The description of individuals' cognitive subsets in fun shopping activities by making use of association rules algorithms

Case study in Hasselt, Belgium

Bijlagen

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Masterproef voorgedragen tot het bekomen van de graad van
master in de verkeerskunde

universiteit hasselt

HASSELT UNIVERSITY
INTERFACULTY INSTITUTE TRANSPORTATION SCIENCES

The Description of Individuals' Cognitive Subsets in Fun Shopping Activities by Making Use of Association Rules Algorithms: Case Study in Hasselt, Belgium: Annexes

Master thesis submitted to
obtain the degree of Master in Transportation Sciences,
specialization Mobility Management

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2010

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Annex 1: Research plan (23/10/2009)

The research plan in this attachment was the start of this master thesis. It was handed in on October 23rd, 2009. The document presents the research's intentions and planning at the start of the research process. It is important to keep in mind that the planning and the execution of the research have been subject to changes during the course of the research.

In this research, the individuals' decision making process concerning fun shopping will be investigated. A computer-based survey that is based on the CNET card game technique will be used to gather the data. The CNET protocol enables the elicitation of a mental representation of the respondents' decision making process. Furthermore, this mental representation can be modeled by using a Bayesian Decision Network (also called an Influence Diagram) (Korb & Nicholson, 2003). 200 respondents who live near Hasselt will be questioned in December and January. A rich dataset, containing cognitive subsets that construct individuals' mental representations, will be built. This data will be analyzed by using Association Rules Algorithms to find regularities and patterns in individuals' cognitive subsets. Findings will be discussed based on existing literature.

Research questions

General questions that have to be answered first are:
What are Bayesian Decision Networks?
What is the CNET protocol in general and how does the CNET card game technique in particular work?
What are association rules algorithms and how do they work?

The main research question is the following:
What are individuals' motivations and reasoning behind their decisions related to the transport mode choice and shopping location choice in leisure shopping?

Related sub questions are:
What considerations are most prevalent?

Do patterns differ among different socio-demographic groups (e.g. differences among age categories, between men and women,…)?
What are possible explanations for differences that appear?

Research framework

Consumer's decisions related to leisure shopping trips are complex and require the consumer to make multiple choices, e.g. a shopping location and a transport mode choice. Over the last decades, the number of trips generated by this pastime has strongly increased. In order to reduce energy consumption caused by these trips and to lower pressure on urban infrastructure, many attempts have been made to steer individuals' travel behavior towards a more sustainable form by implementing Travel Demand Management (TDM) measures. However, to increase the behavioral impact of TDM's, travel choices should be studied on a disaggregate level, as the outcome of each individual's decision process (Kusumastuti et al., 2009a). The CNET protocol is such a method that studies travel choices on a disaggregate level, allowing us to capture individuals' mental representations and components that originate them; namely contextual, instrumental and evaluative factors.

As mentioned before, about 200 respondents will be questioned by means of a computer-based survey based on the CNET card game protocol.

A first important challenge is to develop the computer-based survey. An important limitation of the method is that filling in a questionnaire based on the CNET protocol is very demanding for respondents, both because of the large number of questions and because we "dig deep" into their decision making process. That is why a lot of time and effort will be spent in optimizing the survey, making sure questions are as clear as possible and the number of questions is reduced to the absolute minimum, but still can sufficiently be used in the analysis to answer the research questions.

A mayor challenge will therefore be to find enough respondents, with sufficient differences in social background (place of residence, gender, age, education level…). Respondents will be recruited by means of the snowball sampling method. They are asked for their willingness to participate by email, and to forward the message to friends,

relatives, colleagues,… who meet the requirements (living 3-10 km from the inner ring of Hasselt and owning a driver's license).

The most important assumption for this master thesis relates to the technique that is being used, i.e. the CNET card game method. It is assumed that this method is an appropriate and valid method to gather information about complex decision making processes. Although the CNET card game has not been formally validated yet, there are no reasons to assume validity problems. Successful pilot studies have been implemented, and the CNET interview protocol, which is a strongly related technique, showed a good trustworthiness.

Outline of used theories, exploratory review

What are Bayesian networks?

The most important documents to answer this question in detail are:

1. Finn V. Jensen, *Bayesian Networks and Decision Graphs*, 2nd ed. (New York: Springer, 2007).
2. Kevin B. Korb and Ann E. Nicholson, *Bayesian Artificial Intelligence*, 1st ed. (Chapman & Hall/CRC, 2003).
3. Diana Kusumastuti et al., "Qualitative and quantitative comparisons of the CNET interview and the CNET card game to explore contextual, instrumental and evaluative aspects in individuals' fun shopping travel decisions," 2009.

Bayesian Decision Networks are graphical models for reasoning under uncertainty, where nodes represent variables (discrete or continuous) and arcs represent direct connections between them (Korb & Nicholson, 2003). The Bayesian Decision Network consists of three types of nodes: decision nodes, chance nodes and utility nodes. The direct connections are often of a causal nature (Korb & Nicholson, 2003).

Furthermore, Bayesian Decision Networks model the quantitative strength of the connection between variables, allowing probabilistic beliefs about them to be updated automatically as new information (called "evidence") becomes available. This is called "belief updating" or "belief revision" (Korb & Nicholson, 2003).

Bayesian Decision Networks are a good way to model the information gathered by the CNET protocol, because the way the variables are classified is similar. The most important difference is the fact that the CNET protocol makes a further distinction for the chance nodes. These are subdivided into contextual nodes, instrumental nodes and evaluative nodes.
The Bayesian networks will be made by making use of the software package Hugin Researcher 7.0. The actual modeling of the gathered data into a Bayesian network is beyond the scope of this thesis. However, it is important to have a general idea about the way Bayesian networks work, because this affects the way the survey questions have to be formulated (e.g. validation questions involve adding evidence to the network and check how the respondent's decision is influenced).

What is the CNET protocol in general and how does the CNET card game technique in particular work?

The most important documents to formulate an answer to this question are:

1. Theo A. Arentze, Benedict G. C. Dellaert, and Harry J. P. Timmermans, "Modeling and Measuring Individuals' Mental Representations of Complex Spatio-Temporal Decision Problems," *Environment and Behavior* 40, no. 6 (November 1, 2008): 843-869.
2. Benedict G.C. Dellaert, Theo A. Arentze, and Harry J.P. Timmermans, "Shopping context and consumers' mental representation of complex shopping trip decision problems," *Journal of Retailing* 84, no. 2 (June 2008): 219-232.
3. Anouk den Hartog, "Activiteit en mobiliteit gevangen in een net" (Masterthesis, Eindhoven University of Technology, 2004).
4. Diana Kusumastuti et al., "Qualitative and quantitative comparisons of the CNET interview and the CNET card game to explore contextual, instrumental and evaluative aspects in individuals' fun shopping travel decisions," 2009.
5. Diana Kusumastuti et al., "Qualitative exploration of contextual, instrumental and evaluative aspects in individuals' fun shopping travel decisions," in (presented at the Proceedings of the 12th International Conference on Travel Behavior Research, Jaipur, India, 2009).

Briefly stated, the Causal Network Elicitation Technique (CNET) is a method to map the mental model of an individual's decision making process into a decision network. CNET describes this mental representation, taking into account: (1) contexts and constraints surrounding individuals, (2) different considerations of attributes related to choice alternatives, and (3) benefits, values or utilities attached to action outcomes (Dellaert et al., 2008). These aspects are defined contextual, instrumental and evaluative variables, respectively. One set consisting of (a contextual variable,) a situational variable and a benefit variable is called a cognitive subset (Kusumastuti et al., 2009b).

