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“Schools with Bene-Fiets”

**Nudging School’s Employees to Cycle
to Work in Brussels**

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Abstract

CO2 emissions have to decrease to tackle climate change. Traffic, as a significant contributor to this problem, has to be managed more sustainably. This thesis presents a theoretical nudge to increase the number of workers who use their bike to commute in Brussels. It consists of a letter sent to workers in which figures the number of kilometres cycled by the recipient, his colleagues, and the treatment group as well as tips, experiences, shared by their colleagues, and policies implemented as well as studies explained by credible sources. A randomized control trial evaluates the average treatment effect of “Schools with Bene-Fiets”. This paper is a contribution to render traffic more sustainable.

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I. Introduction

Signals on the catastrophic impact of climate changes on our planet have been increasing. From “the limits to growth” (Meadows, D.H., Meadows, D.L., Randers, J., Behrens III, W.W., 1972) to the IPCC report on global warming (IPCC, 2018), scientists are trying to influence the decisions of the policymakers towards sustainable policies. Nevertheless, time is running out and actions have yet to be made to limit the impact of global warming. This paper is a contribution to a more sustainable world.

This paper presents a policy focusing on the reduction of car emissions by nudging schools’ workers to use their bikes to go to work. Of course, this policy alone is not sufficient to tackle climate change. However, it catalyses a faster change towards bike as a credible low emitting mean of transportation.

The primary motivation of this policy is CO₂ reduction, which has a concrete implication on citizen’s health and the environment. Traffic, as the third most emitting sector in Belgium and a lasting problem for public administrations, offers convenient features to implement this policy. Besides, reducing the use of cars will have other benefits such as more fluid traffic, workers in better shape, more room on the public space for bike and bus lanes, trees, terraces and can even improve students’ results. Additionally, this policy helps raise awareness of the impact of an individual’s decisions on society’s pollution problem. Brussels offers tremendous opportunities to improve because it is one of the most congested cities in the world. As traffic jams are 16 times more polluting than regular traffic, reducing their recurrence by decreasing the number of cars is essential.

“Schools with bene-fiets” is inspired by behavioural science. Its originality, compared with other policies in the field, lies in the fact that it uses cognitive bias and social pressure instead of economic incentives. It offers a new angle to tackle the traffic problem for Brussels. The domain has already proven its effectiveness all over the world as attested by the number of Nobel Prize winners coming from the field.

The thesis is presented as follows: Part II explains the basic theory of behavioural sciences to understand the premises used in the construction of the policy. Part III answers to how and why the states are managing the greenhouse gas emissions, and its necessity to tackle this issue followed by a focus on the traffic situation in Belgium and Brussels. Part IV outlines the social bias that reveals why cars are so used in Brussels. It also describes the details about the policy and explains how to implement it, its strengths and weaknesses. Besides, it reports two possibilities of extension for this policy: nudging other sectors than schools’ employees which require a little more concrete preparation but stays almost identical, or nudging schools’ students by making it part of a course to self-monitor their behaviour to become active actors of their education. Part V sums up the main insights and offers a conclusion.

II. Behavioural sciences

Economists have been struggling for decades to find international solutions to reduce greenhouse emissions with regulation, norms, and taxes. This paper will present another method of dealing with the problem by focusing on people's behaviour. The behavioural sciences are growing in interest since the last two decades five behavioural economists have been granted the notorious Nobel Memorial Prize in Economic Sciences. Behavioural scientists argue that people's decisions are not always rational. Indeed, choices differ from rational choice because they are biased. Either they did not pay full attention, had not full information, had limited cognitive abilities, or incomplete self-control. To control these biases, behavioural scientists came up with a creative solution called nudges. A nudge is interpreted as a change in any aspect of the choice architecture that predictably alters people's behaviour without forbidding any options or significantly changing their economic incentives (Thaler and Sunstein, 2009). This chapter helps to grasp the basic insights behind behavioural science.

1. Nudges

Behavioural science is a subpart of economics that offer new solutions to manage inefficient people's behaviour. Its strength lies in the fact that it unites economics and psychology. The point is to look at how human deviates from the economic model and the possibility to influence people's choices to better match the economic model. *"A nudge, as we will use the term, is an aspect of the choice architecture that alters people's behaviour in a predictable way without forbidding any options or significantly changing their economic incentives. To count as a mere nudge, the intervention must be easy and cheap to avoid"* (Sustain, C., Thaler, R., 2008, p. 6). By identifying the bias in someone's behaviour, nudges will correct the gap with the rational choice. The theory is close to the neoclassical view as it

considers a deficient “homo oeconomicus” with bounded rationality, who might not pay full attention, with no full information, with limited cognitive abilities, and incomplete self-control (Sustain, C., Thaler, R., 2008, p. 6).

Nudges are a “libertarian paternalism” concept as they intend to influence the decision of a person (**paternalism**). The paternalism in a nudge is seen positively as the outcome must make the lives of the targeted groups better. It comes from the conclusion that humans do not choose as rational decisions as society would have hoped if it wanted to maximize the welfare of its people. Therefore, nudges are created to increase individual or social welfare. Nevertheless, it must be done without taking away their freedom of choice (**libertarian**) (Sustain, C., Thaler, R., 2008, pp. 4-6). The intent is that the framework must offer an easy way to take a different decision than the one considers as optimal by the policymaker.

Some sociologists have criticized the concept on its methodology. They perceive it as too general, leaving limited place for contextual parameters. These parameters are important to acknowledge the differences between humans (Jatteau A., 2013; Jatteau A., 2016). Another critic lies in the fact that behavioural scientists are closer to the neoclassical economist that they are willing to admit. The sociologist’s critics continue by stating that behavioural scientists consider human beings as more detailed “homo oeconomicus” who fail to maximize their utility (neoclassical) instead of considering them as atoms of the social sphere (Martinache, I., Roman, P., Thiry, G., 2019, pp. 7-17).

Even though this paper will not talk about our bathroom time, this illustrates how simple “nudges” can have concrete outcomes. In the early 1990s, a modest revolution improved drastically the comfort of users of the men’s rooms in Amsterdam’s Schiphol Airport. Indeed,

Jos van Bedaf wanted to « nudge » men to concentrate. He had the idea to etch the image of a fly into the bowl. Then, men increased their accuracy by aiming at them, thus reducing the cleaning costs up to 20% (Evans-Pritchard, B., 2013, pp. 67-70).

On a more serious note, even though, the critics are understandable, the concept allows to gain quick wins. For example, a 1.13 Tera Watt per hours reduction of energy consumption (the equivalent of Saint-Louis and Salt Lake City consumption) in the United States thanks to the Home Energy Report that will be develop later on (Laskey, A., 2013). As climate change call for quick answers, nudges help by informing society on the consequences of its choice of consuming and reduce spillage of energy consumption by inducing a change of behaviour. The concept will have to be coupled with other political measures to reach a satisfactory level of energy consumption to achieve a sustainable level.

2. Controlling the rebound effect

The economist W. Stanley Jevons sheds light on the rebound effect in 1865. His paradox states that “*when technological progress or government policy increases the efficiency with which a resource is used, the consumption of that resource increases due to a rise in the demand*” (Polimeni, J., Mayumi, K., Giampietro, Alcott, B., 2008). This problem is visible in environment policies where savings from a gain in energy efficiency changes human behaviours. Either the money saved from the rise of efficiency is used to consume more, either the moral gain due to energy savings is offset by a more polluting choice of consumption. Thus, leading to an increase of at least an offset of the gain of pollution. Let me illustrate by an example: Someone rides an electric car that emits 20% less CO₂ than classical cars. He could use it 20% more than before as he might feel less guilt from using the auto (direct effect) or

book more flight tickets than before with the money saved (indirect effect). Therefore, he offsets the benefit of electric cars and the rebound effect is equal to 1.

