



**Development and Testing of an
Assessment Battery for Older Drivers**

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16. Abstract <p>The purpose of this project was to develop and test a comprehensive battery of assessment instruments for older drivers that was inexpensive and easy to administer. The resulting battery was developed by selecting a set of validated assessment instruments and combining them into a battery, whose total cost for acquisition was less than \$900. As part of this battery, three questionnaires were developed utilizing items from established questionnaires with minor modifications. Subjects were requested to bring in each medication and supplement they were currently taking.</p> <p>Testing of the battery entailed administering the battery to a convenience sample of 38 drivers aged 65 years or older. The time required to complete various portions of the battery was measured. Feedback about the battery was gathered from all subjects and the battery administrator.</p> <p>The study found that the assessment battery required on average less than one hour to complete. The study found that data from the assessment outcomes fell within normative ranges. In general, subjects had positive comments about the battery. Subjects felt the battery was acceptable, generally free of problems, had tasks presented in a good order, and was not too long. Most subjects felt that they did not need to bring in their medications in order to remember the names of those they were taking. Those taking several medications, however, were more likely to indicate that they might have difficulty remembering without bringing them in. We conclude, therefore, that the "brown bag" method for medication recall we used in testing should remain a part of the assessment battery.</p> <p>The test administrator was quite positive about the ease of administering each of the tests, except for the ruler drop test. Some subjects failed to catch the ruler, leading to difficulty in coding these outcomes. The ruler drop test was selected originally because it required no special equipment or technology. Simple reaction time is a straightforward ability to measure if technology, such as a computer, is utilized. Thus, we recommend that the ruler drop test be removed from the assessment battery and a technology-based reaction time test be included instead.</p> <p>In conclusion, the assessment battery described here is low-cost, transportable, easy to administer, easy for subjects to complete, and provides a comprehensive assessment of a person's physical health, mental health, and driving behaviors. With the replacement of the ruler-drop test with a technology-based test of reaction time, we believe that the assessment battery would serve as a valuable data collection tool for a longitudinal study of older drivers.</p>					
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INTRODUCTION

The population in the United States (US) is aging. Presently, the proportion of the population of US individuals 65 years of age and older is about 13 percent. Population projections suggest that within 50 years that proportion will increase to nearly 21 percent (US Department of Commerce, Census Bureau, 2001). In terms of absolute numbers, those 65 years of age and older will increase from the current population of 35 million now to about 70 million in the next five decades.

The traffic safety impacts of this demographic trend have been widely debated (see e.g., Transportation Research Board, TRB, 2005). Early research suggested that older drivers (those aged 65 years or more) had a higher rate of crashes than driver under 65 years of age (e.g., McKenzie & Peck, 1998; National Highway Traffic Safety Administration, NHTSA, 2000). Current research has called this viewpoint into question. As described by Hakamies-Blomqvist (2004), the typical measures of exposure used for calculating crash rates (population, licensed drivers, and vehicle-miles-traveled) are either potentially biased or are difficult to determine accurately. For example, Hakamies-Blomqvist and her colleagues (Hakamies-Blomqvist et al., 2002; Langford, et al., 2006) have shown that a “low-mileage bias” exists when crash rates are determined on a simple per-distance basis. It is well known that older drivers reduce their driving distances (see e.g. Gallo, Rebok, & Leiskar, 1999; Kostyniuk, Shope, & Molnar, 2000). As first described by Janke (1991), people of all ages who travel shorter distances have a greater risk of crash per unit of distance than drivers who travel greater distances. Several recent studies have shown that when crash rates are corrected for the low-mileage bias, the apparent age-related increase in crash risk disappears (Hakamies-Blomqvist et al., 2002; Fontaine, 2003; Langford, et al., 2006).

Although these results show that only older drivers who have low annual driving distances (about 10 percent of older drivers in a Netherlands study; Langford, et al., 2006) are over-represented in crashes when compared to younger drivers, they do not suggest that road safety countermeasures targeted at older drivers are unnecessary. There is strong evidence that for a crash of given dimensions, older drivers are more likely to be injured than younger drivers, due, presumably, to increased frailty (see e.g., Evans, 1991; Massie & Campbell, 1993). As such, older drivers are likely to be over-

represented in fatal and serious crashes (Hauer, 1988; Maycock, 1997). In addition, older drivers as a group tend to be involved in different types of crashes than younger drivers. For example, when compared with younger drivers, drivers 65 years of age and older, and particularly drivers 75 years of age or older, have more vehicle-to-vehicle collisions, more intersection crashes, and fewer alcohol-involved crashes (e.g., Dulisse, 1997; Eby, 1995; Hakamies-Bloomqvist, 1994, 2004; Hauer, 1988). Such findings are in line with what is known about driver behavior in this age group. Older drivers as a group adjust their driving to reduce the demands of the driving task (Gallo, Rebok, & Lesikar, 1999; Kostyniuk, Shope, & Molnar, 2000); that is, older drivers tend to travel slower and choose times, roadways, and routes that make them feel safest. Such findings suggest that unlike crashes among younger drivers, older driver crashes do not result from risk taking or careless driving, but rather from age-related declines in driving abilities.

It is well-established that aging can lead to declines in perceptual, cognitive, and psychomotor function (see Eby et al., 1998 for a review). These declines result from age-related medical conditions and the medications used to treat the conditions, as well as from the effect increasing age has on the various systems of the human organism. Accurately assessing declines in driving abilities, relating them to increases in crash risk, and developing effective countermeasures have been goals of traffic safety professionals for many years. As solutions to the problem of maintaining safe older driver mobility are identified and investigated, there is general agreement among researchers that assessment of the driver should play a key role (Staplin, Lococo, Stewart, & Decina, 1999; TRB, 2004). There is also general agreement that there are still many critical questions yet to be answered regarding senior mobility that only a well-planned longitudinal study could answer. Such a study would require obtaining a large, nationally representative sample of older adults and studying them over several years to determine changes in health, driving behaviors, and traffic safety outcomes. Such a longitudinal study should utilize a well-researched battery of assessment instruments that are reliable, valid, acceptable, and easily administered.

The purpose of the present study was to develop and evaluate a battery of assessment instruments for use in a longitudinal study of older adults. The battery was developed to accurately measure several aspects of older adult health (physical,

functional, and mental), social isolation, driving behaviors, reasons for driving reduction and cessation, if applicable, and traffic safety outcomes (e.g., violations, crashes).

The study took place in two parts. The first part was the development of the battery of assessment instruments. Development started with a detailed review of the literature followed by a careful analysis of all discovered assessment instruments to determine which would be used in the battery. The second part was a process evaluation of the battery with a convenience sample of older adult drivers.

METHODS

Development of Assessment Battery

The primary goal of the assessment battery was to construct a set of assessment instruments that accurately measured several aspects of health and driving behaviors. Note that the battery was not designed to assess the driving performance or crash risk associated with the assessment areas. The battery, however, was seen as a valuable tool when used in a longitudinal study to help identify declines in driving performance or change in crash risk, that might be associated with changes in specific assessment areas.

The first step in battery development was to decide on the assessment domains and areas to be addressed. Based on expert opinion and review of the literature, a list of domains and areas within the domains to assess was developed. An extensive literature search was then conducted to identify specific assessment instruments for each area. Appendix A contains the results of the primary literature search from which the assessment instruments were selected. The list of instruments was organized by the assessment domain and the function assessed. To select instruments for the assessment battery the following criteria were used: easy and quick to administer, low cost, transportable, not involving simulated or actual driving, presence of reliability and validity data, not specific for a certain subpopulation of the aged population, and not requiring specialized training for administration.

Based on these criteria, 17 assessment instruments were selected and/or developed to comprise the assessment battery. Details about each instrument including the required materials, the area(s) they were designed to assess, administration instructions, scoring instructions, and references are included in Appendix B. Also included in this appendix is the complete text for the three questionnaires. The names of the 17 instruments are shown in Table 1.

Table 1: Names of the 17 Assessment Instruments Used in the Battery and the Order of Administration	
Test Number	Name
1	Pelli-Robson Contrast Sensitivity Test
2	Snellen "E" Visual Acuity Test
3	Rapid Pace Walk Test
4	Arm Reach Test
5	Clock Reading Test
6	Amsler Grid Test
7	Ruler Drop Reaction Time Test
8	Jamar Dynamometer Hand Strength Test
9*	Health Questionnaire
10	Randot Stereoacuity Test
11	Motor Free Visual Perception Test (MVPT)
12	Nine-Hole Peg Test
13	Trail Making A and B Tests
14	Clock Drawing Test
15	Mini Mental State Exam (MMSE)
16*	Driving Questionnaire
17	Demographic Questionnaire

* The order of administration of the driving and health questionnaires was reversed for one half of the subjects.

Subjects

Subjects in this study were licensed drivers, age 65 to 90, who were currently driving in the state of Michigan at the time of their participation. Subjects were recruited in several ways. Advertisements were placed in a variety of local newspapers. Flyers were faxed or sent to senior centers, independent living communities, fraternal organizations (such as Veterans of Foreign Wars, the Elks, and the Rotary Club), local religious centers, grocery stores, pharmacies, recreation centers, and a local geriatric clinic. Follow-up phone calls were made to confirm that the flyers had been posted.

Interested volunteers were instructed to call or send an email to an UMTRI researcher, who then contacted them by phone. Volunteers were screened to verify that they were age 65 or older and had a valid driver license. Qualified subjects were then scheduled to participate. Subjects were sent a confirmation that included directions and a map to the study location (the UMTRI building).

Thirty subjects were initially recruited. As the local area used for recruiting included the University of Michigan, the subjects were highly educated. An overwhelming majority had at least a college degree (90 percent) and 67 percent had a graduate degree or higher. Only 3 percent of subjects indicated a high school diploma as their highest level of education. The remaining 7 percent had at least some college or technical education.

