



# Do young novice drivers overestimate their driving skills more than experienced drivers? Different methods lead to different conclusions

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## ABSTRACT

In this study we argue that drivers have to make an assessment of their own driving skills, in order to sufficiently adapt to their task demands in traffic. There are indications that drivers in general, but novice drivers in particular, overestimate their driving skills. However, study results differ on the subject of self-assessment of skills. The objectives of this paper are (1) to study whether novice drivers indeed overestimate their driving skills more than experienced drivers; and (2) to evaluate the influence of the method to measure self-assessment of skills (i.e. comparison to 'average' and 'peer' driver versus independent measures of own performance). The results show that the conclusion of whether novice drivers overestimate their driving skills is highly affected by the method chosen to measure self-assessment of skills. When drivers are asked to compare themselves to the average and peer driver, we can conclude that novice drivers are not as optimistic about their driving skills as has been reported in the past. They seem to recognize that they are not as skilled (yet) as the average driver. However, when comparing their self-assessment with their actual behaviour there are indications that they overestimate their driving skills.

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## 1. Introduction

Young, novice drivers have a higher crash rate than all other age categories in motorised countries (see e.g.: Engström et al., 2003; Mayhew et al., 2006; OECD - ECMT, 2006). Since the driving task is "self-paced", a driver can reduce task demands (e.g. by reducing speed or increasing following distance), and thus making the driving task easier (Fuller, 2005, 2008). In theory, this strategy may be successful in overcoming the limitations of novice drivers' performance; a novice driver can decrease task demands to fit his/her (deficient) level of driving skills. However, in order to sufficiently adapt task demands, a driver has to make a correct assessment of his/her own driving skills. There are indications that especially young novice drivers are not very accurate in the assessment of their driving skills (OECD - ECMT, 2006), and that their overestimation of driving skills in particular, is related to the high crash risk of young, novice drivers (Gegersen, 1996).

In the past, overestimation of skill, also called the optimism bias (Svenson, 1981; Deery, 1999; Weinstein and Lyon, 1999) or self-enhancement bias (Brown, 1986; Walton, 1999), has been

investigated by simply asking drivers to compare their skills with the 'average driver' in a questionnaire. Results show that drivers rate themselves to be better drivers than the average driver (McCormick et al., 1986; Mckenna et al., 1991; Delhomme, 1996). Particularly novice drivers are assumed to have an even poorer perception of their actual ability, they overestimate their ability more than experienced drivers do (OECD - ECMT, 2006). However, not all studies into overestimation of skills reach the same conclusion. Mayhew and Simpson (1995) provide an extensive overview of studies into the assessment of skill. They have found studies indicating that young drivers are especially overconfident. However, other studies indicated that young drivers do not differ from older drivers in self-assessment, or have shown that young drivers are overconfident, but not in all driving situations. Finally, Mayhew and Simpson also report studies showing that young drivers express less overconfidence than older drivers. More recently, Waylen et al. (2004) found that expert police drivers overestimate their skill to the same degree as novices. However, it should be noted that the 'novice' drivers in this study had their drivers licence for 9.7 years on average and their mean age was 28.2 years. A longitudinal questionnaire study in the United Kingdom (Grayson and Elliott, 2004), reported varying levels of confidence, dependent on the amount of time novice drivers held their drivers' license. Immediately after passing their exam drivers reported having much confidence in

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their driving skills. After a few months, participants probably developed a more realistic view of the demands of traffic and their own skills, because six months and twelve months after passing the driving test, their confidence level decreased significantly. After a year of driving experience the confidence level started to increase again, but it never reached the high level just after passing the driving test.

Most of the disagreement in the studies can be explained by the method used to measure overconfidence (see also Sundström, 2008b, for a review on the measurement of self-assessment). Sometimes drivers had to compare themselves with 'the average driver', sometimes they had to compare themselves with 'someone from their peers'. With this method, respondents were not only asked to make an assessment of their own driving skill, but they also had to make an assessment of the driving skill of an 'average driver' or a 'peer'. But who is the 'average driver'? As Groeger (2000) points out, 'average' may be a negative rather than neutral descriptor, and traffic would be very unsafe if the average driver is only a mediocre driver. Besides this theoretical problem, the interpretation of results also differs. If a certain group expresses high confidence in their own skills, it is frequently assumed that this assessment is incorrect. But what if their actual skill level is indeed higher than the comparison group? For example, Mathews and Moran (1986), show results indicating that a group of young, novice drivers express about the same confidence in comparison with the average driver as an older, more experienced group. However, the authors reason, as the group of young, novice drivers have a higher crash risk, their expressed confidence is further from the truth than the confidence of the experienced group.

