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► To cite this version:

Béatrice Degraeve, Marie-Axelle Granié, Karyn Pravossoudovitch. Men and women drivers: a study of social representations through prototypical and correspondence analysis. *WiT Paris 2014: Women's Issues in Transportation, 5th International Conference on Women's Issues in Transportation - Bridging the Gap*, Apr 2014, Paris, France. 18p. hal-01973983

HAL Id: hal-01973983

<https://hal.science/hal-01973983v1>

Submitted on 8 Jan 2019

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**MEN AND WOMEN DRIVERS: A STUDY OF SOCIAL REPRESENTATIONS
THROUGH PROTOTYPICAL AND CORRESPONDENCE ANALYSIS**

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Thematic axe: Health, safety and personal security, pillar 2

Key words: social representations, prototypical analysis, correspondence analysis, stereotypes, drivers.

Submitted on October 31, 2013

Word count = abstract (242) + introduction (699) + method (664) + results (1047) + discussion (1005) + conclusion (314) = 3971 words.

+ 2 figures and 3 tables = 1250 words (5221 words total).

ABSTRACT

Representations of men and women drivers and their implications are a major societal issue since several years. However, so far, few studies have demonstrated the precise content of these representations among adults. This study is based on the structural approach of social representations. The aim is to analyze the representations of men and women behind the wheel according to sex, age and social status, and to generate hypotheses about the central or peripheral status of the items revealed. According to an intergroup pattern, 414 French participants were asked to answer a questionnaire, using verbal association methodology (N=203 for men drivers, N=211 for women drivers). They were equally distributed on the basis of sex, age class (from 16 to 50 years-old and over) and social status. The thematic analysis revealed four large topics, including 16 subtopics in both cases. By comparing occurrence frequencies of these associations (salience in the representational field) and average ranks (importance given by subjects), the structural pattern of these representations was explored. Besides, differences and social anchors were analyzed through a correspondence analysis. The results seem to reflect the effect of social positions on the choices made to designate a man or a woman driver. Attitudes also seem to vary according to age: younger people referred more to risk and rules, whereas older individuals referred more to skills and expertise. The results are discussed through gender-related essentialism, in-group/out-group relations, age and socialization impacts in gender stereotypes associated with driving.

1. INTRODUCTION

In most Western countries, men are two to three times more likely to die in a traffic accident than women (1-3). Their chances of being injured in a car accident are 25% higher compared to women (4). Studies show that men are more frequently involved in accidents related to a violation of the rules. In France, at equal mileage, women have 2.5 times fewer points removed from their driving license, and are 6.2 times less convicted for offenses (5). However, despite these objective data about accidentology, it seems that the negative stereotype against women, according to which they would be poor drivers (6), continues. These stereotypes, providing the foundation for strong inductive inferences, can have significant cognitive and behavioral consequences (7-9). In the context of driving, the study of stereotypes appears to be an important aspect of understanding social construction of such content, gender identity, as well as threat phenomena and its implications. Nevertheless, so far, few studies have demonstrated the precise content of these stereotypes among adults. Although some studies are based on a brief review of its characteristics, their study is often restricted to preliminary research (8), and no study has reported this content in terms of social representations. To the best of our knowledge, the specific content of these representations has not been explored in depth among an adult population yet, although we are using it for many other studies. As a consequence, the objective of this study is to analyze the specific contents of the social representations of men and women behind the wheel according to sex and age.

