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## Driving slow motorised vehicles with visual impairment

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# CHAPTER 8

General Discussion And Conclusion



Slow motorised vehicles play an important role in maintaining independence in peoples' lives. Due to the absence of legal visual standards for users of these vehicles, visually impaired people in particular can benefit from them to maintain their independent mobility. However, little is known about the physical and mental factors influencing driving safety in these vehicles, which leaves uncertainties in clinical practice. In particular, professionals working directly with clients are not fully equipped to offer adequate support and advice in certain situations. A challenge in this field of work is to find the balance between supporting the mobility needs of clients and at the same time ensuring that traffic safety can be maintained. The aim of the present thesis therefore was twofold: to gain more insight into the driving safety of visually impaired people using slow motorised vehicles, and to explore potential approaches to support independent mobility. For this purpose, driving ability and practical fitness to drive mobility scooters and microcars was investigated in a group of people with visual impairments and a group of normally-sighted people. Several different approaches were used to measure these concepts under different conditions. Driving performance was examined both in an on-road situation (measuring fitness-to-drive and the ability to gain driving skills) and in a driving simulator. Furthermore, the value of neuropsychological test assessment in determining someone's practical fitness to drive was explored. This chapter will give a general discussion of the outcomes and will describe the implications for clinical practice and future research.

## Driving ability

One requisite of driving safely in traffic is sufficient driving ability. Adequate driving ability is important to be able to operate slow motorised vehicles safely and forms a basis to establish practical fitness-to-drive. One part of our experiments therefore included a mobility scooter driving skill test to determine if visually impaired people were able to gain the necessary skills to operate a mobility scooter safely (**Chapter 3**). The results of that experiment indicate that, in general, visually impaired people can learn to drive mobility scooters adequately. After only a short time of practising basic mobility scooter manoeuvring skills, all participants but one showed sufficient driving ability to proceed to a more challenging on-road driving test (see below). It is noteworthy that visually impaired participants needed more repetition to obtain those skills as compared to normal-sighted controls. This indicates that visually impaired individuals may need more mobility scooter training than normal-sighted people. However, this might not hold for all types

of visual impairment. Results indicated that especially participants with combined visual acuity and visual field impairments may experience difficulties during the training process, whereas participants with (very) low visual acuity do not differ from normal-sighted controls with regard to acquiring the necessary driving skills.

One specific skill that required extensive practice was the appropriate operation of the lever to accelerate, decelerate, and stop the mobility scooter. In line with our expectations, stopping was observed as being the most challenging skill. However, safe use of the lever is not associated with visual impairment, but rather a general difficulty that all prospective mobility scooter users may encounter. Research shows that improper use of the lever is a leading cause of accidents involving mobility scooters (Schepers, 2007). Particularly in the Netherlands, where bicycles are one of the main transport means, people might find the lever on the mobility scooter counterintuitive. Whereas cyclists are used to squeezing the brake to stop, the same action on the mobility scooter would lead to acceleration. The appropriate use of the lever should therefore be given extra attention during training, e.g., practising how fast a mobility scooter accelerates and how long it takes before the mobility scooter stops at different speeds after the lever has been released. Furthermore, the electronics of the mobility scooter should be adjusted according to the client's needs. Maximum speed, power-assisted steering, or the rate of acceleration are modifiable in mobility scooters and should be individualised per client. Another driving skill that caused difficulties was reversing. Participants with peripheral visual field defects in particular showed problems with this skill. In contrast to operating the lever, problems with reversing was associated with visual impairment. Whereas correct use of the lever should be trained in all people who want to drive a mobility scooter, training how to reverse safely needs to be mainly offered to people with peripheral field defects.

Interestingly, more driving experience in any kind of motorised vehicle (e.g., moped, car) was not associated with better performance on the mobility scooter driving skill test. This confirms outcomes of a study by Nitz (2008), who argues that driving mobility scooters requires a new set of skills that are independent of the driving skills acquired through car driving. This outcome implies that - just as car driving skills - mobility scooter driving skills need to be learned thoroughly before the scooter is used in traffic. The same applies to traffic rules: Since traffic rules of slow motorised vehicles differ from those of regular car traffic, it is important that rehabilitation professionals give attention to these rules during training. Providers

of mobility scooters and healthcare professionals should therefore monitor whether people are given the opportunity to receive a sufficient amount of training as insufficient training may unnecessarily restrict mobility scooter use in people with visual impairment.