History shows that resource and energy efficiency increased due to technical innovation (Ayres, R., Warr, B., 2005, pp. 181-209). In the meantime, environmental indicators depict a worsening situation (Herring, H., Roy, R., 2007, pp. 193-203). While thinking about nudging people, it is crucial to reduce the chance of a rebound effect. Three strategies can be used to tackle this effect: 1) we can consume more efficiently by increasing environmental efficiency across consumption sectors; 2) we can consume differently by choosing a greener path to consume; and 3) we can reduce our consumption (Jackson, T., 2014).

III. Emissions reduction

3. An important issue

The loss of biodiversity is accelerating at an alarming rate. The total number of wild animals lost 50% of its population over the 40 last years, insects decreased by 75% in the last 25 years (Dale, A., King, L., Behan-Pelletier, V. et al., 2019). Between 2010 and 2015, the world lost 3.3 million hectares of forest areas, more than half of the soil is suffering from soil degradation (United Nations, 2019b). These facts are, of course, due to climate change and the list goes on. In the health sector, 400 000 deaths are due to climate change each year (Climate Vulnerable Forum, 2012). The food market productivity is decreasing. For example, for each degree of temperature increase, grain yields decline by about 5% (United Nations, 2019a). The impact is visible on the rise of the sea level by 19 cm (United Nations, 2019a). Natural disaster increases. Climate change affects everybody, everywhere with a greater magnitude for the poor and the vulnerable. The damages and the bill to adapt to climate change is getting bigger every day (Watkiss, P., Downing, T., Handley, C., Butterfield, R., 2005).

4. Growing interest in the last years

To manage global warming and to limit its consequences, countries from all over the world have been meeting in the last two decades to establish the path of global warming. It started in 1992 with the United Nations Framework Convention on Climate Change in Rio. It included 156 countries agreeing on preserving the actual climate system, with particular precautions for some developing countries (United Nations, 1992). Five years later, the Kyoto agreement was ratified to fix goals for the signing parties. It bound parties to reduce their greenhouse gases by 5% by 2012 with respect to their level of 1995. It was responsible for the

creation of a worldwide permit market to emit.¹ Nevertheless, the United-States did not sign the agreement even though it was responsible for 25% of the world's emissions. No sanction was planned for deviant countries. 2009 changes the way global warming will be handled at an international level from the Rio agreement. The Copenhagen agreement stated that global warming must not go beyond an increase of 2°. By listening to the most affected countries, the goal was set to avoid an increase of 1,5°. The agreement did not assign objectives per country and let every signatory party choose its policy to achieve the common goal. It went from a strict top-down framework with a repartition of effort to a bottom-up structure leaving every state master of its effort (Godard, O., 2010, pp. 35-41). To my mind, this change of framework leads to a typical case of “the tragedy of the commons”. Finally, The COP21 in Paris, in 2015, confirmed the bottom-up approach. It states that every signatory party has to come up with tougher restrictions every five years to limit global warming under 1,5°. They also must publish by 2020 their long-term policies. Nevertheless, in 2019 the sum of all “Nationally Determined Contributions”² from the COP21 did not allow to stay under the increases of 2° (OECD, 2018). This alarming conclusion calls for urgent measures to limit temperatures growth.

Those who are the most affected are not necessarily those who polluted the most which raises the question of equity of effort. Developed countries benefited from an economy without any ecological constraints compare to developing countries. Developed countries have been growing thanks to cheaper and more polluting energy sources. Therefore, it gives them an unfair advantage compared with developing countries. A bottom-up strategy, as proposed by the

¹ The concept is as follow:

- 1) Determinate the amount of depollution required.
- 2) Create as many permits as necessary
- 3) Giving/selling permits to companies
- 4) Companies who need to pollute more buy permits from companies who do not need their permits
- 5) For each Kilos of emission companies have to give their permits to the state

² Which is the formal name of the national restrictions

COP21, seems unjustified as developed countries might not internalize their historical responsibility in their new policy.

For all these reasons, new policies need to emerge. As a very congested capital of a developed country and capital of the European Union, Brussels has a major role model to play. This paper focuses on the behaviour of Brussels' schools' employees. As formators of the next generation, school's employees are key actors to enhance a change in a more sustainable direction. Therefore, the nudge presented here tackles their transport habits as traffic is responsible for 21,5% of greenhouse gas emissions in the country³ (Commission Nationale Climat, 2018).

5. Belgium needs to act on its traffic

Car traffic is one of the biggest problems in Belgian large cities. Antwerp and Brussels are respectively, 94th and 154th most congested cities in the world. Brussels climbs to the 15th place when considering the most time lost in traffic. The problem is significative as every Brussels inhabitant waste on average 195 hours per year (L'Echo, 13/02/2019). A duration equivalent of 130 football matches sitting in a car, doing nothing. Furthermore, special attention has to be given to traffic jams as it is a waste of energy. Indeed, they are 16 times more polluting than regular traffic (Le Parisien, 2017). To sum up, it means that for 195 hours per year, each Brussels inhabitant pollute 16 times more for nothing. Fortunately, according to *Bruxelles Mobilité*⁴, a 10% reduction in the number of cars on the road reduce traffic congestion by 40% (L'Echo, 31/01/2019). The experts of *Fédération des Entreprises de Belgique* states that the average number of people in a car is 1,4. Moreover, cars are parked 95% of the time (le Vif –

³ The two other main emitter sectors are industries (25,8 %) and the residential sector (32,2%)

⁴ The organism responsible for the mobility in Brussels

Tendances, 17/07/2018). Therefore, cars are essential targets to improve greenhouse gas emissions. Luckily, alternatives are growing in popularity, from 2005 to 2017, the utilization of cars and moto dropped by 12,8% in large cities (SPF Mobilité et transport, 2017).

Besides, in 2019, the OECD estimates that traffic congestion in Belgium is responsible for a loss between 3,9 and 7,9 billion euros every year. Experts estimate a loss of 600.928€ every day (Transport & Mobility Leuven, 2012). Almost 50% of companies declare that traffic harms their business (OECD, 2013). However, numbers of cars are increasing in Belgium from 5.130.578 in 2008 to 5.853.782 (Statista, 2019) even though fewer people use them to go to work.

The good news is that alternatives are growing in popularity. The second most popular mean of transportation is the bike. Indeed, 11,1% of Belgian workers cycle to work but the repartition is very unequal. Only 1,6% of workers in Wallonia take their bikes against 17% of the Flemish. In Brussels, since 2010, the number of cyclists grow by 13% each year to reach 4,4% in 2017 (SPF Mobilité et transport, 2017). The percentage in Brussels is still low however the evolution is important. Bikes are seen as the most credible solution to be used in this policy. The main intuitions behind this policy are: “Many people are already changing their behaviour towards a more sustainable mode of transport such as a bike, if they can do it, so can you. *Be the change you wish to see in the world* (Gandhi)!” , keeping in mind that this is not an option for everyone.

An alternative used by 10,6% of workers is the train (SPF Mobilité et transport, 2017). However, it suffers from a bad reputation from its lack of punctuality. According to the SNCB rapport for January 2019, around 10% of the train arrived with more than 6 minutes of delay. It

grows to almost 20% from Arlon to Brussels. 2.36% of the trains were canceled. Moreover, 50% have a delay bigger than 1minute. It gets worse during peak hours. Between 6 AM to 9 AM, 40,7% arrived on time, it falls just under 40% in the afternoon peak (Le Soir, 23/01/2019). Even though it is not perfectly reliable, the percentage of users rises to 34% in Brussels. Trains are a credible alternative to cars, but the service needs to improve to convince more people to use them. Once the punctuality stops being an issue, the nudge proposed in this thesis can easily be transferred to convince more workers to use the train.