There are two different CNET elicitation methods: CNET interview protocol and CNET card game. The computer-based survey will be based on the CNET card game because respondents' responses are more complete when using CNET card game in stead of CNET interview, and respondents of a pilot test thought the CNET card game method was more pleasant and easier to answer (Kusumastuti et al., 2009a).

In the CNET card game, predefined pick lists of possible variables are shown to the respondent. They should indicate which of the mentioned variables are considerations that they take into account when making a decision. Then, other variables are linked by the respondent to the variables that were initially indicated to form cognitive subsets.

What are association rules algorithms and how do they work?

To answer this question, the main references are:

1. Diana Kusumastuti et al., "Qualitative and quantitative comparisons of the CNET interview and the CNET card game to explore contextual, instrumental and evaluative aspects in individuals' fun shopping travel decisions," 2009.
2. Chengqi Zhang and Shichao Zhang, *Association Rule Mining: Models and Algorithms*, 1st ed. (Springer, 2002).

Association rules are used for data mining. Strictly speaking, data mining is a process of discovering valuable information from large amounts of data stored in databases, data warehouses or other information repositories. Data mining differs from traditional statistics in that formal statistical inference is assumption-driven. This means that a hypothesis is formulated and validated against the data. Data mining on the other hand

is discovery-driven in the sense that patterns and hypotheses are automatically extracted from the data (C. Zhang & S. Zhang, 2002).

In this master thesis, association rules are used as a tool to describe frequent patterns of cognitive subsets generated from elicited mental representations of fun shopping decisions (Kusumastuti et al., 2009a).

What are individuals' motivations and reasoning behind their decisions related to the transport mode choice and shopping location choice in leisure shopping?

To answer this question, 200 respondents that live 3-10 km from the city centre of Hasselt will be asked to fill in the survey. The sampling method that is used is snowball sampling.
Snowball sampling is a special nonprobability sampling method that is most often used when the desired sample characteristic is rare (StatPac Inc., 2009). It is a chain referral method whereby a sample is constructed from a base of initial contacts, who are asked to provide introductions to their associates, who, in turn, are asked to refer to others. This process continues until a sample has been built (Wright & Stein, 2005). It is important to keep in mind that this technique comes at the expense of introducing bias because the technique reduces the likelihood that a good cross section from the population is selected (StatPac Inc., 2009).
Although this research is not focusing on a rare sample characteristic, but ideally wants to question a diverse and representative sample of the population, there is one important reason that justifies its use for this survey. The large burden this survey places on respondents requires them to be relatively strongly motivated to participate. So this research looks for people with a strong motivation. Snowballing is well-suited to find them. It is decided to start the snowball by addressing associations, sports clubs… that are situated in the area of interest, because, in general, they consist of people who are relatively socially committed. The chance that they are willing to participate in the survey is therefore larger.

What considerations are most prevalent?

As stated before, this question will be answered by applying association rules to the gathered data.

Do patterns differ among different socio-demographic groups?

These patterns will also be traced by means of association rules.

What are possible explanations for differences that appear?

The patterns that appear will be explained using scientific literature (preferably) and common sense (if no literature is available). Gathering new data to try to explain patterns that can not be explained using existing literature is beyond the scope of this master thesis. These patterns will be possible subjects for future research.

Initial time schedule (on 23/10/2009)

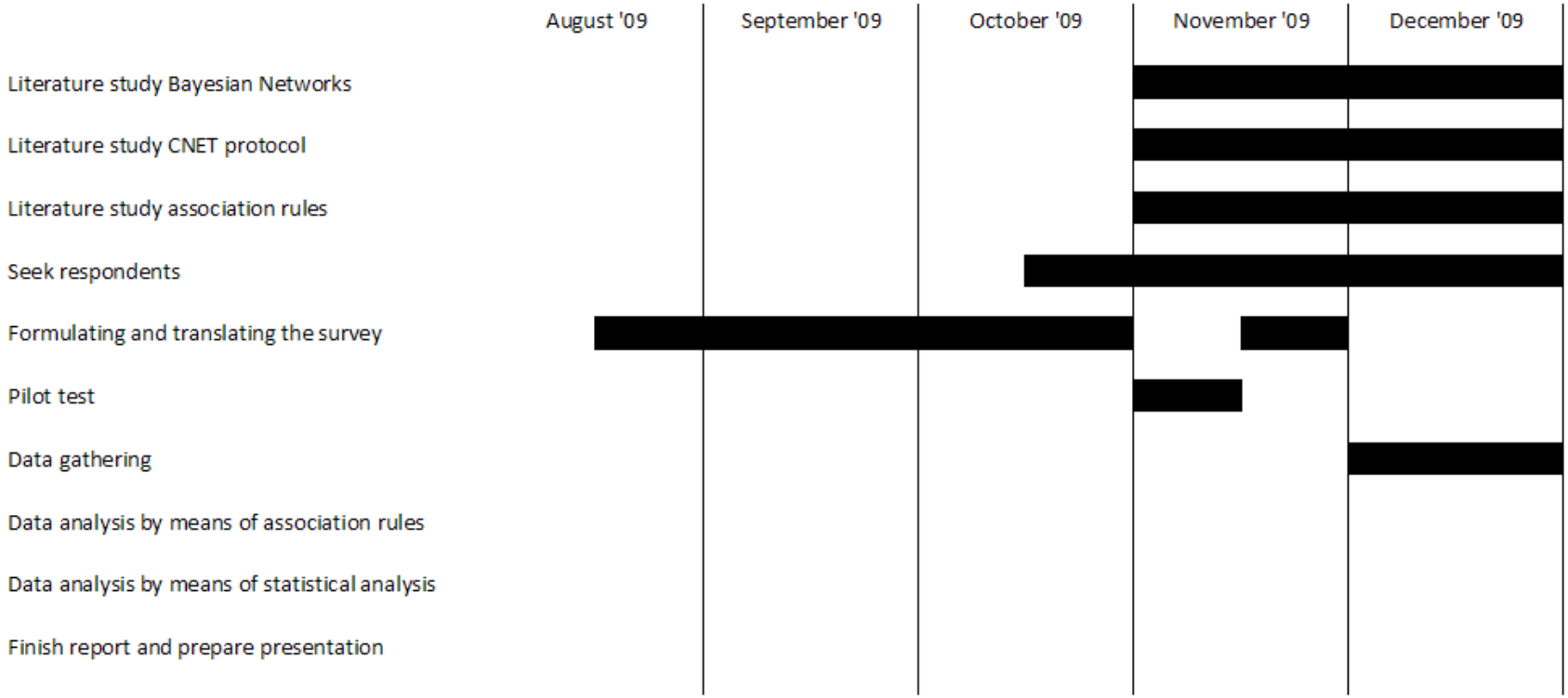

Figure 1: Time schedule.