Because of the unusually high number of individuals with at least a college degree in the sample, we decided to focus additional recruitment on obtaining subjects with lower educational attainment. To recruit this demographic, we moved our testing location to a senior activity center located about 15 miles from the University of Michigan, which according to the senior center staff, has a considerable number of clients fitting the desired educational profile. The senior program coordinator of the senior center contacted members in the appropriate age group, inviting them to participate in the study. Interested individuals were instructed to contact an UMTRI researcher who screened them for eligibility and scheduled them for a session at the senior center. The study was housed at the center in a room that could be closed off to accommodate the privacy of the participant, as well as to accommodate the specific requirements of the assessment instruments.

Using this secondary testing site, eight more subjects were added to the sample bringing the total number of study subjects to 38. The resulting educational demographics of the sample were much better balanced. The final percentage of those with a graduate degree or greater was 53 percent, while those with some graduate education and those with college degrees only made up about 11 percent of the sample. Individuals with at least a college degree decreased to about 73 percent. Of

the subjects who had not graduated from college, about 16 percent had gone through some college or technical schooling and about 11 percent listed a high school diploma or its equivalent as their highest educational attainment. The study sample had a mean age of 74 years, was about 61 percent female, and 92 percent white/Caucasian.

Testing Room Setup

An important criterion for the development of the assessment battery was that it could be administered in a normal room (non specialized) with only slight modifications. It was preferable but not necessary that this space be contained in a single room. The minimum requirements for a testing-room are that it be at least 15 by 15 feet, with three chairs and a table.

The experimental setup we utilized in both locations for the current process evaluation is shown schematically in Figure 1. This set-up was designed to maximize ease of administering the battery and subjects' comfort.

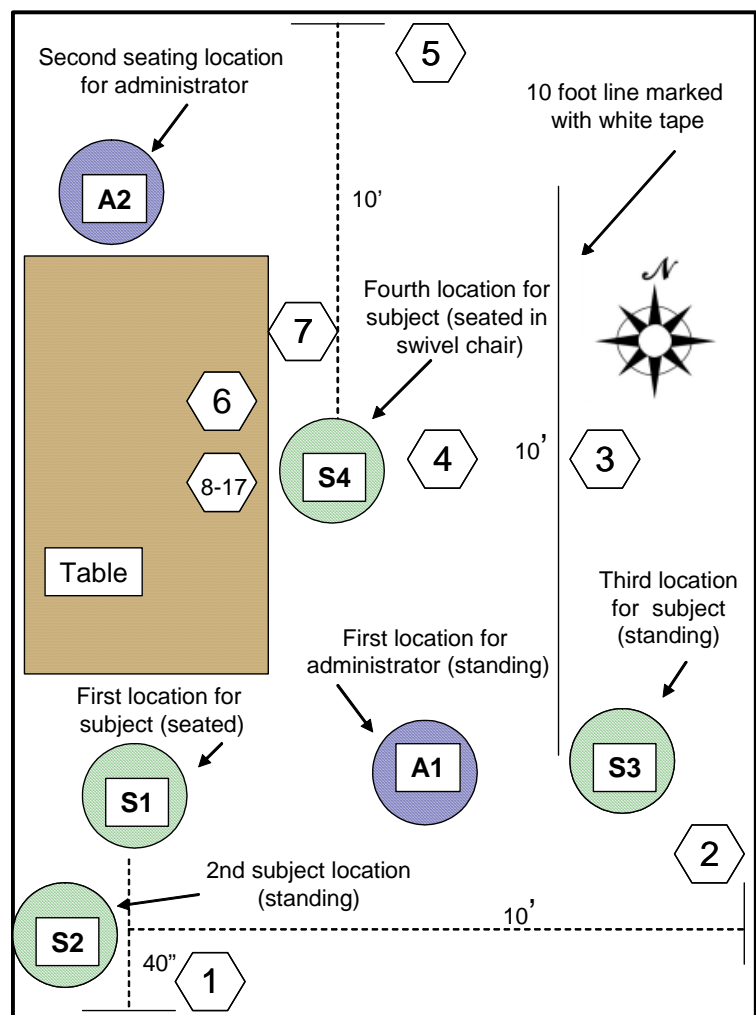


Figure 1: Arrangement of the room used for administering the assessment battery (not to scale).

The circles in Figure 1 indicate the positions of both the person who administered the assessment instruments (A) and the subject (S). The hexagon-shaped symbols indicate the locations where the 17 instruments shown in Table 1 were conducted. The numbers in the hexagons indicate the order in which the instruments were administered and relate to the test numbers in Table 1.

Procedures

The study was conducted at the University of Michigan Transportation Research Institute (UMTRI) between November 2005 and January 2006, as well as at a local senior center over two days in February 2006. The protocols for administering the assessment battery and collecting data for the process evaluation were guided by a data form used by the administrator.

The study commenced with confirmation of the subject's address, phone number, and valid driver license. Once confirmed, the subject was given a brief overview of the study and asked to read and sign the informed consent for the study to comply with institutional review board requirements.

As shown in Figure 1, administration of the assessment battery began with the subject seated facing the South wall (S1) and the administrator standing (A1). The subject was administered the Pelli-Robson contrast sensitivity test. The subject then stood and moved to the second location facing the East wall (S2) and was administered the Snellen "E" visual acuity test. The subject then moved to the third location (S3) where the Rapid Pace Walk was administered. The subject then moved to the fourth location (S4), where he or she could sit for the rest of the testing. A swivel chair was used at this subject location to facilitate administration of the remaining instruments. With the subject facing the South wall and the administrator standing at location A1, the Arm Reach assessment was administered. The administrator then set the hands of the clock placed on the North wall to the proper position and administered the head/neck rotation task. The administrator then seated himself at the second location (A2) and the subject swiveled his or her chair to face the table placed along the West wall. The Amsler Grid test was then administered. The subject then swiveled his or her chair to face the administrator and was given the Ruler Drop reaction time test. All the

remaining instruments were administered in the order shown in Table 1, with the subject facing the table.

The order of assessment-instrument administration was designed to be easy for the administrator and subject. Because it was impractical to measure the duration of each assessment task while also administering the task, the assessment instruments were divided into five sections that could be timed by the administrator. The first section included tests 1-8; the second was either the driving or health questionnaire; the third section included tests 10-15; the fourth section was either the driving or health questionnaire; and the final section was the demographic questionnaire. The order in which the driving and health questionnaires were administered was alternated between subjects.

The testing-session finished with a structured interview with each subject (Appendix D) to gather data on the assessment battery. The objective of the interview was to get immediate feedback on the battery including information about: acceptability of the instruments; problems with the instruments; the ordering of the assessments; duration of the tasks; usefulness of bringing in medications as opposed to having to remember what they were currently taking; format of the questionnaire; and any other comments on the assessment battery. After the interview, subjects were paid US\$15 for their participation, debriefed on the purpose of the study, and given the opportunity to ask questions. Prior to conducting the assessment battery, the decision was made that, unless asked, we would not provide testing results to the subject, with the exception of the Amsler Grid (which can indicate serious eye disease, such as glaucoma). Two subjects failed this test and were given this feedback. Both, however, reported that they were aware of the problem and had already visited an ophthalmologist.

RESULTS

The purpose of this study was to develop an assessment battery and conduct a process evaluation of the battery to ensure that it: was of sufficiently short duration; was acceptable to subjects; obtained high data-quality; and was easily administered. The results are presented in four sections: duration, data quality, subject feedback, and administrator debriefing.

Assessment Duration

Table 2 shows the mean, standard deviation, median, and mode duration of the various sections of the battery and for the entire battery. The time required to complete the entire assessment battery was 52 minutes on average. Thus, with additional time for administrative paper work, an average subject should be able to complete the assessment battery within one hour. Both the health and driving questionnaires individually required about 11-13 minutes to complete, the duration for which they were designed.

Table 2: Mean, standard deviation, median, and mode of duration of the various sections of the battery and overall.					
Name(s)	Duration Mean	Standard Deviation	Duration Median	Duration Mode	Duration Range
Pelli-Robson; Snellen "E" ; Rapid Pace Walk; Arm Reach; Clock Reading; Amsler Grid; Ruler Drop; Jamar Dynamometer	10.7 min	1.9 min	11.0 min	11.0 min	8.0-15.0 min
Health Questionnaire	12.6 min	4.4 min	12.0 min	12.0 min	4.0-22.0 min
Randot; MVPT; Nine-Hole Peg; Trail Making A and B; Clock Drawing Test; MMSE	15.3 min	2.9 min	15.0 min	17.0 min	11.0-24.0 min
Driving Questionnaire	11.3 min	4.6 min	11.0 min	8.0 min	7.0-29.0 min
Demographics Questionnaire	2.1 min	0.6 min	2.0 min	2.0 min	1.0-3.0 min
Total Assessment Battery	52.0 min	11.5 min	50.0 min	49.0 min	32.0-82.0 min

Data Quality

Table 3 shows the mean, standard deviation, median, mode, and range of scores for the 38 subjects. Also included in this table are age-adjusted (where available) normative data for comparison. As can be seen in the table, mean scores for the Pelli-Robson, Snellen "E"; rapid pace walk; arm reach, clock reading, Amsler grid, rule drop; Jamar hand strength; MVPT; 9-hole peg; trail making A & B; clock drawing; and MMSE were in line with the normative data. The Randot test, on the other hand, had a mean score that was well out of the normative range. Examination of the score range among the 38 subjects showed that some were exceptionally better than average and some were exceptionally worse. When such a large range of scores are present, the mean score is unreliable unless a large number of subjects are included, because outlying scores can influence the mean. In this case, the median and mode scores are more reliable measures of overall performance. When the median and modal scores are considered, it can be seen that they fall within the normative range.

