Pleasure of driving components: a partial least square – path modeling approach.

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Abstract

Instrumental factors, like cost, travel time and comfort, play a determinant role in mode choice. In the last 20 years, literature is suggesting to consider also psychological factors to better understand the transport decision-making process.

In this study, we examine the latent construct "*pleasure of driving*" and its composition. The degree to which travel is enjoyed is a key determinant of shaping desires to reduce travel: the more travel is enjoyed, the less the desire to reduce it. Using factor analysis and structural equation model (in detail, component based techniques), we explore this latent construct: evidences show that, through a two levels model, attitudes related to *car performance* (speed, design, brand), to *convenience* (comfort, practicality) and to *emotion* (relax, stress, boredom) are connected with the pleasure of driving. Data are collected by means of a paper and pencil survey among young commuters (by car) that work or study in Lugano.

Keywords

Pleasure of driving – structural equation model

1. Introduction

In the last 30 years, urban transport experienced a deep transformation worldwide, characterized by a spasmodic use of private car although the intensification of public transport systems.

In Switzerland, approximately 65% of transfers per year (independently from the reason) is done using an individual motorized transport mean (Bundesamt für Statistik, 2010) and the number of cars per inhabitants grew up of 18% from 1991 to 2012 (Eurostat). Similar patterns can be found also in Italy (grow rate of 23%), Germany (36%) and France (22%).

Analyzing the percentage share of each mode of transport in total inland transport, private car is fully dominant (from 77.8% in Switzerland to 85.7 in Germany), confirming a huge dependence on it (Eurostat).

The obsessive use of private car is influencing the quality of life weighing on pollution, congestion and accessibility of destinations. In the last decades, literature is focusing on transport policy measures, both "hard" and "soft", aiming at reducing or changing car use (Bamberg et al., 2011). Hard measures such as introduction of temporarily incentives may however not alone be effective in achieving car-use reduction (Stopher, 2004), and some are difficult to implement because of public opposition or political infeasibility (Gärling and Schuitema, 2007; Jones, 2003). Soft measures consist in persuading car users through information dissemination to voluntarily switch to sustainable travel modes (Taylor, 2007; Taniguchi et al., 2007; Gärling and Fujii, 2009), or acting psychological and behavioral strategies (Fujii and Taniguchi, 2006). Soft measures seem to be more effective than hard (Taylor, 2007; Cairns et al., 2008; Richter et al., 2010; Brög et al., 2009).

Apart from instrumental factors such as comfort and convenience, an additional reason for the huge private car use is the positive utility of travel time. In the last 15 years, research contrasted the conventional preconception that travel is a cost to be minimized (derived demand). Indeed, travel could be desired for its own sake: motion, control and exposure to scenic beauty, under certain circumstances, can provide pleasure even for commuting trips (Mokhtarian and Salomon, 2001). Other studies showed that there is a level of enjoyment in the daily commute for a variety of reasons, such as interacting with nature, being with others, relaxing (Handy et al., 2005, Mokhtarian and Salomon, 2001). Ory and Mokhtarian (2005) retraced this topic concluding that "getting there is half the fun".

However, very few researchers, mostly sociologists and psychologists, (Hagman, 2010; Marsch and Collett, 1986) focused on the pleasure of driving (PoD) itself. Hagman counterposes the definition of driving pleasure based on the essence (engine power, speed and driveability) drawn from advertisement and motor press to the one based on the context (road quality, weather conditions, aim of the journey) given by car users. Marsch and Collett stated that affective and symbolic functions play an important role as well.

In the wake of the latter consideration, literature (Golob and Hensher, 1998; Steg, 2005; Nilsson and Küller, 2000; Nordlund and Garvill, 2003) suggests to also consider psychological factors to better explain why private car is so used. Golob and Hensher underline the importance of the car as a status symbol: women who perceive car as such, are more inclined to choose driving alternatives. Steg (2005) found that commuter car use (especially for frequent drivers) is mostly explained by symbolic (car as a mean to express the social position) and affective (emotions evoked by driving the car) motives and not by instrumental ones. On the other hand, intention to reduce the driving is higher for people who showed environmental awareness (Nilsson and Küller, 2000; Nordlund and Garvill, 2003).

What we intend to do in this work is to shape the pleasure of driving using structural equation model (SEM) techniques starting from several attitudes towards car and the act of driving itself. A deeper knowledge on this topic can help policy makers acting psychological and behavioral strategies in order to contrast the increase of private car use.

This work is organized as follow: Section 2 describes the sample; Section 3 illustrates the component based SEM methodology; Section 4 reports the results; Section 5 discusses the key findings and the future research plans.