The solution to these difficulties with interpretation can be resolved, by letting drivers make an assessment of their own driving skills and compare this with their actual driving skills. In domains other than driving, self-assessment of skills has been related to a more objective measure of the skill, rather than group average. For example, Kruger and Dunning (1999) compared actual performance with assessed performance, and found that participants scoring in the bottom quartile on tests of humour, grammar, and logic reasoning grossly overestimated their test performance and ability. In some studies concerning driving skills, self-assessment was also compared to an independent measure. Delhomme and Meyer (2000) compared male drivers' expectation on how many cones they would knock over on a track with their actual performance. The results showed that less experienced drivers had higher levels of expected performance on the task than the more experienced drivers in the study. Horrey et al. (2008, 2009) conducted a series of experiments in which they compared younger and older drivers' expectations about the effect of distraction (completing a series of tasks on a cell phone) with their actual performance while driving around a course in an instrumented vehicle. The results showed that drivers were generally not able to assess the magnitude of the distraction effects. More specifically, Horrey et al. (2008) found that young male drivers who thought they performed better in a stopping task actually performed worse than others. No such difference between estimated and actual performance loss was found for the older male drivers or the female drivers. Overall, these studies indicate that, for these very specific tasks on a track, young, novice and male drivers overestimate their performance on these tasks. This could be an indication that young novice drivers also overestimate their general driving skills.

Recently, Sundström (2008a) compared novice drivers' performance on the theory and practical driving test with drivers' assessment on how well they would perform on these tests. Sundström found only a weak relationship between predicted and actual performance on these tests, with performance on the theory test having the strongest relationship with perceived performance. In contrast, Mynttinen et al. (2009) concluded on the basis of a similar study, that a large proportion of driving candidates made realistic

self-assessments of their driver competence. Between 40% and 50% of respectively Dutch and Finnish candidates made realistic assessments and "only" 40% to 30% overestimated their competence. Both studies, however, made no comparison between novice and experienced drivers. Therefore, it is still inconclusive whether novice drivers overestimate their skills more than experienced drivers do. In addition, it is not very clear how these results should be interpreted: If approximately half of the novice drivers make a realistic assessment, does this indicate that novice drivers as a group are accurate in their assessment or the opposite: that they are not?

To sum up, results of previous studies differ considerably on the subject of self-assessment of driving skills. This can (partly) be explained by different approaches used; (a) comparison of a drivers' assessment with the group average or (b) comparison of the assessment of each driver to an independent measures of skills. The current study elaborates on results presented at the Young Researchers Seminar (De Craen et al., 2007a) and aims (1) to study whether novice drivers indeed overestimate their driving skills more than experienced drivers; and (2) to evaluate the influence of method effects (i.e. comparison to 'average' and 'peer' driver versus independent measures of own performance).

## 2. Method

### 2.1. Participants

Two groups of drivers, novice and experienced, were selected for this study. In collaboration with the CBR, the Dutch Driving Test Organisation, all drivers under the age of 25, who had passed their driving test in September 2005, were invited to participate in this project. Within two weeks we contacted 553 drivers of whom 509 agreed to participate. This is a response rate of 92% for the novice drivers. The experienced drivers were recruited differently. RDW, the Dutch Vehicle Technology and Information Centre, randomly provided the names of 999 experienced drivers, who had held their licence for more than 10 years and were not older than 50. The first 179 drivers that responded positively to our invitation to participate were included in the study.

After some initial drop-out (12%) the total sample consisted of 607 drivers; 173 experienced drivers (drop-out=3%) and 434 novice drivers (drop-out=15%). The experienced drivers had a mean age of 41 (SD=5.6 years), had held their license for more than 10 years (M=20; SD=5.7 years), and 49% of the experienced drivers were male. The novice drivers had only two weeks of driving experience when they completed the first questionnaire; they had a mean age of 20 (SD=1.8 years), 52% being male.

### 2.2. Design

The results reported here were collected within a larger longitudinal study, in which novice and experienced drivers completed questionnaires over a two-year period. With such a longitudinal design it is possible that drivers who, on a regular basis, fill in questionnaires about traffic behaviour and traffic safety will become more aware of the risks of driving than drivers who perhaps never even think about traffic safety (Falk, 2010). In order to rule out these and other learning effects (e.g. Bouchet et al., 1996) as alternative explanations for our results, the novice drivers were randomly divided into two groups. A total of 297 novice drivers (Novice I) started filling in questionnaires and diaries in October 2005, the remaining 137 novice drivers (Novice II) were selected for participation in September 2005, but did not start filling in the questionnaires until May 2006.