Table 3: Mean, median, mode, range of scores and comparative normative data for the assessment tasks.						
Test Name	Mean	Standard Deviation	Median	Mode	Range	Normative Data
Pelli-Robson Scores						
Right eye	1.45	0.17	1.50	1.35	1.05-1.65	1.55-1.65
Left eye	1.39	0.17	1.35	1.35	0.90-1.65	1.55-1.65
Both eyes	1.58	0.11	1.65	1.65	1.20-1.65	1.55-1.65
Snellen "E"						
Right eye	20/33	11.6	20/30	20/30	20/20-20/70	20/40
Left eye	20/39	30.8	20/30	20/30	20/20-20/200	20/40
Rapid Pace Walk (sec)	6.8	2.3	5.9	5.9	3.0-12.6	7.0
Arm Reach	97% passed	na	na	na	na	Pass
Clock Reading	71% passed	na	na	na	na	Pass
Amsler Grid	92% passed	na	na	na	na	Pass
Ruler Drop (ms)	202	21	207	207	158-250	201 ms
Jamar (lb pressure)						
Right hand	60.2	25.7	56.4	79.0	21.6-116.7	42.6-91.0
Left hand	56.4	25.4	54.4	41.7	19.3-103.4	37.6-76.8
Randot (log arc sec)	114	141	70	70	20-500	50-80
MVPT (# correct out of 11)	9.7	1.8	10.5	11	3-11	9-11
Nine-Hole Peg (sec)						
Right hand	20.8	3.6	19.8	18.3	15.7-29.7	19.0-25.8
Left hand	22.2	4.1	21.3	none	16.9-37.2	20.3-24.1
Trail Making (sec)						
A	9.9	4.9	9.3	11.6	3.9-29.1	<30.0
B	108.8	38.3	104.6	none	54.2-190.1	<180.0
Clock Drawing (# out of 7)	6.6	0.7	7	7	4-7	7
MMSE (# out of 30)	29	1.4	29	30	23-30	24-30

Acceptability and Ease of Use

Subject Feedback

At the conclusion of the assessment battery, all subjects were administered a feedback questionnaire verbally. Each subject was asked the same 11 interview questions by the administrator who recorded their answers. Answers were then categorized. The results for each question were as follows:

In general, how acceptable were the tasks? By acceptable, we mean how tolerable were they; to what extent were they okay for you?

All respondents indicated that the tasks were either acceptable or very acceptable.

Were there any tasks that you had a particular problem with?

More than one-half of the respondents indicated that they had no problems with any of the tasks. Those who did indicate having problems cited the following tasks: Pelli-Robson (1 subject); all vision tests (2); Snellen “E” (1); clock reading (1); trail making B (8); Jamar (2); 9-hole peg (1); and clock drawing (1).

Were there any tasks that you think others would have a problem with even though you did not?

Nine subjects indicated that they did not think others would have a problem with any of the tasks. Those who thought others might have problems cited the following tasks: Pelli-Robson (3 subjects); rapid-pace walk (1); trail making B (4); Randot (1); 9-hole peg (5); MMSE (1); all cognitive tasks (1); and all perception tasks (3).

Did the order of the tasks make sense to you? Could the tasks have been done in a better order? What order is that?

Nearly all respondents indicated either that the order made sense or that they had no opinion on the order of tasks. Six subjects did not think the order made sense. No subjects thought that the order of tasks could be improved or suggested a better ordering of tasks.

Was the time required for the tasks acceptable? What time period would be more acceptable to you?

All subjects indicated that the time required for the tasks and assessment battery was acceptable. No subject suggested a different time period for conducting the assessment battery.

What did you especially like about the tasks?

Those who especially liked something about the tasks cited the following: tasks bring critical issues to light (3 subjects); tasks are similar to other UM tests (1); tasks make it possible to assess health (3); tasks were interesting/fun (6); tasks allowed competition with self (1); everything (2); tasks were easy (1); tasks were challenging (6);

objective of study is for a good cause (2); and the administrator (1). Others cited specific tasks that they liked: MVPT (1 subject); clock drawing (1); driving questionnaire (1); and all questionnaires (1). Ten subjects indicated that there was nothing they especially liked about the tasks.

What did you especially dislike about the tasks?

Thirty-five of the 38 subjects indicated that there was nothing they especially disliked about the tasks. Those subjects that indicate there was something they disliked about the tasks cited the following: Not knowing the results (1); trail making B (1); and the 9-hole peg test (1).

Do you think you could have remembered all your medications without having brought them in?

Five of the subjects forgot to bring in their medications and did not answer the question. Twenty-four subjects thought that they would have been able to remember all of their medications without bringing them in to the testing session, while nine subjects either thought they would not have been able to remember or were unsure. Those subjects who explained why they might have difficulty remembering their medications cited the following: Might forget some but not all medications (5); might not remember supplements (1); and might remember purpose but not name of medication (1).

Would there have been a better way for us to find out about the medications you are taking?

All but six of the subjects indicated that there was no better way for us to find out about medications that subjects were currently taking other than to have subjects bring them in to the testing session. Of the remaining subjects, three had no opinion; one thought it depended on the amount of medications, with the amount being greater than four or five; one thought the data could be collected over the phone; and one thought the researchers should talk directly with the subject's doctor.

Was the written format of the questionnaires acceptable? Would you have preferred to have someone ask you the questions?

All subjects thought that the written format of the questionnaires was acceptable. Two of these subjects also indicated that someone should be present during the completion of the questionnaire to provide clarification if needed. All but one subject indicated that they would not want to have someone ask them the questions. The remaining subject indicated that either a written or verbal format would be acceptable.

Do you have any other thoughts or comments about the entire process you just completed?

Most subjects did not have additional comments. Those who did have comments said the following:

- It is good to keep yourself informed about the status of your abilities (1 subject);
- Interested in being in research studies (1);
- Interested in the final outcomes of the study (2);
- The study was interesting/fun (4);
- Glad that UMTRI is doing this type of research (2);
- The study was short;
- The Pelli-Robson and Ruler Drop were interesting tasks;
- The issue of suddenly not being able to drive was brought up on the driving questionnaire and provoked thought about this situation.

Administrator Feedback

The same administrator assessed all 38 subjects in the study. At the end of the study he was debriefed by the project director to determine if there were any difficulties or issues with administration of the assessment battery. The administrator indicated that the administration process went smoothly. When asked about issues specific to certain tasks, he indicated that all of the tasks were easy and straightforward to administer, with the exception of the ruler drop test. For this test, he indicated that many subjects dropped the ruler. This occurred either because of the subject's poor coordination; the subject not gripping the ruler tight enough; the administrator not dropping the ruler correctly (e.g., not dropping the ruler straight down); or the subject not reacting quickly enough to catch the ruler before it passed between his or her fingers. When this occurred, the administrator had to make a subjective assessment of

why the subject dropped the ruler. If it was administrator error or the subject not applying enough pressure to hold the ruler, then the trial was repeated. If not, then a ceiling reaction time had to be recorded for that trial (250 ms). If the trial was not scored or repeated, then slow reaction times were effectively omitted for the assessment. Thus, the administrator recommended that a different method for measuring reaction time be utilized.

Cost

Table 4 shows the costs for acquiring the 17 assessment instruments used in the battery. The total cost for acquiring the battery was less than \$900. Note that six of the tests require special equipment, charts, or diagrams. The other instruments can be developed from common office materials or reproduced without a fee.

Table 4: Acquisition costs for the assessment instruments used in the battery.	
Test Name	Acquisition Cost
Pelli-Robson Contrast Sensitivity Test	\$390
Snellen "E" Visual Acuity Test	\$12
Rapid Pace Walk Test	Less than \$5
Arm Reach Test	Free
Clock Reading Test*	\$10
Amsler Grid Test	Free
Ruler Drop Reaction Time Test	Less than \$5
Jamar Dynamometer Hand Strength Test	\$220
Health Questionnaire	Free
Randot Stereoacuity Test	\$136
Motor Free Visual Perception Test (MVPT)*	\$10
Nine-Hole Peg Test	\$70
Trail Making A and B Tests*	\$10
Clock Drawing Test	Free
Mini Mental State Exam (MMSE)*	\$10
Driving Questionnaire	Free
Demographic Questionnaire	Free
Assessment Battery	\$878

* The clock for the clock reading test, the MVPT diagrams, Trail Making diagrams, and the MMSE are part of the GRIMPS kit which sells for \$40.

DISCUSSION AND CONCLUSION

The purpose of this study was to develop and test a comprehensive battery of assessment instruments for older drivers that was short, inexpensive, and easy to administer. The resulting battery was developed by selecting a set of validated assessment instruments and combining them into a battery, whose total cost for acquisition was less than \$900. As part of this battery, three questionnaires were developed utilizing carefully selected items from established questionnaires with minor modifications.

Testing of the battery entailed administering the battery to a convenience sample of 38 drivers aged 65 years or older. The time required to complete various portions of the battery was measured. Feedback about the battery was gathered from all subjects and the battery administrator.

The study found that the assessment battery required on average less than one hour to complete. There was a moderate amount of variability for completing the battery, with a standard deviation of 11.5 min and a range of 50 minutes. Analysis of subjects who took 70 minutes or more to complete the battery showed that these subjects were slower than other subjects completing the questionnaires, particularly the health questionnaire. Discussion with the battery administrator confirmed that these subjects tended to talk with him during the questionnaires and took more time to list their medications due the large number of medications they were taking.