2. Data

I collected data among young commuters in Lugano. Throughout seven months (from February to September 2015) I submitted a paper and pencil questionnaire in professional schools, universities (Università della Svizzera Italiana and Scuola Universitaria Professionale della Svizzera Italiana) and some local firms. The total sample is composed by 405 people, but I use only respondents who had a driver license (322, about 79%). In detail, there is a slight majority of males (56%). Most respondents were students (78%), the remaining were apprentices (7%), full time (8%) and half time (7%) workers. Mean age was 22.5 years and almost 75% stated to have a private car available.

The survey is made up of two sections, respectively a stated preference experiment on transport choice and 30 attitudinal questions related to private car and driving. A battery of 18 attitudes is measured by means of Osgood's semantic differential with 7 points scale (Osgood et al., 1976), from *Totally Disagree* to *Totally Agree*, and 12 more attitudes are measured through a 5 points Likert Scale (Likert, 1932).

In this paper, I focus on the second section, aiming at shaping the construct of pleasure of driving. In the Appendix the whole list of attitudes is reported.

In Table 1, the average value for any attitude is shown. The attitudes that show respectively the highest and the lowest values are *ecodist* (It's urgent to do something against the ecological destruction caused by using the car, 5.43) and *cpstrang* (I like to share a ride with unknown people (carpooling) because I can meet someone interesting, 2.43). More general, attitudes related to environmental awareness (*airq1*, *airq2*, *dist*, *futgen*, *ecodist*, *morept*) show almost everywhere large values indicating a strong interest for environmental issues by young people. Among attitudes measured through the 5 point scale (from *relax* to *chall*), highest value is recorded by *funny* (Depending on your experience, you think that driving is funny, 3.82) and lowest by *boring* (Depending on your experience, you think that driving is boring, 2.16). I decided to insert couple of opposite adjectives, such as relaxing – stressing, funny – boring, flexible – binding, in order to distinguish between the ambivalence and the indifference (Costarelli and Colloca, 2004; Thompson et al., 1995). That is, high values of both adjectives indicates ambivalence feeling while low values indicates indifference. Obviously, high value of positive (negative) adjective and low value of negative (positive) prove positive (negative) attitude toward driving.

Table 1: attitudes' means

Attitude	**Average**	**Attitude**	**Average**	**Attitude**	**Average**
airq1	3.84	*power*	3	*funny*	3.82
airq2	4.6	*brand*	3.14	*boring*	2.16
dist	5.18	*cpconv*	4	*safe*	3.11
futgen	4.58	*cpstrang*	2.43	*risk*	3.33
ecodist	5.43	*cpflex*	4.91	*flex*	3.51
morept	4.63	*csstat*	2.93	*bind*	2.84
envy	2.85	*cspark*	4.05	*comf*	3.59
fast	4.61	*csmodel*	4.08	*discomf*	2.8
rumble	3.97	*relax*	3.45	*handy*	3.39
design	4.61	*stress*	2.89	*chall*	2.87

3. Methodology

Several indicators (or items) were collected to identify the latent construct of pleasure of driving. I have no preconceived notions about what the factor pattern will look like and, for this reason, the first methodological step to perform is an explorative factor analysis (EFA, for a textbook on this topic, see Bartholomew et al., 2011; Skrondal and Rabe-Hesketh, 2005), in order to realize how the indicators are linked. This methodology is composed by measurement model and structural model. The first studies the relationships among a set of observed indicators, identifying underlying constructs that explain the relationships among items; the latter explores the relationships among the constructs and explanatory variables testing hypothesis on them.