A total of 130 drivers (83 novice drivers and 47 experienced drivers) were randomly drawn from the sample, and invited to par-

ticipate in an on-road driving assessment. Because not all novice drivers in the longitudinal study started at the same time, half of the novice drivers (Novice I) filled out the questionnaire first and then participated in an on-road driving assessment, and half of the novice drives (Novice II) first participated in the driving assessment and then filled out the questionnaire. All experienced drivers first filled out the questionnaire and then participated in the driving assessment.

### 2.3. Instruments

#### 2.3.1. Questionnaire

The participants completed questionnaires on a website that was designed for this study. In addition to some background information (age, occupation, etc.) the questionnaire contained eight questions on driver confidence. Two questions asked participants how confident they are as a driver, and how much danger they perceive in traffic, without any reference to other drivers. The respondents rated on a five-point scale whether they were: (1) very confident, (2) confident, (3) neutral, (4) insecure or (5) very insecure. Regarding traffic safety, they responded with either: (1) traffic is very dangerous, (2) traffic is quite dangerous, (3) neutral, (4) traffic is quite safe, or (5) traffic is very safe. In the remaining six questions the participants were asked to compare themselves, with the average and peer driver, on their driving skill, ability to cope with hazards, and their risk of being involved in a crash. They indicated on a five point scale whether they viewed themselves as either (1) a much better, (2) a better, (3) not a better nor a worse, (4) a worse, or (5) a much worse driver compared with the average or peer driver.

#### 2.3.2. On-road driving assessment

The driving assessment consisted of half an hour driving on different road types. The rides were carried out at two Dutch Driving Test locations in the cities of Rotterdam and Rijswijk. In both cities the participants drove a fixed route, which was selected in such a way that the routes in Rijswijk and Rotterdam were as comparable as possible. Because of traffic jams, on a few occasions an alternative route was driven. In order to make the ride resemble an ordinary trip, the participants were instructed to follow signposts on part of the route (e.g., “Use the sign posts to find your way to the station”). For the remaining part, “go left/go right” instructions were used.

The driving assessments were conducted by three professional driving license examiners. Previous to the actual drives, each examiner drove both routes in Rotterdam and Rijswijk three times, with different participants. The purpose of these ‘pilot-drives’ was to familiarize the examiners with the routes, and to standardize the assessments of the examiners. The driving examiners were aware of the objective of the study. As this could bias their assessment (e.g. young drivers are ‘most likely novice drivers’), the examiners were explicitly informed that the group consisted of different types of drivers, some older who rarely drove, and some younger who drove on a regular basis (e.g. as a professional courier). In addition, the participants were instructed not to mention anything about their prior driving experiences to the examiner.

The examiners were asked to rate the drivers on a scale from 0 to 10; on their ‘ability to drive safely’, 5.5 being the pass-fail criterion in a real driving test. This scale of ‘ability to drive safely’ reflects the scale on which candidates are assessed in the Dutch driving test and resembles how school performance is graded in the Netherlands (i.e. a score of 10 would equal an A+, and a score of 6 would equal a ‘just passed’ C). Although a certain level of vehicle manoeuvring skills is necessary, the ‘safe driving’ score is meant to reflect mostly higher-order-skills, such as appropriate speed choice, hazard perception and anticipating on other road users.

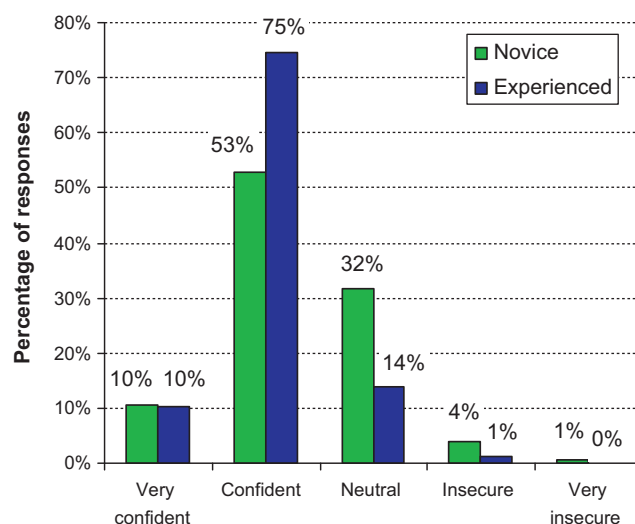


Fig. 1. Confidence in own driving skills. Experienced drivers ( $n=166$ ) are more confident about their own driving skills than novice drivers ( $n=421$ ).