Some social objects can be described as “social representations” (10). These objects, concerning which each individual has a structured definition, are developed through interactions with others, including consensual elements shared by all, as well as minor items on which differences can be observed. On the axis of the work of Moscovici (10), another approach was developed by Abric (11, 12) to account for the internal organization of social representations. According to this structural approach, the central core theory aims to demonstrate how are structured the elements constituting a representation. This theory assumes that any representation is organized around a central core. These few elements forming the core (opinions, beliefs, knowledge elements ...) are subject to a consensus among the individuals who share this representation. In this manner, the core has two main functions: a generating meaning function, by conferring meaning to the other elements of the representation, and an organizing function, by characterizing the type of links of the elements constituting this representation. The core has another important property: the stability of the component elements, which are more resistant to change. Other elements related to the representation but are not part of the central core are called “peripheral elements”. These elements allow certain flexibility in the representation and reflect the individual appropriation and the context in which they are developed. Thus, unlike the central elements characterized by a consensus, the representation considers many interindividual variations in the peripheral system. The work of Guimelli (13) shows in this way that some hunters say that hunting is “a solitary activity”, others that it is a “way to meet friends”. These individual variations at the peripheral level, however, are not sufficient to reconsider the central element that corresponds to the “territory management”. A protective function of the central core (or defense function according Abric) is also involved: the peripheral system operates as “bumper of the representation”, according to the expression of Flament (14, 15). Indeed, it allows the integration of new elements in the representation: the transformation of representation first takes place at a peripheral level. Thus, even if the core is the foundation of the representation, peripheral elements play an important role, by operating in a complementary manner with the central system. They are the interface between the core and reality, the concrete situation in which the representation is developed. In the theoretical field of social representation, the aim

of the present study is to analyze the contents of social representations of men and women behind the wheel according to sex, age and social status, and to generate hypotheses about the central or peripheral status of items revealed.

2. METHOD

2.1. Material

This study is based on the verbal association procedure and the substitution technique. These tools are relevant for the study of specific social groups and for identifying the content of social representations, which is the case of the present research. Many studies used the method of verbal associations to reveal various representational contents (16-21). During a first phase, participants were asked to associate 5 words or expressions to an inductor related to the object of representation. It was thus given the following instruction to the subjects: "Give 5 words or expressions that come immediately to mind to describe a man (vs. a woman) driver". In a second phase, after completing these associations, participants were asked to rank their answers, from the most important to least important to characterize the object. Thus, two indicators are used in the study of associations produced: the frequency of appearance of an item (is the item cited by many participants?) and its importance in the representational field (what is the rank associated with the item by the participants?). Elements that are considered particularly important to characterize the object (and that are potentially the core elements of the representation) are both characterized by a high frequency (consensual aspect) and a high importance. Therefore, a low rank reflects a high importance, because it indicates that the word has been ranked in the first positions. Conversely, a high rank reflects a low importance because it indicates that the word was ranked in the last position (i.e. close to 5).

The median is used to determine the threshold from which a word can be considered to have a low vs. high importance. Given that the importance can be rated from 1 to 5, the associations which importance is evaluated less than 3 are considered to be the most important for the participants. For the frequency criterion, we consider that a word is characterized by a high frequency (vs. low) when cited by more than 10% of the population (22, 23). Given that the population consists of 203 and 211 participants, thresholds are respectively equal to 20 and 21. Concerning elements that can lead to masking strategies, Guimelli and Deschamps (20) propose to use a substitution instruction, which consists not directly asking individuals about their personal opinions but what they think the opinions of others are (typically those of the "French in general"). Participants thus give the opinion they think the French have on men or women drivers. The assumption is that this instruction lowers the normative pressure, which allows individuals to express views they would mask in another situation. Therefore, this procedure allows identifying relevant content, including the problematic and non-problematic aspects. This instruction was used as a precaution, assuming that the potential undesirable content (especially against women) would have led to a masking phenomenon (20), which would have made a whole section of the social representation not accessible. However, the results showed that there were no differences between the two types of instructions.

2.2. Population

The sample consisted of 203 participants for the “man driver” questionnaire and 211 participants for the “woman driver” questionnaire. We divided the population into subgroups based on certain criteria (gender, age, socio-professional category). The socio-economic status (SES) of the participants or of their both parents (for students or high school students) was obtained by referring to the grid of the National Institute of Statistics and Economic Studies, in order to obtain a balanced sample between higher SES (Entrepreneurs, liberal professions, intellectual professions) and lower SES (intermediate professions, employees or workers). Four age groups constituting targets that are likely to differentiate in attitudes or driving behaviors were identified: 16-18 year-olds, 19-29 year-olds, 30-49 year-olds, aged 50 and over. A southeastern France junior-high school and high school were solicited in order to collect data on participants aged between 12 and 15 years and between 16 and 18 years. Concerning adult participants, data collection was conducted on a random basis, in some southeastern France cities, such as Marseilles and Salon-de-Provence.

