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A STUDY ON THE ACCURACY OF SELF-ASSESSED DRIVING SKILL

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ABSTRACT

This study examines the accuracy of self-evaluated driving skills. In addition, I tried to determine a possible relationship between the extent of overconfidence and the drivers' characteristics such as gender and age. Japanese driver candidates (n = 2021) completed a self-assessment shortly after clearing a practical test. An examiner also rated the candidates' performance on the same scale. Nineteen items were assessed and categorized into five skill sets, namely, 'indicators', 'handling', 'speed,' 'safety check', and 'social skills'. The comparison between self-assessment and examiner-assessment revealed that about 40 percent of candidates had a tendency of overestimating their skills, especially in the categories of 'handling', 'social', and 'safety check'. Furthermore, the results indicated that males displayed higher levels of overconfidence than females, while older candidates (over 25 years) realistically assessed themselves in contrast to younger drivers. The results of this study are consistent with common findings of earlier questionnaire studies conducted in Europe. This study highlights the need to introduce practices that lead to improving the accuracy of self-assessments in driving schools before issuing licenses.

Keywords: Self-assessment, Driving skills, Overconfidence, Driver candidates, Gender differences, Age differences

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1. INTRODUCTION

1.1 Japanese traffic situation

In Japan, 4,914 people were reported to have died from traffic accidents in 2009 (National Police Agency, 2010). Although fatalities have reduced by over 71 percent from the worst death toll in 1970, the overall number of traffic accidents (765,510)and injuries (944,071) were identical to the totals in 1970. The decrease in the number of fatalities may have been due to safety improvements in roads and vehicles, the development of traffic laws, and advances in medical technology. The contention of this paper is that in the 21st century, psychological safety methods such as driver education will be increasingly important.

To drive in Japan, one requires either a driving license obtained in Japan or an International Driving License available in countries that are party to the Geneva Convention on Road Traffic. In order to obtain a Japanese driving license, one must study the traffic laws and regulations of Japan and pass both a theory (paper) test and a driving examination at the prefectural governments' public safety commissions. Alternatively, if one passes the practical (road) test at a licensed driving school, a driving examination at a prefectural licensing centre is absolved. About 97 percent of candidates go to a driving school and complete the course (26 theoretical lessons and 31–34 practical lessons, 50 minutes per lesson). In other words, driving schools play a key role in driver training in Japan. Practical lessons are comprised of two stages: stages 1 and 2. At stage 1, candidates have to drive a vehicle through a purpose-designed driving course while obeying the relevant traffic rules. At stage 2, after obtaining the learner's permit, which requires operating a vehicle for the purpose of learning to drive and taking a driving test, the learners practice driving on public roads with an instructor. Upon completion of the essential training, they graduate from driving school if they score over 70 percent in the practical road test.

In some European countries, an educational system based on the GDE (the Goals for Driver Education) model (see Table 1; Hatakka *et al.*, 2002) has been proposed. Finnish, Swedish, and Dutch driver training and examinations are said to be based on this conceptual model focusing on fundamental skills for traffic safety (Mynttinen, Sundström, Koivukoski *et al.*, 2009; Mynttinen, Sundström, Vissers *et al.*, 2009). Traditional driver training and tests have focused on the mastery and manoeuvring knowledge and skills detailed in Table 1. The information in the model related to evaluating life goals/skills and the driving context that are more safety related, is extremely important for novice drivers (Laapotti *et al.*,2001). In order to cover the self-assessment aspect in the GDE model, Finland and Sweden have applied self-assessment procedures in the driving-license test by comparing candidates' self-assessments with instructors' assessments (Mynttinen, Sundström, Koivukoski *et al.*, 2009). In contrast, the only concern in the Japanese context is whether one has passed the examination. Therefore, in Japan no one pays attention to the accuracy of the self-assessment of driver candidates.