Finally, bus, metro, and tram are only used by 6,7% of the workers (SPF Mobilité et transport, 2017). These numbers are biased as tram and metro are not common in the country. In Brussels, where they are well implemented, the percentage rises to 19%. This paper could also be applied to this category with two limitations. First, the data are much harder to collect than the number of km done with a bike. Second, even though buses are better alternatives than cars, they emit relatively more CO₂ than the others (as shown in Figure 1). Therefore, this alternative is set aside for this paper.

6. Benefits from alternatives

This section will help shed light on the problem raised by cars and the benefits of alternatives. It will focus on the means available in Brussels (public transports, cars, bikes, scooters). First, let's focus on CO₂ emission to understand the impact of the choice of transportation. The distances ridden are often short. Indeed, 25% of the trips made by car measure less than 1km (STIB, 2019), 37% are between 3 and 5 km, and only 20% measure over 10km (Bruxelles Environnement, 2015). The STIB has published a report (CO₂logic, 2008) classifying all the means of transportation by their CO₂ emission per kilometer presented in Figure 1. Electric bikes, scooters (TrotinetteLAB, 2019) and non-electric bikes are added to the

original table. As far as emissions are concerns, reducing the amount of car is clearly the priority.

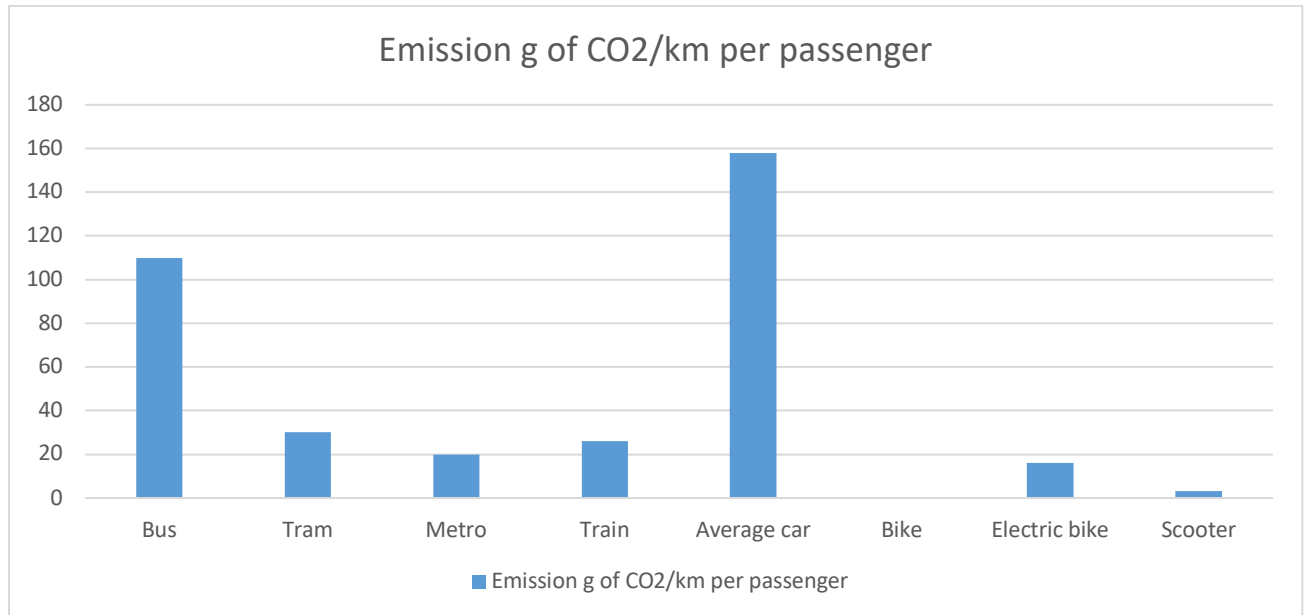


Figure 1

According to the Human Health Organization, diminishing air pollution has to be taken seriously as it is responsible for one-third of deaths from stroke, lung cancer and heart disease (World Health Organization, 2018). Oxford University estimates to 1.000.000 deaths per year globally (Douglas, M., Watkins, S., Gorman, D., Higgins, M., 2011, pp. 160-169). Road transport accounts for an estimated 30% of the emissions of fine particles and 50% of ultrafine particles. In the capital, 94% of energy consumption comes from road traffic, 6% come from train, metro, and tram.

Furthermore, studies show a positive relation between cycling, health, and functional benefits such as an improvement in cardiorespiratory fitness as well as a risk reduction for cancer mortality, morbid obesity (Oja, P., Baumman, A., de Geus, B., et al., 2011, pp. 496-509).

By nudging to cycle, the policy also improves the individual health quality of the treatment group⁵.

In Brussels, 70% of the public space dedicates to cars (road and parking) (Bruxelles Environnement, 2015). By decreasing their amount, cities can increase the number of square meters available for bike lanes, trees, and cultural or leisure activities. Besides, according to the University of Wisconsin-Madison, trees can lower summer daytime temperature by 5,5° Celsius and capture CO2 emissions. This indirect impact is important considering the ecological price of unnatural cooling systems.

Another advantage of using alternatives is parking space reduction and an increase of space per passenger. Indeed, one car parking space can be replaced by 4 polls that can accommodate 2 bikes each (Choisir le vélo, 2017). Furthermore, it is a gain of room on the street as it is shown in an Australian experience picturing the space used by 69 people in different vehicles.

⁵ The recipients of the policy

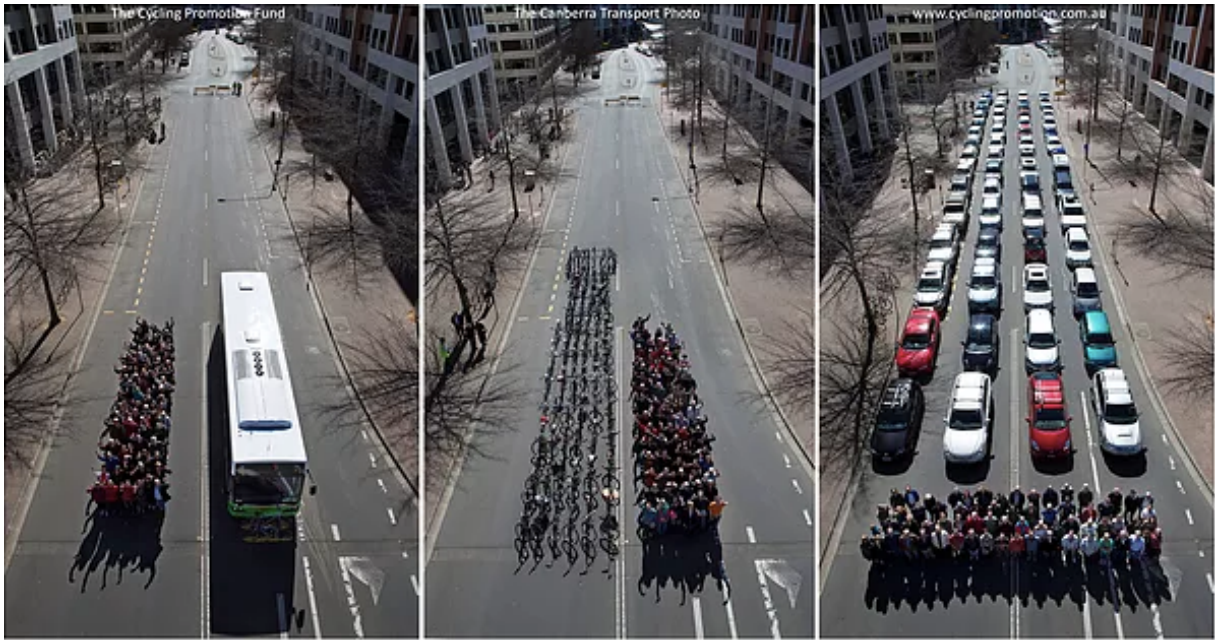


Figure 2

7. Brussels' policies to reduce car's emissions

To benefit from the advantages presented above, Brussels has already launched several policies. It uses norms and regulations as well as cooperation with companies and workers. A toll system of a kilometeric tax are two debated topics, but they are widely unpopular and are not yet planned to be implemented.