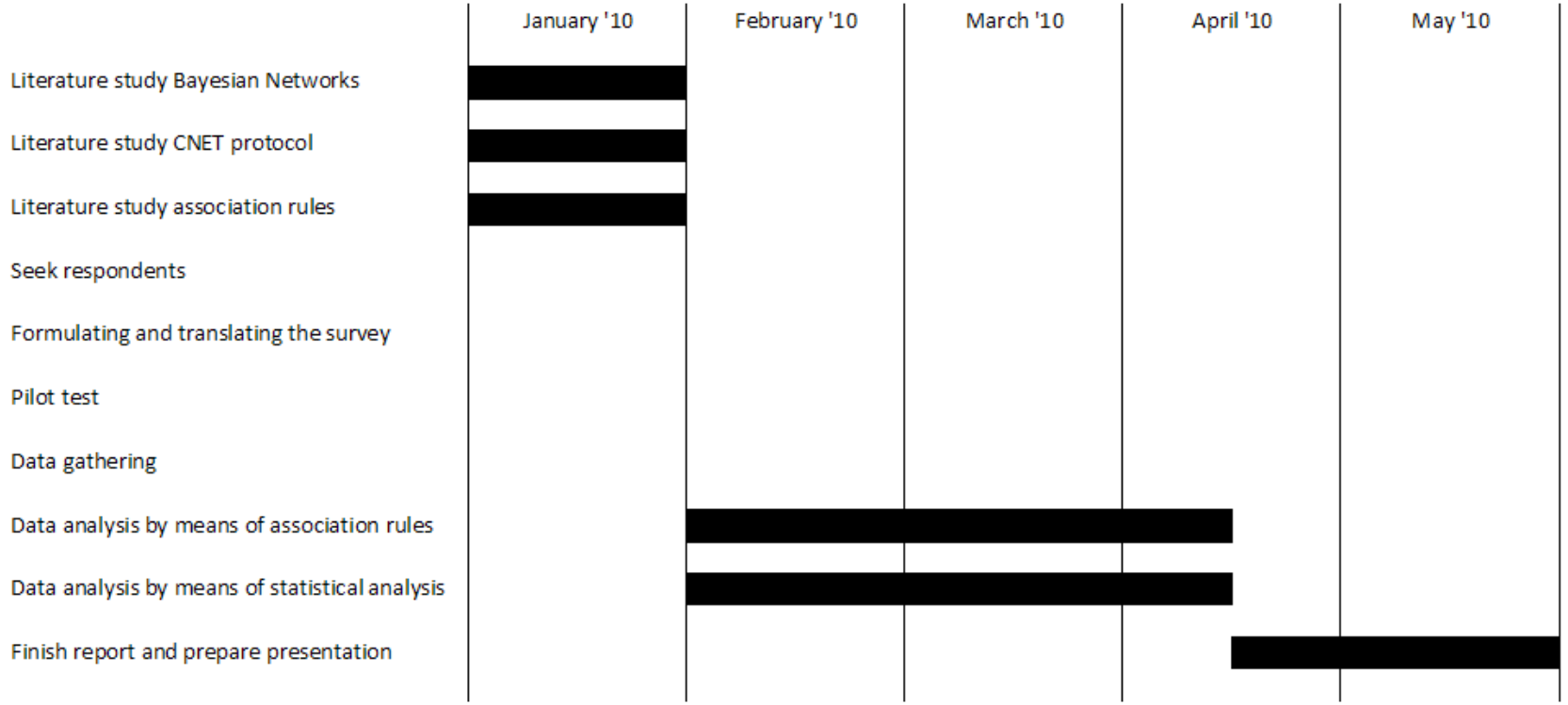

Figure 30: Time Schedule (Cont'd).

Annex 2: Lists of variables

In this section, the definitions of all variables are shown. First, the lists of contextual variables are shown. Then, the list of evaluative variables is shown. This list is the same for both decisions. And finally, the lists of instrumental variables are presented.

Table 1: List of contextual variables for the SL decision.

Budget availability	Budget availability (whether you have plenty or limited budget) may influence a shopping location decision. Is it a strong influential factor for your shopping location choice?
Companion	Having companion (e.g. his/her shopping location preference) or not may influence a shopping location decision. Is it a strong influential factor for your shopping location choice?
Information from others	Having information from others (e.g. positive/negative advice about a specific location) or not may influence a shopping location decision. Is it a strong influential factor for your shopping location choice?
Interest in specific product	Having an interest in specific product (e.g. clothing or non-clothing) or not may influence a shopping location decision. Is it a strong influential factor for your shopping location choice?
Existing plan of other activities in Hasselt	Having existing plan of other activities in Hasselt or not may influence a shopping location decision. Is it a strong influential factor for your shopping location choice?
Existing plan of other activities elsewhere but Hasselt	Having existing plan of other activities elsewhere but Hasselt or not may influence a shopping location decision. Is it a strong influential factor for your shopping location choice?
Mood	Your mood (whether you are in a good or bad mood) may influence a shopping location decision. Is it a strong influential factor for your shopping location choice?
Baggage	Number or size of goods being purchased may influence a shopping location decision. Is it a strong influential factor for your shopping location choice?
Physical condition	Your physical condition (whether you are fit or not) may influence a shopping location decision. Is it a strong influential factor for your shopping location choice?

Sale season	Sale season (whether there is sale or not) may influence a shopping location decision. Is it a strong influential factor for your shopping location choice?
Time available	Time availability (whether you have plenty or limited time) may influence a shopping location decision. Is it a strong influential factor for your shopping location choice?
Weather	Whether the weather is nice (e.g. no rain) or not may influence a shopping location decision. Is it a strong influential factor for your shopping location choice?
Crowdedness in Hasselt	Crowdedness in the city centre (whether it is crowded or not) may influence a shopping location decision. Is it a strong influential factor for your shopping location choice?
Eating a snack	Whether someone feels more welcome to eat snack in a shopping location may influence a shopping location decision. Is it a strong influential factor for your shopping location choice?
Availability of parking space in/near the area	Parking space availability in or near a shopping location may influence a shopping location decision. Is it a strong influential factor for your shopping location choice?

Table 2: List of contextual variables for the TM decision.

Availability of parking space	Parking space availability may influence a transport mode decision. Is it a strong influential factor for your transport mode choice?
Companion	Having companion (e.g. his/her transport mode preference) or not may influence a transport mode decision. Is it a strong influential factor for your transport mode choice?
Crowdedness in bus	Different cowdedness in bus may influence a transport mode decision. Is it a strong influential factor for your transport mode choice?
Existing plan of other activities in Hasselt	Having existing plan of other activities in Hasselt or not may influence a transport mode decision. Is it a strong influential factor for your transport mode choice?
Existing plan of other activities elsewhere but Hasselt	Having existing plan of other activities elsewhere but Hasselt or not may influence a transport mode decision. Is it a strong influential factor for your transport mode choice?
Mood	Your mood (whether you are in a good or bad mood) may influence a transport mode decision. Is it a strong influential factor for your transport mode choice?
Baggage	Number or size of goods being purchased may influence a transport mode decision. Is it a strong influential factor for your transport mode choice?
Physical condition	Your physical condition (whether you are fit or not) may influence a transport mode decision. Is it a strong influential factor for your transport mode choice?
Possession of bus season ticket	Bus season ticket (whether you already own it or not) may influence a transport mode decision. Is it a strong influential factor for your transport mode choice?
Crowdedness in the center	Crowdedness in the city centre (whether it is crowded or not) may influence a transport mode decision. Is it a strong influential factor for your transport mode choice?
Tax & insurance	Tax & insurance (whether it has been paid or not) may influence a transport mode decision. Is it a strong influential factor for your transport mode choice?
Time available	Time availability (whether you have plenty or limited time) may influence a transport mode decision. Is it a strong influential factor for your transport mode choice?
Unusual things	Whether you expect something unusual or not (e.g. bus strike, etc.) may influence a transport mode decision. Is it a strong influential factor for your transport mode choice?
Precipitation	Precipitation (whether it is raining or not) may influence a transport mode decision. Is it a strong influential factor for your transport mode choice?