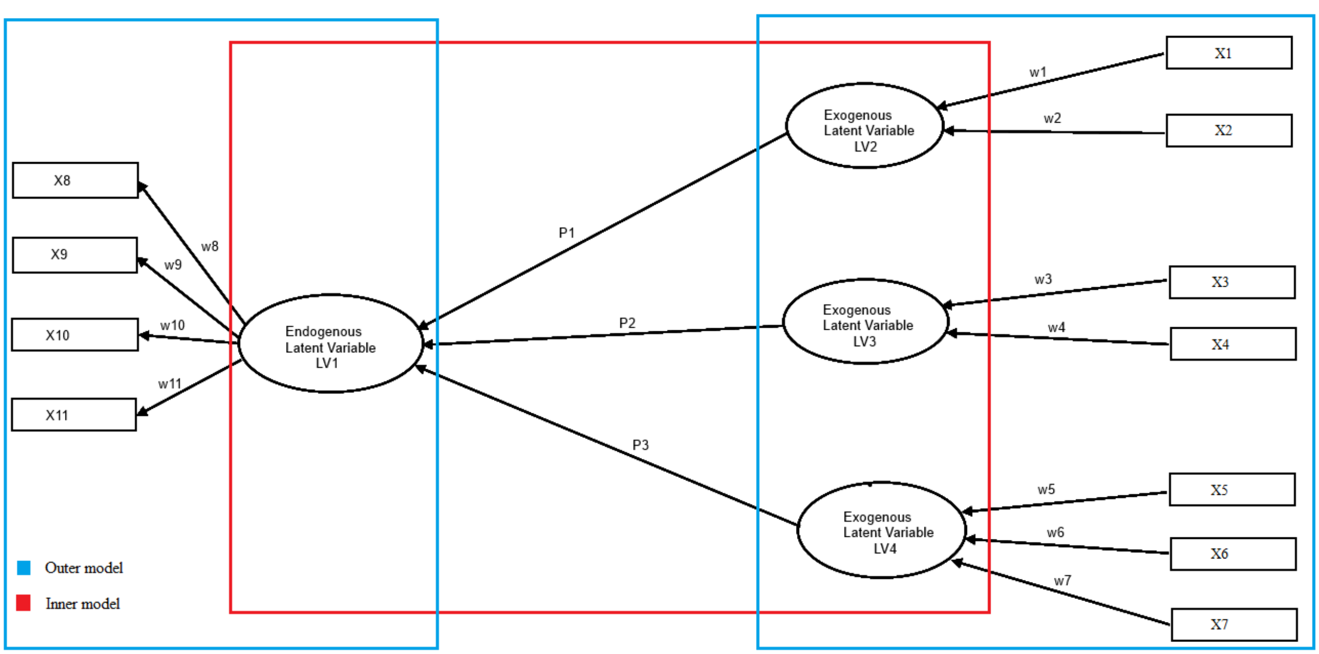
In the present work, the EFA is followed by a structural equation model. Two different approaches belong to this wide family of methods which let to analyze cause-effect relationships: *covariance* based methods, such as LISREL, developed by Karl Jöreskorg, and *component* based methods, such as PLS-PM, developed by Herman Wold. The former approach is mainly used as confirmative technique. It aims at minimizing the discrepancy between observed variables' variance/covariance matrix and estimated one, using estimation methods such as maximum likelihood (ML), quasi-maximum likelihood (QML) or unweighted least squares (ULS). It is a full information method. The latter approach is a partial information method and it aims at maximizing the latent variables (LV) representativeness within and between blocks. It is performed in two steps: 1) using an algorithm, LV scores are computed and 2) structural equations are estimated through OLS regressions on LV scores. Component based SEM, conversely, is mainly used for score computation and can be carried out on very small samples (Tenenhaus et al., 2005 on 6 subjects).

Hair et al. (2011) provided rules of thumb for selecting CB-SEM or PLS-SEM. According to those, since the goal of this research is to explore a structural theory and since the main interest is in detecting key driver constructs, I opt for performing a PLS-SEM.

Looking at Fig. 1, PLS-SEM has two components. The inner model (in red) shows the relationships among latent variables: LV explained by other latent constructs are named *endogenous* while those who have not any path relationship pointing them are *exogenous*. The outer model (in light blue) includes relations between any latent variable and observed variables: if indicators are function of the latent construct, then the scheme is *reflexive* (also labeled MODE A) and the associated coefficients for the relationships are named *outer loadings*; if indicators cause a latent construct, then the scheme is *formative* (MODE B) and the coefficients are named *outer weights*.

In the example below, the endogenous latent variable LV1 is explained by exogenous LV2 – LV4. Structural model relationships are described by three coefficients P1-P3. Any of the exogenous latent variable has a formative scheme: w1 - w7 are outer weights measuring the dependence of any LV on the observed variables. The endogenous latent variable LV1 has a reflexive scheme and w8 – w11 are the loadings explaining the relationships between any observed variable X8 –X11 and the correspondent latent variable.

Fig.1: Example of path model



The basic PLS-PM algorithm is an iterative process based on two stages (in turn, first stage is divided into 4 steps):

1. **Stage one** (repeated until the difference between the sum of the outer weights in two consecutive steps is lower than a threshold (in most software 10^{-5})):
   I. Computation of LV scores using values of manifest variables and priors for outer weights and/or outer loadings (w1 – w11). Note that since it is an iterative process, at the second iteration outer weights are carried out from the step IV;
   II. Computation of structural model relationships coefficients (P1 – P3 in Fig.1) using different weighting schemes (path weighting scheme, centroid weighting scheme, factor weighting scheme);
   III. Approximation (linear combination) of LV scores based on values computed in steps I and II;
   IV. Outer weights (w1 – w11) computation (if reflexive scheme correlation between LV score and manifest variable is computed, if formative scheme OLS coefficient from a regression are used).
2. **Stage two**: Final estimates of coefficients (outer weights and loadings w1 – w11, structural model relationships P1 – P3) are determined using the ordinary least squares method for any partial regression in the PLS-SEM.

4. Results

4.1 *Explorative factor analysis*

In the EFA only 23 out 30 items seem to contribute at explaining the variance of the phenomenon and the best representation occurs with five factors (results shown in Fig. 2). According to the rules of thumb by Hair et al. (1998), I take into account loadings (relations between item and factor) greater than 0.35 (after deleting missing data for this analysis the sample size is 311).