The first important policy presented is the creation of “Low Emission Zone” (LEZ). The zones are forbidden for older, more polluting vehicles. Those who ride with diesel fuel are considered as a priority and progressively banned. In 2025, only the most recent ones⁶ will be allowed in Brussels. They represent 39% of the diesel car in Brussels today. Petrol-cars are more accepted because they are less harmful. However, older models⁷ are also progressively

⁶ Car categories are: EURO 6, 6b, 6d, temp / VI

⁷ Car categories are: EURO, EURO 1/I, EURO 2/II

banned. The policy has already begun as 5 categories are already banned (LEZ.Brussels). The major success, for now, lies in the replacement of old cars. The greenhouse gas emissions also declined but the implication of the policy in this effect has yet to be determined. Finally, they acknowledge that this measure will not be sufficient to meet the level required by the World Health Organization (Bruxelles Environnement, 2019).

Another campaign called “Prime Bruxell’ air” has been launch by the region of Brussels to improve the quality of the air by decreasing the number of cars. In exchange for the license plates of their citizens for a year, the region proposes a free public transport pass for a year and a free subscription to Cambio Start⁸ or a maximum of 505€ to buy a bike and a free Cambio Start subscription. Last year 860 people participate and 631 two years ago. Nevertheless, the take-up rate is decreasing every year except for 2018 when it grows by 37%. This increase coincides with the launch of the LEZ’s first restrictions. When it started 1760 people used it (RTBF.be, 08/07/2019).

In addition, the city wants to discourage people to use their car by reducing parking spaces on the street by 65.000 in ten years. The main reduction targets streets near offices and leaves residential neighborhood unchanged. (L’Echo, 10/08/2019). They would like to collaborate with large companies to use their parking when they are under-used (mainly during the weekends and at night).

A partnership also exists with private companies. Before, employers proposed company cars to their employees. It is considered as a tax reduced bonus. It is heavily debated as it promotes individual cars. Now, employees can manage this bonus in a “mobility budget”. First,

⁸ With Cambio Start, the user only pays the price per kilometers ridden as the unlock is free.

they can exchange their company cars against an increase in the net wage, based on the price of the car they give up. Second, they can choose to manage their use of the mobility budget and spend it on several advantages such as a less emitting car, a combination of public transport tickets + (electrical) bikes, if they live less than 5km away they can also use it to pay their rent. The cash left is converted into an increase of the net salary but is it less advantageous as a 38,07% tax is applied (Cellule Mobilité, 2017). This policy can be combined with the one offering a maximum of 0,24€/km cycled to work. It is paid by the employer, but it has the advantage of being tax-free.

Large companies⁹ in Brussels are submitted to a legal obligation to publish every three years a mobility plan, called “Plan de Déplacements d’Entreprise” (Bruxelles Environnement & Bruxelles Mobilité, 2017). In 2017, 478 companies have sent a PDE and 2011, 2014 and 2017 data are available for 313 companies. The point is to accumulate precise data to analyse the evolution of the habits and to identify the problems for public intervention.

Moreover, for the employer, the costs incurred to facilitate the use of bicycles by its employees to and from work are deductible at 120% (100% from 01/01/2020). These are the costs incurred for the storage of bicycles during working hours (shelters built or renovated), for the provision of changing rooms, for the installation of sanitary facilities (showers), for the acquisition, maintenance, and repair of company bicycles. (Provelo).

Finally, a controverted policy was set up in the center of Brussels. Pedestrian streets replaced a congested place in the historical center. The point was to decrease the noise and air pollution; the stress due to a surplus of cars; install more green spaces in the center of the city

⁹ More than 100 workers

(from 200 square meters before the policy to 3000 after); to dynamize the economic life of the neighborhood (Bruxelles.be). Besides, the government of the region is about to generalize a 30km/h speed limit in the Brussels' entire residential neighborhoods that are already implemented in a municipality.

8. Brussels' workers' habits

Before explaining the policy, it is important to understand the habits of workers to commute to work. The data are freely available thanks to the mobility plan required by the city (Bruxelles Environnement & Bruxelles Mobilité, 2017). The statistics are also regrouped by sector which allows having some insight into the educational sector targeted by the policy. The report shows that the major economic poles of the city are considered as very well deserved by public transport which suggests that cars are not a necessity. Figure 3 shows the general picture of the employees' habits come to work in Brussels.

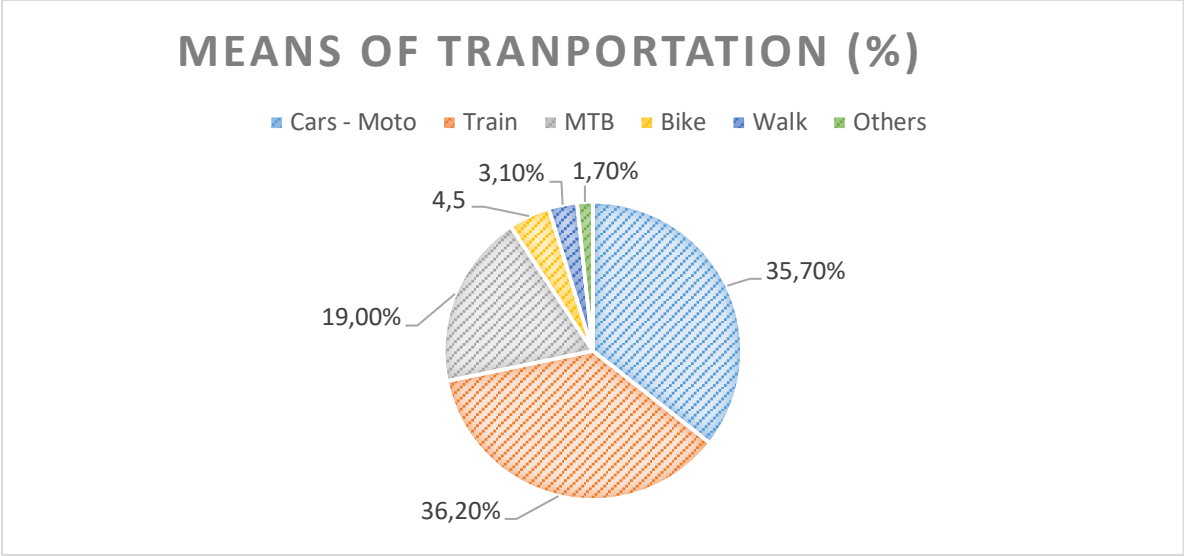


Figure 3¹⁰¹¹

¹⁰ MTB represents the tram, bus, and metro
¹¹ Others include carsharing and shuttles.

Aside from the fact that the sum of the percentages is higher than 100%, here are the main conclusions. The report teaches us that 50% of the workers come from outside of Brussels. Trains are the first choice of the employee, just before the cars and motorbikes. Bikes have a small part, nevertheless, previous data shows that they have almost doubled in 6 years (from 2,8% to 4,5). The numbers of cars are decreasing (from 36,3% to 34,1%) and workers walk less to work (from 3,7 to 3,1%).

Table 1 depicts the share of transport chosen by workers living inside and outside Brussels. (Bruxelles Environnement & Bruxelles Mobilité, 2017).