#### 2.4. Data analysis

Respondents answered the questions about confidence and danger in traffic on a five-point scale, resulting in ordinal variables. The difference between experienced and novice drivers on these ordinal variables was analysed using Chi-square tests. Spearman's Rho was used to calculate bivariate correlation coefficients between these ordinal variables. The safe driving scores provided by the examiner were analysed as an interval variable. *F*-test univariate analysis of variance (ANOVA) was used to test for significant differences between experienced and novice drivers. Besides significance of the results ( $\alpha = .05$ ), also the effect size (Partial eta squared,  $\eta^2$ ) was considered with  $\eta^2 \approx .01$  as a small,  $\eta^2 \approx .06$  as a medium, and  $\eta^2 \approx .14$  as a large effect size (Cohen, 1988).

The scores of three variables in which the participants compared themselves with the average driver were added up to form a new variable ‘self-assessed comparison to the average driver’. The internal consistency, or Cronbach's alpha, of .72 suggested that the three original variables measured the same construct and adding was a valid handling of the data. The Cronbach's alpha of the three variables that measured how participants compared themselves with peer drivers was .81. The scores on these variables were also added up to form the new variable ‘self-assessed comparison to peers’. Finally, these new compound variables were ranked and compared to the ranking of safe driving scores from the driving assessment.

### 3. Results

There were no significant differences between the Novice I and Novice II drivers on demographic variables, responses to the questionnaire or ‘ability to drive safely’ as rated by the examiners. These drivers were analysed as one group of novice drivers for the remaining analyses.

#### 3.1. Perceived confidence and danger

Experienced and novice drivers did not differ in the amount of danger they perceived in traffic. There was, however, a difference in how much confidence drivers had in their own driving skills (see Fig. 1). Experienced drivers were more confident about their driving skills than novice drivers ( $\chi^2 (3, N = 587) = 27.89; p < .001$ )<sup>1</sup>.

<sup>1</sup> Due to low frequencies, the categories ‘Insecure’ and ‘Very insecure’ were combined into one category.

**Table 1**

Comparison of novice drivers ( $n=421$ ) and experienced drivers ( $n=166$ ) to 'the average driver' and peers; and Chi-square analysis results.

	Novice	Experienced	Significance
I am a (much) better driver compared with...			
Average	32%	51%	$p < .000$
Peers	49%	41%	n.s.
I have (much) less risk in traffic compared with...			
Average	30%	44%	$p < .001$
Peers	45%	33%	$p < .009$
I am (much) better in coping with hazards in traffic compared with...			
Average	37%	57%	$p < .000$
Peers	44%	43%	n.s.

### 3.2. Comparison with 'average' driver and peers

The participants were asked to compare themselves with the average driver and to their peers. Table 1 shows the percentages of positive answers; for example the percentage of drivers believing to be 'better drivers' or 'much better drivers'.

The difference between novice and experienced drivers was tested using Chi-square analysis. The right-hand column of Table 1 shows the significance level of these tests. When comparing with the average driver, a significant higher proportion of experienced drivers see themselves as '(much) better drivers', having '(much) less risk in traffic', and being '(much) better in coping with hazards'. However, when comparing to peer drivers, experienced drivers are less positive and novice drivers are more positive, resulting in a small, not significant, difference between novice and experienced drivers. Only regarding their perceived risks in traffic, novice drivers are significantly more optimistic than experienced drivers (see Table 1).

### 3.3. Comparison with expert's opinion

The drivers' assessments were also compared to the examiner's opinion of driving skills. Table 2 shows the statistics of the grade for safe driving. ANOVA showed that this grade was significantly higher for experienced drivers ( $F(1, 126) = 29.34$ ;  $p < .001$ ). The effect size ( $\eta^2 = .16$ ) indicates that this is a large effect. Table 2 furthermore shows that 70% of the novice drivers would have passed if the driving assessment was an actual driving test, compared to 94% of the experienced drivers.

Spearman's correlation coefficients were calculated to test for correlation between the safe driving scores and the drivers' perception of skills and risks in traffic (see Table 3). In general, no correlation was found between drivers' perception of skills or risks and the examiner's 'safe driving' score. One exception was the positive relationship indicating that novice drivers, who believe they are less at risk in traffic than their peers, were indeed rated as being safer in the driving assessment.

In this study the nature of the lack of correlation between the drivers' self-assessments and the examiners opinion is of special interest. In order to graphically depict this (lack of) relationship, the measures of self-assessment and the examiners opinion were converted into percentiles. That is, the total group of 130 drivers was sorted on the basis of their performance on the driving assessment

**Table 2**

Mean grade and pass rate on-road driving assessment.

	Novice drivers	Experienced drivers
N	83	47
Mean score	5.8	6.8
Standard deviation	1.2	0.9
Pass rate	70%	94%

**Table 3**

Spearman Rho correlations of self-assessments and examiners 'safe driving' score.