1.2 Self-assessment of driving skills

Traffic psychology researchers have been discussing self-rated driving competencies. As shown in Figure 1, self-estimation of one's driving skills was considered as one of the factors

Table 1 The Goals for Driver Education (GDE) model

Hierarchical level of behaviour	Essential contents (examples)		
	Knowledge and skills	Risk-increasing factors	Self-evaluation
Goals for life and skills for living (general)	Knowledge about control over how life goals and personal tendencies affect driving behaviour	Risky tendencies	Self-evaluation/awareness of
	- lifestyle/life situation	- acceptance of risks	- personal skills for impulse control
	- group norms	- self-enhancement through driving	- risky tendencies
	- motives	- high level of sensation seeking	- safety-negative motives
	- self-control, other characteristics	- complying to social pressure	- personal risky habits
	- personal values	- use of alcohol/drugs	
		- values, attitudes towards society	
	etc.	etc.	etc.
Goals and context of driving (trip related)	Knowledge and skills concerning	Risks connected with	Self-evaluation/awareness of
	- effects of trip goals on driving	- driver's condition (mood, BAC etc.)	- peronal planning skills
	- planning and choosing routes	- purpose of driving	- typical goals of driving
	- evaluation of requested driving time	- driving environment (rural/uraban)	- typical risky driving motives
	- effects of social pressure in car	- social context and company	
	- evaluation of necessity of trip	- extra motives (competing etc.)	
	etc.	etc.	etc.
Mastery of traffic situations	Knowledge and skills concerning	Risks caused by	Self-evaluation/awareness of
	- traffic rules	- wrong expectations	- strong and weak points of basic traffic skills
	- observation/selection of signals	- risk-increasing driving style (e.g. aggressive)	- personal driving style
	- anticipation of course of situations	- unsuitable speed adjustment	- personal safety margins
	- speed adjustment	- vulnerable road-users	- strong and weak points for hazard situations
	- communication	- not obeying rules/unpredictable behaviour	- realistic self-evaluation
	- driving path	- information overload	
	- driving order	- difficult conditions (darkness etc.)	
	- distance to others/safety margin	- insufficient automatism/skills	
	etc.	etc.	etc.
Vehicle manoeuvring	Knowledge and skills concerning	Risks connected with	Awareness of
	- control of direction and position	- insufficient automatism/skills	- strong and weak points of basic manoeuvring skills
	- tyre grip and friction	- unsuitable speed adjustment	- strong and weak points of skills for hazard situations
	- vehicle properties	- difficult conditions (low friction etc.)	- realistic self-evaluation
	- physical phenomena		
	etc.	etc.	etc.

Note: From Hatakka*et al.*(2002).

that determined whether or not a driver would take risks (Renge, 2000). According this model, drivers who gave their driving skills a higher rating were likely to underestimate accident risks and indulge in risk-taking behaviour, even if they could perceive the hazard. Actually, Matthews and Moran (1986) revealed the negative correlation between self-evaluated driving skills and risk perception. They found that the compulsory skid training method introduced in some Nordic countries led to overconfidence in skills on slippery roads. As a result, the number of relevant accidents has not decreased (Katila *et al.*, 1996; Katila *et al.*,2004). Moreover, there is some evidence for the assumption that drivers who rate themselves as more skilful have more accidents and commit more traffic violations (Horswill *et al.*, 2004; Sümer *et al.*, 2006). In addition, drivers with advanced training rate themselves as being safer and faster drivers than others (Karlaftis *et al.*, 2003). Moreover, Baldock *et al.* (2006) found that elderly drivers with high confidence did not tend to indulge in risk compensation behaviour such as refraining from driving under rainy and dark conditions or busy roads. Likewise, it has been said that safety countermeasures such as campaigns have not have much effect on hi ghly confident drivers (Svenson, 1981; Walton & McKeown, 2001).

There are many previous studies on self-estimation. Further, generically, drivers tend to overestimate their own driving skills (e.g., Delhomme, 1991; Freund *et al.*,2005; Goszcynska & Roslan, 1989). In many such studies, questionnaires were widely used in which

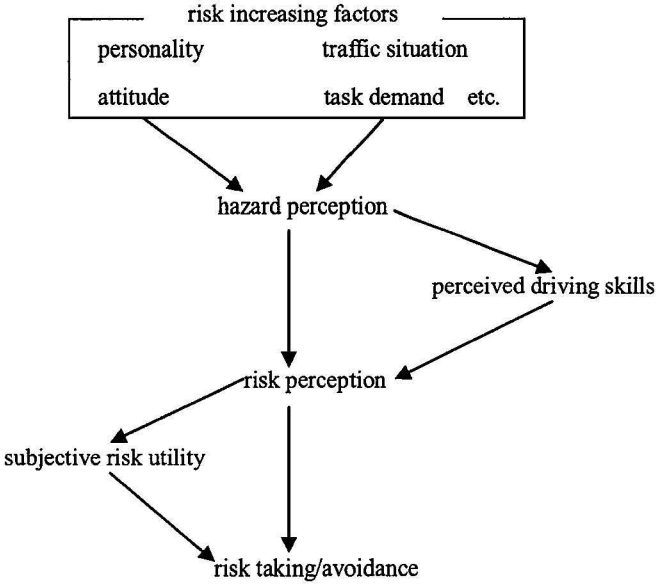

Fig. 1 Psychological processing of risk taking or avoidance
Note: From Renge (2000).