We found that data from the assessment outcomes fell within normative ranges, as was expected given that our convenience sample was composed mainly of healthy older adults. In general, subjects had positive comments about the battery. Subjects felt the battery was acceptable, generally free of problems, had tasks presented in a good order, and was not too long. Most subjects felt that they did not need to bring in their medications in order to remember the names of those they were taking. Those subjects taking several medications, however, were more likely to indicate that they might have had difficulty remembering them without bringing them in. We concluded,

therefore, that the “brown bag” method for medication recall we used in testing should remain a part of the assessment battery.

The test administrator was quite positive about the ease of administering each of the tests, except for the ruler drop test. As discussed previously, some subjects dropped the ruler, leading to difficulty in coding these outcomes. The ruler drop test was selected originally because it required no special equipment or technology. Simple reaction time is a straightforward ability to measure if technology, such as a computer, is utilized. For example, reaction time can be easily measured using the following web site: <http://www.getyourwebsitehere.com/jswb/rttest01.html>. Thus, we concluded that the ruler drop test should be removed from the assessment battery and a technology-based reaction time test be substituted.

The cost impact of adding a technology-based reaction time measure depends on a number of factors. Devices designed specifically to measure reaction time can cost up to \$500. These devices are designed to administer a range of reaction time measures, such as choice reaction time, when only simple reaction time is needed. Thus, the price is not justified. A better method is to use a computer with an internet connection, and administer the simple reaction time test, using one of the many web sites that are designed for this purpose. After a search of dozens of these sites, the one described above is the most straightforward for administration. Of course, if the testing location does not have a computer or an internet connection, then the price for administering this test will be quite high. In either case, using technology will require no more time to administer the reaction time test than was required by the ruler-drop test.

In conclusion, the assessment battery described here is low-cost, transportable, easy to administer, easy for subjects to complete, and provides a comprehensive assessment of a person’s physical health, mental health, and driving behaviors. With the replacement of the ruler-drop test with a technology-based test of reaction time, we believe that the assessment battery would serve as a valuable data collection tool for a longitudinal study of older drivers.

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APPENDIX A
Literature Review Results

Domain	Instrument	Function Assessed	Citations
Cognition	Attention Switching	Attention/concentration	Reger et al., 2004
Cognition	Auditory Attention Task	Attention/concentration	Mercier et al., 1997
Cognition	Auditory Selective Attention Test	Attention/concentration	Staplin et al., 1999
Cognition	Auto Trails	Attention/concentration	Janke & Eberhard, 1998; Staplin et al., 1999
Cognition	Concealed Word Test	Attention/concentration	James et al., 1997
Cognition	Continuous Performance Test	Attention/concentration	Reger et al., 2004; Staplin et al., 1999
Cognition	Crossing-Off	Attention/concentration	Reger et al., 2004
Cognition	Digit Span Test	Attention/concentration	Reger et al., 2004; Rizzo et al., 1997; Schanke & Sundet, 2000; Szlyk et al., 2002; Wechsler, 1981
Cognition	Digit Symbol	Attention/concentration	Stephens et al., 2005; Lundqvist, 2001; Reger et al., 2004; Szlyk et al., 2002
Cognition	Embedded Figures Test (EFT)	Attention/concentration	James et al., 1997
Cognition	Freed's Selective Attention	Attention/concentration	Reger et al., 2004
Cognition	K Test	Attention/concentration	Lundqvist, 2001; Lundqvist, Gerdle, Ronberg, 2000
Cognition	Letter Cancellation Test	Attention/concentration	Stephens et al., 2005; Lezak, 1983; Reger et al., 2004
Cognition	Mackworth Clock	Attention/concentration	Reger et al., 2004
Cognition	Mattis Attention	Attention/concentration	Reger et al., 2004
Cognition	Number cancellation test	Attention/concentration	Marottoli et al., 1998; Staplin et al., 1999
Cognition	Number Comparison Test	Attention/concentration	James et al., 1997
Cognition	Paced Auditory Serial Addition Test	Attention/concentration	Lundqvist, 2001; Lundqvist, Gerdle, Ronberg, 2000
Cognition	Seashore Rhythm Test	Attention/concentration	Szlyk et al., 2002
Cognition	Simple or Choice/Complex Reaction Time	Attention/concentration	Reger et al., 2004
Cognition	Smith-Kettlewell-M Synemen Perimeter	Attention/concentration	Staplin et al., 1999
Cognition	Sternberg Test	Attention/concentration	Reger et al., 2004
Cognition	Symbol Digit Test	Attention/concentration	Marottoli et al., 1998; Staplin et al., 1999
Cognition	Useful Field of View (UFOV) Test	Attention/concentration; visual field	Ball et al., 1998; Coeckelbergh et al., 2002; Crabb et al., 2004; DeRaedt & Ponjaert-Kristofferson, 2000 James et al., 1997 Rinalducci et al., 2001 Reger et al., 2004 Staplin et al., 1999; Wood & Troutback, 1995
Cognition	Vigilance Test	Attention/concentration	Reger et al., 2004
Cognition	Visual Attention Task	Attention/concentration	Mercier et al., 1997
Cognition	Visual Search and Attention Test	Attention/concentration	Reger et al., 2004
Cognition	Visual Tracking	Attention/concentration	Reger et al., 2004
Cognition	Wechsler Adult Intelligence Scale (WAIS) Digit Symbol	Attention/concentration	Staplin et al., 1999
Cognition	WAIS/WAIS-R Digit Span	Attention/concentration	Woodruff-Pak, 1997
Cognition	WAIS/WAIS-R Digit Symbol	Attention/concentration	Drebing et al., 1994; Schultheses, Garay, Deluca, 2001; Woodruff-Pak, 1997
Cognition	WAIS-R Block Design	Attention/concentration	Schultheses, Garey, Deluca, 2001
Cognition	Washington University Attention Switching Task	Attention/concentration	Staplin et al., 1999
Cognition	Waypoint	Attention/concentration	Staplin et al., 1999
Cognition	WORLD spelled backward test	Attention/concentration	Reger et al., 2004
Cognition	Rules of the Road	Driving knowledge	Stephens et al., 2005; Staplin et al., 1999
Cognition	Traffic Sign Recognition Test	Driving knowledge	Marottoli et al., 1998; Staplin et al., 1999; Stutts, 1996; Stutts, Stewart, Martell, 1998
Cognition	Word Fluency	Executive fuctions	Luria, 1966
Cognition	Block Design	Executive functions	Rizzo et al., 1997
Cognition	Category Fluency	Executive functions	Reger et al., 2004
Cognition	Category Naming	Executive functions	Reger et al., 2004
Cognition	Cognitive Estimates Test (CET)	Executive functions	Radford & Lincoln, 2004; Gillespie, Evans, Gardener, Bowen, 2002

Cognition	Cognitive Flexibility Test	Executive functions	DeRaedt & Ponjaert-Kristofferson, 2000
Cognition	Color Word Test (CWT)	Executive Functions	Lundqvist, Gerdle, Ronberg, 2000
Cognition	Controlled Oral Word Association (COWAT)	Executive functions	Ott, Heindel, Whelihan, et al., 2003; Rizzo et al., 1997; Woodruff-Pak, 1997
Cognition	Digit Symbol	Executive Functions	Lundqvist, Gerdle, Ronberg, 2000
Cognition	Letter Sets	Executive functions	Allaire & Marsiske, 2002
Cognition	Mattis Initiation/Preservation	Executive functions	Reger et al., 2004
Cognition	Mazes	Executive functions	Reger et al., 2004
Cognition	Novel Estimation Questions (n-EQ)	Executive functions	Gillespie, Evans, Gardener, Bowen, 2002
Cognition	Number Series Tests	Executive functions	Allaire & Marsiske, 2002
Cognition	Picture Arrangement	Executive functions	Reger et al., 2004
Cognition	Porteus Maze Errors Test	Executive functions	Brown & Ott, 2004; Ott, Heindel, Whelihan, et al., 2003
Cognition	ShIPLEY Abstraction	Executive functions	Reger et al., 2004
Cognition	Stroop Color-Word Test	Executive Functions	Radford & Lincoln, 2004; Reger et al., 2004; Schultheses, Garay, Deluca, 2001; Schanke & Sundet, 2000
Cognition	Temporal Judgment Test (TJT)	Executive functions	Gillespie, Evans, Gardener, Bowen, 2002
Cognition	Trail Making A and B Tests	Executive functions	Stephens et al., 2005; Lundqvist, 2001; Lundqvist, Gerdle, Ronberg, 2000; Marottoli et al., 1998; Ott, Heindel, Whelihan, et al., 2003; Radford & Lincoln, 2004; Reger et al., 2004; Rinalducci et al., 2001; Rizzo et al., 1997; Schultheses, Garay, Deluca, 2001; Staplin et al., 1999; Stutts, 1998; Stutts, Stewart, Martell, 1998; Szlyk et al., 2002; Woodruff-Pak, 1997
Cognition	Weigl Sorting Test	Executive functions	Luria, 1966
Cognition	Wisconsin Card Sorting Test (WCST)	Executive functions	Bielauskas et al., 1998; Lundqvist, 2001
Cognition	Word Fluency	Executive functions	Reger et al., 2004
Cognition	Aphasia Battery	Language	Reger et al., 2004
Cognition	Boston Naming Test	Language	Reger et al., 2004; Staplin et al., 1999; Woodruff-Pak, 1997
Cognition	Comprehension	Language	Reger et al., 2004
Cognition	Information	Language	Reger et al., 2004
Cognition	Reading IQ Equilavent	Language	Reger et al., 2004
Cognition	ShIPLEY Vocabulary	Language	Reger et al., 2004
Cognition	Token Test	Language	Coughlan & Warrington, 1978
Cognition	Verbal IQ	Language	Reger et al., 2004
Cognition	Verbal Meaning Test	Language	Allaire & Marsiske, 2002
Cognition	WAIS Similarities	Language	Schanke & Sundet, 2000
Cognition	WAIS/WAIS-R Vocabulary	Language	Woodruff-Pak, 1997
Cognition	Auditory Verbal Learning Test (AVLT)	Language/memory	Lundqvist, 2001
Cognition	Associate Learning	Memory	Reger et al., 2004
Cognition	Benton Visual Retention Test	Memory	Reger et al., 2004; Rizzo et al., 1997; Staplin et al., 1999
Cognition	East Boston Memory Test	Memory	West et al., 2003
Cognition	Facial Recognition Test	Memory	Reger et al., 2004
Cognition	Hopkins Verbal Learning Test	Memory	Allaire & Marsiske, 2002
Cognition	Listening Span	Memory	Lundqvist, 2001
Cognition	Logical Memory	Memory	Reger et al., 2004
Cognition	Mattis Memory	Memory	Reger et al., 2004
Cognition	Object Memory Evaluation	Memory	Woodruff-Pak, 1997
Cognition	Recognition Memory for Faces or Words	Memory	Reger et al., 2004
Cognition	Recognition Memory Tests (RMT)	Memory	Radford & Lincoln, 2004
Cognition	Rey Auditory Verbal Learning Test	Memory	Drebing et al., 1994