	Novice ( $n=83$ )	Experienced ( $n=47$ )
How confident are you concerning your own driving skills?	-.07	.16
What is your opinion about traffic risks?	.19	.17
I am a (much) better driver compared with...		
Average	.03	.07
Peers	.18	-.01
I have (much) less risk in traffic compared with...		
Average	.10	-.06
Peers	.32**	.10
I am (much) better in coping with hazards in traffic compared with...		
Average	-.09	.02
Peers	.14	-.08

Significant correlations are indicated: \* $p < .05$ ; \*\* $p < .01$ .

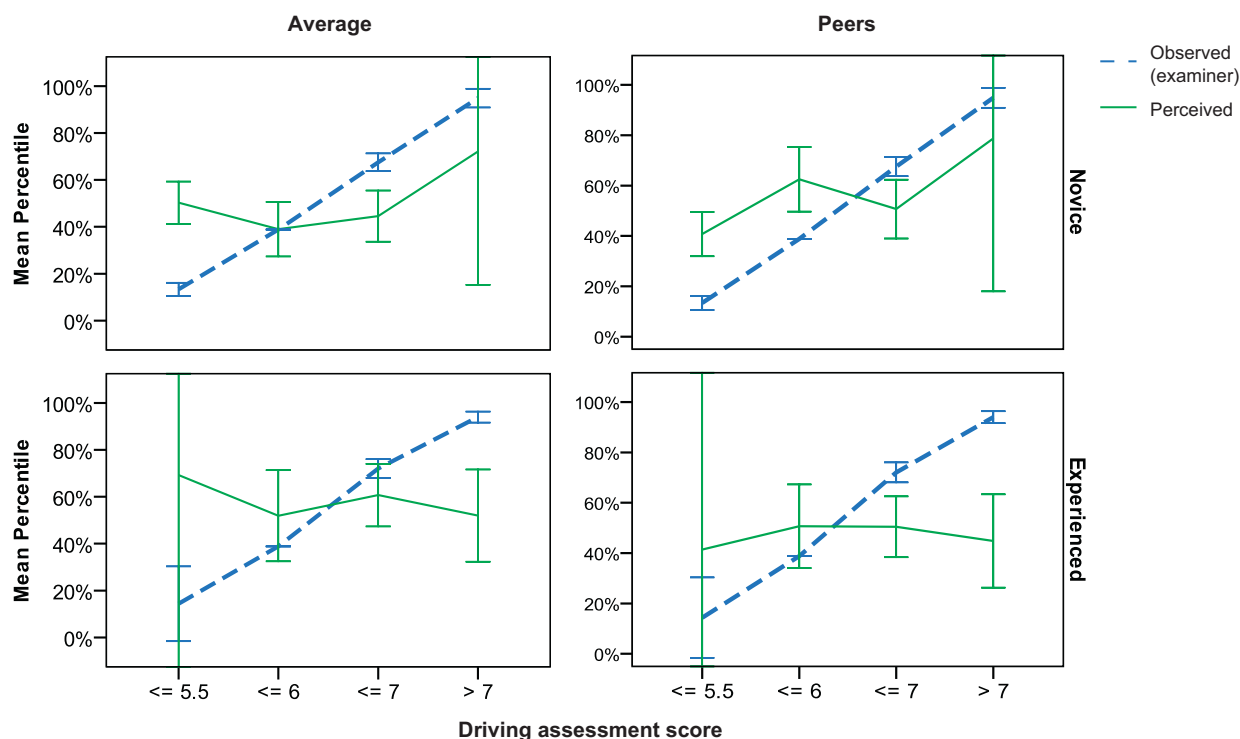
and was assigned a rank. For example, falling in the 5th percentile in the driving assessment indicates that the driver belongs to the worst 5% of drivers. The same was done for the compound variables 'self-assessed comparison to the average driver' and 'self-assessed comparison to peers'. The dotted lines in Fig. 2 indicate the driver's percentile on the grades provided by the examiner. The solid lines represent the percentile on the drivers' self-assessments. The whole sample was divided into four groups, each with about 25% of all drivers in the sample, displayed on the x-axes of Fig. 2. All drivers scoring less than 5.5 on the driving assessment form one group. These are drivers who would have failed the driving assessment if it were an actual driving test. The second group is formed by drivers who scored between 5.5 and 6 on the driving assessment. The third group scored between 6 and 7. And the final group performed best on the driving assessment, with a score higher than 7. Note that the dotted line only serves as a reference line of 'actual' performance to which the drivers' assessments are compared. In general, less distance between the dotted and solid line indicates more agreement between drivers' assessments and examiners' safe driving scores.