respondents were asked to rate their skills compared to others (e.g., Laapotti *et al.*, 2003; Svenson, 1981). The most common method of assessing drivers' subjective skills was to ask them to compare their skills to those of the average driver. Almost all such studies found that the majority of the drivers estimated themselves to be more skilled (e.g., Matthews &Moran, 1986; McKenna, 1993). In some questionnaire studies (e.g., Horswill *et al.*, 2004; Nakai & Usui, 2008), respondents rated their own skills as well as their peers' skills in comparison to the average driver. The results showed that drivers rated themselves as being more skilful than their peers and the average driver.

Several studies have been conducted on the characteristics of drivers that affected their subjective driving skills. Generically, males tended to have more confidence than females (e.g., Dejoy, 1989; 1992; Keskinen *et al.*, 1994; Matsuura *et al.*, 2002). As for age characteristics, although older drivers reckoned that they were safer and less likely to be involved in traffic accidents, younger drivers gave their vehicle control skills higher ratings (Dejoy, 1989; Matthews &Moran, 1986). In several studies that focused on the driver's experiences (e.g., Dejoy, 1989; Lajunen & Summala, 1995; McKenna *et al.*, 1991), more experienced drivers tended to give their skills of operating a vehicle a higher rating. At the same time, the transiently strong self-confidence of young male drivers was discovered (Karlaftis *et al.*, 2003; Lajunen & Summala, 1995).

However, the questionnaire surveys used in the majority of the previous works had certain methodological problems. Specifically, Groeger and Grande (1996) pointed out the issue of 'downward comparison', which is a defensive tendency to evaluate oneself through a comparison group whose troubles are more serious than one's own. Also, it was hard to imagine the average driver as a target for comparison (Goszczynska & Roskan, 1989). Moreover, if

traditional questionnaires were used, they could not distinguish whether high self-estimated driving skills were due to respondent overconfidence or due to the respondents actually being more skilful.

So, researcher's attempts to compare subjective skills with objective skills have been increasing recently. In such studies, judgments of driving school instructors or driver examiners were often used in order to attempt to measure actual driving skills (e.g., Groeger, 2001; Victoir *et al.*, 2005). Groeger (2001) noted that driving ability as assessed by an examiner was highly correlated with self-assessment concerning 100 novice drivers. Victoir *et al.* (2005) verified the correlations between driving school students' and instructors' ratings in terms of general driving skill and errors. Although both the correlation coefficients were significantly positive (respectively, $r = .43, .28$), driving school students evaluated their performances more favourably than did the instructors. In the studies by Mynttinen, Sundström, Koivukoski *et al.* (2009) and Mynttinen, Sundström, Vissers *et al.* (2009), cross-national surveys of self-evaluated driving skills of candidates who took a license test were carried out. All the correlation coefficients were weakly or moderately positive. About half the Finnish and Dutch candidates made a realistic assessment, although between 58 and 70 percent of Swedish candidates overestimated their skills. This international difference seemed to be derived from their self-assessment experiences, the amount of training by an instructor, and the pass-rate of driving tests. In Finland, self-assessment has been integrated with the driving test since the year 2000. On the other hand, in Sweden and the Netherlands, this system is just beginning to catch on. However, as compared with Finland, Dutch candidates had a larger amount of driving practice but had pass-rates that were about 25 percent points lower. Likewise, studies of elderly drivers were conducted, and some of them showed a positive correlation (Eby *et al.*, 2003), but others reported no relationship (Marottoli & Richardson, 1998). In a Japanese study, elderly drivers rated their skills higher than did their instructors (Ota *et al.*,2004).