The first factor summarizes attitudes related to car performance (hereafter, *Performance*), the second factor includes environmental concerns (*Environment*), the third regards practicality and convenience (*Convenience*), the fourth represents attitudes related to car-sharing and carpooling (*CsCp*) and the last factor describes emotions (*Emotion*).

In order to validate the constructs' internal consistency, Cronbach's alpha is computed. Emotion shows the lowest value (0.7082) that is in any case higher than the acceptance limit of 0.7 given by the rule of thumb by Nunnally (1978). Remaining constructs seem to explain clearly the same concept (values from 0.7521 to 0.8766).

Note that relationships between discomf and Convenience, challeng and Convenience, stress and Emotionality, boring and Emotionality are negative, meaning that an increase in the factor score reflects a decrease in the related attitude. Remaining relationships are all positive.

Fig. 2: EFA results

Variable	Performance	Environment	Convenience	CsCp	Emotion	Uniqueness
airq1		0.6232				0.4987
airq2		0.6516				0.5900
futgen		0.6613				0.6207
ecodist		0.6301				0.5358
morept		0.4361				0.6054
envy	0.7508					0.4732
fast	0.7112					0.4162
rumble	0.7104					0.3885
design	0.7283					0.4141
power	0.8158					0.3968
brand	0.7037					0.4989
cpconv				0.7466		0.4669
cpstrang				0.7117		0.4875
csstat				0.5663		0.5631
cspark				0.5821		0.5596
relax					0.7066	0.5448
stress					-0.5727	0.6550
funny					0.5639	0.5782
boring					-0.5921	0.6119
comfort			0.7677			0.4138
discomf			-0.7766			0.4204
handy			0.8359			0.2988
challeng			-0.7744			0.3633
Cronbach's alpha	0.8766	0.7521	0.8665	0.7634	0.7082	
(blanks represent abs(loading)<.35)						

Using the five factors scores obtained, I run a further factor analysis in order to explore the dimensionality and the consistency underlying these constructs (Fig. 3). Two factors best synthetize the variance: Environment and CsCp are positively related to the first factor (e.g. the more the people are aware of environment and the more they agree with car-sharing and carpooling principles, the more they score on the first latent factor) while Performance, Convenience and Emotion are positively related to the second underlying construct (e.g. the more the people like speedy cars or think that commuting by car is comfortable or relaxing, the higher is their score on the latent factor). In this step I didn't exclude Convenience from the analysis (the uniqueness is greater (0.7911) than the cutoff given by the rule of thumbs by Nunnally) since here just two factors emerge: it follows that it is likely that low loading on a factor strongly influences total uniqueness. Therefore, since the relation between Convenience and Pleasure of driving is not very low (loading is larger than the cutoff given by the rule of thumbs by Hair et al.), I decided to keep Convenience in this second explorative factor analysis.

Considering the whole set of items included in the analysis and the relationships directions among latent constructs, we can interpret the first latent construct as *Green attitudes* and the second latent construct as *Pleasure of driving.*

Fig. 3: second stage EFA results

Variable	Green Att	PoD	Uniqueness
Performance		0.5151	0.6437
Convenience		0.4411	0.7911
CsCp	0.8326		0.3466
Environment	0.9417		0.1072
Emotion		0.7797	0.4381

(blanks represent abs(loading)<.35)

4.2 PLS-PM

The main goal of this work is to explore the structure of the latent construct pleasure of driving and provide an estimate of that value for any observation, in order to investigate in future work whether and to what extent it can affect the decision-making process in commuting. For this reason I decided to run a SEM with component based approach.

