train tickets being too expensive for being truly attractive.

Barriers to increased modal share of the Leman Express are multiple and were more evidently highlighted by the comments left by some respondents. There are issues that may be seen as temporary and might be resolved as the system matures, however there are also issues that will not be resolved in the short term and won't be addressed at all without investment and serious considerations by authorities.

## 6.5 – Impact of COVID-19 (RQ4)

Regarding the perception of COVID-19 on public transport, only 26% of all respondents answered that the pandemic had changed their view on public transport. ANOVA testing resulted in a p-value of 0.056 showing that results were not statistically significant based on user groups. In other words mode used does not influence perception of public transport after COVID-19.

*Table 4: Change of mode due to COVID-19*

| Mode used prior to COVID-19 | **No change of mode, feel safe** | **No change of mode but feel at risk** | **Change to car** | **Change to walk or cycle** |
|---|---|---|---|---|
| **Train** | 61% | 13% | 20% | 7% |
| **Other Public transport** | 75% | 25% | 0 | 0 |

Most users of public transport answered that they had not and were not planning to change mode of transport for commuting and felt safe using their mode of transport. Others answered they will not or cannot change modes but feel that they are now taking a risk when travelling. Meanwhile, 20% of train users have switched to using a car since the COVID-19 crisis. This may be not only due to concerns over health risks but also due to a reduction in PT provision as suggested by the comments left by respondents. 7% of train users have switched to cycling, this rate is low as distances are potentially too important to be replaced by cycling.

Finally, respondents were asked to rate a series of statements relating to COVID-19 and transport and the results are as follows. These are rated from 1 (strongly disagree) to 5 (strongly agree), 3 representing neither agree nor disagree. A MANOVA test was again conducted to understand whether these results were statistically significant based on user groups.

*Table 5: Rating of statements regarding COVID-19*

| **Statement** | **p-value*** | **Score Car**** | **Score Train**** | **Score other public transport**** | **Score Walk or Cycle**** |
|---|---|---|---|---|---|
| "I fear using PT because of the risk of infecting *others*" | 0.000 | 2.45 | 1.96 | 1.86 | 3.67 |
| "I fear using PT because of the risk of getting infected *myself*" | 0.063 | 2.58 | 2.40 | 2.43 | 3.67 |
| "I feel that increased cleaning measure taken by PT agencies are sufficient" | 0.000 | 3.43 | 3.48 | 3.29 | 1.67 |
| "I believe hygiene masks should be made mandatory on PT" | 0.211 | 2.44 | 2.00 | 2.71 | 2.33 |

* cells highlighted in grey when values are statistically significant for a $\alpha$=0.05 confidence level.

** cells highlighted green when group average score is in *agreement* with the statement by a 0.5 point margin, cells highlighted red when group average score is in *disagreement* with the statement by 0.5 point margin.

These results show that most respondents overall do not feel at risk using public transport, even stating that hygiene masks should not be made compulsory. However, it is worth noting the survey was conducted before hygiene masks were made compulsory on public transport, and, since, hygiene masks have become much more common. This opinion may thus have shifted since, as a "new normal" sets in.

*Table 6: COVID-19 impact on work habits*

| | Cannot / will not change work habits | Some more teleworking | Much more teleworking | Already teleworked | Change of commute times |
|---|---|---|---|---|---|
| **Car** | 56% | 19% | 4% | 7% | 15% |
| **Train** | 41% | 32% | 20% | 7% | 0 |
| **Other public transport** | 40% | 0 | 20% | 40% | 0 |
| **Walk or cycle** | 50% | 0 | 50% | 0 | 0 |

The survey also tried to understand if COVID-19 has changed work habits. This gives some indications of what work and commuting habits may look like in the future. Interestingly, it

seems like car users indicate at higher rates than train users that they are unable or unwilling to change work habits. Similarly, only 23% of car users indicated that given COVID-19 they will work remotely more regularly, whilst 52% of train users claimed the same. This could suggest that cross-border car commuters work less in white-collar employment than train users and have thus less flexibility regarding both their presence at work as well as their work schedule. However, no conclusive finding can be asserted here as both "cannot" and "will not" were included in the same answer.

Finally, qualitative analysis has only resulted in one category of answers related to this research question. Respondents stated discontent with regards to the impact of COVID-19 on public transport provision levels. Whether during the "lockdown" when no trains were operated on the French side of the border or since the gradual reopening with full operations not yet re-established. These measures have obliged some essential cross-border workers such as those employed in the medical field to use the car.