1.3 Purposes and hypotheses of this study

The present study had two aims; the first aim was to verify the accuracy of self-evaluated driving skills of Japanese driving school students by means of applying the framework used in previous studies (Mynttinen, Sundström, Koivukoski *et al.*, 2009; Mynttinen, Sundström, Vissers *et al.*, 2009). A tendency to overestimate was anticipated because Japanese candidates had no chance to estimate their own driving skills despite the fact that lessons last for relatively long durations and the pass-rate of the practical test at a licensed driving school is about 90 percent. The second aim was to analyze the driver characteristics affecting overconfidence from the perspective of gender and age differences. It can be hypothesized that males and younger candidates are more likely to overestimate their skills than are female and older candidates as was seen in the earlier questionnaire studies.

2.METHOD

2.1 Participants

Data of 2,021 candidates were collected; these individuals had passed the practical test at Tsukinowa Driving School (Shiga Prefecture; 13,201 people obtained driver licenses in this prefecture in 2008). Among these, 1,128 males (55.8%) had a mean age of 20.2 years and that of 893 females (44.2%) was 20.7. About 30 examiners were present for this study. Although the criteria for judgment differed slightly with each individual, examiner-by-examiner analyses were not conducted. This kind of examination in Japan can be terminated once candidates commit a serious violation, stall their engines four times, or run off course. This is the reason only candidates passing the test were included. In comparison, about 90 percent of the candidates at this driving school could pass the test the first time.

2.2 Procedure

During the practical examination, candidates had to drive a vehicle through a designated course on a public road. Shortly after they took a practical examination, the examiners rated their driving performance using a 5-point scale. The candidates were asked to fill out the self-assessment form and face sheet after obtaining their agreement. They did not notice that they were being rated by an examiner on the same form until they self-rated. In order to compare their self-assessment with that of the examiners, they were asked to put in their 10-digit ID numbers on the forms.

2.3 Rating items

Each candidate drove for approximately 20 minutes during this test. Half the route was designated and the other half was self-planned. As a result, driven courses varied slightly from person to person; for instance, all the candidates did not pass through the intersection with a stop sign. Therefore, the situations rated in this study were limited to what was seen in the performance of all candidates. To be specific, driving skills in the six driving situations listed on Table 2 were rated, including 2–4 concrete items belonging to each situation. The 19 items listed on Table 2 were determined by three experts (including two instructors with over 30 years' experience) by referring to previous research (e.g., Marottoli & Richardson, 1998). Each criterion of the examiners' rating was defined according to the Japanese Road Traffic Law. For instance, when examiners rated the driving positions while turning left (left-handed traffic in Japan), the candidates who initially approached the intersection as close to the left edge of the road as possible and proceeded around the curve of the intersection were given a rating of 5. Higher scores meant better driving skills.

2.4 Analyses

Nineteen items were categorized into five components as shown in Table 2. These items were: 'directional indicator' (*indicator*), 'vehicle handling and position' (*handling*), 'performing a safety check' (*safety check*), 'speed choice' (*speed*), and 'social skills' (*social*). As the number of

Table 2 Items assessed by both candidates and examiners after the driving test

situation	items	*components*
1 turning left	timing of making indicator	*indicator*
	vehicle position	*handling*
	speed	*speed*
	safety check	*safety check*
2 turning right	timing of making indicator	*indicator*
	vehicle position	*handling*
	speed	*speed*
	safety check	*safety check*
3 lane changing	timing of making indicator	*indicator*
	safety check	*safety check*
	steering	*handling*
4 consideration to pedestrians/cyclists	attention around zebra crossing	*social*
	safe, wide berth when passing a pedestrian or a cyclist	*social*
5 attention to other vehicles	consideration to other drivers	*social*
	headway distance	*social*
	use of rear-view mirror	*social*
6 reversing	safety check	*safety check*
	speed	*speed*
	steering	*handling*

items in each category differed, the average scores were calculated. First, the correlations between these average scores of self-assessment and the examiner's assessment were discussed. Then, a 2-way analysis of variance (ANOVA) was conducted to demonstrate whether the gender or age of the candidates affected the accuracy of self-assessment. In order to analyze the age effect, to sub-equalize the sample size of all the age groups, candidates over 25 years were bracketed together. If interactions were significant, for the purpose of this study, only the simple main effects of the estimators (self/examiners) were calculated, and a post-hoc test was conducted using non-pooled error terms (Howell, 2002). All the statistical analyses were carried out by the SPSS 16.0 package.