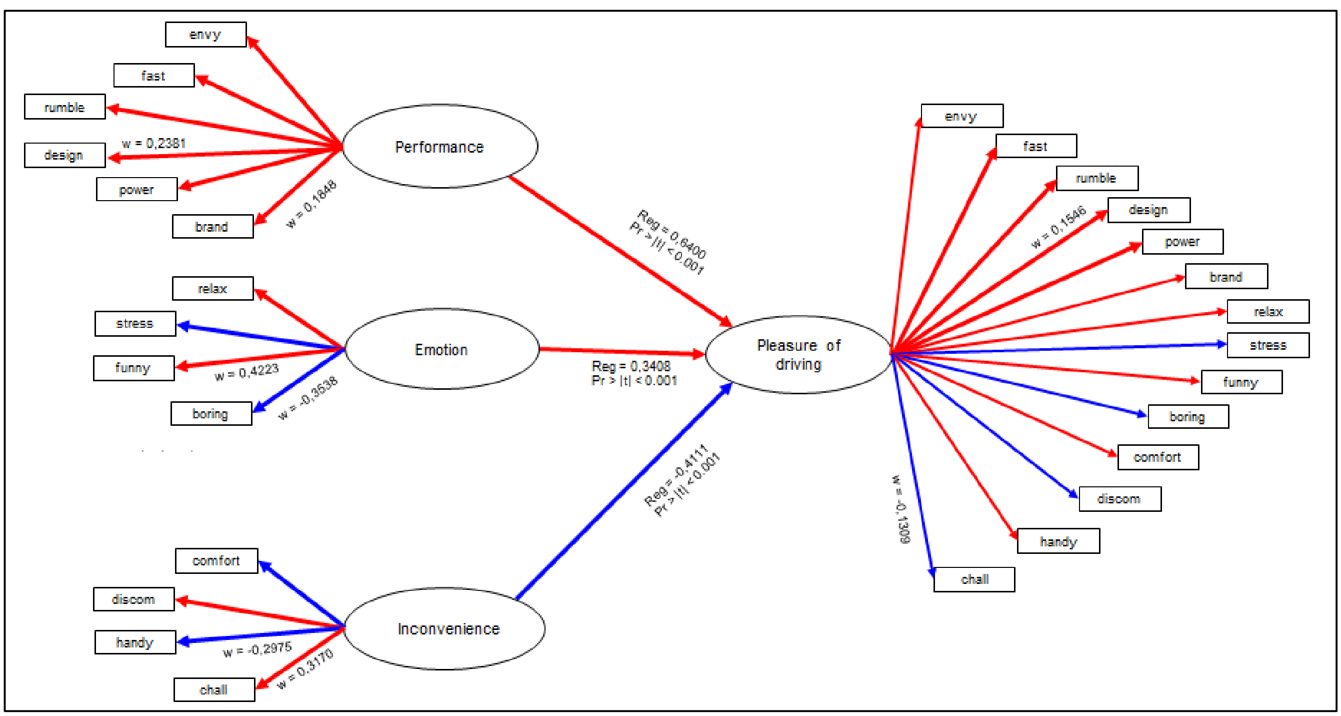
To run the PLS-PM I used the package XLSTAT 2014 (Addinsoft, 2014).

In the present work, the focus is only on the pleasure of driving and its three sub-latent constructs and their relative items. Therefore, 14 items related to Performance, Convenience and Emotion (respectively 6, 4, 4) are used to design the Pleasure of Driving. This specification is designed as hierarchical model: at the first (lower) level, observed items are linked to three latent variables, which in turn, are linked to one further latent variable at a second (higher) level. To distinguish, hereafter I will indicate with FLV (first stage latent variable) latent variables driven from the first stage EFA (Fig. 2) and SLV (second stage latent variable) those showed in the second stage EFA (Fig. 3).

The specification is reported in Fig. 4. The measurement model follows a reflexive scheme while FLVs form the Pleasure of driving in the inner model. Note that to build a hierarchical PLS-PM three different techniques can be used: (1) repeated indicator approach, (2) two stage approach, (3) hybrid approach. In this work the first approach has been used: fourteen indicators are linked to respective FLVs and at the second stage, all indicators are connected to the SLV. For a deeper knowledge on this topic see Becker et al. (2012).

In the Fig. 4 blue and red arrows indicate respectively a negative and a positive link in both outer and inner model and their thickness is representative of the correlation between constructs. One can note that, differently from what happens in the EFA, the FLV Convenience has now a negative meaning: indeed, items comfort and handy are negatively linked to the latent construct and discom and chall are positively. For this reason, it represents now the *Inconvenience*. As expected, the link between FLV Inconvenience and the SLV Pleasure of driving is negative: that is, the higher is the score of the latent attitude Inconvenience, the lower will be the pleasure of driving. Remaining FLVs, Emotion and Performance, positively influence the pleasure of driving. Coefficients reported on the arrows of the inner model represent the regression coefficients (all significant) where the endogenous variable is dependent. All rest being equal, an additional unit in Performance and Emotion score increases the Pleasure of driving score of 0.64 and 0.34 respectively, while one unit increase in Inconvenience decreases the SLV score of 0.41. In the outer model the highest and the lowest weight is reported. It represents the coefficient of the linear regression having as dependent variable the item and independent variable the latent construct. For instance, an increase of 1 unit in Performance score raises its connected items of a value between 0.1848 (brand) and 0.2381 (design).

Fig. 4: PLS-PM, Pleasure of driving



Reflective measurement model should be evaluated looking at the reliability and the validity of the constructs. To this aim, it is appropriate to check each indicator's reliability looking at the standardized loadings (Tab. 2), the Cronbach's alpha, the Dillon-Goldstein's rho (Tab. 3) and the cross-loadings (Tab. 4).