Temperature	Outdoor temperature (whether it is pleasant or not) may influence a transport mode decision. Is it a strong influential factor for your transport mode choice?
Happening/event	Whether there is a happening (event) or not may influence a transport mode decision. Is it a strong influential factor for your transport mode choice?
Arrival time at home	Your arrival time at home (late at night after 8pm or early before 8pm) may influence a transport mode decision. Is it a strong influential factor for your transport mode choice?
Departure time from home	Your departure time from home (early in the morning before 9am or after 9am) may influence a transport mode decision. Is it a strong influential factor for your transport mode choice?
Having a lift by someone	Whether you have a lift by someone or not may influence a transport mode decision. Is it a strong influential factor for your transport mode choice?
Wind	Wind (whether it is a windy day or not) may influence a transport mode decision. Is it a strong influential factor for your transport mode choice?
Parking cost	Parking cost (whether it is free or not) may influence a transport mode decision. Is it a strong influential factor for your transport mode choice?
Bus cost	Bus cost (whether it is free or not) may influence a transport mode decision. Is it a strong influential factor for your transport mode choice?
Fuel cost	Fuel cost (whether it is cheap or expensive) may influence a transport mode decision. Is it a strong influential factor for your transport mode choice?
Traffic control	Possibility to face traffic control may influence a transport mode decision. Is it a strong influential factor for your transport mode choice?
Bus frequency	Bus frequency (whether it is frequent or not) may influence a transport mode decision. Is it a strong influential factor for your transport mode choice?
Bike infrastructure availability	Bike infrastructure availability (whether it is available or not sufficiently available) may influence a transport mode decision. Is it a strong influential factor for your transport mode choice?
Car availability	Car availability (whether there is an available car or not) may influence a transport mode decision. Is it a strong influential factor for your transport mode choice?

Table 3: List of evaluative variables (both decisions).

Assurance / certainty	Full confidence & freedom from doubt
Being healthy	Possessing or enjoying good health
Being sociable	Friendly or agreeable in company; companionable; pleasant
Convenient	Suited or favorable to one's purpose or needs, easy to reach, accessible
Durability	Well lasting and endurance, environment friendly
Efficiency (time & effort)	Accomplishment of a job with a minimum expenditure of time & effort
Fun (e.g. happiness, enjoyment, pleasure, satisfaction)	Including happiness, enjoyment, pleasure, satisfaction
Freedom	The state of being free and not under any restraints
Get the best use (of something that is already possessed)	The state of getting the best use out of something owned (e.g. bus yearly card)
Having information	The state of having information (about price, products, quality, etc.)
Having privacy	The state of being free from disturbance in one's private life
Luxury & prestige	A material object or service conducive to fine living (a delicacy, elegance, refinement) instead of necessity
Physical comfort	Physical well being provided by a person or thing
Safety & security	Condition of being safe from danger, risk or injury / Something that secures (makes safe, protection or defence)
Saving money	Reducing an outlay or expenditure of money spent for doing such an activity

Table 4: List of instrumental variables for the SL decision.

Ambiance / environment	Different areas have different environment (ambiance). Environment in a certain shopping location can be favorable to you or not. Do you strongly consider this aspect to help you in gaining the selected benefit?
Cafe & restaurant	Different areas have different characteristic regarding the presence of café & restaurant. Do you strongly consider this aspect to help you in gaining the selected benefit?
Customer service	Different areas have different levels of service given to customers (it can be good or bad). Do you strongly consider this aspect to help you in gaining the selected benefit?
Familiarity with the area	You are already familiar with a certain shopping area and unfamiliar with other areas. Do you strongly consider this aspect to help you in gaining the selected benefit?
Other activities in the area	Different additional activities in the area (beside café & restaurant). E.g. museum, parks, etc. Do you strongly consider this aspect to help you in gaining the selected benefit?
Presence of favorite shop	Presence of your favorite shop(s) in a certain area. Do you strongly consider this aspect to help you in gaining the selected benefit?
Product price	Different areas have different product prices . Do you strongly consider this aspect to help you in gaining the selected benefit?
Product quality	Different areas have differences in product quality. Do you strongly consider this aspect to help you in gaining the selected benefit?
Shop arrangement	Different areas have different arrangement of the shops (whether the shops in the area located close to each other or not). E.g. in gallery area the shops are located closer to each others compared to the boutique area (because there are churches, parks, etc.). Do you strongly consider this aspect to help you in gaining the selected benefit?
Similarity of product	The similarity (mostly clothing product or mostly non-clothing product) or the differences in the type of product being sold in the area. Do you strongly consider this aspect to help you in gaining the selected benefit?
Social status	Different areas give different image to your social status. E.g. if you go shopping in boutique area, people may think that you have a high social status. Do you strongly consider this aspect to help you in gaining the selected benefit?

Type of store	Different types of product being sold. The types of product can be generalized into two groups: Clothing: clothes and accessories, shoes, cosmetics & perfume; Non-clothing: CD, electronics, toys, home appliances shops & food. Do you strongly consider this aspect to help you in gaining the selected benefit?
Shopping location preference	Going to a certain shopping location because you like it. Do you strongly consider this aspect to help you in gaining the selected benefit?
Accessibility of the area	Different areas have different accessibility. Accessibility to a certain area can be good whilst to the others are bad. Or it can also be that you go to a certain shopping location because it is on your route. Do you strongly consider this aspect to help you in gaining the selected benefit?
Size of shopping location	The size of the shopping area. Do you strongly consider this aspect to help you in gaining the selected benefit?
Image of shops	The image that you want to get from a certain shopping area. E.g. there is an image that the gallery sells cheaper product, or an image that boutique has a better quality of product, etc. Do you strongly consider this aspect to help you in gaining the selected benefit?
Indoor shopping mall	The presence of mall in the area. E.g. gallery area. Do you strongly consider this aspect to help you in gaining the selected benefit?
Chance to meet acquaintances	A bigger chance to meet your friend(s) or other people that you know in a certain shopping area. Do you strongly consider this aspect to help you in gaining the selected benefit?
Size of shops	The size of the shops in the area (how big they are). Do you strongly consider this aspect to help you in gaining the selected benefit?
Opening time	Opening time of the shops in the area. Do you strongly consider this aspect to help you in gaining the selected benefit?
Closing time	Closing time of the shops in the area. Do you strongly consider this aspect to help you in gaining the selected benefit?
Presence of infrastructure	Different areas provide you with different infrastructure (e.g. presence of parking for your car & bike and bus stop in the area). Do you strongly consider this aspect to help you in gaining the selected benefit?

Table 5: List of instrumental variables for the TM decision.

Accident & damage	Different type of vehicles have different consequences for you in case there is an accident. Do you strongly consider this aspect to help you in gaining the selected benefit?
Adjustment in transport mode	A certain vehicle gives the possibility to make adjustment inside. E.g. in car you can hear music, adjust the position of your seat, adjust the air condition, etc. Do you strongly consider this aspect to help you in gaining the selected benefit?
Availability of seat	The seat in a certain vehicle may not always be available for you (e.g. bus during peak hour) and other vehicle (e.g. car) may always be available for you. Do you strongly consider this aspect to help you in gaining the selected benefit?
Capacity of vehicle	Different types of vehicles can load different amounts of people inside. Bus (> 7 people – large); Car (+ 5 people – medium); Bike (< 2 people – small). Do you strongly consider this aspect to help you in gaining the selected benefit?
Decreasing value (because of use)	The value of a vehicle (e.g. car) can be reduced the more you use it. Do you strongly consider this aspect to help you in gaining the selected benefit?
Easiness for parking	Different types of vehicles have a different need for parking; E.g. you can park your bike easily in the centre of Hasselt but you cannot do that for your car and car parking space can be very limited especially on Saturday. Do you strongly consider this aspect to help you in gaining the selected benefit?
Environment inside bus & car / around bike	Different type of vehicles has different environment in it (it can be hot or cold, noisy or silent, you can socialize or not, being in open air or no, etc). It can be generalized that the environment inside (or around it in case of the bike) a certain vehicle can be favorable to you or not. Do you strongly consider this aspect to help you in gaining the selected benefit?
Environment-friendliness of the TM	Different types of vehicles produce different levels of emission and noise and have a different fuel consumption. In general, bike is the most environmental friendly transport mode, and bus is more environmental friendly than car. Do you strongly consider this aspect to help you in gaining the selected benefit?
Fine	The risk of getting a fine. E.g. when you use a car can get a fine if you do not park it properly, if you stay longer than the time mentioned in the parking ticket, etc. Do you strongly consider this aspect to help you in gaining the selected benefit?