3. RESULTS

3.1The correlations of self-evaluation and examiners' evaluation

Pearson's product-moment correlation coefficients of five components are shown in Table 3. Although all the components were significant, as the sample size was relatively large, the correlations were weak. A t-test revealed that candidates overestimated their *handling*, *safety check*, and *social skills*. Meanwhile, self-ratings of *indicator* and *speed* were the same as the examiners' ratings.

3.2 Gender effects on the accuracy of self-evaluation

A 2×2 (evaluator×gender) ANOVA was carried out on the mean scores of the five components. Table 4 s hows the average score by evaluator and gender. As for the *indicator* score,

Table 3 Mean and standard deviation (*SD*) for 5 components score and the correlation coefficients

	indicator	*handling*	*safety check*	*speed*	*social*
n	2021	2021	2021	2021	2021
examiner's rating	4.03	3.87	3.97	4.15	3.83
SD	0.63	0.56	0.55	0.53	0.55
self-rating	4.03	4.00	4.18	4.13	4.00
SD	0.66	0.59	0.60	0.62	0.57
Pearson's *r*	.24 ***	.22 ***	.24 ***	.17 ***	.14 ***
t	-0.14	-7.73 ***	-13.28 ***	1.16	-10.53 ***
r (effect size)	.00	.16	.28	.03	.23

Note: ***: $p < .001$

Table 4 Mean (M) and standard deviation (SD) for 5 components score by evaluator and gender

		males (n = 1128)		females (n = 893)	
evaluator		examiner	self	examiner	self
indicator	*M*	4.05	4.12	4.01	3.92
	SD	*0.63*	*0.64*	*0.62*	*0.66*
handling	*M*	3.88	4.10	3.86	3.87
	SD	*0.55*	*0.57*	*0.57*	*0.60*
safety check	*M*	3.99	4.23	3.94	4.11
	SD	*0.55*	*0.60*	*0.54*	*0.60*
speed	*M*	4.14	4.17	4.16	4.08
	SD	*0.53*	*0.62*	*0.52*	*0.61*
social	*M*	3.85	4.04	3.81	3.96
	SD	*0.56*	*0.58*	*0.54*	*0.54*

self-assessment did not differ from that of the examiners' ($F(1, 2019) = 0.16$, *n.s.*), while the main effect of gender was significant ($F(1, 2019) = 26.97$, $p < .001$, $\eta^2 = .009$). The interaction was significant ($F(1, 2019) = 21.50$, $p < .001$, $\eta^2 = .004$) as well. Males self-rated their skills relating to indicators higher than that of the examiners ($p < .01$), while females underestimated their skills ($p < .01$). On the *handling* score, both the main effects of estimator and gender were significant ($F(1, 2019) = 49.35, 38.3\,5$, $p < .001$, $\eta^2 = .010, .012$). The interaction was also significant ($F(1, 2019) = 38.18$, $p < .001$, $\eta^2 = .008$), and it is demonstrated that only males rated their *handling* skills higher than the examiners ($p < .001$). Furthermore, on the *safety check* score, both the main effects of evaluator and gender were significant ($F(1, 2019) = 167.52, 16.57$, $p < .001$, $\eta^2 = .031, .005$). Although the interaction was significant ($F(1, 2019) = 4.94$, $p < .05$, $\eta^2 = .001$), a post-hoc test revealed that candidates, regardless of gender, evaluated their driving skills relating to *safety check* higher than the examiners did ($p < .001$, in both gender). Concerning the *speed* score, although the main effects of estimator and gender were non-significant ($F(1, 2019) = 2.45, 3.33$, *n.s.*), the interaction was significant ($F(1, 2019) = 12.28$,

$p< .001$, $\eta^2= .003$). Males rated their ability of speed choice similar to the ratings by the examiners, while females rated these abilities as significantly lower ($p< .01$). The analysis of *social* score showed that candidates overestimated their social skills compared with the examiners ($F(1, 2019) = 106.25, p< .001, \eta^2= .023$) and the ratings of social skills of males were higher than those of females regardless of the rater ($F(1, 2019) = 10.50, p< .01, \eta^2= .003$). The interaction was not significant ($F(1, 2019) = 1.67$, *n.s.*).