> *"I had to change my habits since the train I used to take (05:38am in Perrignier) is no longer running. Since then, I use the car. I would like to use the train, but my work schedule simply doesn't allow it. Thank you Leman Express!" (Male, 41)*

All in all, results suggest that most people do not view public transport more negatively since COVID-19. A minority have stopped using public transport and are using the car or non-motorised transport. Most indicate that this is due to concerns over personal health however comments left in the survey also seem to suggest this is due to cuts in service levels of public transport.

# 7. Discussion

## 7.1 Limitations

There are number of limitations to this dissertation mainly stemming from the fact that the transport system studied, the Leman Express, has spent insufficient time in regular operation to truly understand its effect on modal shift. This state of affairs is partly due to the global COVID-19 pandemic which has rattled our society into uncertain times. It is also due to specific contextual elements related to the LEX such as the industrial action in the French rail sector at the turn of the year or the operational difficulties related to this novel bi-national regional rail system. Accordingly, the findings of this dissertation are to be understood bearing these limitations in mind. There are, nonetheless, interesting points to be made.

## 7.2 Findings and wider implications

The analysis of the results presented in the previous part indicate that, for the time being, the Leman Express is perceived as a fairly limited alternative to the car for commuting. There are several reasons behind this, some which will be resolved in the short term, others that will take more effort to be addressed. Reliability issues resulting from many cancellations and delays can be fixed reasonably rapidly as the LEX system matures. However other issues pointed out by the analysis will require a more thorough reflection and investment by public authorities. As mentioned these are related to the service provision levels, chiefly service frequency but also travel time. As the rail infrastructure on the French side of the border was never planned for high frequency levels, upgrading it to the standards necessary for higher frequencies will require heavy investment. Stop-gap measures such as that of using buses to improve frequency levels are not necessarily seen positively by users and should not be considered a long-term solution.

Further, analysis also showed that many car users believe their mode to be the only available option for their commute. Possible reasons behind this may stem from the fact that the LEX has improved public transport links along several corridors but that the areas in between remain

poorly served by public transport. As such, last-mile transport solutions such as feeder bus systems from peripheral areas of the corridor into the LEX would possibly improve this prospect. More simply even, providing sufficient car parking at train stations might also function to 'feed' people into the rail system and stop drivers from using their car for the entirety of their commute journey.

Finally, the analysis also demonstrated that COVID-19 has not altered the perception of public transport as much as feared by some at the beginning of the crisis. It has, however, altered working habits and has pushed some to work remotely more. Nevertheless, it is reasonable to state that those who are in such a position may well work higher-paying jobs and that many are unable, by the very nature of their employment, to work from home and, as such, will continue to travel to work and will continue to require good quality mobility solutions for everyday commuting.

At this stage, there are a few links worth mentioning between the literature presented in part 3 and the findings of this work. First of all, it is interesting to note that the conclusions of Senior (2009) seem to be relevant here too. Indeed, the car-to-train modal shift is, so far, less than overwhelming and although it may be explained by reasons discussed above, it may also be due to the fact that there are no concurrent measures to restrict car use or even to pass on the *true cost* of driving to the user as suggested by Taylor (2006). It is also worth discussing how relevant Taylor's criticism of the contradiction of pursuing both pro-car and pro-alternative views in transport planning is to this case as a motorway construction project along one of the LEX corridors was given the go-ahead from French authorities not one month after the inauguration of the new rail system (RTS, 2020). This indicates how long the road still is to the culmination of a truly coherent overall transport planning vision.

Given the recent COVID-19 pandemic, parallels can also be drawn between the findings and Tardivo et al.'s (2020) warning of not falling in to the trend of favouring car-based solutions by cutting back on public transport. Indeed, it would seem that although some abandoned public transport in favour of the car on grounds of risk of infection, at least as many, were obligated to do so due to cut-backs in public transport provision. Service needs then to be restored to full regular operation, in order to continue to provide an alternative to car use.

All in all, based on similar conclusions reached by several authors (Weinberger and Lucas, 2011; Jones, 2011; Taylor, 2006), what is needed to appropriately tackle car use and dependence is a network of interventions to restrict car use and to attract drivers to alternative forms of mobility. In this optic, the Leman Express is only the first step in a web of complex measures that will need to be taken in order to break the dominance of the automobile which, it too, is the fruit of a complexity of factors. Many hurdles still lie ahead as the car remains heavily defended by interests and societal norms which are not so easily dismantled. Politics, planners and academics will need to work hand in hand in order to achieve successful outcomes.