ORIGIN	CARS & MOTORBIKES	TRAIN	MTB	BIKES	WALK	OTHERS
WORKERS LIVING INSIDE (%)	31,5	3,6	46	9,4	8,7	0,8
WORKERS LIVING OUTSIDE (%)	37,8	52,7	5,2	2	0,3	2,10

Table 1

The major difference lies inside the public transport sector as people from outside use the train while others, living generally closer, use the MTB network. Another logical difference lies in the bike and walk categories. The distance is most likely to be the major decision factor. However, almost 20% of Brussels’ citizen use an emission-free mean of transportation. The table only shows the use of one mean of transportation per person, but some workers use a combination which is not represented here.

Table 2 shows the evolution of the use of means of transportation since 2011 classified by origin. It is based on the same data as before (Bruxelles Environnement & Bruxelles Mobilité, 2017). The numbers represent the percentage points gained or lost.

ORIGIN	CARS & MOTORBIKES	TRAIN	MTB	BIKES	WALK	OTHERS
FROM BRUSSELS	-4,2%	-0,7%	+3,9%	+3,2%	-1,9%	-0,4%
FROM OUTSIDE	-0,5%	-0,3%	-0,2%	+0,9%	0,0%	-1,0%

Table 2

The share of cars and motorcycles has decreased the most (cars -4,8%; motorbikes +0,6%). They are replaced by public transport or bikes. The decrease of people walking to work is explained by the fact that companies start offering free STIB¹² (consider in the MTB in table 2) tickets to everyone instead of giving them to workers living at least 3km away from work as it was the case in lots of companies in 2011. The use of bikes has drastically increased in recent years for a distance up to 15km between home and work. 31% of workers come from the Flemish region and 17,6% comes from Wallonia. As mentioned before, the Flemish seems to have a more developed social norm to use their bikes. Therefore, their over-representation comes as good news (SPF Mobilité et transport, 2017).

The authors¹³ have divided workplaces into 3 categories according to their accessibility with public transport (excellent, well, medium). For the “excellent” and “well” level, there seems to be a correlation between the number of parking spots per 100 workers and the number

¹² Brussels’ public transport company

¹³ The authors of the report of (SPF Mobilité et transport, 2017).

of people coming by car per 100 workers. Indeed, for “excellent”, there are 16 parking spots for 100 workers and 17% of the workers come by car and for “well”, there are 32 parking spots per 100 workers for 31% car users. The situation around the schools in Brussels is the worst as there is one parking space for 9 workers. It means that 8 out of 9 workers coming by car have to lose their time searching for a parking space every morning.

Moreover, “*More parking spaces means more cars*” can be transformed into “*more (secured) parking spaces means more bikes*” according to Massey University in New-Zeeland (Smith, P., Wilson, M., Armstrong, T., 2011). The correlation between parking places for bikes and the number of employees coming to work with their bikes is also proven in the mobility plan (PDE) report. Furthermore, 77% of Brussel’s companies are considered to have sufficient parking spaces for bikes. Legally, there has to be one parking spot per cyclist in the company, plus, 20% more to be prepared for peaks and new cyclists (Bruxelles Environnement & Bruxelles Mobilité, 2017).

Economic incentives are already common in Brussels. 84% of companies pay 0,24€ tax-free for every kilometer done by bike (401 companies out of 478), 70% offer free public transport for their employees (334 companies) and 80% offer free train tickets to come to work (382 companies). It means that economic incentives are already widely used (Bruxelles Environnement & Bruxelles Mobilité, 2017). In order to increase their effectiveness, public administration should continue to encourage more companies to propose them or increase the tax-free limit of 0,24€/km. As it is a costly policy, combine it with nudges seems an appropriate solution.

IV. “Schools with bene-fiets”

9. Behavioural barriers

Now that the situation of Brussel’s traffic is clear, let’s discuss the behavioural barriers on which the policy is based, that push workers to use their cars to go to work. Behavioural barriers are cognitive barriers to achieve a desirable outcome. They must be identified to understand which cognitive bias to counter to increase the number of cyclists in Brussels. On the other hand, they are precious in the framework of the nudge as they help increasing its efficiency. The point is to counter those with an undesirable outcome and put forward those helping to reach the desirable outcome.

a. Limited cognitive abilities

The first identified barrier is the limited cognitive abilities of a human. When someone is facing indecision, he has no sufficient cognitive abilities to analyse all the possibilities. His thoughts make him believe that cars are the best choice. Drivers use cars not just by necessity but also by choice (Hiscock, R., Macintyre, S., Kearns, A., et al., 2002, pp. 119-135). However, their choice might change if they look deeper into the literature. For example, people use the argument of speed to justify their car usage (Anable, J., 2005, pp. 65-78). When analysing his choice of transport one can argue that cars are the best choice to avoid being late because cars can go faster. Nevertheless, studies show that bikes are at least as fast as cars to travel in cities (Jensen, P., Rouquier, J.-B., Ovtracht, N., et al., 2010, pp. 522-524). Moreover, a simple way to make a decision is by doing a cost-benefit analysis. Such an experiment has been done in Denmark. They conclude that cars have a cost of 0,5€ per km and 0,08€ per km for bikes

(Gössling, S., Choi, A. S., 2015, pp. 106-113). Finally, as shown before, cars pollute more per km.

People are filled with misbeliefs; therefore, informing workers about the results of those researches can change the conclusion they have drawn. Identifying the reasons for those misbeliefs is key to tackle the ones leading to bad social choices. Moreover, the policy is using bias who helps change the treatment group's behaviour. For example, scientists have realized that people are cost-averse which means that the costs of losing are bigger than the gain of winning the same amount (Sustain, C., Thaler, R., 2008). The policy will use this cognitive bias by informing about the social and individual costs of taking the car. Explaining this increase the chance for the treatment group to change their behaviour to a more socially desirable mean of transportation.

b. Representativeness & Identity theory

“representativeness” is a mental mechanism that works in the following way. *“When asked to judge how likely it is that A belongs to category B, people (and especially their Automatic Systems) answer by asking themselves how similar A is to their image or stereotype of B (that is, how “representative” A is of B)”* (Sustain, C., Thaler, R., 2008). Car-drivers have a negative opinion of the cyclists in general (Basford, L., Reid, S., Lester, T., et al., 2002). To help overcome this issue, the nudge uses the identification theory which states that individuals view members of their group (the in-group) more positively than members of different groups (Tajfel, H., Turner, J. C, 1979). It includes experiences and stories from their cyclist colleagues from whom they will have a better opinion. Moreover, people who have not cycled recently

have more chance to identify cyclists as lifestyle cyclists (Tajfel, H., Turner, J. C, 1979).¹⁴ In other words, people who have not cycled recently have less chance to relate to cyclists as for them riding a bike is a change of lifestyle. Therefore, starting to cycle implies changing their actual lifestyle and mindset. For those who have cycled more recently, cyclists are most likely to be responsible, commuters. They view cycling as less as a lifestyle and more an activity. To counter this bias, it is important to push workers to get on a bike. The “mobility week” organized every year, in September, by the region of Brussels, seems the perfect opportunity as it asks for everybody in schools to come with alternative means of transportation. By reading about the positive experiences of their colleagues and proposing to take part in the “mobility week”, the take-up rate is likely to rise.

c. Present bias

The present bias refers to the tendency of people to give stronger weight to payoffs that are closer to the present time when considering trade-offs between two future moments (O’Donoghue, T., Rabin, M., 1999, pp. 103-124).