Flexibility / independency	Different type of vehicles offers you different flexibility due to the control that you have over it. E.g. flexibility offered by car & bike is bigger than bus. Do you strongly consider this aspect to help you in gaining the selected benefit?
Maintenance	The need for maintenance. E.g. the more you use your car, the more you have to maintain it. Do you strongly consider this aspect to help you in gaining the selected benefit?
Mental effort & ease	Different type of vehicles offers more easiness for you (mentally) and the others require more mental effort when you use it. E.g. you have to check for bus schedule and make sure that there is bus that can take you back home; you have to think where to park your car, etc. Do you strongly consider this aspect to help you in gaining the selected benefit?
Physical effort	Different types of vehicles require different physical effort when you use it. E.g. bike demands more physical effort to use it compared to the others. Do you strongly consider this aspect to help you in gaining the selected benefit?
Possibility to consume alcohol	Some vehicles (e.g. car) have a restriction for the amount of alcohol that you can consume during fun shopping. Do you strongly consider this aspect to help you in gaining the selected benefit?
Possibility to be stolen	Different types of vehicles (e.g. bike vs. car) have different locking systems that may make one type of vehicle more vulnerable for stealing than the other. Do you strongly consider this aspect to help you in gaining the selected benefit?
Reliability	The reliability of different types of transport mode. A certain type of vehicle can be unreliable (undependable, questionable, or deceitful). E.g. a bus can be late, it may leave earlier than what it should, etc. Do you strongly consider this aspect to help you in gaining the selected benefit?
Shelter provision (staying dry)	Different types of vehicles offer different protection to you against bad weather (raining, wind, cold) due to the presence of shelter. E.g. car & bus offer more chance to stay dry than bike when it is raining. Do you strongly consider this aspect to help you in gaining the selected benefit?
Travel time	Different vehicles offer different probabilities of having a short, medium, or long travel time. E.g. car can have medium travel time because you have to find parking. Do you strongly consider this aspect to help you in gaining the selected benefit?
Treatment of bags	Different types of vehicles offer different possibilities to store your belongings (e.g. your shopping bags) that can make you be able to treat your bags easily or not. Do you strongly consider this aspect to help you in gaining the selected benefit?

Preference of transport mode	Using a certain vehicle because you like it. Do you strongly consider this aspect to help you in gaining the selected benefit?
Direct travel	Using a certain vehicle because you do not want to change your vehicle. E.g. you might have to change bus several times; or it can be that you have to change from bike to bus, etc. Do you strongly consider this aspect to help you in gaining the selected benefit?
Route	Using a certain vehicle because of the route that you have to take when you use it (e.g. direct route, d-tour, etc). Do you strongly consider this aspect to help you in gaining the selected benefit?
Sensation of speed	The speed of different types of transport mode. Do you strongly consider this aspect to help you in gaining the selected benefit?
Cost	The cost considerations of different types of transport mode. Do you strongly consider this aspect to help you in gaining the selected benefit?
Accessibility	The accessibility concern (e.g. some area is more accessible with bike/car/bus). Do you strongly consider this aspect to help you in gaining the selected benefit?

Annex 3: Full tables network complexity

In this annex, the full tables of the network complexity in section 5.1 are presented.

Overall network complexity

Table 6: Network complexity for each decision separately (full table).

	SL decision	*TM decision*
Mean	16,74208	27,45701
Standard Error	0,537762	0,758428
Median	16	25
Mode	18	18
Standard Deviation	7,994401	11,27484
Sample Variance	63,91045	127,122
Kurtosis	0,037662	3,116935
Skewness	0,563893	1,295973
Range	43	76
Minimum	3	5
Maximum	46	81
Sum	3700	6068
Count	221	221
95% CI	[15,688; 17,796]	[25,970; 28,944]

Table 7: Network complexity SL depending on decision order (full table).

	# SL variables picked when SL is FIRST decision	*# SL variables picked when SL is SECOND decision*
Mean	20,65714	14,24306
Standard Error	0,882985	0,573065
Median	21	14
Mode	12	7
Standard Deviation	7,387584	6,876784
Sample Variance	54,5764	47,29016
Kurtosis	-0,64533	0,081306
Skewness	0,105242	0,642238
Range	31	31
Minimum	5	3
Maximum	36	34
Sum	1446	2051
Count	70	144
95% CI	[18,926; 22,388]	[13,120; 15,366]

Table 8: Network complexity TM depending on decision order (full table).

	# TM variables picked when TM is FIRST decision	*# TM variables picked when TM is SECOND decision*
Mean	26,66667	26,11429
Standard Error	0,845827	1,005068
Median	25	25
Mode	24	22
Standard Deviation	10,14993	8,409006
Sample Variance	103,021	70,71139
Kurtosis	0,189487	-0,13986
Skewness	0,605454	0,490241
Range	55	42
Minimum	5	8
Maximum	60	50
Sum	3840	1828
Count	144	70
95% CI	[25,009; 28,325]	[24,144; 28,084]

Table 9: Network complexity for each decision separately (fractions) (full table).

	SL decision (fraction)	*TM decision (fraction)*
Mean	0,315888	0,330807
Standard Error	0,010146	0,009138
Median	0,301887	0,301205
Mode	0,339623	0,216867
Standard Deviation	0,150838	0,135841
Sample Variance	0,022752	0,018453
Kurtosis	0,037662	3,116935
Skewness	0,563893	1,295973
Range	0,811321	0,915663
Minimum	0,056604	0,060241
Maximum	0,867925	0,975904
Sum	69,81132	73,10843
Count	221	221
95% CI	[0,29600; 0,33578]	[0,31290; 0,34872]

Network complexity in different scenarios

Table 10: Network complexity for both scenarios (full table).

	Time pressure scenario	*No time pressure scenario*
Mean	45,25455	43,15315
Standard Error	1,710461	1,516721
Median	43,5	42
Mode	28	37
Standard Deviation	17,93947	15,97965
Sample Variance	321,8245	255,3491
Kurtosis	1,404861	0,055916
Skewness	0,971498	0,512582
Range	92	77
Minimum	12	10
Maximum	104	87
Sum	4978	4790
Count	110	111
95% CI	[41,903; 48,607]	[40,180; 46,126]

Differences between different socio-demographic groups

Gender

Table 11: Network complexity of men vs. women (full table).

	Men	*Women*
Mean	44,51579	43,96032
Standard Error	1,749539	1,513134
Median	42	42,5
Mode	37	44
Standard Deviation	17,0524	16,98489
Sample Variance	290,7843	288,4864
Kurtosis	0,268556	1,600752
Skewness	0,618416	0,940311
Range	88	92
Minimum	10	12
Maximum	98	104
Sum	4229	5539
Count	95	126
95% CI	[41,087; 47,945]	[40,994; 46,926]

Table 12: Network complexity of men vs. women, SL decision only (full table).

	Men SL	*Women SL*
Mean	17,04211	16,51587
Standard Error	0,897167	0,659845
Median	16	16
Mode	18	17
Standard Deviation	8,744501	7,406737
Sample Variance	76,46629	54,85975
Kurtosis	0,15172	-0,32246
Skewness	0,613093	0,465516
Range	43	33
Minimum	3	3
Maximum	46	36
Sum	1619	2081
Count	95	126
95% CI	[15,283; 18,801]	[15,223; 17,809]

Table 13: Network complexity of men vs. women, TM decision only (full table).