Fig. 2 shows the relationship between the self-assessed comparison to the average or peer driver and the examiner's opinion. The higher the solid line, the more drivers believe they are better drivers, better in coping with hazards and are less at risk in traffic than the average driver. The left-hand side of the figure shows a more optimistic view of the novice drivers who failed the driving test; and a moderate view of experienced drivers performing best on the driving test when drivers compare themselves to the average driver. When novice drivers compare themselves with their peers (right-hand side of Fig. 2) the figure is more similar to the examiner's opinion, although the drivers that just barely passed the driving test (score between 5.5 and 6) are still more optimistic about their driving skills and risks in traffic than the assessment by the examiner.

## 4. Discussion

The objectives of this paper were (1) to study whether novice drivers indeed overestimate their driving skills more than experienced drivers; and (2) to evaluate the influence of method effects (i.e. comparison to 'average' and 'peer' driver versus independent measures of own performance). The results show that the conclusion of whether novice drivers overestimate their driving skills more than experienced drivers is highly affected by the method chosen to measure this overestimation of skills. When drivers are asked to compare themselves with 'the average driver' on confidence and perceived danger in traffic, it seems that novice drivers are modest. That is, experienced drivers are more optimistic





**Fig. 2.** Observed driving skills versus self-assessed comparison to the average driver (left) and comparison to peers (right). The dotted lines indicate the grades provided by the examiner, the solid lines represent the percentile on the drivers' self-assessments.

about their driving skill and risks in traffic than novice drivers. If compared with the average driver, significantly more experienced drivers see themselves as '(much) better drivers', having '(far) less risk in traffic', and being '(much) better in coping with hazards'. If compared to 'peer drivers', however, novice drivers are more optimistic and experienced drivers are more pessimistic. In addition, novice drivers are significantly less concerned than experienced drivers with the risks in traffic.

The general result reported in the introduction that the majority of drivers rate themselves to be better drivers than the average driver (Svenson, 1981; McCormick et al., 1986; Delhomme, 1996), was not replicated in this study. Partly, this can be explained by the structure of the questionnaire. In our study, participants assessed their skills on a five point scale, whereas, for example, Svenson (1981) and McCormick et al. (1986) used respectively ten and seven point scales. In addition, our method differs from the abovementioned studies in that we used a website to collect our data, instead of participants being in the same room with the researcher and other participants. Groeger and Brown (1989) replicated Svenson's results, but explained most of the overconfidence as an artefact; "people seek not to respond accurately, but to appear in a good light with respect to their peers". On the other hand, McKenna et al. (1991) used a mail system to collect their data anonymously, and still found that drivers overestimate their skills in different driving scenarios. In conclusion, our deviant results can only partly be explained by the different methods used.

In our second approach, self-assessment of skills was compared with a more independent measure of these skills, instead of the group averages. The results indicate little correlation between drivers' perception of risks and driving skills and expert assessment of 'ability to drive safely'. With the exception of the positive relationship indicating that novice drivers who believe they are more at risk in traffic than their peers performed better on the driving assessment. It is important to realize that the absence of a correlation between self-assessment and the expert opinion does not

necessarily prove that there is no relationship. It merely shows that the relationship was not found in this particular study. The statistical significance of results is for example also related to the number of participants, which was rather low in the current study. Because it is not possible to statistically test the *absence* of a relationship, the assessments of the driver and the examiner were compared visually. This comparison suggests that the group of novice drivers who performed worst on the driving assessment (failed the test) have an average level of confidence. Experienced drivers failing the driving test were less confident about their driving skills. For experienced drivers there was a difference between self-assessment and performance, in the group who performed best on the driving assessment. These drivers were less positive as compared to their performance on the driving assessment.

The limitation of comparison with this type of 'independent' measure lies in the quality of the assessment. There have been some doubts about the reliability and validity of a driving assessment (Maycock, 2002; Baughan et al., 2005; Senserrick and Haworth, 2005). On the other hand, there are indications that driving behaviour during a driving assessment is less influenced by the presence of an observer than has been suggested in the past (Quimby et al., 1999; Grayson et al., 2003). An additional problem with the use of the driving assessment as an independent measure of driving skills was that the examiners were aware of the age of the participants. As this could bias their assessment (e.g. young drivers are 'most likely novice drivers'), some precautions were taken. For example, the examiners were explicitly informed that the groups consisted of different types of drivers, some older who rarely drove, and some younger who drove on a regular basis (e.g. as a professional courier). The participants were also instructed not to mention anything about their prior driving experiences to the examiner. In addition, because of these concerns, a small scale experiment was designed to study how observers are influenced by the appearance of drivers (De Craen and Van Der Zwan, submitted for publication). No evidence for a possible bias as a result of the

apparent age of the participants was found, however, could neither be ruled out completely.