# 8. Conclusion

The aim of this dissertation was to understand the effect of public transport investment on car dependency for commuting. This was carried out using the case study of the Greater Geneva area. The complications related to cross-border governance have long delayed the provision of good public transport, resulting in high levels of car use for cross-border commuting. However, a new rail system, the Leman Express was inaugurated in late 2019, profoundly disrupting the transport scene around Geneva.

This dissertation began by presenting a review of the literature seeking to understand the impacts of the dominance of automobility and trying to grasp the complexity of factors behind personal decisions to use the car. Previous research was also read in order to comprehend what possible pathways exist to break our addiction to the car. Consensus seems to exist around the fact that interventions to move away from the hegemony of automobility will need to be multiple and coordinated in order to address the complexities of car dependence.

The findings of previous research were then confronted to the quantitative and qualitative data collected through an online survey. Analysis of results shows that, the Leman Express is the first step in the right direction, but remains, for now, only a limited alternative to car use due to several issues. The service has been plagued with reliability problems which have severely affected the attractivity of the train. Nevertheless, it is reasonable to state that these issues might be resolved in the near future. There are, however, other factors which might only be resolved in the long-run. Infrastructure enabling higher capacity in terms of frequency and speed will need to be invested in, as well as last-mile or feeder transport solutions to better embrace the potential of the rail system. Results also show that COVID-19 has had a limited impact on the perception of public transport but that it has altered work patterns and habits. This latter subject is, however, not only the result of increased perceived risk of infection but also due to the severe cutbacks in public transport provision during the crisis, creating a renewed dependency on the car.

All in all, the heavy investment in public transport as seen in the CEVA and the Leman Express is a positive step towards shifting the focus of our transport system away from the car. Alone, however, it remains far from sufficient to fully achieve this goal. As previous research has shown, further highlighted by the analysis of the results, what is needed is a *network* of interventions. This will need to achieve two objectives. On one hand, develop high-quality transport alternatives to lure drivers away from their car. And on the other, to restrict the use of the automobile by, among other mechanisms, re-internalising the *true cost* of cars to the user. To this end, better cooperation among the many actors, from government to planners to academics, is also crucial as well as to establish a clear overarching vision instead of short-sighted interventions. Research also has a part to play in aiming to better understand and direct coordinated policies aiming to reduce car use. Among other areas of further research, understanding how to break away from the *culture of the car* in terms of societal and personal considerations is surely an area with much potential.

To conclude, time is of the essence as we are currently only at the start of what certainly is the worst crisis mankind has ever faced: the climate crisis. Transport has had a clear influence on this as it is the source of much GHG emissions and as such is an area with significant potential to reduce its carbon footprint. We must act now and we must act together in order to create a better world for the generations to come.

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# Appendices

- Survey
- Risk assessment form

# Dissertation Survey Draft II

## Introduction

Thank you for taking the time to participate in this survey. We are well aware that the past few months have been anything but ordinary.
This research focuses on commuting trends in the Geneva area through three different temporalities:

- Before the 15th of December (Opening of Léman Express, extension of 17 Tram, ...)
- After the 15th of December but before the beginning of the COVID-19 crisis (~15 March)
- After the end of the COVID-19 crisis and lockdown measures (~11 May - 1 June)

Different parts of the survey will reflect these different temporalities and we hope you answer accordingly.

We thank you for your cooperation and for your time.

## Part 1: General information

**Q1: Please indicate your age in years.**

**Q2: Please indicate your gender.**

◯ Female ◯ Male ◯ Other ◯ Prefer not to say

**Q3: What is your current main occupation?**

◯ Full-time employment ◯ Part-time employment ◯ Independant
◯ Unemployed ◯ Not Working ◯ Student
◯ Retired ◯ Other (please indicate below)

**Q4: Have you commenced a new job / course in the past 6 months?**

◯ YES ◯ NO ◯ N/A, not applicable



**Q5: How many persons 14 years old or more, who have a driver's licence (Categories A and/or B, learner's permit non-included) live in your household?**

◯ 0 ◯ 1 ◯ 2 ◯ 3 ◯ 4 ◯ 5+

**Q6: How many cars does your household count? (Not including motorcycles, mopeds, etc.)**

◯ 0 ◯ 1 ◯ 2 ◯ 3 ◯ 4 ◯ 5+

**Q7: How many other motorised vehicles such as motorcycles and mopeds does your household have (not including cars, vans, etc.)?**