## Practical Fitness-to-drive

To investigate practical fitness-to-drive (the ability to drive safely with an impairment, taking into account individual strategies) in mobility scooters, participants completed an on-road driving test, consisting of a route that covered both indoor and outdoor environments in a busy and urban setting (**Chapter 4**). Although the visually impaired participants' performance was rated significantly worse on average compared to normal-sighted controls, their driving safety was generally still rated as sufficient. This outcome indicates that there is no reason to exclude visually impaired participants from using mobility scooters merely due to their visual impairment.

Almost all participants (90%) passed the on-road test. Participants who failed had either a very low visual acuity ( $<0.16$ ;  $<6/38$ ;  $<20/125$ ), peripheral field defects or a combination of both low visual acuity and visual field defects. None of the normal-sighted controls and participants with low visual acuity ( $0.16-0.4$ ;  $6/38-6/15$ ;  $20/125-20/50$ ) failed the on-road test. These results imply that especially individuals with peripheral field defects (with or without low visual acuity) are more likely to be involved of being involved in hazardous situations and therefore might need more guidance and training in real-life traffic situations to become aware of potential hazards when using their mobility scooter. Individuals with low visual acuity on the other hand do not seem to need extra attention during training based on their visual abilities, as their performance in the present study does not imply specific difficulties in real-life traffic.

It is worth emphasising that these results are based on a sample of people with no prior mobility scooter experience who underwent only relatively brief training before completing the complex on-road drive. Yet, the pass-rate observed in this experiment was relatively high. In addition to that, it is not unreasonable to assume that some of the individuals that failed might have passed the on-road test with more extensive training or if the on-road test had been carried out in a familiar and/or more rural setting. Using a qualitative design, McMullan (2016) observed four mobility scooter users with various visual impairments in

their familiar environment and concluded that all were safe enough to participate in traffic. Further support for the ability to drive driving mobility scooters with visual impairment comes from Deverell & Ong (2011), who had normal-sighted participants completing an on-road circuit using low-vision simulator goggles. They found that participants with a simulated visual acuity of 0.05 (6/120; 20/400) or with a 5° visual field did not experience problems when encountering different environmental features (high and low contrast shorelines, change in terrain, street furniture and poles, traffic light crossings, busy road crossings without lights). At a simulated visual acuity of 0.025 (6/240; 20/800), however, the level of vision was no longer sufficient to independently deal with low contrast shorelines and busy roads without lights. Problems with low-contrast obstacles were also encountered in the driving simulator environments of the current study (see below).

### Driving performance in a simulator

Although in the on-road mobility scooter driving test the circuit and the instructions were the same for all participants, it was not possible to control circumstances such as the exact amount and the behaviour of other traffic participants or the weather conditions. In addition, due to ethical reasons, the test leader was able to stop participants with a remote control in case of a hazard, which might have skewed results towards a more positive outcome. In order to measure driving performance in a more controlled environment, we created a driving simulator with a real mobility scooter and microcar driving simulator to engage in a virtual world (**Chapter 5**). Participants completed several drives in different environments and with different instructions. The results of this experiment revealed that visually impaired participants were generally able to control vehicle position at different speeds (5–45km/h) on a winding road, but showed more risky driving behaviour than normal-sighted controls when presented with obstacles or when interacting with other traffic participants. However, the average number of collisions in the group of people with visual impairments remained small. These results are in line with the outcomes of the on-road test, but due to a high drop-out rate caused by simulator sickness, no distinction could be made between the different types of visual impairment.

Compared to the group of normal-sighted people, the group of visually impaired participants did not show inferior performance (i.e. a higher number of collisions) with increasing speed in either the microcar simulator or the mobility scooter

simulator. Except for the very first drive in the microcar driving simulator, the number of collisions and time-to-collision were similar in the microcar simulator compared to the mobility scooter simulator. A likely explanation of the poorer performance in this first microcar drive could be the novelty of the task, as suggested in other research (Brouwer, 2015; Lundberg & Hakamies-Blomqvist, 2003). The driving simulator tasks thus suggest that many visually impaired participants are not only able to safely drive mobility scooters, but - after sufficient familiarisation with the simulator - are also able to safely drive microcars. Since it can be difficult to generalise driving simulator performance to real-life situations, findings should be interpreted with the necessary care (**Chapter 6**). Participants who did not do well in the driving simulator did not necessarily fail the on-road test in our study. In addition, the high occurrence of people suffering from simulator sickness might have influenced driving performance in the driving simulator negatively. Habituation seems to be one possible solution to tackle simulator sickness (see **Appendix A**), but might not always be feasible in clinical practice. Until these challenges have been tackled, an on-road examination in microcars probably gives the most realistic prediction of someone's safety in traffic. Nevertheless, additional use of a simulator may offer supplementary information of someone's driving performance that cannot easily be tested in an on-road situation.