3. RESULTS

3.1. Thematic content analysis

Thematic analysis of the words used by the participants was conducted using four independent judges. The study of the social representation of “the man driver” allowed identifying 16 characteristics (self-confidence, citizenship, practical skills, technical skills, arrogance, impatience, carelessness, inattention, incivility, incompetence, patience, pleasure, caution, transgression of the rules, virility and speed). The study of the representation of the “woman driver” allowed identifying 16 characteristics (lack of practical skills, lack of technical skills, the functional aspect of the conduct, citizenship, skills, compliance with rules, danger, impatience, inattention, incivility, slowness, patience, lack of confidence, caution, transgression of the rules, and vigilance). The categories determined and their frequencies of occurrence in the population are presented in Table 1.

Insert Table 1 here

3.2. Prototypical analysis

The prototypical analysis of the characteristics was carried out with the “Evoc” program (24, 25). For “men drivers”, the most frequently words cited by participants and considered at the same time as the most important to define the object were “speed”, “self-confidence”, “carelessness”, “caution”, “impatience” and “transgression of the rules” (table 2). These words were those with the highest probability of belonging to the central system (22, 23). The first periphery (i.e. the frequently mentioned elements but considered as less important) revealed interindividual variations, with terms such as “arrogance” or “incivility”. Elements such as “citizenship” and “incompetence” composed the second periphery (i.e. the elements characterized by a low frequency and a low importance). No contrasted element (i.e. not frequently mentioned but very important items) for the representation of the men drivers was found. This area outlines the elements that can be the foundation of diverging or even conflicting conceptions in the representational field.

Insert Table 2 here

For “women drivers”, the most consensual and important terms were “caution”, “compliance with rules”, “vigilance”, “lack of practical skills and confidence” and “danger” (table 3). Concerning the first periphery (i.e. consensual elements but with a low importance), were found elements such as “impatience” and “slowness”. Aspects related to “skills” were part of the contrasted elements (i.e. items characterized by a low frequency but high importance). Finally, the functional aspects of the driving, was found in the second periphery (i.e. not frequently mentioned elements and considered as unimportant).

Insert Table 3 here**3.3. Correspondence factor analysis (CORR. F. A.)**

The analysis of the associations produced for each representation was conducted through a Correspondence factor analysis (CORR. F. A.) (26). This analysis aimed to identify differences in the frequency of the associations, according to the selected variables. This permits to reveal the relationship between associations to define a man or a woman driver and the different variables, i.e. disclose connections between collected items and modalities of variables. Two CORR. F. A. were performed by focusing the analysis on the variables of sex and age. The two-dimensional graph displays the results of the CORR. F. A. Only items with a sufficient contribution per factor were selected. The more an item is located at the intersection of the two axes, the more this item is consensual (no deviation from independence). On the contrary, the more an item is located at the extremity of the graph, the more it is specific of a particular group. In other words, the more an item deviates from the center, the less it indicates a consensus, but rather reflects a specific discourse of a given group. For each axis, were selected the modalities for which the contribution to the formation of an axis exceeded the average (1.666 for the variables and 0.0625 for the observations).

Concerning the first analysis (men drivers), dimension 1 (eigenvalue: 0.030813, 52.59% of inertia) opposes the male respondents to the female respondents. Dimension 2 (eigenvalue: 0.016489, 28.15% of inertia) opposes aged 16 to 18 to those aged 30 and over. Thus, we can see that men associate with their social representation of the “men drivers” characteristics related to practical skills and caution. In contrast, women consider more aspects related to transgression of rules and inattention. Concerning Factor 2, we notice that respondents aged between 16 to 18 years more associated with frequency characteristics such as practical skills to the “men drivers”. Conversely, those aged 30 and over rather mentioned characteristics related to technical expertise and the manly aspects of driving.