◯ 0 ◯ 1 ◯ 2 ◯ 3 ◯ 4 ◯ 5+

**Q8: Which of the following best describes your access to an automobile (including Vans, not including motorcycles and mopeds)**

◯ I own a motorised vehicles
◯ I have regular access to someone else's vehicle
◯ I have no access to a motorised vehicle
◯ I have access to a company vehicle
◯ I have occasional access to someone else's vehicle

**Q9: How do you value the financial cost of owning and/or using a car/motorised vehicle?**

◯ The cost is no issue whatsoever for me.
◯ There is a cost but I see it as acceptable.
◯ The cost represents a substantial part of my monthly/yearly finances.
◯ The cost is a significant financial burden for me.
◯ The cost is externalised / Someone else pays.
◯ Not applicable

**Q10: Please indicate where your place of residence is located.**

◯ France - Haute-Savoie [74]
◯ France - Ain [01]
◯ Switzerland - Geneva [GE]
◯ Switzerland - Other (please indicate below)
◯ France - Savoie [73]
◯ France - Other (please indicate)
◯ Switzerland - Vaud [VD]

**Q11: Please indicate your commune (postal code) of residence (5-digit code for France, 4-digit code for Switzerland)**

**Q12: Please indicate where your place of employment/education is located.**

- ◯ Switzerland - Geneva [GE]
- ◯ Switzerland - Other (please indicate)
- ◯ France - Savoie [73]
- ◯ France - Other (please indicate)
- ◯ Switzerland - Vaud [VD]
- ◯ France - Haute-Savoie [74]
- ◯ France - Ain [01]

**Q13: Please indicate the municipality (postal code) where your place of employment/education is located (5-digit code for France, 4-digit code for Switzerland).If you do not know exactly but work in Geneva, answer "1200"**

## Part 2: Commuting trends between 15.12.2019 and 15.03.2020

**Q14: How often did you travel to your place of employment/education? (prior to the COVID-19 crisis, during a regular week)**

- ◯ Everyday
- ◯ Several times per week
- ◯ Once a week
- ◯ Less often

**Q15: What was your main mode of transport on your commute? (One choice only, choose mode of transport used for longest part of commute journey, again in a pre-COVID 19 context).**

- ◯ Individual motorised vehicle [Car, van, motorcycle, ...]
- ◯ Public Transport - Train (Léman Express)
- ◯ Public Transport - Other (Tram, Bus)
- ◯ Taxi (including Uber or similar)
- ◯ Cycling
- ◯ Walking
- ◯ Other (please indicate below)



**Q16: Why did you choose this mode of transport? (Choose all that apply)**

| | Cheaper | Faster | Only available option | Comfortable | Healthier | Enjoyable | Most luxurious | Environmentally friendly | Other (please indicate below) |
|---|---|---|---|---|---|---|---|---|---|
| | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

**Q17: How long was your commute prior to the crisis (one-way)?**

- ◯ Less than 15 minutes
- ◯ 15 to 30 minutes
- ◯ 30 minutes to 1 hour.
- ◯ Over 1 hour

**Q18: What was your level of satisfaction regarding your average commute journey?**

- ◯ Very low (Poor)
- ◯ Low
- ◯ Average
- ◯ High
- ◯ Very high (Excellent)
- ◯ N/A

**Q19: Since the 15th of December 2019 (Timetable change and opening of Leman Express and Tram 17 extension), but before the COVID-19 crisis, had you changed transport mode for your commute?**

- ◯ YES
- ◯ NO

## Part 3: Commuting trends before 15 December 2019 and new public transport provision.

*Note: if you have answered/chosen item [2] in question 19, skip the following question*

**Q20: Prior to the 15th of December 2019 what was your main mode of transport for your commute?**

- ◯ Individual motorised vehicle [Car, motorcycle, ...]
- ◯ Public Transport - Train (Léman Express)
- ◯ Public Transport - Other (Tram, Bus, ...)
- ◯ Taxi (including Uber or similar)
- ◯ Cycling
- ◯ Walking
- ◯ Other (please indicate below)

*Note: if you have answered/chosen item [2] in question 19, skip the following question*

**Q21: Prior to the 15th of December 2019, was your commute time longer, similar or shorter than today?**

◯ Considerably shorter ◯ A bit shorter ◯ No tangible change ◯ A bit longer
◯ Considerably longer