3.3 Age effects on the accuracy of self-evaluation

A 2×8 (evaluator×age groups) ANOVA was carried out on the mean scores of the five components. Table 5 shows the average score by evaluator and age groups.

Neither the main effects of evaluator or age groups nor the interaction was significant (respectively, $F(1, 2013) = 0.06$, $F(7, 2013) = 0.45$, $F(7, 2013) = 1.30$, all were *n.s.*) when the analysis on *indicator* score was conducted. As for the *handling* score, the main effect of the evaluator was significant ($F(1, 2013) = 31.85, p< .001, \eta^2= .007$), while that of the age groups was not ($F(7, 2013) = 1.59$, *n.s.*). However, a post-hoc analyses to test the simple effect of age groups were carried out as the interaction was significant ($F(7, 2013) = 2.11, p< .05, \eta^2= .003$). As a result, candidates aged 22, 24, and 25 years self-evaluated their vehicle handling skills as high as the examiners did, while the candidates who were 18–21 and 23 years of age rated their skills higher than the examiners (18, 19 yrs $p< .001$; 20 yrs $p< .05$; 21, 23 yrs $p< .01$). Similar findings were found on the *safety check* score. Although the main effect of age groups was non-significant ($F(7, 2013) = 0.82$, *n.s.*), that of the estimator ($F(1, 2013) = 90.32, p< .001, \eta^2= .017$) and interaction ($F(7, 2013) = 2.22, p< .05, \eta^2= .003$) were significant. Self-evaluations of candidates aged 25 years and above were accurate, despite the fact that those who were under 25 years overestimated their behaviour to check the safety as compared to the examiners (age 18–21: $p< .001$, age 22: $p< .05$, age 23, 24: $p < .01$). As for the *speed* score, none of the main effects and interactions were significant (evaluator: $F(1, 2013) = 0.10$; age groups: $F(7, 2013) = 0.78$; interaction: $F(7, 2013) = 0.89$; all were *n.s.*). With regard to the *social* score, candidates rated their social skills significantly higher than the examiners ($F(1, 2013) = 70.09, p< .001, \eta^2= .015$), while the main effect of age groups and the interactions were not significant (respectively, $F(7, 2013) = 1.72, 1.50$; both were *n.s.*).

4. DISCUSSION

From the results, it was revealed that driving school students in Japan are prone to rate their roadcraft higher than their actual skills would warrant. In this sample, the coefficients of correlations ranged from 0.14 to 0.24, which corresponded with previous research (e.g., Victoir *et al.*, 2005; Mynttinen, Sundström, Koivukoski *et al.*, 2009; Mynttinen, Sundström, Vissers *et al.*, 2009). However, in two components out of five, the *indicator* and *speed* self-ratings of candidates did not differ from those of the examiners. As for the *indicator*, it was regulated to ensure that the indicator was activated at 30 meters ahead of the point where a left/right

Table 5 Mean (M) and standard deviation (SD) for 5 components score by evaluator and age groups

age of candidates		18 (n =526)		19 (n = 435)		20 (n = 397)		21 (n = 259)		22 (n = 164)		23 (n = 75)		24 (n = 43)		over 25 (n = 122)	
evaluator		examiner	self	examiner	self	examiner	self	examiner	self	examiner	self	examiner	self	examiner	self	examiner	self
indicator	*M*	4.04	4.03	3.99	4.03	4.04	4.05	4.03	4.03	3.98	4.01	4.07	4.06	3.96	4.12	4.16	3.99
	SD	*0.64*	*0.65*	*0.60*	*0.66*	*0.62*	*0.66*	*0.65*	*0.68*	*0.65*	*0.64*	*0.66*	*0.71*	*0.55*	*0.69*	*0.68*	*0.63*
handling	*M*	3.90	4.06	3.84	4.00	3.87	3.96	3.85	3.98	3.85	3.88	3.82	4.09	3.89	4.09	3.96	3.94
	SD	*0.55*	*0.58*	*0.56*	*0.60*	*0.56*	*0.62*	*0.55*	*0.57*	*0.58*	*0.63*	*0.61*	*0.52*	*0.56*	*0.58*	*0.56*	*0.56*
safety check	*M*	3.96	4.20	3.93	4.19	4.00	4.15	3.94	4.19	3.98	4.11	3.96	4.23	3.93	4.24	4.13	4.19
	SD	*0.55*	*0.59*	*0.52*	*0.59*	*0.55*	*0.63*	*0.55*	*0.59*	*0.58*	*0.65*	*0.56*	*0.64*	*0.43*	*0.65*	*0.54*	*0.58*
speed	*M*	4.16	4.11	4.12	4.11	4.16	4.14	4.12	4.14	4.18	4.14	4.16	4.27	4.12	4.16	4.23	4.12
	SD	*0.55*	*0.64*	*0.52*	*0.63*	*0.52*	*0.65*	*0.51*	*0.59*	*0.54*	*0.58*	*0.52*	*0.52*	*0.49*	*0.59*	*0.51*	*0.53*
social	*M*	3.84	4.00	3.77	3.98	3.85	3.97	3.83	4.02	3.80	4.01	3.82	4.07	3.80	4.13	3.99	4.04
	SD	*0.54*	*0.57*	*0.56*	*0.59*	*0.50*	*0.57*	*0.56*	*0.53*	*0.57*	*0.52*	*0.59*	*0.63*	*0.52*	*0.52*	*0.60*	*0.61*