Not surprisingly, the simulator tasks revealed that visually impaired participants were especially challenged by small objects with a low contrast. Raising awareness of these types of potential hazards should therefore be part of both mobility scooter training for visually impaired people and infrastructure design.

Noticeable in these tasks was the high individual variation within the groups of visually impaired participants with regard to the number of collisions and vehicle position control. This variation implies that individual differences other than visual function (e.g., cognitive and personality factors, coping with stressful situations, adapting to new situations, actual behaviour in traffic) may play a role in driving performance.

## The influence of cognition

The previous experiments showed that visual impairment in general is not a good predictor of an individual's fitness to drive. Yet, as stated above, individual variation of participants was large. In addition, users of mobility scooters generally belong to the elderly population in which cognitive impairments have a higher prevalence.

Therefore, the relation between cognitive functions and driving performance was examined (**Chapter 8**). In addition, the extent to which neuropsychological tests may contribute to the assessment of driving safety was investigated.

Though carefully selected, one major problem of the (neuropsychological) tests that were used for assessment was the validity of the tests in a population of visually impaired people. Most neuropsychological tests assume normal visual functioning, thereby creating bias for those with visual impairment. In the present study, visually impaired people performed worse than normal-sighted participants on a number of tests. Considering that both groups were similar with regard to age, level of education, and did not report any brain injury or neurodegenerative disease, these results are unlikely to reflect poorer cognitive functioning in visually impaired participants. A more likely explanation would be that the visual impairment prevented people from performing optimally on tests that require good visual acuity or an intact visual field. Nevertheless, the TMT and the Dot Counting Task were positively correlated with mobility scooter driving performance. Although far from being ideal, these tests could to a certain extent be used as indicators of driving performance. Low performance on these two tests may signify difficulties in an on-road drive and should therefore be paired with an additional driving test or observation. On the other hand, good performance on these tests despite a visual impairment appears to be predictive of good driving performance. In addition, low performance on the Dot Counting Task indicates difficulties with getting an overview of a visual scene. Such a result could be particularly useful to forewarn of difficulties someone might encounter in an on-road drive (e.g., intersections or crossing traffic participants) and might give directions for further training (e.g., scanning training).

With regard to car traffic, it has been difficult to establish a direct relationship between cognition and safe driving performance. According to Brouwer (2015), cognitive impairment needs to be quite severe to threaten safe driving performance, since drivers (in particular those with many years of driving experience) may be able to compensate for reduced cognitive abilities to a certain extent. Similar to our results, showing that visual impairment on its own is not a good predictor of driving safety in slow motorised vehicles, research on people with cognitive impairment (e.g., early stages of dementia) has shown that these people are not necessarily unsafe car-users (Brouwer, 2015). However, cognitive impairment as a comorbidity in visually impaired drivers might have a more detrimental effect on

driving performance. For future research, it would be interesting to explore the impact of both visual and cognitive impairment on driving performance in slow motorised vehicles.

## Limitations and future research

The project Mobility4All is the first study to examine driving safety of visually impaired individuals in slow motorised vehicles. Besides a relatively large sample size, and a very practical approach, the inclusion of participants with different types of visual impairment enabled us to draw conclusions for a relatively broad group of people with visual impairment. In addition, we were the first to develop a mobility scooter and microcar driving simulator in which virtual environments are designed in such a way that they can identify problems of visually impaired individuals. However, outcomes need be considered in the light of several limitations.