*Note: if you have answered/chosen item [2] in question 19, skip the following question*

**Q22: Has your level of satisfaction increased, decreased or stayed similar to your previous commute?**

◯ Severely decreased (Poor) ◯ Slightly decreased ◯ Similar
◯ Slightly increased ◯ Strongly increased (Excellent) ◯ N/A

*Note: if you have answered/chosen item [1] in question 19, skip the following question*

**Q23: The introduction of the new rail service has not made you change your commute habits. How much might you willing to switch transport modes?**

◯ No way, I am completely satisfied with my commute
◯ Not really, by and large, my commute is ok
◯ Possibly, however I have never seriously considered the question
◯ Yes, I might be interested
◯ Yes, definitely

*Note: if you have answered/chosen item [2] in question 19, skip the following question*
*Note: if you have answered/chosen item [1, 3, 4, 5, 6] in question 15, skip the following question*

**Q24: If you are a current user of the Léman Express what specific elements have drawn you to switch modes?**

| | Not at all | Not really | Somewhat | Yes, absolutely | N/A |
|---|---|---|---|---|---|
| Travel time | ◯ | ◯ | ◯ | ◯ | ◯ |
| Cost | ◯ | ◯ | ◯ | ◯ | ◯ |
| Reliability | ◯ | ◯ | ◯ | ◯ | ◯ |
| Comfort | ◯ | ◯ | ◯ | ◯ | ◯ |
| Environmental reasons | ◯ | ◯ | ◯ | ◯ | ◯ |

Other (please indicate)



*Note: if you have answered/chosen item [2, 3] in question 4, skip the following question*

**Q25: If you answered YES in question 4, did the opening of the Léman Express weigh in your decision to accept your new job/course?**

◯ No, not at all ◯ No, not really ◯ Yes, somewhat ◯ Yes, absolutely ◯ N/A, no answer

**Q26: Regardless of the mode of transport you use for your daily commute, do you think that since the 15th of December there has been an overall increase in Public Transport provision for your commute? (Both qualitatively and quantitatively)**

◯ Not at all, Public Transport provision is same or worse than before
◯ Not really, Public Transport provision is same or not much better than before.
◯ Somewhat, Public Transport provision is a bit better than before
◯ Yes, Public Transport provision is considerably better than before
◯ I don't know, no answer

**Q27: Given the new public transport provision in your area, would you consider getting rid of your/one of your car(s) or motorised vehicle(s)?**

◯ No, definitely not ◯ No, not really
◯ Yes, possibly, I am open to the idea. ◯ Yes, definitely
◯ N/A, no answer

## Part 4: Barriers / Areas for improvement for the Léman Express

**Q28: In your opinion what are the current barriers stopping you from using the Léman Express for your commute if you currently do not**
**OR**
**If you are a current user, what elements have room for improvement in order to increase your satisfaction with the service?**

| | Strongly disagree | Disagree | Neither | Agree | Strongly agree | I don't know, not applicable |
|---|---|---|---|---|---|---|
| Frequency and operating hours of train is sufficient | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ |

| | | | | | | |
|---|---|---|---|---|---|---|
| Reliability of Léman Express is high | ○ | ○ | ○ | ○ | ○ | ○ |
| The cost of use is too high for what it is worth. | ○ | ○ | ○ | ○ | ○ | ○ |
| Overall the Léman Express is/seems easy to use. | ○ | ○ | ○ | ○ | ○ | ○ |
| Travel time is satisfactory | ○ | ○ | ○ | ○ | ○ | ○ |
| I have been sufficiently informed about the new service and how to use it. | ○ | ○ | ○ | ○ | ○ | ○ |
| The Léman Express does not go where I need it to | ○ | ○ | ○ | ○ | ○ | ○ |
| I have no interest in taking the train | ○ | ○ | ○ | ○ | ○ | ○ |
| Facilities at stations including parking places are sufficient | ○ | ○ | ○ | ○ | ○ | ○ |
| Connectivity with other public transport is poor | ○ | ○ | ○ | ○ | ○ | ○ |
| Cycling facilities both at stations and on-board are sufficient | ○ | ○ | ○ | ○ | ○ | ○ |

**Q29: Are there other elements that could be improved within the Léman Express system?**



## Part 5: Post COVID-19 crisis and the future

**Q30: With the COVID-19 crisis has your perception of public transport changed?**

- ○ Yes, absolutely. I do not feel safe using public transport anymore.
- ○ Yes, somewhat.
- ○ No, not really
- ○ No, the COVID-19 crisis changes nothing to my view on public transport.
- ○ N/A, no answer