Cognition	Rey-Osterrieth Complex Figure Test (CFT)	Memory	Drebing et al., 1994; Rizzo et al., 1997
Cognition	Serial 7 Test	Memory	Freund & Szenovacz, 2001
Cognition	Short Blessed Orientation Memory Concentration	Memory	Stutts, 1998; Stutts, Stewart, Martell, 1998
Cognition	Spatial Recognition Test	Memory	Reger et al., 2004
Cognition	Verbal Descriptions of Road Signs (VSRS)	Memory	Radford & Lincoln, 2004
Cognition	Visual Reproduction	Memory	Bogner et al., 2004; Reger et al., 2004; Szlyk et al., 2002
Cognition	Wechsler Memory Scale (WMS)	Memory	Marottoli et al., 1998; Odenheimer et al., 1994; Staplin et al., 1999; Szlyk et al., 2002; Woodruff-Pak, 1997
Cognition	Word List Learning	Memory	Reger et al., 2004
Cognition	Memory Impairment Screen (MIS)	Memory	Kuslansky et al., 2002
Cognition	Behavior Rating Scale	Mental Status	Reger et al., 2004
Cognition	Blessed Dementia Rating Scale	Mental Status	Reger et al., 2004
Cognition	Cambridge Cognitive Examination (CAMCOG)	Mental Status	Mitchell, Castleden, Fanthome, 1995
Cognition	Clinical Dementia Ratings (CDR)	Mental Status	Duchek, Carr, Hunt, et al., 2003; Reger et al., 2004
Cognition	Cognitive Abilities Screening Instrument (CASI)	Mental Status	Drachman & Sweener, 1996; Valcour, Masaki, Blanchette, 2002
Cognition	Dementia Rating Scale	Mental Status	Reger et al., 2004
Cognition	Direct Assessment of Functional Status	Mental Status	Reger et al., 2004
Cognition	Expanded Constructional Praxis	Mental Status	Reger et al., 2004
Cognition	Full Scale IQ	Mental Status	Reger et al., 2004
Cognition	Independent Activities of Daily Living (IADL) Assessment	Mental Status	Reger et al., 2004
Cognition	Mattis Dementia Rating Scale	Mental Status	Reger et al., 2004
Cognition	Mini Mental State Exam (MMSE)	Mental status	Adler & Kuskowski, 2003; Adler, Rottunda, Dyksen, 1996; Bielauskas et al., 1998; Brown & Ott, 2004; Carr, 2000; Carr, Schmader, Bergman, 1991; Cox et al., 1998; Fox et al., 1997; Gallo, Rebok, Lesikar, 1999; Harvey, Frase, Bower, 1995; Janke, 2001; Johansson et al., 1996; Krulewitch et al., 2000; Lundberg et al., 2003; Marottoli, 1993; Marottoli et al., 1998; Messinger-Rapport, 2002; Mitchell, Castleden, Fanthome, 1995; Odenheimer et al., 1994; Ott, 1996; Ott, Heindel, Whelihan, et al., 2003; Perryman & Fitten, 1996; Reger et al., 2004; Retchen, Hillner, 1994; Staplin et al., 1999; Szlyk et al., 2003; Taira, 1989; Wild & Cotrell, 2003; Woodruff-Pak, 1997
Cognition	Mattis Organic Mental Syndrome Screening Exam	Mental Status	Owsley, McGwin, Ball, 1998; Sims et al., 1998; Staplin et al., 1999
Cognition	National Adult Reading Test (NART)	Mental status	Nelson, 1991
Cognition	Neurobehavioral Cognitive Status Exam (NCSE)	Mental Status	Drane & Osato, 1997
Cognition	Shipley IQ Estimate	Mental Status	Reger et al., 2004
Cognition	Short Blessed Cognitive Screen	Mental status	Staplin et al., 1999; Stutts, 1996; Hunt, 2003
Cognition	Short Portable Mental Status Questionnaire (SPMSQ)	Mental Status	Lyman, McGwin, Sims, 2001
Cognition	Sum of Boxes	Mental Status	Reger et al., 2004
Cognition	Temporal Orientation	Mental Status	Reger et al., 2004; Rizzo et al., 1997
Cognition	Telephone Interview of Cognitive Status (TIC-S)	Mental status	de Jager, Budge, Clarke, 2003
Cognition	Story-telling Tests	Mental status	Scherr et al., 1988
Cognition	AHEAD Aggregate Index of Cognitive Functioning	Multi abilities/impairments	Herzog & Wallace, 1997
Cognition	Cognitive Behavioral Driver's Inventory (CBDI)	Multi abilities/impairments	Klavora, Heslegrave, Young, 2000
Cognition	Dynavision Performance	Multi abilities/impairments	Klavora, Heslegrave, Young, 2000

	Assessment Battery (DPAB)		
Cognition	Everyday Cognitive Battery (ECB)	Multi abilities/impairments	Allaire & Marsiske, 2002
Cognition	Halstead-Reitan Battery	Multi abilities/impairments	Palmer et al., 2002
Cognition	Manual for Kit of Factor-Referenced Cognitive Tests	Multi abilities/impairments	Wochinger, Boehm-Davis, 1995
Cognition	Nordic Stroke Driver Screening Assessment (SDSA)	Multi abilities/impairments	Lundberg et al., 2003; Mitchell, Castleden, Fanthorne, 1995; Radford & Lincoln, 2004
Cognition	Short 1st Tier Battery	Multi abilities/impairments	Raedt & Ponjaert-Kristofferson, 2000
Cognition	Awareness Index	Other - anosognosia	Schanke & Sundet, 2000
Cognition	Finger Tapping Test	Psychomotor speed	Lundqvist, 2001; Lundqvist, Gerdle, Ronberg, 2000; Luria, 1966
Cognition	Serial Digit Modalities Test	Psychomotor speed	Schanke & Sundet, 2000
Cognition	AARP Reaction Time Test	Reaction times	Staplin et al., 1999; Stutts, 1996; Stutts, Stewart, Martell, 1998
Cognition	Bilateral Movements	Reaction times	Luria, 1966
Cognition	Cue Recognition (Doron Driver Analyzer)	Reaction times	Janke & Eberhard, 1998; Staplin et al., 1999;
Cognition	Manual assessment	Reaction times	Staplin et al., 1999
Cognition	Model 63014 Reaction Time Apparatus	Reaction times	Bielauskas et al., 1998
Cognition	Reaction Time Tests	Reaction Times	Lundqvist, Gerdle, Ronberg, 2000
Cognition	3D Copying	Visuospatial skills	Whiting et al., 1985
Cognition	Bender Gestalt Test	Visuospatial skills	Margolis et al., 1989
Cognition	Benton Copy	Visuospatial skills	Reger et al., 2004
Cognition	Benton Line Orientation	Visuospatial skills	Reger et al., 2004
Cognition	Benton-Van Allen Facial Recognition Test	Visuospatial skills	Rizzo et al., 1997
Cognition	Block Design	Visuospatial skills	Lundqvist, 2001; Reger et al., 2004; Schanke & Sundet, 2000; Szlyk et al., 2002
Cognition	Clock Drawing Test	Visuospatial skills	Brown & Ott, 2004; Estaban-Santillan et al., 1998; Ott, Heindel, Whelihan, et al., 2003; Powlishta et al., 2002; Reger et al., 2004; Shulman, 2000
Cognition	Embedded Figures Test	Visuospatial skills	Marottoli et al., 1998; Mercier et al., 1997
Cognition	Figure-Ground Test	Visuospatial skills	Reger et al., 2004
Cognition	Hooper Visual Organization Test	Visuospatial skills	Marottoli, 1993; Marottoli et al., 1998; Reger et al., 2004
Cognition	Incomplete Letters Test	Visuospatial skills	Warrington & James, 1991
Cognition	Mattis Construction	Visuospatial skills	Reger et al., 2004
Cognition	Motor Free Visual Perception test (MVPT)	Visuospatial skills	Bogner et al., 2004; Burton & Stephen, 2003; Staplin et al., 1999; Schultheses, Garay, Deluca, 2001
Cognition	Paper Folding Test	Visuospatial skills	DeRaedt & Ponjaert-Kristofferson, 2000
Cognition	Picture Completion	Visuospatial skills	Reger et al., 2004; Schanke & Sundet, 2000
Cognition	Raven Progressive Matrices	Visuospatial skills	Lundqvist, 2001
Cognition	Rey Osterrieth Complex Figure Test	Visuospatial skills	Lundqvist, 2001
Cognition	Right-Left Shape Copying	Visuospatial skills	Whiting et al., 1985
Cognition	Simultaneous Capacity Test	Visuospatial skills	Lundqvist, Gerdle, Ronberg, 2000
Cognition	Visual Form Discrimination Test	Visuospatial skills	Szlyk et al., 2002
Cognition	Visuospatial task - Stanford-Binet Intelligence Scale	Visuospatial skills	Reger et al., 2004
Cognition	Visual Object and Space Perception Battery	Visuospatial skills	Radford & Lincoln, 2004
Cognition	WAIS/WAIS-R Block Design	Visuospatial skills	Woodruff-Pak, 1997
Cognition	WAIS-R Picture Completion	Visuospatial skills	Staplin et al., 1999
Cognition	WMS-R Visual Reproduction	Visuospatial skills	Staplin et al., 1999
Cognition/ Motor	Performance/Information Processing Systems (PIPS)	Multiple areas	Williamson et al., 2000
Combination	Assessment of Driving Related Skills (ADRES)	Multiple areas	Wang et al., 2003
Combination	Automated Psychological Test	Multiple areas	McKnight & McKnight, 1998