Tab. 2: standardized loadings

Latent variable	Item	Standardized loading
Performance	*envy*	0.7437
	fast	0.8028
	rumble	0.8089
	design	0.8082
	power	0.8046
	brand	0.7387
Emotion	*relax*	0.7322
	stress	-0.6456
	funny	0.7792
	boring	-0.7571
Inconvenience	*comfort*	-0.8342
	discom	0.8254
	handy	-0.8675
	chall	0.8531

Standardized loadings should be higher than 0.70 (Becker et al., 2012): only *stress* has a value slightly lower than the threshold but it does not affect other measures of internal validity.

Cronbach's alpha and Dillon-Goldstein's rho greater than 0.7 indicate a correct outer model specification, measuring the internal consistency. According to Chin (1998), due to its composition, Dillon-Goldstein's rho is considered a better index: indeed, while the former assumes equal importance of the items, the latter is based on the loadings rather than on the correlations observed among the manifest variables in the data. Cronbach's alpha gives a sort of lower bound estimate of reliability.

Tab. 3: Cronbach's alpha and Dillon-Goldstein's rho

	Cronbach's alpha	Dillon-Goldstein's rho
Performance	0.8776	0.9075
Emotion	0.7725	0.8542
Inconvenience	0.7704	0.8542

Cross-loadings are a good instrument to check if items are related with the more appropriate latent construct. In this model, following results from the EFA, all the items have the highest loading with their relative latent variable.

Tab. 4: cross-loadings

	Performance	Emotion	Inconvenience
envy	**0.7437**	0.1186	-0.1252
fast	**0.8028**	0.3340	-0.1449
rumble	**0.8089**	0.2884	-0.1772
design	**0.8082**	0.2953	-0.2493
power	**0.8046**	0.2010	-0.0999
brand	**0.7387**	0.1640	-0.0784
relax	0.1356	**0.7322**	-0.1431
stress	-0.1248	**-0.6456**	0.2233
funny	0.3505	**0.7792**	-0.2006
boring	-0.2304	**-0.7571**	0.1764
comfort	0.1645	0.2039	**-0.8342**
discom	-0.1442	-0.1645	**0.8254**
handy	0.1546	0.2072	**-0.8675**
chall	-0.1804	-0.2763	**0.8531**

As concerns the goodness of fit, there is no overall fit index in PLS-SEM. Nevertheless, a global criterion of goodness of fit has been proposed by Tenenhaus et al. (2004): the GoF index. It takes into account the model performance in both the measurement and the structural model. Both the GoF and the relative GoF are descriptive indexes, i.e. there is no inference-based threshold to judge the statistical significance of their values. A value of the relative GoF equal to or higher than 0.90 supports the model. It is possible to compute the GoF using the bootstrap methods in order to get a cross-validated estimate of the model. Results are reported in Tab. 5.

Tab. 5: GoF indices

	GoF	GoF (bootstrap)
Absolute	0.6851	0.6856
Relative	0.9970	0.9964

Another index used to evaluate the model is the communality or AVE (Tab. 6). The average variance extracted (AVE) of 0.50 indicates a sufficient degree of convergent validity, measuring to what extent the variability of the block is explained by the latent construct.

Tab. 6: communality indices

	Communality
Performance	0.6164
Emotion	0.5333
Inconvenience	0.7144
Average	0.6207

5. Discussion

In the last two decades, researchers moved their attention from instrumental factors (like price, travel time, comfort) to psychological attitudes to better explain choices in transport, mainly considering environmental awareness (Nilsson and Küller, 2000), symbolic and affective factors (Steg, 2005), pleasure of travelling (Ory and Mokhtarian, 2005). Travel time is not purely derived demand (a cost to be minimized) but it raises the concept of positive utility of travel time (Mokhtarian and Salomon, 2001; Handy et al., 2005; Ory and Mokhtarian, 2005).

The present work fits in this context: it aims at exploring the composition of the wide latent construct *pleasure of driving* (PoD) in commuting. Very few researchers, mostly sociologists and psychologists, (Hagman, 2010; Marsch and Collett, 1986) focused on expressly on this concept. Data concerning attitudes towards driving are collected through a paper and pencil questionnaire among young students and workers in Lugano.

In order to investigate the PoD composition, an explorative factor analysis and a structural equation model have been carried out. As concerns the structural equation model, I opted for component based techniques (Tenenhaus, 2008; Hair et al., 2011; Reinartz et al., 2009) that are more appropriate when the goal of the research is to explore a structural theory and to detect key driver constructs. Following results from the explorative factor analysis, the model proposed here is hierarchical: at the first (lower) level, observed items are linked to three latent variables, which in turn, are linked to one further latent variable at a second (higher) level.

From the structural equation model, it comes that three sub-latent constructs compose the PoD: *Performance* contains attitudes related to the importance of speed, power, brand, design of the car; *Emotion* reflects on feelings such as enjoyment and relax while driving; *Inconvenience* includes emotions like discomfort and impropriety while commuting. The inner model in the PLS-PM provide a linear regression with PoD as dependent variable: all rest being equal, an additional unit in Performance and Emotion score increases the Pleasure of driving score of 0.64 and 0.34 respectively, while one unit increase in Inconvenience decreases the PoD score of 0.41.