Insert Figure 1 here

Concerning the “women drivers”, were also identified modalities for which the contribution to the formation of an axis exceeded the average contribution (0.1666 for the variables and 0.0625 for the observations, the number of variables and observations being

equivalent as for “the men drivers”). Dimension 1 (eigenvalue: 0.022775, 49.89% of inertia) opposed the male respondents and female respondents. Men associated women drivers with criteria such as slowness, more than women. In contrast, women more frequently mention characteristics related to danger, vigilance and compliance with rules to describe “women drivers”. Dimension 2 (eigenvalue: 0.013483, 29.54% of inertia) opposed respondents aged 16 to 18 years to those aged 30 and over. The former refer to transgression with the rules, impatience and incivility and, while the latter focus more on the lack of practical and technical skills.

Insert Figure 2 here

We see the social construction of these attitudes, depending on the social positions occupied by the individuals. Consequently, we can see that men emphasized on characteristics related to the skills and expertise in their social representation of the “men drivers” characteristics related to the skills and expertise, while women further consider aspects related to the transgression of the rules and inattention, i.e. the dangerous aspects of their driving. To describe the “women drivers”, women more frequently mention characteristics related to compliance with rules and vigilance, and highlight a careful driving style. Meanwhile, men associate more criteria for slowness, – which seems to indicate an excess of caution –, lack of confidence or competence in their description of the “women drivers”. It seems that the attitudes also differ depending on the age (Dimension 2) where the younger participants suggest more the relation to risk and rules, unlike the older participants, making more references to skills and abilities, in both cases. Thus, for men and women drivers each group emphasized on different skills and behaviors needed to drive safely, men and experienced drivers stressed the technical and practical skills, whereas women and younger drivers stressed on safety skills and compliance with rules. It seems that social groups highlight and evaluate men and women drivers in relation to the skills they think they possess or that are important to them.

4. DISCUSSION

The objective of this study was to analyze the social representations of men and women behind the wheel according to sex and age. These analyzes allowed to identify some constants. Associations showed shared cognitions, which some are common to the whole group of participants. This is the case of the elements related to self-confidence and impatience (man driver) and lack of confidence (woman driver), ranked first and most frequently cited in the prototypical analysis and not included on the correspondence analysis (which seems to reflect more of a consensual rather than a specific discourse). In the end, it appears that the vision of the “men drivers” seems to be primarily based on their skills. In contrast, the vision of the “women drivers” seems to be primarily based on their incompetence. However, a second aspect appears to come into opposition simultaneously, in both cases. While women seem to be described as very cautious and vigilant, men seem to be seen as driving fast and risky. This could explain the aspects related to the confidence (low confidence for women vs. high confidence for men), which could be seen as a cause or a consequence of the level of competence in driving. These findings are consistent with some studies which have shown that adolescents and preadolescents already differentiate expertise