Although the standardised mobility scooter driving skill test and the mobility scooter on-road test were largely based on an official training programme for mobility scooters offered in the Netherlands, these test drives have not been validated. The possibility that both tests missed elements that would have given important information about the participants' abilities cannot be excluded. For instance, elements such as using the main road instead of the pavement, driving with higher speeds for a prolonged time, or finding a suitable location to leave the pavement were not included in the tests, but might very well be useful additions. Another important element that could be included in a driving test is speed. Due to practical circumstances (e.g., time and location), most of the mobility scooter on-road test of the current study consisted of driving at low speeds indoor or on pavements (approximately 5 - 6km/h). However, since mobility scooters are often used on cycle lanes or roads in the Netherlands, a stronger emphasis on higher speeds is advised in training as well in clinical practice. By including high speeds in the on-road driving assessment, better advice or training could also be given to clients (e.g., a client might do well with low, but not high speeds). Lastly, the use of an external stop button is highly recommended.

In addition, interrater-reliability for evaluation of the driving test was low. The solution to take the lowest score of the assessor might have resulted in a higher number of people failing the driving tests. A future research goal could be to establish a uniform training programme with a validated scoring system for people with visual impairment that can be used by rehabilitation professionals.

Furthermore, we filmed the mobility scooter on-road test and used a scale from 1 to 10 to evaluate driving performance in the present study. For clinical practice, a more reliable result might be achieved by evaluating an on-road driving test. Furthermore, using a Likert scale as described in **Chapter 3** (1 = good performance; 2 = satisfactory performance; 3 = insufficient performance; Van Baalen & Boerwinkel, 2011) might simplify the interpretation of how well clients do on particular subtasks.

The high drop-out rate in the driving simulator study challenged interpretations of the results. Even though the driving simulator was designed to achieve a high ecological validity, a less immersive environment might have resulted in less simulator sickness. In addition, participants could have been familiarised to the driving simulator before the experimental tasks were executed, since habituation seems to be effective in reducing simulator sickness symptoms (see **Appendix A**). However, habituation might be difficult to establish in clinical practice, since this would mean that assessment would be spread over multiple days. At this stage of development, limited use of the driving simulator in clinical practice would be recommended, since in the current state the disadvantages outweigh the advantages. Future research needs to focus on how to design a mobility scooter driving simulator that can reliably predict driving safety with reduced incidence of simulator sickness. Simplified virtual environments or smaller screen sizes might perhaps help to reach this goal.

With regard to cognitive factors, no firm conclusions about the cognitive abilities could be drawn since visual impairment biased the results of most tests. At present, only the TMT and the Dot Counting Task showed an association with driving performance for visually impaired individuals, whereas the MMSE, RCFT, Schuhfried RT and DT and the Vlakveld Hazard Perception Task were not related to driving performance. An additional problem was a ceiling effect on the mobility scooter on-road test as only a small number of participant failed this test. Thus, more research should be done to examine neuropsychological tests in people with visual impairment and – in order to investigate the impact of cognition on driving safety in slow motorised traffic – in people with brain damage or neurodegenerative diseases. In addition, the predictive ability of test batteries as a whole rather than individual tests could be explored.

Although this thesis aimed at studying traffic safety in mobility scooter and

microcar users, the main focus has been on mobility scooters. Due to safety and practical reasons, driving performance in microcars was only investigated in a driving simulator. In contrast to mobility scooters, on-road assessments with microcars are riskier for participants due to their higher speeds and probably would have required a driving instructor and a vehicle with an instructor's brake to be able to intervene in critical situations. While we assume that participants with visual impairment that fall within the legal visual standards for driving a car will be safe to drive a microcar as well, more research should be undertaken with visually impaired people that fall outside these standards.

### **Implications for clinical practice**

Finding the right balance between sustaining mobility and promoting driving safety is one of the challenges in (visual) rehabilitation. On the one hand, it is often thought that normal visual functioning is required to use slow motorised vehicles safely and that the lack of legal visual standards leads to an increase in accidents. On the other hand, the importance of community participation and the role that slow motorised vehicles play in fulfilling active and independent participation has been shown in several studies (Deverell, 2011; McMullan, 2016). The absence of legal visual standards for microcars can be used to the advantage of people who are not legally permitted to drive cars, thereby creating a possibility to continue with every day activities and stay connected with their social circles. Especially in rural areas, the risk that losing one's driving licence leads to poorer quality of life may be countered by the use of microcars. Since the main function of mobility scooters is to increase mobility for those who are physically less able, taking away a mobility scooter due to visual impairment might even have more severe consequences for affected individuals. The absence of legal visual standards also highlights the own responsibility of the driver. Ultimately, visually impaired drivers of slow motorised vehicles need to decide for themselves if they are able to participate in traffic in such a way that they do not cause dangerous situations or hinder traffic in an unsafe way (Article 5, Dutch Road Traffic Act, 1994). The role of (visual) rehabilitation centres is to give sufficient information and evidence-based advice to help the client make a well-informed decision. This does not necessarily just involve helping as many clients as possible to drive slow motorised vehicles, but also to offer alternatives if the use of these vehicles cannot be recommended.