When workers get out of their homes in the morning, they have a choice. Bikes offer positive outcomes as gain in personal and public health, speed, economic savings, space on the road and diminution of pollution. Except for speed, which is not a piece of information shared by everybody, all those outcomes are not immediately perceptible. Unfortunately, at the end of the trip, money did not appear in our wallet, our body does not send us an email saying it is feeling better, we cannot perceive the impact of the absence of our car on a parking spot or on the road and we do not feel our lungs filled with purer air. For cars, convenience, speed,

¹⁴ The results have to be taken carefully as the sample was not representative of the population. Nevertheless, no significant differences arise when controlling for socio-economic factors.

comfort, and individual freedom are well-known arguments (Hagman, O., 2003). Even though the literature does not justify all these commonly accepted impressions, they are immediately identifiable. In accordance with the present-bias theory, arguments on cars have more impact which partly explains their success.

d. Social norms & emotional factors

81% of Belgian citizens consider climate change as the main issue in the country and the percentage is rising every year. 40% think that households' behaviours are part of the solution (Climat.be, 2017). As in the Home Energy Report policy¹⁵, this nudge counts on social pressure to change people's behaviour. It works because what others think of ourselves matter to us. When trying to identify what is essential for people to start using the bike, the social norm was listed as "important" factor, but the emotional factors was identified as "at least as important". Social norms are associated with negative anticipated emotions while past experiences are associated with positive anticipated emotions. In other words, when thinking about cycling, people's fears such as accidents or high frequency of mechanical problems come from social norms. They believe it because it is widely common opinions. On the other hand, motivation and positive thoughts come from personal experiences (Passafaro, P., Rimano, A., Piccini, M. P., et al., 2014, pp. 76-83). By comparing bike usage of employees and counting on the fact that the number of cyclists continues to rise in Brussels which seems likely, the policy can decrease the negative anticipated emotions of those who do not cycle. By decreasing those emotions, more people will start cycling and accumulate positive experiences which will then have a positive impact on their opinion about riding a bike. This induces a virtuous cycle towards this mean of transportation.

¹⁵ The home energy report is a nudge implemented in the U.S. to decrease energy consumption. The policy is explained on the next page.

Moreover, the literature suggests that by monitoring goal progress, the policy will increase the chance of reaching its goal (Webb, T. L., Chang, B. P. I., Benn, Y., 2013, pp. 794-807). Monitoring the habit of the employees' choice of transportation combined with a comparison to those of their colleagues serve to nudge people into using less carbon emitting ones.

10. Proposition

After the summary of the problems of mobility and the benefits of alternatives, the identification of the cognitive bias, it is time to explain how to nudge people to change their habits. The policy is based on an experiment in the USA that decreased household's energy consumption called the Home Energy Report.

The Home Energy Report is an experiment made in the USA. It consists of sending a one-page letter with the electricity bill that compares a household's energy consumption to those of its neighbours, combined with tips on how to consume less. The result was a diminution by 1,1% to 2,8% of energy consumption. It is estimated as an equivalent result as if energy price increased by 17 to 28% with the advantage of being much more cost-effective as a public intervention.

On basis of the program, students put door hangers with a different energy conservation message. Interestingly, presenting descriptive social norms to groups with low pre-treatment usage induce people of the group to consume more. Showing that the rebound effect is important to be controlled.

a. Nudge targeting schools' employees

This section explains the framework of the nudge targeting schools' employees in the Region of Brussels (private schools excluded). The educational sector's employees offer a great opportunity because they have similar contracts regardless of the schools they work in. They do not receive any company cars, and they receive free train and MTB tickets to go to work. The latter means that economic incentives are used at their maximal potential. Moreover, as teachers form students and are considered as role models, this will raise awareness in the most important persons' mind, the next generation (Fullan, M. G., 1993, p. 4). Finally, this allows to randomize at the school level and preserve a relatively homogenous set of individuals. However, it is important to keep in mind that the framework tries to stay as general as possible to facilitate its extension to other sectors. The first goal is to nudge them into using their bike to go to work. Several tools have been identified in the previous chapter to counter their cognitive bias. The second is pushing workers into taking a lasting commitment like buying a bike in a Purchasing Group (PG). A PG has the power to decrease the price and reduce the sum of individual's effort due to economies of scale process and information (Faes, W., Matthyssens, P., Vandenbempt, K., 2000, pp. 539-553). As they offer an economic incentive, the proposition to join a PG will be sent to everyone in the treatment and the control group.

The nudge consists of a letter sent to the home of every employee. It starts in January and ends in December. To improve the cost-effectiveness, the letter will be sent 4 times (January, April, September, November,). January and September are the beginning of a scholar period as they are appropriate for "new resolutions".¹⁶ Besides, in September the region

¹⁶ A scholar year is divided into 2 periods: from January to December and from January to June

organize its “mobility week” where schools are asked, among other things, to come with low CO₂ emitting means of transportation. As revealed in the previous chapter, positive emotions which are determinant in the choice of using a bike comes from past experiences. Combining this activity with a letter will improve its effectiveness. In November, the weather changes a lot and the letters serve as cues to continue to motivate them. In April, the weather conditions improve so letters serve as cues to remind about the policy to those who were waiting for warmer weather.

The letter is separated into two main parts. First, it shows the amount of savings of CO₂ emissions and kilometres ridden with a bike have been accumulated since the beginning of the policy by the recipient of the letter, by the school for which the person works for and by the treatment group in general. The contribution of the period is mentioned beside. By putting forward the CO₂ emissions saved since the beginning of the policy, it avoids a negative psychological effect as the number cannot decrease. Decreasing numbers can be associated with failure or doing less good than before. Discouraging factors leading to drop out are to be avoided. As in the Home Energy Report, the policy will reward those who are contributing to the CO₂ savings with a “Thank you” and a smiley face.¹⁷ It is done to avoid the rebound effect mentioned above. Moreover, below this part, a small text will be added to congratulate people who use other low CO₂ emitting means of transportation even though their contribution is not taking into account in this policy so that they still feel rewarded for their efforts.

¹⁷ It differs from the Home Energy Report as here it makes no point to categorize workers by the amount of CO₂ emission saved and to reward those who are doing the best job as someone living five hundred meters away from the schools who use his bike every day might not get rewarded. Nevertheless, the idea is preserved.

Secondly, it presents short stories – tips – experiences of different actors that are suggested to counter the cognitive bias described before. Each letter presents new arguments to avoid a redundancy of information which can lead to a massive drop out. The categories are:

- a) Environmental benefits: The advantages of using bikes and reduces CO2 emissions for each user and society. It comes from different credible sources of information to increase the credibility of the message.
- b) Economic benefits: They are explained by colleagues who want to share their experience about the savings they manage to make from stopping riding their car, from riding a bike, tips on savings on bike materials. The colleagues help counter the identification bias.
- c) Health Benefits: Doctors explain the importance and the positive impact of regular physical activities on the body and the state of mind.
- d) Time benefits: Colleagues also talks about the amount of time they take to come to work. *Bruxelles Mobilité* illustrates with numbers the minutes gain from leaving their car at home.
- e) Positive experiences and stories of their colleagues from the treatment group: Positive experiences help to deconstruct common accepted anti-bike arguments as they lead to negative emotions in the mind of those who did not ride for a long time.

- f) School information: The school's administration explains how to be reimbursed for the kilometres ridden by bike. Moreover, this paragraph puts forward what schools do to facilitate access by bike.

- g) Public administrations: They also have the opportunity to explain the existing and future policies. This way, workers will have incentives from learning about the region's policy. For example, an employee sees that the region is planning to decrease the amount of parking spaces on the street and it is already hard to find one, he will anticipate by changing his behaviour right now.

Finally, the email address to whom they have to write to stop receiving the letters and the information about the policy is written on the bottom.

Furthermore, an email will be sent to every person of the treatment and control groups to join the purchasing group. It includes information about the bikes proposed, professional advises on those bikes and tips on how to take care of it. In addition, it will give information about the minimum reduction they get and the extended reduction depending on the number of orders. In the end, there is practical information about the store and the dead-line to sign-up list which is two weeks later. Investing in a bike is an example of a lasting commitment. This is essential for the effect to continue once the policy is stopped.