and driving skills according to sex: women have abilities for safety but not for driving, while men have driving skills but neglect security and safety (27). It would be since women are incompetent they must be cautious and because men are competent they can become careless. These results are in line with stereotypes describing men as taking risks, being more aggressive (28), competent (29-32) and women more hesitant, less active (33), and considered less competence in driving, even if they have fewer accidents (34). Furthermore, the results of Näätänen and Summala (35) showed that even among adolescents, the tendency to drive fast and to overtake is considered as an indicator of competence (one of the most important and frequent characteristic to describe “men drivers”). This suggests that asymmetrical attributions may be made according to the sex of driver: in case of an accident, men would be judged to not have enough take the other users into account while women would be judged to have demonstrated a lack of mastery of the vehicle (34). Conversely, in case of good driving (or accident avoidance), women would have been cautious and vigilant towards other road users (thus avoiding an accident) while men would have expertise and dexterity for driving cars (and this is due to those skills that they avoid an accident). This can be related to Deaux’s findings (36, 37) according to which performances that are consistent with expectations are attributed to stable and internal causes (such as ability) while performances that are inconsistent with expectations are attributed to more unstable causes (such as effort or luck). Since people usually more expect men to succeed than women (which remains the case for driving), women’s successes are more likely to be attributed to luck or effort, and less to ability, contrary to men. Similarly, since people usually more expect women to fail than men, women’s failures are more likely to be attributed to a lack of ability, and less to a lack of effort or luck, contrary to men. In this perspective, this indicates that men succeed through internal factors, these factors explaining failure for women. Note that these performance expectations and the reasons attributed to these performances are elaborated by consensus to both sexes (38). This means that women also consider themselves as incompetent and explain it by internal factors, rather than other factors. These results tend to suggest this phenomenon, since negative terms are used by both sexes for women drivers, such as “danger”, “lack of practical skills” or “lack of confidence”, characterized by a high frequency and high importance. Regarding terms characterized by a high frequency and high importance, no elements indicating any lack of competence are used by both sexes to characterized men drivers. Thus, the representation that the members of the dominant group elaborate toward the members of the subordinate group enables the former to legitimize their dominant position. But at the same time, the representation that subordinate group members elaborate toward dominant group members allow them to justify their position of subordination. Otherwise, according to Fiske (39), the stereotypical judgment is a way of exercising control over others, which reinforces the power of an individual or a group. In other words, stereotypes are used by members of dominant groups to maintain the status quo. This echoes the work of Berger (6), according to which negative stereotypes about women drivers were spread in the early twentieth century due to emancipation that could generate the car. As a result, this threat would have been at the base of a negative stereotype toward women drivers, in order to minimize the impact of the automobile as a perspective of women’s liberation and involvement into social change. Various popular beliefs against their driving style appeared according to which, due to their physical and emotional sensitive constitution, they would be unable to handle stressful situations requiring rapid decision making, which would make them poor drivers.

Beyond these consensual aspects, nevertheless, elements that can give rise to differences within the group are observed. This is the case of “contrasted elements” for women drivers, for example. Aspects related to the “skills” are considered as very important

(listed in the first positions), but only through a part of the population, which explains why it is considered to have an overall low frequency. This discrepancy is also found on the analysis of correspondence, where these aspects are more frequently mentioned by women. In fact, women promote more the in-group and denigrate more the out-group than men. Men being members of the dominant group, women tend to defend their position (40). However this phenomenon does not occur for “men drivers” for whom no “contrasted elements” are observed, as if there was no real divergence point among participants.

5. CONCLUSION

This research attempted to analyze the social representations of men and women drivers among young adults and adults. This work allows starting to establish a representational content but does not allow drawing any conclusion yet. The results seem to indicate the effect of social positions to designate a man or a woman driver. Indeed, it seems that the characteristics selected to determine these objects can differ according to social affiliations. We have seen that the vision of the “men drivers” was mainly based on their skills whereas the vision of the “women drivers” was mainly based on their incompetence. Other characteristics also differed by sex or age. However, an accurate diagnosis of these items cannot be established at this point, because the methodology used here only allows making assumptions about the central vs. peripheral status of these elements. Indeed, the method of free associations is an effective method to identify a representational content, but does not enable to specify its structural organization. In this perspective, this analysis must be completed by a structural diagnostic test, such as the “Test of Context Independence” (TCI) (41) or the technique of “calling into question” (42). Future research should focus more specifically on this differentiation, as this study was unable to distinguish directly what comes under the central core and what comes under the peripheral system, which limits the conclusions of this study.

The practical significance of these results concerns the gender differences in driving behaviors and its implications in terms of accidents and risk-taking. Differences in risk taking between men and women in road space can be due to the manifestation of a behavior consistent to social expectations (43). Moreover, the differentiated beliefs about the driving skills of men and women that this study shows could have direct implications on men and women behaviors and may cause effect of stereotype threat on women drivers (7, 8, 9).