The results of this thesis show that there is little evidence that visual impairment

alone leads to unsafe driving in slow motorised vehicles or the inability to learn the necessary skills to operate these vehicles. This outcome supports the currently legislation on the absence of legal visual standards for slow motorised vehicles. Due to the large individual differences in driving performance, which cannot necessarily be attributed to visual impairment, an individual approach is therefore recommended in (visual) rehabilitation. Clients should be given the opportunity to show and practise driving skills in the slow motorised vehicle of their choice, but not every client should be obligated to follow such a training programme. People with visual acuity problems as low as 0.16 (6/38; 20/125), for example, would probably not experience many difficulties in traffic as their driving performance in the current study did not differ from, or came close to, the performance of normal-sighted controls. Participants with very low visual acuity (< 0.16; <6/38; <20/125), peripheral field defects or a combination of both showed more difficulties in the experiments of this project and would probably benefit from extra training. In case of doubt, a driving test can lead to further insights. Assessment of contrast sensitivity should also be included as it was shown that low contrast sensitivity may lead to unsafe driving performance (see **Appendix B**). In addition, neuropsychological test assessment may help decide whether a client needs extra training. In the present study, the TMT and the Dot Counting Task were shown to be associated with driving performance in mobility scooters. Very low performance on these tests might be indicative of difficulties with the driving task for some individuals and might prompt a driving test, whereas good performance on these tests in general indicates good driving performance.

If a driving assessment is employed, we recommend that driving skills should be practiced first, until clients show satisfactory performance and can operate the vehicle without difficulties. For mobility scooters, the official national mobility scooter course developed by “Blijf Veilig Mobiel [Staying Mobile Safely]” (Van Baalen & Boerwinkel, 2011) forms a good basis to practise relevant mobility scooter skills and can be easily assessed and evaluated. In particular, appropriate use of the lever (all clients) to be able to stop on time and reversing (specifically for people with peripheral visual field defects) should be practised. Furthermore, the electronics of the mobility scooter should be adapted according to the client’s needs. It is self-evident that individuals who are not able to learn these basic skills – be it due to visual impairment or other reasons – are unlikely to participate safely in traffic. In those cases, alternatives to stay as independent as possible should accordingly

be discussed with the client. After all, the goal is to support safe and responsible traffic participation. In addition to training and testing driving skills, an on-road test, preferably in the clients' own environment should be executed to identify challenging situations. Although a stop button would be advisable as it allows intervention to avoid accidents in critical situations, this is not feasible in all practice situations. With regard to microcars, clients who already possess the appropriate driving licence and have car-driving experience<sup>5</sup> need to be distinguished from those who need to gain the licence necessary for driving microcars (class AM4). The exam for the licence AM4 involves a theoretical and a practical assessment focused on driving skills (an on-road assessment is not required). In the present project, microcar driving performance was only assessed in a driving simulator. Problems were particularly noticeable in situations where obstacles and other traffic participants were present. Again, in case of doubt, an on-road driving assessment might help to make the right decision. For driving assessments the rule should be adopted that practical fitness-to-drive should be assumed as long as the (visual) impairment is not noticeable to an external observer. In addition, performance of participants in the driving simulator improved over subsequent drives. People who exhibit difficulties during a first assessment should therefore be given the opportunity to train and improve their performance.

As Brouwer and Withaar (1997) argue, non-suitability for driving motorised vehicles should only be claimed when all possibilities of rehabilitation are exhausted. Rehabilitation should therefore always include the training of compensation strategies. Michon's (1985) hierarchical driving model is suitable to explore the options of compensation. In clinical practice, this could involve an educational module where participants discover what their challenges are (e.g., crossing a complex intersection, using roads with uneven surfaces, driving in bad weather) and accordingly learn how to deal with these challenges on a strategic (e.g., planning the route beforehand) or tactical (e.g., adapting speed) level. For mobility scooters in particular, speed restriction based on the clients' abilities would be an easy and straightforward choice. Compensation in the form of visual training is also an option for both mobility scooters and microcars. Earlier research showed that scanning or saccadic training improved mobility in people with visual field loss (De Haan, Melis-Dankers, Brouwer, & Tucha, 2015; Ivanov et al., 2016). Scanning training for people with visual field defects could thus be offered for slow motorised traffic