Combination	Gross Impairment Screening Battery (GRIMPS)	Multiple areas	Eby et al., 2003; Staplin, Gish, Wagner, 2003
Demographics	Hollingshead Index of Social Position	Demographics	Shah et al., 2004
Demographics	Unnamed Questionnaire	Demographics	Raitanen et al., 2003
Demographics	Unnamed Questionnaire	Demographics	Bauer et al., 2003
Demographics	Senior Driver Research Inventory (SDRI)	Demographics	Lonero, Clinton, Wilde et al., 1994
Driving	Driver Skill Inventory (DSI)	Abilities, risk taking	Lajunen et al., 1998
Driving	Driving Confidence Rating Scale	Abilities, risk taking	Marottoli & Richardson, 1998
Driving	Unnamed Questionnaire	Abilities, risk taking	Parker et al., 2001
Driving	Unnamed Questionnaire	Abilities, risk taking	Sivak, Soler, Trankle, 1989
Driving	Unnamed Questionnaire	Abilities, risk taking	Wilde & Cotrell, 2003
Driving	Unnamed Questionnaire	Abilities, risk taking	Lyman, McGwin, Sims, 2001
Driving	Self Rating of Driving Ability	Abilities, risk taking	Marottoli & Richardson, 1998
Driving	Self-Assessed Driving Skill Questionnaire	Abilities, risk taking	Groeger & Grande, 1996
Driving	Senior Driver Research Inventory (SDRI)	Abilities, risk taking, Habits, patterns, history	Lonero, Clinton, Wilde et al., 1994
Driving	True/False Statements	Abilities, risk taking	Szlyk et al., 1995
Driving	Asset & Health Dynamics Among the Oldest (AHEAD)	Cessation	Fonda, Wallace, Herzog, 2001
Driving	Unnamed Semi-Structured Interview	Cessation	Johnson, 1998
Driving	Unnamed Questionnaire	Cessation	Dellinger et al., 2001
Driving	Unnamed Questionnaire	Cessation	Marottoli et al., 2000
Driving	Unnamed Questionnaire	Cessation	Stutts & Wilkens, 2003
Driving	Barnstead Place Mobility Centre Q	Habits, patterns, history	Simms & O'Toole, 1994; Simms, 1992
Driving	Driving Habits Interview	Habits, patterns, history	Szlyk et al., 2002
Driving	Driving Habits Questionnaire (DHQ)	Habits, patterns, history	Ball et al., 1998; Cohen, Wells, Owsley, 2003; Owsley, McGwin, McNeal, 2003; Owsley et al., 1999; Rinalducci et al., 2001; Groeger & Grande, 1996
Driving	Driving Practices Survey	Habits, patterns, history	Marottoli & Richardson, 1998
Driving	Unnamed Interview	Habits, patterns, history	Simms, 1992
Driving	Unnamed Questionnaire	Habits, patterns, history	Adler & Kuskowski, 2003
Driving	Unnamed Questionnaire	Habits, patterns, history	Bauer et al., 2003
Driving	Unnamed Questionnaire	Habits, patterns, history	Bogner et al., 2004
Driving	Unnamed Questionnaire	Habits, patterns, history	Cushman, 1995, 1996
Driving	Unnamed Questionnaire	Habits, patterns, history	Mercier et al., 1997
Driving	Unnamed Questionnaire	Habits, patterns, history	Petrocine, 1979
Driving	Unnamed Questionnaire	Habits, patterns, history	Hakamies-Blomqvist & Siren, 2003
Driving	Unnamed Questionnaire	Habits, patterns, history	Ansley & Smith, nd
Driving	Unnamed Questionnaire	Habits, patterns, history	Lyman, McGwin, Sims, 2001
Driving	Driver Behavior Questionnaire (DBQ)	Lapses, errors, violations	Owsley, McGwin, McNeal, 2003; Parker et al., 2001; Groeger & Grande, 1996; Parker et al., 2000
Driving	Unnamed Questionnaire	Multiple	Taira, 1989
Driving	Unnamed Questionnaire	Self-imposed restrictions	West et al., 2003
Health/functioning	Assessment of Living Skills and Resources	Activities of Daily Living (ADLs)	Barbas & Wilde, 2001
Health/functioning	Basic ADLs	ADLs	Rubenstein, Calkins, Greenfield, et al., 1988
Health/functioning	Direct Assessment of Functional Status Scale	ADLs	Barbas & Wilde, 2001
Health/functioning	Independence Living Scale	ADLs	Barbas & Wilde, 2001
Health/functioning	Modified Katz Index of ADL	ADLs	Carr, Jackson, Alguire, 1990
Health/functioning	Unnamed Questionnaire	ADLs	Raitanen et al., 2003

Health/functioning	Structural Assessment of Independent Living Skills	ADLs	Barbas & Wilde, 2001
Health/functioning	The Everyday Problems Test	ADLs	Barbas & Wilde, 2001
Health/functioning	Beth Israel/UCLA Functional Status Assessment	General health status	Rubenstein, Calkins, Greenfield, et al., 1988
Health/functioning	COOP Chart	General health status	Rubenstein, Calkins, Greenfield, et al., 1988
Health/functioning	Medical Outcomes Study Short Form (MOS SF-36)	General health status	Andresen et al., 1995
Health/functioning	Unnamed Questionnaire	General health status	Bauer et al., 2003
Health/functioning	Quality of Well Being (QWB)	General health status	Andresen et al., 1995
Health/functioning	Rand Short Form	General health status	Rubenstein, Calkins, Greenfield, et al., 1988
Health/functioning	Seniors in the Community: Risk Evaluation for Eating and Nutrition	General health status	Keller, McKenzie, Goy, 2001
Health/functioning	Sickness Impact Profile Short Form	General health status	Rubenstein, Calkins, Greenfield, et al., 1988
Health/functioning	Sickness Impact Profile (SIP)	General health status	Andresen et al., 1995
Health/functioning	Physical Health Rating Scale	Physical functioning	Shah et al., 2004
Health/functioning	Physical Performance Test (PPT)	Physical functioning	Shah et al., 2004
Health/functioning	Unnamed Questionnaire	Physical functioning	Wild & Cotrell, 2003
Health/functioning	CHS/Supp on Aging-National Health Interview	IADLs	Sims et al., 1998
Health/functioning	Lawton & Brody	IADLs	Rubenstein, Calkins, Greenfield, et al., 1988
Health/functioning	Pfeffer Functional Activity Scale	IADLs	Allaire and Marsiske, 2002
Health/functioning	Direct Assessment of Functional Status (DAFS)	Multiple	Palmer et al., 2002
Health/functioning	Faces of Pain Scale (Faces)	Pain	Krulewitsch et al., 2000
Health/functioning	Line (Nonverbal visual analog scale)	Pain	Krulewitsch et al., 2000
Health/functioning	Philadelphia Pain Intensity Scale (PIS)	Pain	Krulewitsch et al., 2000
Medical conditions	Alcohol-Related Problems Survey (ARPS)	Conditions, medications	Fink et al., 2002; Diller et al., 1999
Medical conditions	Driving Decisions Workbook (DDW)	Conditions, medications	Eby, Shope, Molnar, et al., 2000
Medical conditions	Utah Driver License Division Abbreviated Health Q	Conditions	Utah Driver License Division, 2004
Medications/Drugs	CAGE	Other drugs, alcohol	Fink et al., 2002
Medications/Drugs	Michigan Alcoholism Screening Test (MAST)	Other drugs, alcohol	Fink et al., 2002; Hirata et al., 2001
Medications/Drugs	MAST-G (geriatric version)	Other drugs, alcohol	Fink et al., 2002
Medications/Drugs	Short MAST	Other drugs, alcohol	Sims et al., 1998
Motor	Sitting Balance Task	Balance	Stephens et al., 2005
Motor	9 Hole Peg Test	Coordination/dexterity	Schultheses, Garay, Deluca, 2001
Motor	Ball Drop Test	Coordination/dexterity	Staplin et al., 1999
Motor	Finger Tapping	Coordination/dexterity	Staplin et al., 1999
Motor	Tweezer Test	Coordination/dexterity	Staplin et al., 1999
Motor	Rapid Pace Walk	Mobility	Staplin et al., 1999
Motor	Grooved Pegboard Test	Motor speed	Schanke & Sundet, 2000
Motor	Observed Problems	Multi abilities/impairments	Janke, 2001
Motor	Performance Oriented Mobility Adjustment (POMA)	Multi abilities/impairments	Sims et al., 1998
Motor	Jamar Dynamometer	Muscle strength	Taira, 1989
Motor	Manual assessment	Muscle strength	Stephens et al., 2005; Taira, 1989