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Categorical analysis of the associations produced

Table 2

Prototypical analysis of the representation of the “men drivers”

Table 3

Prototypical analysis of the representation of the “women drivers”

Figure 1

Two-dimensional correspondence analysis graph according to sexe and age group (men drivers).

Figure 2

Two-dimensional correspondence analysis graph according to sexe and age group (women drivers).

Categories (Men drivers)	Characteristics	Frequency	Categories (Women drivers)	Characteristics	Frequency
Caution	Prudent, security, responsible, attentive, focused, alert	N=34	Caution	Cautious, prudent, reassuring, protective, less risk	N=152
Carelessness	Reckless, dangerous, unconscious, accidents, road hog	N=99	Danger	Reckless, dangerous, imminent death, unconscious, accident	N=133
Inattention	Inattentive, low concentration, distracted	N=18	Vigilance	Attentive, focused, alert	N =46
Speed	Drive fast, speed	N=104	Inattention	Low concentration, distracted, makeup while driving, doing two things at the same time	N =91
Transgression of the rules	Non compliance with the code, irresponsible, alcohol, drug, offenses	N=70	Slowness	Drove slowly, drives like a granny, traffic jam	N=63
Practical skills	Mastery of vehicle, control, reflexes, pilot, performance, facilities, talented, natural talent, abilities.	N=55	Transgression of the rules	Non compliance with the code, irresponsible, alcohol	N=37
Technical skills	Maneuvers, mechanics, sense of direction, technique, good for parking	N=22	Compliance with rules	Compliance with limitations, code compliance, compliance with traffic signals, responsible	N=48
Incompetence	Drive poorly	N=13	Lack of practical skills	Clumsy, lack of mastery, poor reflexes, poor conductor, is not made for it, "another woman at the wheel"	N=85
Citizenship	Gallant, cordial, civic, polite	N=10	Lack of technical skills	Difficulties for maneuvering, understands nothing in mechanics, does not know their way, difficulties to park	N=61
Incivility	Aggressive, angry, rude, vulgar, grumpy, intolerant, disrespectful, discourteous, selfish, individualistic, self-centered	N=193	Skills	Mastery, control, smooth driving, good driver	N=20
Patience	Calm, serenity, patience	N=6	Citizenship	Respectful, courteous, cordial, civic, polite, kind	N=46
Impatience	Impatient, hurry, brutal conduct, nervous, impulsive, stressed, horn	N=130	Incivility	Rude, vulgar, disrespectful, aggressive, hysterical, angry	N=38
Arrogance	Show off, flirt, proud, arrogant, conceited	N=54	Patience	Calm, patient, less impulsive	N=38
Virility	Virility, domination, sense of superiority, power, macho, sexist	N=61	Impatience	Impatient, hurry, nervous, stressed, horn	N=38
Self-confidence	Confidence	N=38	Lack of confidence	Shy, hesitant, unsure of herself, timid, anxious, panic	N=39
Pleasure	Pleasure like driving, freedom, travel, big cars, fast cars, the importance of the car, attached to the vehicle	N=22	Functional aspect of the driving	Daily trips, small cars, cheaper car, sober car, practical c	N=19