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<sup>5</sup> Drivers who lose their car driving licence (class B) due to visual impairment can apply for the driving licence necessary to drive microcars (class AM4) without any further assessment.

as well. Furthermore, the current rehabilitation programme Auto&Mobility within Royal Dutch Visio offers suitable clients with low visual acuity to use a Biotopic Telescope System (BTS; Melis-Dankers et al., 2008), which has been proven to be successful in car traffic. However, although a BTS could help drivers of slow motorised vehicles in individual cases, reducing speed might be a more feasible option for compensation as slow motorised vehicles are mostly used in familiar environments in which reading street signs and overtaking are not really needed.

Furthermore, driving safety could also be increased by adapting the environment or with the help of technology. Small objects with a low contrast have been shown to pose a risk for people with visual impairment (e.g., bollards, pavement curbs) and should be considered in infrastructure design. Obstacles that cannot easily be distinguished from the pavement should be avoided, for example, by applying high luminance (colour) contrast to increase visibility. Falling off the curb of a pavement is a commonly reported accident in mobility scooters, independent of visual impairment (Schepers, 2007). Making the curb more visible might therefore not only benefit mobility scooter users but also other people with low vision. Apart from improving the infrastructure, technological assistance could support mobility scooter users to avoid hazards. Driver assistance systems for cars have been established for years and might be of advantage in mobility scooters as well (Eck et al., 2012; Fehr, Langbein, & Skaar, 2000; Wang, Mihailidis, Dutta, & Fernie, 2011). A driver assistance system for mobility scooters consisting of velocity control, collision avoidance, navigation support at bottlenecks, park assistance, and a navigation system for safe and barrier-free direction-finding has been tested in the past (for more information see Eck et al., 2012). Research in cars found that driver assistant systems decreased unnecessary waiting time at intersections and led to fewer collisions (Dotzauer, 2014). However, Dotzauer (2014) also warns that these systems can in some cases lead to increased risks as people were also reported to over-rely on the information the system gives. A potentially useful research avenue would be to examine the usefulness and refinement of these assistance systems for users of slow motorised vehicles with impairments (e.g., curb detection, collision avoidance, and help with crossing over at intersections).

Based on the outcomes of this thesis, we suggest that an approach involving positive risk taking rather than focusing on impairment should be adopted (Morgan, 2004). Positive risk taking is defined as the careful consideration of risks to work towards the benefits and positive potentials that such risk taking involves.

A study by McMullan (2016) showed that mobility scooters have been reported to be hugely beneficial when it comes to community participation and that visually impaired users need to engage in positive risk taking to keep their independency. Rehabilitation centres can give evidence-based advice to help the client make a well-informed decision, but the responsibility of participating safely in traffic ultimately lies within the visually impaired drivers themselves.

## Conclusion

This thesis has increased the understanding of the role of visual impairment in driving slow motorised vehicles. Results show that visual impairment alone does not predict whether an individual can (learn to) drive mobility scooters safely or not. As a general rule, people with low visual acuity who would be eligible to drive a car using a Bioptic Telescope System in the Netherlands (minimum visual acuity of 0.16), do not need to be treated differently from normal-sighted controls in terms of mobility scooter allocation. Furthermore, abilities of individuals with visual field deficits, visual acuity below 0.16 (6/38; 20/125), or low contrast sensitivity should be assessed more carefully. With regard to microcars, visually impaired participants showed the capacity to improve substantially with training, which suggests the value of rehabilitation programmes. Instead of only focusing on an individual's impairments, training to apply compensation strategies should be offered and changes in environment should be considered as well. Applying more contrasts to obstacles (e.g., bollards) or curbs would make potential hazards more visible and help visually impaired to avoid accidents.

Based on our results we therefore advise against the introduction of legal visual standards for the use of slow motorised vehicles and rather focus on an individual's potential to improve driving performance and to compensate for their impairment. To put it in the words of Vestri & Marchi, (2009):

“The assessment of fitness-to-drive assumes a specific query that is different from visual clinical practice: it does not ask whether the person has a deficit, it asks whether the person is able to drive safely, even in the presence of a deficit” (p. 115)