When comparing the results from the two approaches we can conclude that novice drivers are not as optimistic about their driving skills as has been thought in the past. They seem to recognize that they are not as skilled (yet) as the average driver. However, when comparing their self-assessment with the expert's opinion there are indications that they overestimate their driving skills more than experienced drivers. In addition, this study shows that the method chosen to measure self-assessment of driving skills has a major impact on the conclusions of the study. Because of the theoretical issues associated with asking drivers to compare themselves with the average or peer driver, it seems indispensable to compare the drivers' assessment to an independent measure of driving skills in future studies on self-assessment of driving skills. Concluding, whether or not drivers overestimate (or underestimate) their driving skills is only relevant for traffic safety when it leads to deviant traffic behaviour. As was mentioned in the introduction, adequate assessment of driving skills is necessary to sufficiently adapt to task demands. Other results of our longitudinal study suggest that overconfident drivers indeed adapt their behaviour less to the traffic situation and reported more violating behaviour (De Craen et al., 2007b; De Craen, 2010).

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## References

- Baughan, C., Gregersen, N.P., Hendrix, M., Keskinen, E., 2005. Towards European standards for testing: final report. Commission Internationale des Examens de Conduite Automobile CIECA, Brussels.
- Bouchet, C., Guillemin, F., Brianc¸on, S., 1996. Nonspecific effects in longitudinal studies: impact on quality of life measures. *Journal of Clinical Epidemiology* 49 (1), 15–20.
- Brown, J.D., 1986. Evaluations of self and others: self-enhancement biases in social judgements. *Social Cognition* 4, 353–376.
- Cohen, J., 1988. *Statistical Power Analysis for the Behavioral Sciences*. Lawrence Erlbaum Associates, Hillsdale NJ.
- De Craen, S., 2010. The X-Factor. A Longitudinal Study of Calibration in Young Novice Drivers. Delft University of Technology.
- De Craen, S., Twisk, D.A.M., Hagenzieker, M.P., Elffers, H., Brookhuis, K.A., 2007a. Do young novice drivers overestimate their driving skills? In: *Proceedings of the Proceedings of the Young Researchers Seminar*, Brno Czech Republic.
- De Craen, S., Twisk, D.A.M., Hagenzieker, M.P., Elffers, H., Brookhuis, K.A., 2007b. Overestimation of skills affects driver's adaptation to task demands. In: *Proceedings of the 4th International Driving Symposium on Human Factors in Driver Assessment, Training, and Vehicle Design*, Stevensen, Washington, USA, pp. 39–45.
- De Craen, S., Van Der Zwan, S. Is the assessment of a driver's ability to drive safely influenced by the perceived age of this driver? In: *Proceedings of the 5th International Conference on Driver Behaviour and Training*. Paris, submitted for publication.
- Deery, H.A., 1999. Hazard and risk perception among young novice drivers. *Journal of Safety Research* 30 (4), 225–236.
- Delhomme, P., 1996. The consequences of driver's evaluations of their driving abilities and their feeling of control over driving behaviour. In: *Conference Report of the International Conference Roadsafe '96 "Influences Affecting Road User Behaviour"*, London, pp. 107–118.
- Delhomme, P., Meyer, T., 2000. Risk taking and self-efficacy among young male drivers: self-efficacy and changing task demands. In: *Proceedings of the International Conference on Traffic and Transport Psychology ICTTP*, Berne, Switzerland.
- Engstr¸m, I., Gregersen, N.P., Hernetkoski, K., Keskinen, E., Nyberg, A., 2003. Young Novice Drivers, Driver Education and Training. Swedish National Road and Transport Research Institute, Link¸ping, Sweden.
- Falk, B., 2010. Do drivers become less risk-prone after answering a questionnaire on risky driving behaviour? *Accident Analysis & Prevention* 42 (1), 235–244.
- Fuller, R., 2005. Towards a general theory of driver behaviour. *Accident Analysis & Prevention* 27 (3), 461–472.
- Fuller, R., 2008. Driver training and assessment: implications of the task-difficulty homeostasis model. In: *Proceedings of the 3rd Conference on Driver Behaviour and Training*, Aldershot, pp. 337–348.