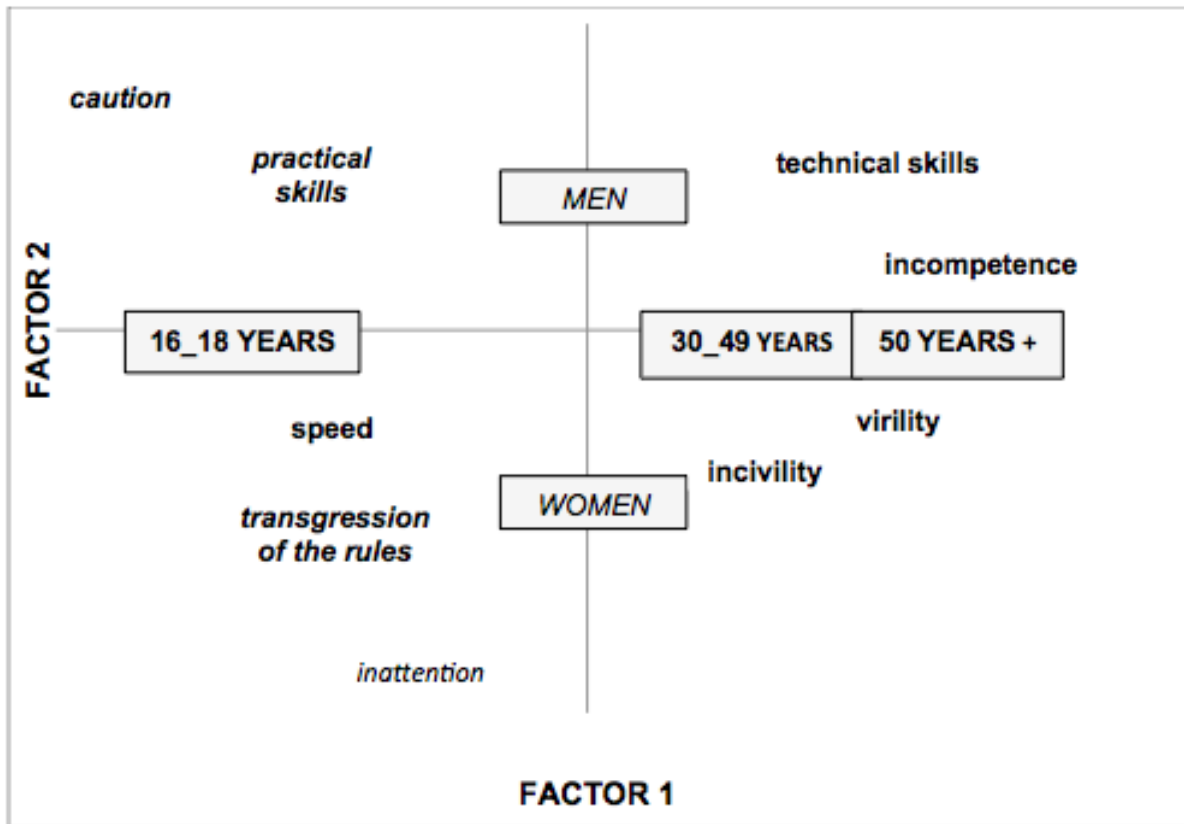
TABLE 2 Prototypical analysis of the representation of the “men drivers”

Frequency	Rank					
	< 3			> 3		
	N	Rank		N	Rank	
> 10 %	Speed	104	2,21	Incivility	193	3,05
	Self-confidence	38	2,57	Virility	61	3,06
	Carelessness	99	2,71	Arrogance	54	3,07
	Practical skills	55	2,72	Technical skills	22	3,40
	Caution	34	2,73	Pleasure	22	3,50
	Impatience	130	2,83			
	Transgression of the rules	70	2,95			
				Inattention	18	3,55
< 10 %			Citizenship	10	4,00	
			Patience	6	4,00	
			Incompetence	13	4,07	

TABLE 3 Prototypical analysis of the representation of the “women drivers”