**Q31: Please rate the statements below regarding Public Transport in a post COVID-19 context.**

| | Strongly disagree | Disagree | Neither | Agree | Strongly agree |
|---|---|---|---|---|---|
| I fear using PT because of the risk of infecting others. | ○ | ○ | ○ | ○ | ○ |
| I fear using PT because of the risk of getting infected myself. | ○ | ○ | ○ | ○ | ○ |
| I feel that increased cleaning measures taken by PT agencies are sufficient at hampering the risk. | ○ | ○ | ○ | ○ | ○ |
| It is important to eradicate COVID-19 through continued social distancing which is impossible in PT. | ○ | ○ | ○ | ○ | ○ |
| Hygiene masks should not be mandatory for PT users. | ○ | ○ | ○ | ○ | ○ |

**Q32: Will the COVID-19 change your commuting habits in terms of mode used?**

- ○ No, I will confidently commute as I did before the crisis.
- ○ No, I will commute as before, but I feel I am doing so at a risk.
- ○ Yes, I will / have change-d mode and use one that enables social distancing such as the Car / Motorised Vehicle
- ○ Yes, I will / have change-d mode and use one that enables social distancing such as the Cycling / Walking
- ○ Yes, I will / have change-d mode and use one that enables social distancing such as Taxi (including Uber or similar)
- ○ N/A, no answer

**Q33: If you answered YES above, do you think these changes are durable?**

- ◯ Yes, I have changed for the foreseeable future.
- ◯ No, these changes are temporary on the medium-term, whilst the wider situations calms down further.
- ◯ No, these changes are temporary on the short-term, for the coming month.
- ◯ Not applicable, no answer.

**Q34: Has the COVID-19 crisis changed your commuting habits in terms of working patterns?**

- ◯ Yes, I will work remotely considerably more - Most days of the week
- ◯ Yes, I will work remotely some days - Least days of the week
- ◯ Yes, I cannot / will not work remotely but will travel at different times of day.
- ◯ No, I already worked remotely.
- ◯ No, I cannot / will not work remotely and cannot change when I commute
- ◯ N/A, no answer

**Q35: Other comments? If there is anything you wish to share with us regarding the new rail service, or commuting in general in the Geneva Area, or any other comments on the topic, please do share below, we will be grateful for the insight.**

# RISK ASSESSMENT FORM
# FIELD / LOCATION WORK

***The Approved Code of Practice - Management of Fieldwork should be referred to when completing this form***
*http://www.ucl.ac.uk/estates/safetynet/guidance/fieldwork/acop.pdf*

**DEPARTMENT/SECTION BSP**
**LOCATION(S) N/A)**
**PERSONS COVERED BY THE RISK ASSESSMENT Pietro Halle**

BRIEF DESCRIPTION OF FIELDWORK NO FIELDWORK UNDERTAKEN.

Consider, in turn, each hazard (white on black). If **NO** hazard exists select **NO** and move to next hazard section.
If a hazard does exist select **YES** and assess the risks that could arise from that hazard in the risk assessment box.
**Where risks are identified that are not adequately controlled they must be brought to the attention of your Departmental Management who should put temporary control measures in place or stop the work. Detail such risks in the final section.**

| **ENVIRONMENT** | **The environment always represents a safety hazard. Use space below to identify and assess any risks associated with this hazard** |
|---|---|
| *e.g. location, climate, terrain, neighbourhood, in outside organizations, pollution, animals.* | Examples of risk: adverse weather, illness, hypothermia, assault, getting lost.<br>Is the risk high / medium / low ?<br><br>LOW |

| **CONTROL MEASURES** | **Indicate which procedures are in place to control the identified risk** |
|---|---|
| ☐ | work abroad incorporates Foreign Office advice |
| ☐ | participants have been trained and given all necessary information |
| ☐ | only accredited centres are used for rural field work |
| ☐ | participants will wear appropriate clothing and footwear for the specified environment |
| ☐ | trained leaders accompany the trip |
| ☐ | refuge is available |
| ☐ | work in outside organisations is subject to their having satisfactory H&S procedures in place |
| ☐ | OTHER CONTROL MEASURES: please specify any other control measures you have implemented: |

| **EMERGENCIES** | **Where emergencies may arise use space below to identify and assess any risks** |
|---|---|
| *e.g. fire, accidents* | Examples of risk: loss of property, loss of life |