- Grayson, G.B., Elliott, M.A., 2004. The attitudes and reported behaviours of novice drivers: results from the Cohort II study. In: *Proceedings of the Behavioural Research in Road Safety 2004*, Fourteenth Seminar.
- Grayson, G.B., Maycock, G., Groeger, J.A., Hammond, S.M., Field, D.T., 2003. Risk, Hazard Perception and Perceived Control. TRL Limited, Crowthorne, Berkshire.
- Gregersen, N.P., 1996. Young drivers' overestimation of their own skill—an experiment on the relation between training strategy and skill. *Accident Analysis & Prevention* 28 (2), 243–250.
- Groeger, J.A., 2000. *Understanding Driving—Applying Cognitive Psychology to a Complex Everyday Task*. Psychology Press Ltd., Hove, East Sussex, UK.
- Groeger, J.A., Brown, I.D., 1989. Assessing one's own and others' driving ability: influences of sex, age, and experience. *Accident Analysis & Prevention* 21 (2), 155–168.
- Horrey, W.J., Lesch, M.F., Garabet, A., 2008. Assessing the awareness of performance decrements in distracted drivers. *Accident Analysis & Prevention* 40 (2), 675–682.
- Horrey, W.J., Lesch, M.F., Garabet, A., 2009. Dissociation between driving performance and drivers' subjective estimates of performance and workload in dual-task conditions. *Journal of Safety Research* 40 (1), 7–12.
- Kruger, J., Dunning, D., 1999. Unskilled and unaware of it: how difficulties in recognizing one's own incompetence lead to self-assessments. *Journal of Personality and Social Psychology* 77 (6), 1121–1134.
- Mathews, M.L., Moran, A.R., 1986. Age differences in male drivers' perception of accident risk: the role of perceived driving ability. *Accident Analysis & Prevention* 18, 299–313.
- Maycock, G., 2002. Novice Driver Accidents and The Driving Test. Transport Research Laboratory TRL, Crowthorne, Berkshire.
- Mayhew, D.R., Simpson, H.M., 1995. The role of driving experience. In: *Implications for the Training and Licensing of New Drivers*. Insurance Bureau of Canada, Toronto, Ontario.
- Mayhew, D.R., Simpson, H.M., Singhal, D., Desmond, K., 2006. Reducing the Crash Risk for Young Drivers. American Automobile Association AAA Foundation for Traffic Safety, Washington, D.C.
- McCormick, I.A., Walkey, F.H., Green, D.E., 1986. Comparative perceptions of driver ability—a confirmation and expansion. *Accident Analysis & Prevention* 18, 205–208.
- McKenna, F.P., Stanier, R.A., Lewis, C., 1991. Factors underlying illusory self-assessment of driving skill in males and females. *Accident Analysis & Prevention* 23 (1), 45–52.
- Mynttinen, S., Sundstr¸m, A., Koivukoski, M., Hakuli, K., Keskinen, E., Henriksson, W., 2009. Are novice drivers overconfident? A comparison of self-assessed and examiner-assessed driver competences in a Finnish and Swedish sample. *Transportation Research Part F: Traffic Psychology and Behaviour* 12 (2), 120–130.
- OECD – ECMT, 2006. Young drivers: The road to safety. OECD—Organisation for Economic Co-operation and Development & ECMT—European Conference of Ministers of Transport; Joint OECD/ECMT Transport Research Centre, Paris.
- Quimby, A., Maycock, G., Palmer, C., Grayson, G.B., 1999. Drivers' Speed Choice: An In-Depth Study. Transport Research Laboratory, Crowthorne, Berkshire.
- Senserrick, T., Haworth, N., 2005. Review of Literature Regarding National and International Young Driver Training, Licensing and Regulatory Systems. Monash University Accident Research Centre, MUARC, Clayton, Victoria.
- Sundstr¸m, A., 2008a. Construct validation and psychometric evaluation of the self-efficacy scale for driver competence. *European Journal of Psychological Assessment* 24 (3), 198–206.
- Sundstr¸m, A., 2008b. Self-assessment of driving skill—a review from a measurement perspective. *Transportation Research Part F: Traffic Psychology and Behaviour* 11 (1), 1–9.
- Svenson, O., 1981. Are we all less risky and more skillful than our fellow drivers? *Acta Psychologica* 47, 143–148.
- Walton, D., 1999. Examining the self-enhancement bias: professional truck drivers' perceptions of speed, safety, skill and consideration. *Transportation Research Part F: Traffic Psychology and Behaviour* 2, 91–113.
- Waylen, A.E., Horswill, M.S., Alexander, J.L., McKenna, F.P., 2004. Do expert drivers have a reduced illusion of superiority? *Transportation Research Part F: Traffic Psychology and Behaviour* 7, 323–331.
- Weinstein, N.D., Lyon, J.E., 1999. Mindset, optimistic bias about personal risk and health-protective behaviour. *British Journal of Health Psychology* 4, 289–300.