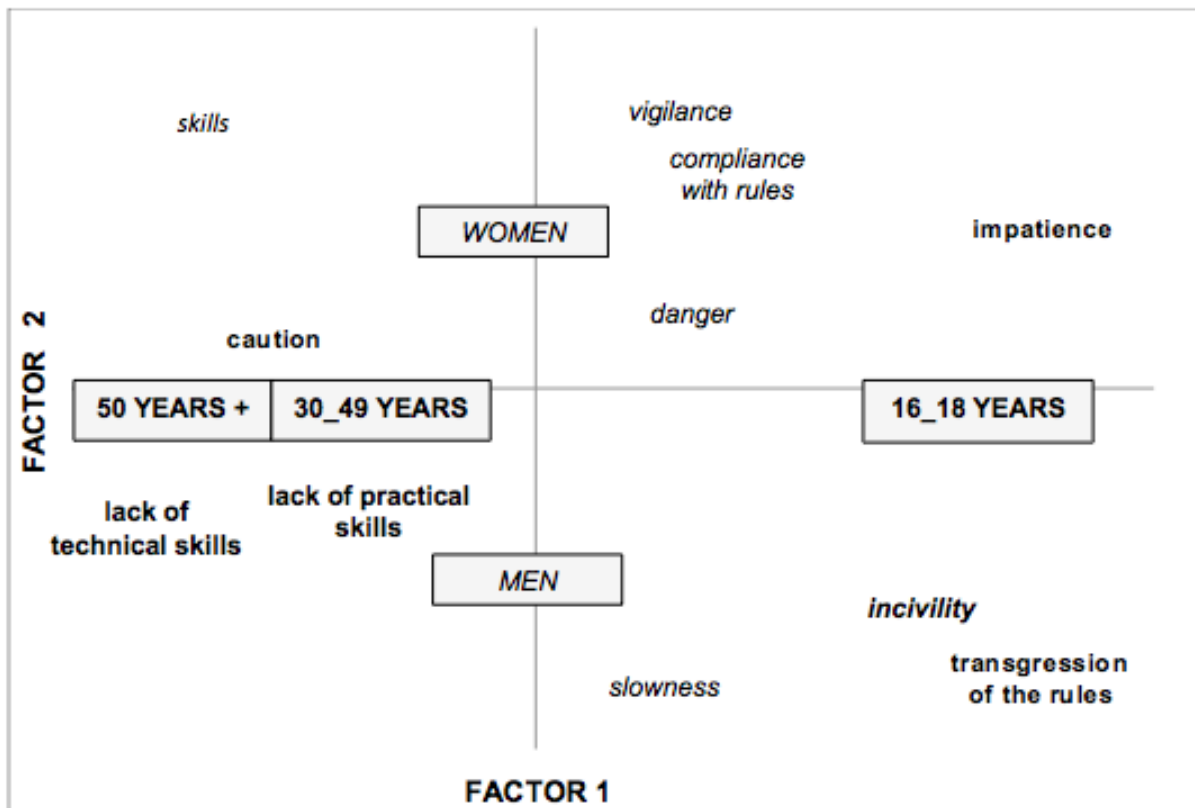
Frequency	Rank					
	< 3			> 3		
		N	Rank		N	Rank
	Caution	152	2,28	Patience	38	3,00
	Compliance with rules	48	2,37	Transgression of the rules	37	3,02
	Vigilance	46	2,56	Lack of technical skills	61	3,21
> 10 %	Lack of practical skills	85	2,69	Citizenship	46	3,40
	Lack of confidence	39	2,82	Slowness	63	3,23
	Danger	133	2,90	Incivility	38	3,39
				Inattention	91	3,40
				Impatience	38	3,42
< 10 %	Skills	20	2,90	Functional aspect of the driving	19	3,21

FIGURE 1 Two-dimensional correspondence analysis graph according to sexe and age group (men drivers).



Note: Abbreviations in capital letters inside grey frames represent the terms of independent variables
 “**TERM**” means that the independent variables accounts for the construction of Factor 1
 “*TERM*” means that the independent variables accounts for the construction of Factor 2
 “**Item**” means that the item accounts for the construction of Factor 1
 “*Item*” means that the item accounts for the construction of Factor 2
 “**Item**” means that the item accounts for the construction of Factor 1 and 2

FIGURE 2 Two-dimensional correspondence analysis graph according to sexe and age group (women drivers).



Note: Abbreviations in capital letters inside grey frames represent the terms of independent variables
 “**TERM**” means that the independent variables accounts for the construction of Factor 1
 “*TERM*” means that the independent variables accounts for the construction of Factor 2
 “**Item**” means that the item accounts for the construction of Factor 1
 “*Item*” means that the item accounts for the construction of Factor 2
 “*Item*” means that the item accounts for the construction of Factor 1 and 2