NONE

| **CONTROL MEASURES** | **Indicate which procedures are in place to control the identified risk** |
|---|---|
| ☐ | participants have registered with LOCATE at http://www.fco.gov.uk/en/travel-and-living-abroad/ |
| ☐ | fire fighting equipment is carried on the trip and participants know how to use it |
| ☐ | contact numbers for emergency services are known to all participants |
| ☐ | participants have means of contacting emergency services |
| ☐ | participants have been trained and given all necessary information |
| ☐ | a plan for rescue has been formulated, all parties understand the procedure |
| ☐ | the plan for rescue /emergency has a reciprocal element |
| ☐ | OTHER CONTROL MEASURES: please specify any other control measures you have implemented: |

| **EQUIPMENT** | **Is equipment used?** | **No** | **If 'No' move to next hazard**<br>**If 'Yes' use space below to identify and assess any risks** |
|---|---|---|---|
| *e.g. clothing, outboard motors.* | Examples of risk: inappropriate, failure, insufficient training to use or repair, injury. Is the risk high / medium / low ? | | |

| **CONTROL MEASURES** | **Indicate which procedures are in place to control the identified risk** |
|---|---|
| ☐ | the departmental written Arrangement for equipment is followed |
| ☐ | participants have been provided with any necessary equipment appropriate for the work |
| ☐ | all equipment has been inspected, before issue, by a competent person |
| ☐ | all users have been advised of correct use |
| ☐ | special equipment is only issued to persons trained in its use by a competent person |
| ☐ | OTHER CONTROL MEASURES: please specify any other control measures you have implemented: |

| **LONE WORKING** | **Is lone working a possibility?** | **No** | **If 'No' move to next hazard**<br>**If 'Yes' use space below to identify and assess any risks** |
|---|---|---|---|
| *e.g. alone or in isolation lone interviews.* | Examples of risk: difficult to summon help. Is the risk high / medium / low? | | |

LOW

| **CONTROL MEASURES** | **Indicate which procedures are in place to control the identified risk** |
|---|---|
| ☐ | the departmental written Arrangement for lone/out of hours working for field work is followed |
| ☐ | lone or isolated working is not allowed |
| ☐ | location, route and expected time of return of lone workers is logged daily before work commences |
| ☐ | all workers have the means of raising an alarm in the event of an emergency, e.g. phone, flare, whistle |
| ☐ | all workers are fully familiar with emergency procedures |
| ☐ | OTHER CONTROL MEASURES: please specify any other control measures you have implemented: |

| **ILL HEALTH** | **The possibility of ill health always represents a safety hazard. Use space below to identify and assess any risks associated with this Hazard.** |
|---|---|
| *e.g. accident, illness, personal attack, special personal considerations or vulnerabilities.* | Examples of risk: injury, asthma, allergies. Is the risk high / medium / low?<br><br>LOW |

**CONTROL MEASURES** **Indicate which procedures are in place to control the identified risk**

- ☐ an appropriate number of trained first-aiders and first aid kits are present on the field trip
- ☐ all participants have had the necessary inoculations/ carry appropriate prophylactics
- ☐ participants have been advised of the physical demands of the trip and are deemed to be physically suited
- ☐ participants have been adequate advice on harmful plants, animals and substances they may encounter
- ☐ participants who require medication have advised the leader of this and carry sufficient medication for their needs
- ☐ OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

| **TRANSPORT** | **Will transport be required** | **NO** ☐ | **Move to next hazard** |
|---|---|---|---|
| | | **YES** ☐ | **Use space below to identify and assess any risks** |
| *e.g. hired vehicles* | Examples of risk: accidents arising from lack of maintenance, suitability or training<br>Is the risk high / medium / low?<br>LOW | | |

**CONTROL MEASURES** **Indicate which procedures are in place to control the identified risk**

- ☐ only public transport will be used
- ☐ the vehicle will be hired from a reputable supplier
- ☐ transport must be properly maintained in compliance with relevant national regulations
- ☐ drivers comply with UCL Policy on Drivers http://www.ucl.ac.uk/hr/docs/college_drivers.php
- ☐ drivers have been trained and hold the appropriate licence
- ☐ there will be more than one driver to prevent driver/operator fatigue, and there will be adequate rest periods
- ☐ sufficient spare parts carried to meet foreseeable emergencies
- ☐ OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

| **DEALING WITH THE PUBLIC** | **Will people be dealing with public** | **No** ☐ | **If 'No' move to next hazard**<br>**If 'Yes' use space below to identify and assess any risks** |
|---|---|---|---|
| *e.g. interviews, observing* | Examples of risk: personal attack, causing offence, being misinterpreted. Is the risk high / medium / low? | | |