Using all attitudes collected through the questionnaire, a further result that needs to be examined in depth is the composition of an additional latent construct at the second level: it includes attitudes related to environment (*Environment*) and pro-sharing vehicle (*CsCp*). This construct could act as counterpart in the decision-making process in transport: while the PoD could have a positive effect on individual motorized means, enhancing for instance the probability of choosing the private car, the green attitude (composed by Environment and CsCp) should have an opposite effect, decreasing that probability.

Following this hint given by the present work, next step is to effectively evaluate whether and to what extent these constructs can affect the decision-making choice in commuting scenarios. The presented work will be also improved broadening the sample with young people studying or working in Zurich, Luzern, Lausanne and Neuchatel in order to explore whether the pleasure of driving can differ due to the social and cultural context differences.

Appendix

Attitudinal questions

1. I limit my auto travel to help improve congestion and air quality (*airq1*).
2. To improve air quality, I am willing to pay a little more to use an electric or other clean-fuel (*airq2*).
3. Having shops and services within walking distance of my home is important to me (*dist*).
4. My personal car use is affecting the quality of life for future generations (*futgen*).
5. It's urgent to do something against the ecological destruction caused by using the car (*ecodist*).
6. It would be useful if I used PT instead of my car in order to reduce congestion and pollution (*morept*).
7. I would like that people look at me and envy me while I am driving my dream car (*envy*).
8. I like speedy cars (*fast*).
9. When I hear a strong car rumble, I am interested in which car it is (*rumble*).
10. Car design is essential for me (*design*).
11. Powerful cars make me feel strong (*power*).
12. I identify myself with my car or my dream car brand (*brand*).
13. I am incline to pool a ride (carpooling), since it is economically convenient, environmentally friendly and less boring (*cpconv*).
14. I like to share a ride with unknown people (carpooling) because I can meet someone interesting (*cpstrang*).
15. In pooling a ride, my schedule becomes less flexible (*cpflex*).
16. If there were more pick-up points for car-sharing in my city, I would not need a private car (*csstat*).
17. I like car-sharing since I can drive with no worries about parking (*cspark*).
18. When I rent a car, I carefully choose the type according to its peculiarities (*csmodel*).
19. Depending on your experience, you think that driving is relaxing (*relax*).
20. Depending on your experience, you think that driving is stressful (*stress*).
21. Depending on your experience, you think that driving is funny (*funny*).
22. Depending on your experience, you think that driving is boring (*boring*).
23. Depending on your experience, you think that driving is safe (*safe*).
24. Depending on your experience, you think that driving is risky (*risk*).
25. You think that commuting by car is a solution flexible (*flex*).
26. You think that commuting by car is a solution binding (*bind*).
27. Depending on your experience, you think that commuting by car is comfortable (*comfort*).
28. Depending on your experience, you think that commuting by car is uncomfortable (*discom*).
29. Depending on your experience, you think that commuting by car is handy (*handy*).
30. Depending on your experience, you think that commuting by car is challenging (*chall*).