turn would be made or about 3 seconds before the driver intended to change lanes. Candidates were specifically instructed about the timing of signals according to this rule during practice. Since the criteria of this component were defined numerically as above, candidates could easily obtain feedback on their performance. Similarly, it was easy to rate their choice of *speed* if they checked the speedometer during the examinations. Also, since this study covered the test performances, candidates might be strongly motivated to maintain the speed limit in order to avoid the deduction of points. However, self-ratings of *safety check* and *social skills* were significantly higher than those of the examiners' ratings because it seems to be difficult to obtain the feedback about these kinds of skills. Therefore, drivers were not aware that their skills or methods of checking safety were insufficient until they had accidents or incidents. With regard to social skills, it was possible that candidates could not look out for other road users even if they knew what to do in the situation in order to interact with others. To cite the evaluations of consideration for pedestrians around a zebra crossing as an example, candidates preparing for the impending theoretical test must have known that they have to yield if pedestrians are there. Thus, the reasons self-ratings were lower than that of the examiners' was because the drivers overlooked the presence of pedestrians. Hence, drivers were not likely to notice their bad habits or weak points concerning their social skills as well as safety confirmation behaviour. From this result we can conclude that it is important to provide candidates with feedback about their driving skills relating to safety confirmations and considerations for other road users in order to let them know about their inadequacy.

The results wherein males were more likely to overestimate their driving skills than females were consistent with previous questionnaire surveys (e.g., Dejoy, 1992; Matthews &Moran, 1986). Particularly, on the *handling* score, which reflected the skills in the lowest level in the GDE model (Hatakka *et al.*, 2002), only male candidates overestimated. Although the skills relating to *speed* choices seemed to belong to the same level, self-ratings on such skills were not higher than those of the instructors. The reason behind this has been mentioned above. Instead, female driving school students were prone to underestimate their speed control skills. Thus, it could be essential to train the candidates on self-estimation skills at the lowest level, particularly in males. However, male candidates could actually drive better than females as the main effects of gender were significant for some components scores. From this we may conclude that the tendencies of overestimation in males highlighted in the previous questionnaire surveys (e.g., Delhomme, 1991; Hatakka, 1998) could be caused by comparisons with females who had relatively lower skills. Meanwhile, the components that candidates were bound to overestimate regardless of gender were *safety confirmation skills* and *social skills*.

Concerning the analyses of age, although the results were not clear-cut as compared with those of gender, self-ratings of elderly candidates were relatively accurate for some components. As in many preceding works (e.g., Hatakka, 1998; Matthews & Moran, 1986), younger drivers were prone to overrate their driving skills. In addition, similar results were obtained if the age group of over 25 was divided into two categories—25–30 and over 30. Thus, it can be said that the accuracy of self-estimation improved with age, although psychological mechanisms were unexplained.

In this study, the framework of previous research in some European countries (Mynttinen, Sundström, Koivukoski *et al.*, 2009; Mynttinen, Sundström, Vissers *et al.*, 2009) was applied in the Japanese context. These results will be valuable when the discussion starts about whether to introduce a new driver licensing system involving training for self-rating skills. However, candidates in this study were recruited from only one driving school; it is necessary to collect more data from a wider sample and to examine the relationship between self-estimation skills and driving records after licensing.

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