	Men TM	*Women TM*
Mean	27,47368	27,44444
Standard Error	1,052576	1,071214
Median	26	25
Mode	22	18
Standard Deviation	10,25924	12,02435
Sample Variance	105,252	144,5849
Kurtosis	0,816446	3,949766
Skewness	0,766242	1,538331
Range	58	73
Minimum	5	8
Maximum	63	81
Sum	2610	3458
Count	95	126
95% CI	[25,411; 29,537]	[25,344; 29,544]

Age

Table 14: Network complexity for different age categories (full table).

	19-29	*30-39*	*40-49*	*50-59*	*60-71*
Mean	43,42593	42,16	43,75	44,58929	46,63158
Standard Error	1,929506	3,331506	2,749355	2,336578	2,902988
Median	42,5	38	41	42,5	46,5
Mode	55	32	28	30	41
Standard Deviation	14,17891	16,65753	19,04809	17,48535	17,89522
Sample Variance	201,0416	277,4733	362,8298	305,7373	320,239
Kurtosis	0,434502	-0,4965	2,096857	0,794199	0,543914
Skewness	0,572022	0,362625	1,189712	0,847249	0,499219
Range	70	63	89	84	86
Minimum	16	10	15	15	12
Maximum	86	73	104	99	98
Sum	2345	1054	2100	2497	1772
Count	54	25	48	56	38
95% CI	[39,644; 47,208]	([35,630; 48,690])	[38,361; 49,139]	[40,009; 49,169]	[40,942; 52,322]

Table 15: Network complexity for different age categories, SL only (full table).

	19-29 SL	*30-39 SL*	*40-49 SL*	*50-59 SL*	*60-71 SL*
Mean	17,18519	16,32	15,5	16,91071	17,71053
Standard Error	0,952423	1,671048	1,116844	1,039879	1,581772
Median	17	15	14	17	17,5
Mode	15	19	7	24	3
Standard Deviation	6,998852	8,355238	7,737722	7,781743	9,750698
Sample Variance	48,98393	69,81	59,87234	60,55552	95,0761
Kurtosis	0,185602	-0,3725	-0,63863	-0,28935	0,477326
Skewness	0,564514	0,652759	0,588737	0,480362	0,539788
Range	33	29	30	32	43
Minimum	3	5	4	4	3
Maximum	36	34	34	36	46
Sum	928	408	744	947	673
Count	54	25	48	56	38
95% CI	[15,318; 19,052]	([13,045; 19,595])	[13,311; 17,689]	[14,873; 18,949]	[14,611; 20,811]

Table 16: Network complexity for different age categories, TM only (full table).

	19-29 TM	*30-39 TM*	*40-49 TM*	*50-59 TM*	*60-71 TM*
Mean	26,24074	27,48148	27,3913	27,67857	28,92105
Standard Error	1,220869	2,670067	1,8401	1,487416	1,830041
Median	26	24	24,5	25,5	28,5
Mode	18	27	35	22	34
Standard Deviation	8,971517	13,87408	12,48017	11,1308	11,28113
Sample Variance	80,48812	192,49	155,7546	123,8948	127,2639
Kurtosis	0,519207	2,988518	6,440075	2,218586	0,252523
Skewness	0,714154	1,431653	1,835231	1,256086	0,646014
Range	42	67	72	53	51
Minimum	8	5	9	11	9
Maximum	50	72	81	64	60
Sum	1417	742	1260	1550	1099
Count	54	27	46	56	38
95% CI	[23,848; 28,634]	([22,248; 32,714])	[23,784; 30,998]	[24,764; 30,594]	[25,334; 32,508]

Education

Table 17: Network complexity for different education levels (full table).

	Lower educated	*Higher educated*
Mean	49,45783	41,03623
Standard Error	2,100075	1,253764
Median	48	40
Mode	54	37
Standard Deviation	19,13259	14,7284
Sample Variance	366,0561	216,9257
Kurtosis	0,466733	0,82161
Skewness	0,642202	0,672088
Range	92	88
Minimum	12	10
Maximum	104	98
Sum	4105	5663
Count	83	138
95% CI	[45,342; 53,574]	[38,579; 43,493]

Table 18: Network complexity SL for different education levels (full table).

	Lower educated SL	*Higher education SL*
Mean	18,80723	15,5
Standard Error	0,871978	0,663319
Median	18	15
Mode	24	7
Standard Deviation	7,9441	7,792238
Sample Variance	63,10873	60,71898
Kurtosis	-0,70729	0,962603
Skewness	0,202229	0,832275
Range	33	43
Minimum	3	3
Maximum	36	46
Sum	1561	2139
Count	83	138
95% CI	[17,098; 20,516]	[14,200; 16,800]

Table 19: Network complexity TM for different education levels (full table).

	Lower educated TM	*Higher educated TM*
Mean	30,6506	25,53623
Standard Error	1,48134	0,785874
Median	29	24
Mode	18	24
Standard Deviation	13,49565	9,231934
Sample Variance	182,1325	85,2286
Kurtosis	2,279493	1,15733
Skewness	1,237826	0,790162
Range	73	55
Minimum	8	5
Maximum	81	60
Sum	2544	3524
Count	83	138
95% CI	[27,747; 33,555]	[23,996; 27,076]

Table 20: Network complexity for SL if it is the second decision (full table).

	SL 2nd decision lower educated	*SL 2nd decision higher educated*
Mean	16,04255319	13,37113402
Standard Error	1,061894632	0,66343497
Median	15	13
Mode	6	7
Standard Deviation	7,27998282	6,534076681
Sample Variance	52,99814986	42,69415808
Kurtosis	-0,448404438	0,548725039
Skewness	0,437997099	0,738109467
Range	29	31
Minimum	3	3
Maximum	32	34
Sum	754	1297
Count	47	97
95% CI	[13,962; 18,124]	[12,071; 14,671]

Table 21: Network complexity for TM if it is the second decision (full table).

	TM 2nd decision lower educated	*TM 2nd decision higher educated*
Mean	26,77419355	25,58974359
Standard Error	1,649183361	1,252645217
Median	26	24
Mode	22	20
Standard Deviation	9,182264345	7,822766871
Sample Variance	84,31397849	61,19568151
Kurtosis	0,128389208	-0,490935151
Skewness	0,355258763	0,606587833
Range	42	31
Minimum	8	13
Maximum	50	44
Sum	830	998
Count	31	39
95% CI	[23,542; 30,006]	[23,135; 28,045]

Income

Table 22: Network complexity for different income categories (full table).

	Low income	*Medium income*	*High income*	*I'd rather not say*
Mean	48,07692	42	44,33333	42
Standard Error	2,380036	1,568597	2,570814	3,675221
Median	46	41	42	38,5
Mode	36	44	28	55
Standard Deviation	19,18846	15,127	16,05473	18,00483
Sample Variance	368,1971	228,8261	257,7544	324,1739
Kurtosis	0,068065	1,574341	-0,07609	5,17396
Skewness	0,490487	0,879998	0,285367	1,826861
Range	87	86	76	86
Minimum	12	15	10	18
Maximum	99	101	86	104
Sum	3125	3906	1729	1008
Count	65	93	39	24
95% CI	[43,412; 52,742]	[38,926; 45,074]	[37,294; 47,372]	([34,796; 49,204])

Table 23: Network complexity different income categories, SL only (full table).

	Low income SL	*Medium income SL*	*High income SL*	*I'd rather not say SL*
Mean	18,36923	15,86022	16,89744	15,5
Standard Error	1,158076	0,79335	1,186857	1,146829
Median	18	15	18	16,5
Mode	24	18	18	17
Standard Deviation	9,336704	7,650791	7,411921	5,618293
Sample Variance	87,17404	58,5346	54,93657	31,56522
Kurtosis	-0,12884	-0,28495	-0,3664	-0,46857
Skewness	0,464601	0,599966	0,241722	0,051351
Range	43	32	31	22
Minimum	3	3	5	5
Maximum	46	35	36	27
Sum	1194	1475	659	372
Count	65	93	39	24
95% CI	[16,099; 20,639]	[14,305; 17,415]	[14,571; 19,223]	([13,252; 17,748])

Table 24: Network complexity different income categories, TM only (full table).