**CONTROL MEASURES** **Indicate which procedures are in place to control the identified risk**

- ☐ all participants are trained in interviewing techniques
- ☐ interviews are contracted out to a third party
- ☐ advice and support from local groups has been sought
- ☐ participants do not wear clothes that might cause offence or attract unwanted attention
- ☐ interviews are conducted at neutral locations or where neither party could be at risk
- ☐ OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

| **WORKING ON OR NEAR WATER** | **Will people work on or near water?** | **No** | **If 'No' move to next hazard**<br>**If 'Yes' use space below to identify and assess any risks** |
|---|---|---|---|

*e.g. rivers, marshland, sea.*

Examples of risk: drowning, malaria, hepatitis A, parasites. Is the risk high / medium / low?

**CONTROL MEASURES** **Indicate which procedures are in place to control the identified risk**

- ☐ lone working on or near water will not be allowed
- ☐ coastguard information is understood; all work takes place outside those times when tides could prove a threat
- ☐ all participants are competent swimmers
- ☐ participants always wear adequate protective equipment, e.g. buoyancy aids, wellingtons
- ☐ boat is operated by a competent person
- ☐ all boats are equipped with an alternative means of propulsion e.g. oars
- ☐ participants have received any appropriate inoculations
- ☐ OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

| **MANUAL HANDLING (MH)** | **Do MH activities take place?** | **No** | **If 'No' move to next hazard**<br>**If 'Yes' use space below to identify and assess any risks** |
|---|---|---|---|

*e.g. lifting, carrying, moving large or heavy equipment, physical unsuitability for the task.*

Examples of risk: strain, cuts, broken bones. Is the risk high / medium / low?

**CONTROL MEASURES** **Indicate which procedures are in place to control the identified risk**

- ☐ the departmental written Arrangement for MH is followed
- ☐ the supervisor has attended a MH risk assessment course
- ☐ all tasks are within reasonable limits, persons physically unsuited to the MH task are prohibited from such activities
- ☐ all persons performing MH tasks are adequately trained
- ☐ equipment components will be assembled on site
- ☐ any MH task outside the competence of staff will be done by contractors
- ☐ OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

| SUBSTANCES | Will participants work with substances | No | If 'No' move to next hazard<br>If 'Yes' use space below to identify and assess any risks |
|---|---|---|---|
| *e.g. plants, chemical, biohazard, waste* | Examples of risk: ill health - poisoning, infection, illness, burns, cuts. Is the risk high / medium / low? | | |

**CONTROL MEASURES** **Indicate which procedures are in place to control the identified risk**

- ☐ the departmental written Arrangements for dealing with hazardous substances and waste are followed
- ☐ all participants are given information, training and protective equipment for hazardous substances they may encounter
- ☐ participants who have allergies have advised the leader of this and carry sufficient medication for their needs
- ☐ waste is disposed of in a responsible manner
- ☐ suitable containers are provided for hazardous waste
- ☐ OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

| OTHER HAZARDS | Have you identified any other hazards? | No | If 'No' move to next section<br>If 'Yes' use space below to identify and assess any risks |
|---|---|---|---|
| *i.e. any other hazards must be noted and assessed here.* | Hazard:<br>Risk: is the risk | | |

**CONTROL MEASURES** **Give details of control measures in place to control the identified risks**

| Have you identified any risks that are not adequately controlled? | | |
|---|---|---|
| | NO ☒ | Move to Declaration |
| | YES ☐ | Use space below to identify the risk and what action was taken |

**Is this project subject to the UCL requirements on the ethics of Non-NHS Human Research?** No

**If yes, please state your Project ID Number** **N/A**

**For more information, please refer to: http://ethics.grad.ucl.ac.uk/**

**DECLARATION** The work will be reassessed whenever there is a significant change and at least annually. Those participating in the work have read the assessment.

Select the appropriate statement:

- ☒ I the undersigned have assessed the activity and associated risks and declare that there is no significant residual risk
- ☒ I the undersigned have assessed the activity and associated risks and declare that the risk will be controlled by the method(s) listed above

NAME OF SUPERVISOR DR. ROBIN HICKMAN

SIGNATURE OF SUPERVISOR DATE 1 JUNE 2020