Motor	Head and Neck Rotation	Range of motion	Staplin et al., 1999
Motor	Manual Muscle Test	Range of motion	Staplin et al., 1999
Motor	Brake Reaction Times	Reaction times	Stephens et al., 2005
Motor	Bumpa-Tel Instructor Psychological Testing Apparatus	Reaction times	Taira, 1989
Motor	Neurobehavioral Evaluation System	Reaction times	Odenheimer et al., 1994
Motor	REACT	Reaction times	Schanke & Sundet, 2000
Motor	Simple Reaction Time Test (SRTT)	Reaction times	Philip et al., 1999
Motor	Ambulation Index Rating		Schultheses, Garay, Deluca, 2001
Perception	Early Treatment Diabetic Retinopathy Study Chart	Acuity	Klein et al., 2003; Rizzo, Kellison, 2004
Perception	Early Treatment Diabetic Retinopathy Study Chart	Acuity	Ball et al., 1998; Owsley, McGwin, Ball, 1998; Staplin et al., 1999; Sims et al., 1998
Perception	Keystone Telebinocular System	Acuity	Rinalducci et al., 2001
Perception	Landolt Ring	Acuity	Shinar & Schieber, 1991; Wood, 2002
Perception	Snellen Chart	Acuity	Currie, Bhan, Pepper, 2000; Janke & Eberhard, 1998; Janke, 2001; Messinger-Rapport, 2002; Shinar & Schieber, 1991; Szlyk et al., 1995; Schultheses, Garay, Deluca, 2001
Perception	Snellen "E" Chart	Acuity	Johansson et al. 1997, Staplin et al., 1999
Perception	Graham Field Chart	Acuity (far)	Staplin et al., 1999
Perception	Bailey-Love Chart	Acuity (high contrast)	West et al., 2003
Perception	Smith Kettlewell Institute Low Luminance (SKILL) card	Acuity (low/high contrast)	Stutts, 1998; West et al., 2003
Perception	Berkeley Glare Test	Acuity (in glare)	West et al., 2003
Perception	Rosenbaum Card	Acuity (near)	Staplin et al., 1999
Perception	Adams Desaturated D-15	Color discrimination	West et al., 2003
Perception	Pelli-Robson Chart	Contrast sensitivity	Ball et al., 1998; Janke & Eberhard, 1998; Janke, 2001; Klein et al., 2003; Owsley, McGwin, Ball, 1998; Rizzo, Kellison, 2004; Sims et al., 1998; Stutts, 1998; Szlyk et al., 1995; West et al., 2003; Wood & Troutback, 1995; Wood, 2002
Perception	Berkeley Glare Test	Glare sensitivity	Wood, 2002
Perception	Brightness Acuity Tester	Glare sensitivity	Staplin et al., 1999
Perception	Vistech MCT-8000	Glare sensitivity	Owsley, McGwin, Ball, 1998
Perception	Hearing Handicap Inventory	Hearing impairment	Sims et al., 1998
Perception	Hearing Handicap Inventory for Elderly (HHIE)	Hearing impairment	Andelin, Alessi, Aronow, 1995
Perception	Welch-Allyn Audioscope	Hearing impairment	Sims et al., 1998
Perception	Whisper Test	Hearing impairment	Messinger-Rapport, 2002
Perception	National Eye Institute Visual Function Questionnaire (NEI-VFQ)	Multi abilities/impairments	Lyman, McGwin, Sims, 2001
Perception	Orthorater	Multi abilities/impairments	Maree, 1988
Perception	Unnamed Questionnaire	Multi abilities/impairments	Klein et al., 2003
Perception	Titmus 2A Stereoptic Vision Screener	Multi abilities/impairments	James et al., 1997
Perception	Your Vision Questionnaire	Multi abilities/impairments	Chaparro, McGregor, Stumpfhauser, 1998; Kline et al., 1992
Perception	Randot Test	Stereoacuity	Staplin et al., 1999
Perception	TNO Test	Stereoacuity	Owsley, McGwin, Ball, 1998
Perception	Automated Visual Field Tester	Visual field	Stutts, 1998
Perception	Binocular Esterman Visual Field Test (EVFT)	Visual field	Crabb et al., 2004
Perception	Friedman Visual Field Analyzer MK2	Visual field	Schanke & Sundet, 2000
Perception	Goldmann Perimeter (III 4-E Test Target)	Visual field	Szlyk et al., 1995
Perception	Humphrey Field Analyzer (HFA)	Visual field	Ball et al., 1998; Owsley, McGwin, Ball, 1998; Wood & Troutback, 1995; Wood, 2002

Perception	Integrated Visual Field (IVF)	Visual field	Crabb et al., 2004
Perception	Modified Synemed Perimeter	Visual field	West et al., 2003
Perception	Fieldmaster Model 101-PR	Visual field	Keltner & Johnson, 1990
Perception	Amsler Grid	Visual field (central)	Staplin et al., 1999; West et al., 2003
Perception	Manual assessment	Visual field (peripheral)	Staplin et al., 1999
Psychosocial	Beck Depression Inventory (BDI)	Depression	Olin et al., 1992
Psychosocial	Brief Psychiatric Rating Scale	Depression	Palmer et al., 2002
Psychosocial	Center for Epidemiological Study of Depression Scale (CES-D)	Depression	Beekman et al., 1997; Levin et al., 2001; Lewinsohn et al., 1997; Sims et al., 1998; Watson and Pignone, 2003; Watson et al., 2004; West et al., 2003
Psychosocial	CES-D Abbreviated	Depression	Fonda, Wallace, Herzog, 2001
Psychosocial	Cornell Scale for Depression in Dementia	Depression	Krulewitsch et al., 2000
Psychosocial	Geriatric Depression Scale (GDS)	Depression	Olin et al., 1992; Watson et al., 2004; Yesavage et al., 1983
Psychosocial	GDS-15	Depression	Pomeroy, Clark, Philp, 2001; Watson and Pignone, 2003
Psychosocial	GDS-4	Depression	Pomeroy, Clark, Philp, 2001
Psychosocial	Hamilton Depression Rating Scale	Depression	Palmer et al., 2002
Psychosocial	Mental Health Inventory (MHI-1)	Depression	Pomeroy, Clark, Philp, 2001
Psychosocial	MHI-5	Depression	Berwick et al., 1991
Psychosocial	Scales for Assessment of Positive/Negative Symptoms	Depression	Palmer et al., 2002
Psychosocial	SelfCARE(D)	Depression	Watson and Pignone, 2003
Psychosocial	Structured Clinical Interview fro DSM-IV (SCID)	Depression	Levin et al., 2001
Psychosocial	Visual Analogue Scale of Depression (VASD)	Depression	Levin et al., 2001
Psychosocial	Extracted Hamilton Depression Rating Scale (XHDRS)	Depression	Rapp, Smith, Britt, 1990
Psychosocial	Attributional Style Questionnaire	General personality	Groeger & Grande, 1996
Psychosocial	Eysenck Personality Questionnaire (EPQ)	General personality	Parker et al., 2001
Psychosocial	Multiple Affect Adjective Check List	General personality	Groeger & Grande, 1996
Psychosocial	Type A Questionnaire	General personality	Lajunen et al., 1998
Psychosocial	Sense of Coherence Questionnaire (SOC)	Locus of control	Lajunen et al., 1998
Psychosocial	Self Rating Inventory for PTSD (SRIP)	Post Traumatic Stress Disorder (PTSD)	van Zelst et al., 2003
Psychosocial	Neugarten et al Life Satisfaction Scale	Quality of life	Cutler, 1975
Psychosocial	Quality of Well Being (QWB) Scale	Quality of life	Palmer et al., 2002
Psychosocial	Voluntary Association Participation	Social isolation	Cutler, 1974

APPENDIX B

Description of Each Task in the Assessment Battery

Pelli-Robson Contrast Sensitivity Test

Materials: Pelli-Robson Contrast Sensitivity Chart and score sheet.

Assessment Area: Contrast sensitivity.

Instructions: The subject will be seated, or stand, directly in front of the chart so that the distance from the eyes to the chart is about 1 meter, or 40 inches. The subject should also wear their best distance correction for this test. This test is unfamiliar to most people and subjects may cooperate more readily if they understand the reasoning for its administration. The administrator should explain by saying, *“In everyday life we do not look only at small black objects. Contrast sensitivity is a more realistic assessment of how well we see large faint objects all around us. This chart is a little different from the regular eye chart. With this chart, letters are all uniformly large and they fade out towards the bottom of the chart. The top line has high-contrast letters, which are black on white. The letters below them are gray and more difficult to see, very much like looking through fog or dirty glasses. What I want you to do is simply try to read as many of the letters as you can. The letters at the bottom of the chart are difficult for everyone to read, so please do not become discouraged.”*

Subjects should be encouraged to guess even when they believe that the letters are invisible. Once it is apparent that this is the case, it may be useful to provide some strategies to help the subject make the best attempt at seeing the letters by the administrator saying, *“Try reading just one letter at a time. Try blinking or viewing the letter by moving your head from side to side.”* It is also a good idea for the tester to indicate the letter that the subject should be concentrating on and then continuing by saying, *“Try reading this one. Do you see something against the white background? Is there a smudge? Is it round or square? Does it have corners or lines you can see? Keep trying. The whole letter may suddenly appear to you. Go ahead and guess.”* Several seconds should be allowed for the faintest letters to appear, but do not let the patient give up until he or she has guessed incorrectly 2 of the 3 letters in a triplet. The reliability of the results depends on this.