The nudge does not end here. To improve the efficiency of the social norms, publishing the savings in CO₂ emission of the school and of the treatment group in strategic location in the school improves the result. Nudges are sent to employee's home, nevertheless, they must

talk about it with each other. This is why I argue that by placing them in the hallway and the teacher's room, it will serve as a conversation starter.

This nudge will improve the take-up rate as it has the opportunity to be mixed with other policy already explained before (PDE, tax shifts, ...). The idea is to tackle mental bias by giving rational explanations, and motivation from credible people and to use the social norm to start changing their behaviour. By making people realize how much they are surrounded by active participants of the policy, employees are nudged to take part to the policy. The hope is to achieve a virtuous cycle as the more people join the movement, the stronger the social norm has an effect.

b. Experimental Design

The office managing the mobility plan states that there are 6 schools with more than 100 employees in Brussels. Figure 4 (Bruxelles Environnement & Bruxelles Mobilité, 2017) shows the classification (per share of car users) of means of transportation per sector. Just under 50% of the workers use their car to work which is positive as the sector has room to improve. However, it is not the worst sector in term of car usage which could have been a significant problem. Therefore, the educational sector has a great average treatment effect potential. Indeed, the worse sectors are industries and service companies. Those sectors can be heavily biased due, for example, to company cars (for the former it is a necessity, for the latter, a nice bonus to offer to your employees) and require stronger policy than nudges to change the situation. In education, they are cycling more compared to other strong car user sectors as shown by the table hereafter. They use a little bit more the MTB network and less the train than other strong car user sectors which suggests that the employees live closer to their jobs compared to other sectors.

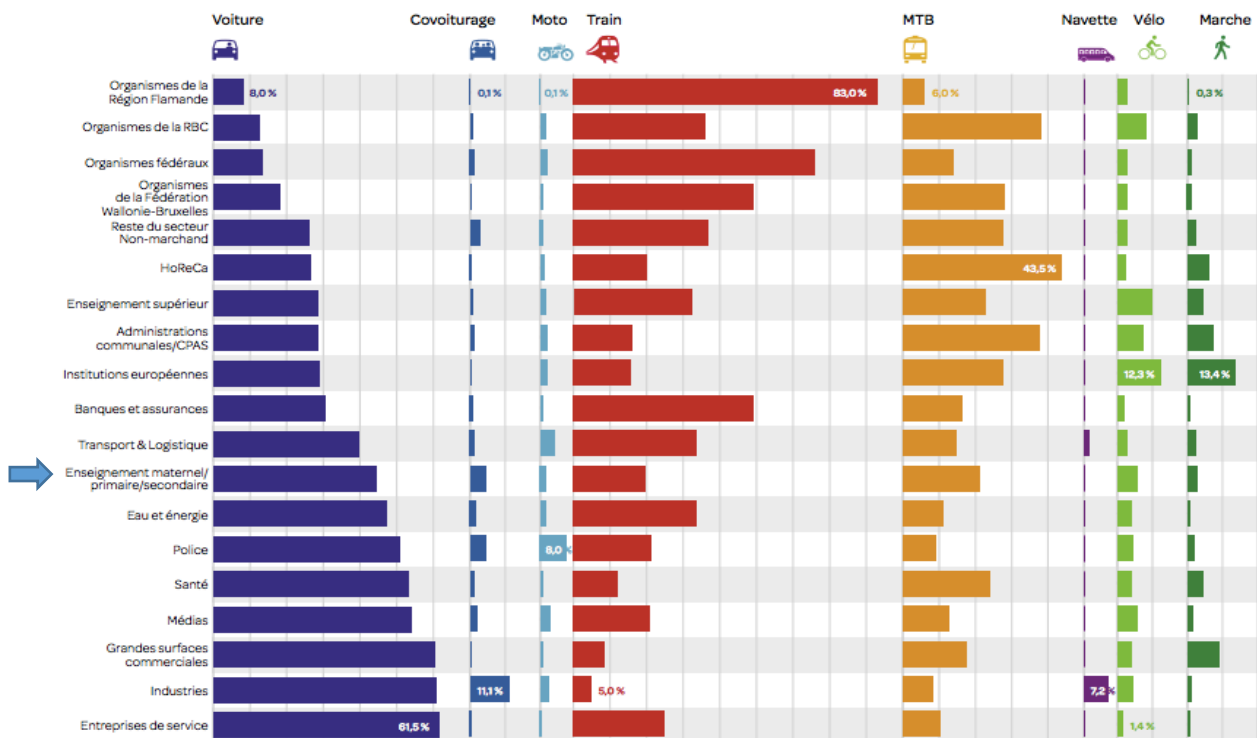


Figure 4 (Bruxelles Environnement & Bruxelles Mobilité, 2017)

Regarding the sample size, calculations suggest that the treatment group contains a minimum of 176 workers and 158 in the control group for a total of 334 workers¹⁸. As the uncertainty about the enrolment ratio is large, the policy will be implemented in three of the six schools and the other three serves as the control group. They employ a total of 1098 workers. The 3 schools are randomly chosen in the treatment and control groups. The school level suits better than the individual level for several reasons. In this case, the spillover problem is reduced but the fixed effect is the threat. Nevertheless, teachers are considered employees of the “Communauté française” regardless of the school they work for. it means they have similar contracts that ask for the same qualifications and offer the same advantages as free tickets for the MTB and SCNB. In January 2018, 87,9% of the teachers have an educational title required to work at the secondary level (Fédération Wallonie Bruxelles, 2018). Secondly, selected schools have more or less the same number of employees and therefore the same need.

¹⁸ Considering a margin error of 5% and a confidence interval of 95%

Therefore, due to the large number of employees per school, I find it reasonable to randomized at the school level and expect a similar repartition of the socio-economic factors and the habits of their employee regarding the transport between their home to work. In economic terms, I expect the fixed effect of school to be low on the impact of the policy. Finally, working at the school facilitates the implementation of the policy.

It is essential to make sure that we can work with the groups sort out by the randomization so that it is possible to identify the treatment effect. To do this, it is necessary to compare statistics between the two groups. Schools will receive a survey to transfer to their workers to understand their habits regarding transport. They will only have to share which mean of transportation they use during a year and the percentage of each utilisation. Also, some questions about their socio-economic status are required to determine the differences between the treatment and control group and their mother language.

Once it is sure that the control and treatment groups are correctly randomized, the policy will start. As schools have to send a survey to every employee to complete their mobility plan and the next actualisation has to be done for 2020 anyway, it seems convenient to do both at the same time. The test period will be from September to June. During this period, four emails will have been sent. At the end of each period, we collect the data, update the previous data, replace the small paragraphs with new information collected during the period and send the letter. The evolutions are calculated for both groups. What is important is to decreases the CO2 emission of employees.

Therefore, to determine CO2 emissions saved, the equation is:

$$\sum_{n=1}^a (D_n^b E^c - D_n^b E^b)$$

n = ID worker

a = Last worker's ID

D = Distance

E = Emission of CO2 per km

c = Car

b = Bike

The last step is to update the results and ask the school to publish them. By publishing them in a public room, workers have more chance to talk about this policy with each other, which will raise awareness to uninterested employees. Moreover, as teachers are considered as role models (Lumpkin, A., 2008, p. 45) by students and society, showing the data publicly increases the expected social norms and has an indirect impact on students who might also change their behaviours. Another analysis is sent by email to every participant with the choices, the tips, and the explanations on how to benefit from the purchasing group.