	Low income TM	*Medium income TM*	*High income TM*	*I'd rather not say TM*
Mean	29,70769	26,13978	27,4359	26,5
Standard Error	1,490148	1,019055	1,747099	2,951295
Median	29	24	26	22,5
Mode	24	23	18	31
Standard Deviation	12,01395	9,827414	10,91063	14,45834
Sample Variance	144,3351	96,57807	119,0418	209,0435
Kurtosis	0,877898	4,256352	-0,32602	8,526576
Skewness	0,799575	1,427457	0,408172	2,57668
Range	56	63	46	70
Minimum	8	9	5	11
Maximum	64	72	51	81
Sum	1931	2431	1070	636
Count	65	93	39	24
95% CI	[26,787; 32,629]	[24,143; 28,137]	[24,012; 30,860]	([20,716; 32,284])

Distance from city centre

Table 25: Network complexity different distances from centre, TM only (full table).

	Close (<4 km) TM	*Medium (5-7 km) TM*	*Far (8-10 km) TM*
Mean	26,45455	27,875	28,17857
Standard Error	1,166657	1,341486	1,407565
Median	25	24	28,5
Mode	18	24	35
Standard Deviation	10,23737	12,58426	10,53325
Sample Variance	104,8038	158,3635	110,9494
Kurtosis	0,452239	4,502663	1,065817
Skewness	0,685291	1,826774	0,556798
Range	52	70	58
Minimum	8	11	5
Maximum	60	81	63
Sum	2037	2453	1578
Count	77	88	56
95% CI	[24,168; 28,742]	[25,246; 30,504]	[25,420; 30,938]

Differences related to overall mobility

Table 26: Network complexity TM for different car use categories (full table).

	Max. 5000 km/year TM	*5001-15000 km/year TM*	*> 15000 km/year TM*
Mean	26,19298	28,94444	25,05556
Standard Error	1,26115	1,123619	1,272846
Median	24	27	24,5
Mode	18	18	28
Standard Deviation	9,521477	11,67699	9,353471
Sample Variance	90,65852	136,352	87,48742
Kurtosis	2,0278	1,510369	0,157208
Skewness	1,023542	1,060183	0,393452
Range	51	63	46
Minimum	9	9	5
Maximum	60	72	51
Sum	1493	3126	1353
Count	57	108	54
95% CI	[23,721; 28,665]	[26,742; 31,146]	[22,561; 27,551]

Table 27: Network complexity for categories of fun shopping frequency (full table).

	Rarely if ever	A few times a year	(nearly) monthly	A few times a month
Mean	41,21429	42,04762	43,375	48,20896
Standard Error	4,613857	1,921577	2,262277	1,925869
Median	43,5	39	40,5	47
Mode	#N/A	30	28	53
Standard Deviation	17,26347	17,61154	16,92933	15,76392
Sample Variance	298,0275	310,1664	286,6023	248,5011
Kurtosis	-1,34107	1,39901	0,037515	2,325056
Skewness	-0,14439	1,060803	0,575438	1,113316
Range	50	91	75	80
Minimum	15	10	12	24
Maximum	65	101	87	104
Sum	577	3532	2429	3230
Count	14	84	56	67
95% CI	([32,171; 50,257])	[38,282; 45,814]	[38,941; 47,809]	[44,434; 51,984]

Differences in node types

Table 28: Node types SL decision (full table).

	Contextual var. SL	Evaluative var. SL	Instrumental var. SL
Mean	3,19457	4,466063	8,113122
Standard Error	0,125078	0,157298	0,305044
Median	3	4	8
Mode	3	3	8
Standard Deviation	1,859415	2,33841	4,534801
Sample Variance	3,457425	5,468161	20,56442
Kurtosis	0,352299	0,750468	-0,0027
Skewness	0,637432	0,79444	0,584703
Range	9	13	21
Minimum	0	1	1
Maximum	9	14	22
Sum	706	987	1793
Count	221	221	221
95% CI	[2,950; 3,440]	[4,158; 4,774]	[7,515; 8,711]

Table 29: Node types TM decision (full table).

	Contextual var. TM	Evaluative var. TM	Instrumental var. TM
Mean	4,361991	5,624434	9,506787
Standard Error	0,22771	0,163255	0,295977
Median	4	5	9
Mode	5	4	7
Standard Deviation	3,385155	2,426958	4,400021
Sample Variance	11,45928	5,890128	19,36018
Kurtosis	9,853554	1,253014	0,325456
Skewness	2,562142	0,884565	0,7113
Range	25	14	24
Minimum	0	1	1
Maximum	25	15	25
Sum	964	1243	2101
Count	221	221	221
95% CI	[3,916; 4,808]	[5,304; 5,944]	[8,927; 10,087]

Habit & node type

Table 30: SL contextual variables when starting from a habit or not (full table).

	No habit SL contextual	*Habit SL contextual*
Mean	3,456693	2,840426
Standard Error	0,150305	0,208108
Median	3	3
Mode	3	1
Standard Deviation	1,693854	2,017681
Sample Variance	2,869141	4,071036
Kurtosis	0,695064	0,142305
Skewness	0,857141	0,664251
Range	8	9
Minimum	1	0
Maximum	9	9
Sum	439	267
Count	127	94
95% CI	[3,162; 3,752]	[2,432; 3,248]

Table 31: SL evaluative variables when starting from a habit or not (full table).

	No habit SL evaluative	*Habit SL evaluative*
Mean	4,464567	4,468085
Standard Error	0,187003	0,271292
Median	4	4
Mode	3	2
Standard Deviation	2,107414	2,630271
Sample Variance	4,441195	6,918325
Kurtosis	0,242025	0,832812
Skewness	0,603389	0,913383
Range	10	13
Minimum	1	1
Maximum	11	14
Sum	567	420
Count	127	94
95% CI	[4,099; 4,831]	[3,936; 5,000]

Table 32: SL instrumental variables when starting from a habit or not (full table).

	No habit SL instrumental	*Habit SL instrumental*
Mean	8,102362	8,12766
Standard Error	0,372776	0,512983
Median	8	7
Mode	8	10
Standard Deviation	4,200972	4,973552
Sample Variance	17,64817	24,73622
Kurtosis	-0,1875	0,029242
Skewness	0,493558	0,653754
Range	19	21
Minimum	1	1
Maximum	20	22
Sum	1029	764
Count	127	94
95% CI	[7,371; 8,833]	[7,122; 9,134]

Table 33: TM contextual variables when starting from a habit or not (full table).

	No habit TM contextual	*Habit TM contextual*
Mean	4,943396	3,826087
Standard Error	0,314327	0,321196
Median	4	3
Mode	5	3
Standard Deviation	3,236195	3,444449
Sample Variance	10,47296	11,86423
Kurtosis	5,054688	15,46709
Skewness	2,17746	3,12785
Range	17	25
Minimum	1	0
Maximum	18	25
Sum	524	440
Count	106	115
95% CI	[4,327; 5,559]	[3,197; 4,455]

Table 34: TM evaluative variables when starting from a habit or not (full table).

	No habit TM evaluative	*Habit TM evaluative*
Mean	5,54717	5,695652
Standard Error	0,227543	0,234081
Median	5	5
Mode	4	4
Standard Deviation	2,342697	2,510238
Sample Variance	5,48823	6,301297
Kurtosis	1,069349	1,419771
Skewness	0,852139	0,907589
Range	12	14
Minimum	1	1
Maximum	13	15
Sum	588	655
Count	106	115
95% CI	[5,101; 5,993]	[5,237; 6,155]

Table 35: TM instrumental variables when starting from a habit or not (full table).