References

- Addinsoft, 2014. XLSTAT. https://www.xlstat.com/en/
- Bamberg, S., Fujii, S., Friman, M., Gärling, T., 2011. Behaviour theory and soft transport policy measures. Transport Policy 18, 228 – 235.
- Bartholomew, D.J., Knott, M., Moustaki, I., 2011. Latent Variable Models and Factor Analysis: A Unified Approach (3rd ed). Wiley.
- Becker, J., Klein, K., Wetzels, M., 2012. Hierarchical latent variable models in PLS-SEM: guidelines for using reflective-formative type models. Long range planning 45, 359 – 394.
- Brög, W., Erl, E., Ker, I., Ryle, J., Wall, R., 2009. Evaluation of voluntary travel behavior change: experiences from three continents. Transport Policy 16, 281 – 292.
- Bundesamt für Statistik, Bundesamt für Raumentwicklung; Mikrozensus Mobilität und Verkehr, 2010. mobilita2010@bfs.admin.ch
- Cairns, S., Sloman, L., Newson, C., Anable, J., Kirkbride, A., Goodwin, P., 2008. Smarter choices: assessing the potential to achieve traffic reduction using soft measures. Transport Reviews 28, 593 – 618.
- Costarelli, S., Colloca, P., 2004. The effects of attitudinal ambivalence on pro-environmental behavioural intentions. Journal of Environmental Psychology 24, 279 – 288.
- Eurostat, ec.europa.eu/**eurostat**
- Fujii, S., Taniguchi, A., 2006. Determinants of the effectiveness of travel feedback programs – a review of communicative mobility management measures for changing travel behavior in Japan. Transport Policy 13, 339 – 348.
- Gärling, T., Fujii, S., 2009. Travel behavior modification: theories, methods, and programs. In: Kitamura, R., Yoshii, T., Yamamoto, T. (Eds.), The Expanding Sphere of Travel Behaviour Research. Bingley, UK: Emerald, pp. 97 – 128.
- Gärling, T., Schuitema, G., 2007. Travel demand management targeting reduced private car use: effectiveness, public acceptability and political feasibility. Journal of Social Issues 63, 139 – 153.
- Golob, T.F., Hensher, D.A., 1998. Greenhouse gas emissions and Australian commuters' attitudes and behavior concerning abatement policies and personal involvement. Transportation Research D 1, 1 – 18.
- Hagman, O., 2010. Driving pleasure: a key concept in Swedish car culture. Mobilities Vol. 5, No. 1, 25 – 39.
- Hair, J.F., Ringle, C.M., Sastedt, M., 2011. PLS-sem: Indeed a silver bullet. Journal of marketing theory and Practice Vol. 19, No. 2, 139 – 152.
- Hair, J.F., Tatham, R.L., Anderson, R.E., Black, W., 1998. Multivariate data analysis 5th Ed. Prentice-Hall: London.
- Handy, S., Weston, L., Mokhtarian, P.L., 2005. Driving by choice or necessity? Transportation Research Part A, 39, 183 – 203.
- Jones, P., 2003. Acceptability of road user charging: meeting the challenge. In: Schade, J., Schlag, B. (Eds.) Acceptability of Transport Pricing Strategies. Elsevier, Amsterdam, pp. 27 – 62.
- Likert, R., *1932.* A Technique for the Measurement of Attitudes. Archives of Psychology 140, 1 – 55.
- Marsch, P., Collett, P., 1986. Driving passion. The psychology of the car. London: Jonathan Cape.
- Mokhtarian, P.L., Salomon, I., 2001. How derived is the demand for travel? Some conceptual and measurement considerarions. Transportation Research Part A – Policy and Practice 35, 695 – 719.
- Nilsson, M., Küller, R., 2000. Travel behaviour and environmental concern. Transportation Research Part D, Volume 5, Issue 3, 211 – 234.
- Nordlund, A.M., Garvill, J., 2003. Effects of values, problem awareness, and personal norm on willingness to reduce personal car use. Journal of Environmental Psychology 23, 339 – 247.
- Nunnally, J. C., 1978. Psychometric theory, 2nd edition. New York: McGraw-Hill.
- Ory, D.T., Mokhtarian, P.L., 2005. When is getting there half of the fun? Modeling the liking for travel. Transportation Research Part A, 39, 97 – 123.

- Osgood, C., Suci, G., Tannenbaum, P., 1976. La medida del significado. Gredos, Madrid.
- Reinartz, W. J., Haenlein, M., Henseler, J., 2009. An Empirical Comparison of the Efficacy of Covariance-Based and Variance-Based SEM. International Journal of Market Research, 26 (4), 332–344.
- Richter, J., Friman, M., Gärling, T., 2010. Review of evaluations of soft transport policy measures. Transportation: Theory and Application 2, 5 – 18.
- Skrondal, A., Rabe-Hesketh, S., 2005. Generalized Latent Variable Models. Chapman and Hall/CRC.
- Steg, L., 2005. Car use: Lust and must. Instrumental, symbolic, and affective motives for car use. Transportation Research A, 39, 147 – 162.
- Stopher, P.R., 2004. Reducing road congestion: a reality check. Transport Policy 11, 117 – 131.
- Taniguchi, A., Suzuki, H., Fujii, S., 2007. Mobility management in Japan: its development and meta-analysis of travel feedback programs. Transport Research Record 2021, 100 – 109.
- Taylor, M., 2007. Voluntary travel behavior change programs in Australia: the carrot rather than the stick in travel demand management. International Journal of Sustainable Transportation 1, 173 – 192.
- Tenenhaus, M., 2008. Component-based structural equation modelling. Total quality management & business excellence.
- Tenenhaus, M., Amato, S., and Esposito Vinzi, V., 2004. A global goodness-of-fit index for PLS structural equation modelling. Proceedings of the XLII SIS Scientific Meeting, Vol. Contributed Papers, CLEUP, Padova, pp. 739–742.
- Tenenhaus, M., Pagès, J., Ambroisine, L., Guinot, C., 2005. PLS methodology to study relationships between hedonic judgements and product characteristics. Food Quality and Preference, 16 n.4, 315 – 325.
- Thompson, M.M., Zanna, M.P., Griffin, D.W., 1995. Let's not be indifferent about (attitudinal) ambivalence. In R. E. Petty & A. J. Krosnick (Eds.), Attitude Strength: Antecedents and Consequences. Hillsdale, NJ: Erlbaum.