Once it is done, it is necessary to focus on the purchasing group. Two weeks after the proposition is sent, the list is closed and transferred to the store. They manage the orders from there. As the more person signing-in, the more the reduction is, the email is only sent in September and January.

c. Critics

At this stage, it is essential to take a step backward, to analyse the strengths and weaknesses of the policy. On the positive side, when compared with already implemented policies, this one as the advantage of being comparatively very cheap. All other policies are

costly as they mainly use economic incentives, or they require to build new infrastructures such as parking spots. However, these other policies are essential for the success of this one as they are used as an argument to convince people to change their behaviour. Here, three main costs are presents: mailing costs, data analysis costs, representative costs. Representative costs represent all the cost linked with the preparation: meetings with schools, looking for tips and stories for the letter, assuring that everything goes smoothly during the policy. This can be done by one person. Low costs are important as it decreases the risk for public administration and increases the cost-effectiveness of the policy which is calculated as the number of Euro per gram of CO2 emission.

Another advantage is the very low amount of time required to prepare the policy. All that is required is that schools agree to participate and to share the data. Besides, it can be extended for an undetermined number of years easily. Once it started, it is simple to repeat it over time, contrary to buildings that need to be taken care of, and economic incentives that need to be adapted depending on the government budget.

On the negative side, studies show that comparing to others can lead to depression (Thwaites, R., Dagnan, D., 2004, pp. 309–323). To make sure this does not happen, it is crucial to make it effortless for the treatment group to drop out of the policy. Moreover, it is designed to push more people into using their bikes but in no way to incriminate those who use their cars. This notion must be kept in every stage of the nudge. Therefore, a broad analysis must be done on the choice of the different stories, tips, benefits presented in the letter to avoid burn-out.

Another negative aspect is that not everyone will be interested, and some will get bored with this design. To manage those problems, it is key to be associated with credible partners

like public administration as they are less likely to be considered as advertisement so that people open the letter. It is fundamental to be as original and concise as possible so that even if they are not directly interested, they read and learn some arguments pro-cycling and might be unconsciously nudged. This problem underlines the importance of making it easy for them to drop out of the policy to avoid wasting money on those who will throw away the letter before opening it.

Finally, this policy is based on the assumption that people are realizing the importance of considering other means of transportation opinion and changing their behaviours. This is supported by the data at the regional level; nevertheless, it is not clear that it is the case in the education sector. Moreover, the policy needs full collaboration of schools to help facilitate the life of their cyclists, which is also not a certainty.

d. Extension: “Commute with bene-fiets”

Looking at the data for all companies in Brussels, it is possible to increase the impact of the treatment group as 70% work less than 5km away from their house. With a shorter distance to cycle, workers have more incentive to use their bike.

For the workers living in Brussels, the median distance separating their work from their house is 3,6 km. Moreover, 70% have less than 5km to travel to work (Ermans, T., Brandeleer, C., d’Andrimont, C., et al., 2017). In March 2017, the city had 694.883 workers, 51,4% lived in the capital (Ibsa.brussels, 2017). It means that over a quarter of them (over 178.584 workers) has less than 3,6km separating their house from their workplace (Ermans, T., Brandeleer, C., Hubert, M., et al., 2018).

The policy is easily extendable to more sectors with few modifications. It was designed with general characteristics so that extensions are simple. The public sector offers an excellent possibility as they have higher economic incentives (0,24€/km) and they offer a free pass for the SNCB and MTB sector. Riding a bike to come to work is already popular in those sectors. The European, Brussels, and communal institutions are three of the four most cyclist sectors.

Besides, extending the nudge to more employees means fewer car users. As mention before, 10% decrease in the number of car users is sufficient to diminish traffic congestion by 40%. This has two contradictory impacts. The negative impact is that if there is less traffic congestion, car users will have more positive experiences from driving and therefore will induce a rise of cars on the road. The positive effect comes from the monetary gain, by the city, through tax, due to the improvement of its economic activity. It only works if it is reinvested in infrastructure for low-carbon emitting means of transportation to increase the welfare of their users which leads to a growth in their usage.

e. Extension: Secondary schools' students

Schools suffer from the same transport problems as companies in the capital. Therefore, the region has come up with the same solutions. Every three years, schools have to send a mobility plan call "Plans de Déplacement Scolaire" (PDS). The main difference with companies is that schools cannot offer economic incentives to change pupil's behaviour. The PDS pictures the situation of 264 schools (primary and secondary education, Flemish and French) in the region of Brussels. No exhaustive analysis has been published but some conclusions arise.

From the data, 44,5% of the students come by car (Service Public Régional de Bruxelles, 2017). Data shows that pupils in their primary education come more by car to schools as parents

feel uncomfortable with the idea of letting their child by themselves (La Ligue de l'Enseignement, 2019a). The distance between homes and schools of students is small as it is a legal criterion to accept a pupil in a secondary school (La Ligue de l'Enseignement, 2019b). 46% (68%) of students have less than 1km (2km) to travel to school (Ermans, T., Brandeleer, C., d'Andrimont, C., et al., 2017).

As shown previously, the bad quality of the air can lead to diseases and death. Therefore, everything should be made to protect children who are more affected by the consequences of polluted air exposure. Nevertheless, a study was conducted, analysing the air quality in Belgian schools (64% in Flanders, 17% in Brussels, 19% Wallonia, for a total of 222 schools). Outdoor air quality is poor or illegal in 61% of the schools studied (Greenpeace, 2019).

The nudge destined to students will not be very different from the one for the school's employees. The idea is still to nudge students into coming by bike to schools by using social norms, explanations, tips, experiences from credible sources and students. Nevertheless, the situation is different as they have no economic incentives. The way to get information will be with a direct survey that they fill in daily (or at least weekly) and are transferred every two months. The policy could be included in the program of sciences or geography as it is helpful to understand the consequences of their choice of action on health, environment and more.

“Education is the most powerful weapon which you can use to change the world” (Mandela N.). By monitoring themselves, students become active actors in their education. As one of the points of this policy is to have a lasting effect, an impact at that stage of a person's development is strategic. An indirect effect will occur by targeting the student as they will have heard about those arguments before enduring commitments such as buying a car. It is a strong

engagement to choose alternative means of transportation, but it is a stronger and more effective involvement to choose not to have a car.

V. Conclusion

This paper has described the benefits of increasing the number of school's workers in Brussels that use their bike as well as the importance of tackling the traffic problems of the city. It uses the recent sciences of nudges as a new perspective to manage this issue. It takes advantage of the power of social pressure and put forward the experiences and tips of colleagues and other credible sources to nudge more people into cycling to work.

Even if commuting habits are already changing, the situation is still very concerning. On the positive side, bikes are gaining in popularity as the number of commuters by bike has been growing by 37% in 6 years in Brussels and cars has been decreasing by a share of 6% for the same period. Nevertheless, public transport suffers from poor results and traffic congestion is still very high.

This policy offers quick wins in the field of emissions reduction. It is easily implementable and can be extended without trouble. However, this nudge alone is not sufficient to tackle this problem. The city must continue to decrease incentives toward cars and increase the effectiveness of alternative means of transportation. The treatment effects of other policies in Brussels have already proven their necessity.

This policy is based on strict presuppositions that might reveal untrue when implemented. The bias might be too strong to be dealt with nudges and the arguments presented by their colleagues or other credible sources might be insufficient to overcome the opinions in favour of cars. It is most likely to be the case for a part of the treatment group. Individuals present different biases

affecting their decision in different magnitudes. After a few periods, the policy will target more accurately groups presenting positive average treatment effect.

To develop this idea with the public administration such as *Bruxelles Mobilité* is ideal as they are the most suitable partner. Their experience would help us improve the theory and assumptions presented above. Moreover, the risk of being ineffective is low as the implementation is very cheap.

In conclusion, climate change is a priority. It has to be tackled at every stage of power in Belgium and elsewhere. More solutions must arise to limit the impact of the increase in temperatures. Many scientists have been alerting us on the disastrous consequences of global warming, it is time to listen and to act towards a sustainable path.

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