	No habit TM instrumental	*Habit TM instrumental*
Mean	9,132075	9,852174
Standard Error	0,394954	0,436204
Median	9	8
Mode	7	7
Standard Deviation	4,066297	4,677763
Sample Variance	16,53477	21,88146
Kurtosis	-0,47797	0,544095
Skewness	0,447534	0,826608
Range	17	24
Minimum	2	1
Maximum	19	25
Sum	968	1133
Count	106	115
95% CI	[8,358; 9,906]	[8,997; 10,707]

Decision order & node type

Table 36: Number of SL contextual variables by decision order (full table).

	# SL contextual variables when SL first	*# SL contextual variables when SL second*
Mean	4	2,652778
Standard Error	0,221981	0,130118
Median	4	2
Mode	4	2
Standard Deviation	1,857222	1,561421
Sample Variance	3,449275	2,438034
Kurtosis	0,322616	0,63883
Skewness	0,237546	0,695205
Range	9	8
Minimum	0	0
Maximum	9	8
Sum	280	382
Count	70	144
95% CI	[3,565; 4,435]	[2,398; 2,908]

Table 37: Number of SL evaluative variables by decision order (full table).

	# SL evaluative variables when SL first	*# SL evaluative variables when SL second*
Mean	5,428571	3,840278
Standard Error	0,262628	0,172019
Median	5	4
Mode	4	2
Standard Deviation	2,197307	2,064225
Sample Variance	4,828157	4,261024
Kurtosis	-0,71306	0,970575
Skewness	0,250545	0,889737
Range	9	10
Minimum	1	1
Maximum	10	11
Sum	380	553
Count	70	144
95% CI	[4,914; 5,944]	[3,503; 4,177]

Table 38: Number of SL instrumental variables by decision order (full table).

	# SL instrumental variables when SL first	*# SL instrumental variables when SL second*
Mean	10,27143	6,777778
Standard Error	0,509098	0,332669
Median	10,5	6,5
Mode	12	3
Standard Deviation	4,259419	3,992028
Sample Variance	18,14265	15,93629
Kurtosis	-0,09781	0,516713
Skewness	0,273418	0,769236
Range	21	19
Minimum	1	1
Maximum	22	20
Sum	719	976
Count	70	144
95% CI	[9,273; 11,269]	[6,126; 7,430]

Table 39: Number of TM contextual variables by decision order.

	# TM contextual variables when TM first	*# TM contextual variables when TM second*
Mean	3,928571	4,034722
Standard Error	0,275517	0,223305
Median	4	4
Mode	4	5
Standard Deviation	2,305139	2,679665
Sample Variance	5,313665	7,180604
Kurtosis	5,163974	4,024602
Skewness	1,814329	1,479373
Range	13	16
Minimum	0	0
Maximum	13	16
Sum	275	581
Count	70	144
95% CI	[3,389; 4,469]	[3,597; 4,473]

Table 40: Number of TM evaluative variables by decision order (full table).

	# TM evaluative variables when TM first	*# TM evaluative variables when TM second*
Mean	5,157143	5,597222
Standard Error	0,229894	0,190927
Median	5	5
Mode	4	4
Standard Deviation	1,923431	2,291118
Sample Variance	3,699586	5,249223
Kurtosis	-0,74212	-0,11554
Skewness	0,185308	0,509713
Range	8	11
Minimum	1	1
Maximum	9	12
Sum	361	806
Count	70	144
95% CI	[4,707; 5,607]	[5,223; 5,971]

Table 41: Number of TM instrumental variables by decision order (full table).

	# TM instrumental variables when TM first	*# TM instrumental variables when TM second*
Mean	8,771429	9,458333
Standard Error	0,419095	0,36155
Median	8	8
Mode	7	7
Standard Deviation	3,506398	4,338597
Sample Variance	12,29482	18,82343
Kurtosis	-0,68988	-0,26328
Skewness	0,378787	0,511538
Range	14	22
Minimum	2	1
Maximum	16	23
Sum	614	1362
Count	70	144
95% CI	[7,950; 9,592]	[8,749; 10,167]

Education & node type

Table 42: Contextual variables SL for different education levels (full table).

	Secondary or lower contextual SL	*Higher education contextual SL*
Mean	3,566265	2,971014
Standard Error	0,197838	0,158654
Median	4	3
Mode	3	2
Standard Deviation	1,802388	1,863761
Sample Variance	3,248604	3,473606
Kurtosis	-0,1123	1,047112
Skewness	0,190786	0,942001
Range	8	9
Minimum	0	0
Maximum	8	9
Sum	296	410
Count	83	138
95% CI	[3,178; 3,954]	[2,660; 3,282]

Table 43: Evaluative variables SL for different education levels (full table).

	Secondary or lower evaluative SL	*Higher education evaluative SL*
Mean	4,987952	4,152174
Standard Error	0,247523	0,199147
Median	5	4
Mode	5	3
Standard Deviation	2,255043	2,33945
Sample Variance	5,085219	5,473024
Kurtosis	-0,45067	1,887612
Skewness	0,414172	1,08764
Range	9	13
Minimum	1	1
Maximum	10	14
Sum	414	573
Count	83	138
95% CI	[4,503; 5,473]	[3,762; 4,542]

Table 44: Instrumental variables SL for different education levels (full table).

	Secondary or lower instrumental SL	*Higher education instrumental SL*
Mean	9,277108	7,413043
Standard Error	0,494255	0,376605
Median	9	7
Mode	6	10
Standard Deviation	4,502881	4,424102
Sample Variance	20,27593	19,57268
Kurtosis	-0,61502	0,718146
Skewness	0,324525	0,791935
Range	18	21
Minimum	1	1
Maximum	19	22
Sum	770	1023
Count	83	138
95% CI	[8,308; 10,246]	[6,675; 8,151]

Table 45: Contextual variables TM for different education levels (full table).

	Secondary or lower contextual TM	*Higher education contextual TM*
Mean	5,325301	3,782609
Standard Error	0,478792	0,210468
Median	4	4
Mode	4	5
Standard Deviation	4,361999	2,472444
Sample Variance	19,02703	6,11298
Kurtosis	6,303897	5,370321
Skewness	2,291218	1,64147
Range	25	16
Minimum	0	0
Maximum	25	16
Sum	442	522
Count	83	138
95% CI	[4,387; 6,263]	[3,371; 4,195]

Table 46: Evaluative variables TM for different education levels (full table).

	Secondary or lower evaluative TM	*Higher education evaluative TM*
Mean	6,216867	5,268116
Standard Error	0,310483	0,177116
Median	6	5
Mode	4	4
Standard Deviation	2,828635	2,080637
Sample Variance	8,001175	4,329049
Kurtosis	0,810413	0,276636
Skewness	0,850457	0,553654
Range	14	11
Minimum	1	1
Maximum	15	12
Sum	516	727
Count	83	138
95% CI	[5,608; 6,826]	[4,921; 5,615]

Table 47: Instrumental variables TM for different education levels (full table).

	Secondary or lower instrumental TM	*Higher education instrumental TM*
Mean	10,45783	8,934783
Standard Error	0,526774	0,34501
Median	10	8
Mode	7	7
Standard Deviation	4,799139	4,052946
Sample Variance	23,03174	16,42637
Kurtosis	0,124946	0,240995
Skewness	0,632661	0,67211
Range	23	22
Minimum	2	1
Maximum	25	23
Sum	868	1233
Count	83	138
95% CI	[9,426; 11,490]	[8,259; 9,611]