The subjects should be tested three times in all: each eye separately and both eyes together. When testing one eye, the other eye should be covered.

Scoring: The subject's sensitivity is indicated by the faintest triplet that for which 2 of the 3 letters can be correctly identified. The score (0 – 2.0) is a measure of the subject's log contrast sensitivity. A score of 2 means that the subject was able to read at least two of the three letters with a contrast of 1 percent (contrast sensitivity = 100 percent or log 2). A Pelli-Robson score of 2.0 indicates normal contrast sensitivity of 100 percent. Scores less than 2.0 signify poorer contrast sensitivity. Pelli-Robson contrast sensitivity scores of between 1.0 and 1.5 indicate visual impairment and a score of less than 1.0 is considered a visual disability.

Sources: Pelli-Robson Contrast Sensitivity Chart Instructions for Use; Pelli, Robson, & Wilkins (1988).

Reliability/Validity: Haymes & Chen, 2004



Figure 2: The Pelli-Robson chart attached to the testing-room wall.

Snellen “E” Test

Materials: Snellen “E” chart.

Assessment Area: Far visual acuity.

Instructions: From 10 feet, the subject will be asked (for each eye separately and with prescription glasses if necessary) which direction the prongs of the “E” are facing for each of the 8 corresponding lines or until the majority of symbols in a line are guessed incorrectly.

Scoring: The level of visual acuity achieved in this test will be determined by the last line of the chart wherein the subject guessed the majority of the symbols correctly.

Source: U.S. Department of Health and Human Services, 1998.



Figure 3: Snellen “E” chart attached to the test-room wall.

Rapid Pace Walk

Materials: Tape measure (at least 10 feet long), adhesive tape, stopwatch.

Assessment Areas: Balance, coordination, strength, and lower body stiffness.

Instructions: The administrator lays out the tape-measure at the ten-foot length on the floor and locks it. If the space can be dedicated to this test, then the path should be marked with colored adhesive tape. Otherwise, the path may be indicated with the tape measure. The subject will be instructed as follows: *“I want you to walk along the side of this tape measure (tape line) to the end, turn around, and walk back here as quickly as you can.”* The administrator will demonstrate, then say, *“I am going to time you. Go as fast as you feel safe and comfortable. If you use a cane or walker, you may use it if you feel more comfortable. Ready, begin.”*

Timing starts when the subject picks up his or her first foot. Stop timing when subject’s last foot reaches the start/finish point. Recorded is the total time to traverse the 10-foot path up and back with a stop watch, a total of 20 feet walked.

Scoring: According to the GRIMPS Score Sheet & Practitioner Summary, the average time it takes to complete this task is 7 seconds.

Sources: GRIMPS Instruction Sheet, revised March 10, 1999; GRIMPS Score Sheet and Practitioner Summary, revised March 12, 1999; Marottoli, Cooney, Wagner, Doucette, and Tinetti, 1994.

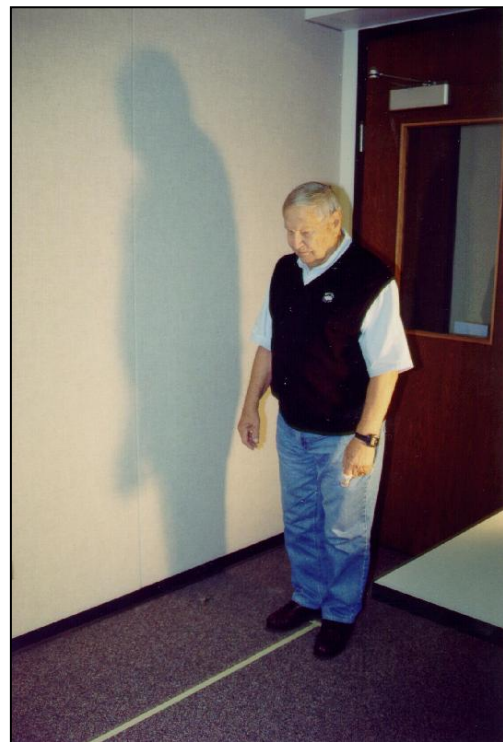


Figure 4: Subject participating in the Rapid Pace Walk Task.

Arm Reach

Materials: None.

Assessment Area: Shoulder flexibility.

Instructions: The subject remains seated facing the administrator. The subject is then asked, "Please raise your right arm as high as you can over your head. You may put your arm down...Now please raise your left arm as high as you can over your head." The subject will be encouraged to try to raise arm higher if the elbow is not raised above shoulder height. If necessary, the administrator will demonstrate.

Scoring: Recorded will be "pass" (arm raised high enough, such that the elbow is above shoulder height) or "fail" (elbow cannot be raised above shoulder height) on data sheet for each arm.

Sources: GRIMPS Instruction Sheet, revised March 10, 1999; GRIMPS Score Sheet and Practitioner Summary, revised March 12, 1999.

Reliability/Validity: Charlton, et al., 2002.



Figure 5: Subject participating in the Arm Reach Task.

Clock Reading Test

Materials: Paper/plastic clock.

Assessment Area: Upper body flexibility and range of motion.

Instructions: The subject does this while seated in the chair. It is a measure of the ability of a driver to look over his/her shoulder to see to the sides and rear of the vehicle when backing, changing lanes, or merging. The administrator stands 10 feet behind the subject at a pre-marked location, and sets the hands to either 3:00 or 9:00 while the subject is facing the other direction. The subject is then told, *“Just as you would turn your head and upper body to look behind you to back your car or change lanes, please turn and read the time on the clock face I am holding behind you.”* If the subject cannot turn far enough in one direction to read the clock, he or she should be asked to try turning the other way.

Scoring: The test is scored as “pass” (the subject can turn far enough, in either direction, to read the clock) or fail (The subject does not have enough flexibility/mobility to perform this motion).

Sources: GRIMPS Instruction Sheet, revised March 10, 1999; GRIMPS Score Sheet and Practitioner Summary, revised March 12, 1999; Tarawneh, McCoy, Bishu, & Ballard, 1993.

Reliability/Validity: Charlton, et al., 2002.

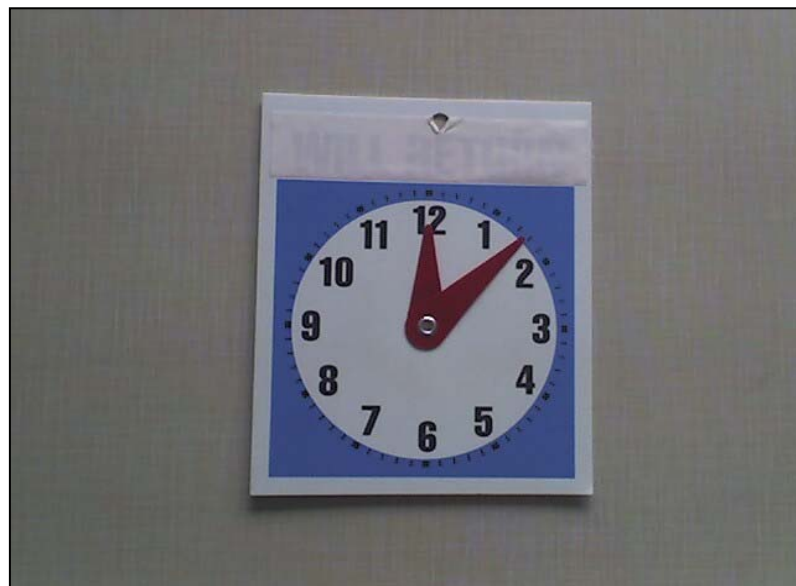


Figure 6: Clock on the wall used for the clock reading test.

Amsler Grid Test

Materials: Amsler grid.

Assessment Area: Central visual field function.

Instructions: While seated, the subject will cover one eye and fixate on the black dot in the middle of the grid, which is held by the subject at regular reading distance (about 14 inches). Subject's should be wearing reading glasses or looking through the reading portion of their bifocals unless neither are necessary for reading purposes. Once subjects are fixated upon the black dot in the center of the grid they are then asked by the administrator this series of questions:

1. *Do you see the black spot in the center of the square chart?*
2. *Keeping your eye fixed on the black spot in the center, can you see the four corners of the big square? Can you also see the four sides of the square?*
3. *Keeping your eye fixed on the black spot in the center, do you see the network of small squares intact? Or are there interruptions in the network of small squares, like holes or blurry areas?*
4. *Keeping your eye fixed on the black spot in the center, do you see all lines, horizontal and vertical, quite straight and parallel? In other words, is every small square equal in size and perfectly square?*
5. *Keeping your eye fixed on the black spot in the center, can you see anything else besides blurred areas, holes, or distortions? A vibration or waving? Anything shining? A color or tint?*
6. *Keeping your eye fixed on the black spot in the center, at what distance from this spot do you see any blur, hole, or distortion? How many small intact squares do you see between the central spot and the first blur, hole, or distortion (both vertical and horizontal)?*

If there are no interruptions or blurs in the grid then the administrator need not go any further than question 4. However, if there are abnormalities in the grid then questions 5 and 6 should be asked of the subject. This test is to be repeated with the subject's other eye.

Scoring: Because this grid assesses the condition of the retina as it applies to central vision, any abnormalities (i.e. interruptions, blurs, black spots, etc.) are regarded as "fail." However, in addition to this, the subject will be asked to identify the area in which there is a blur, hole, or distortion. If the subject reports that the grid is completely intact then this is scored as "pass."

Sources: Freund, 1997; Preferential Hyperacuity Perimeter Research Group, 2005.

Reliability/Validity: Grierson, 1997.

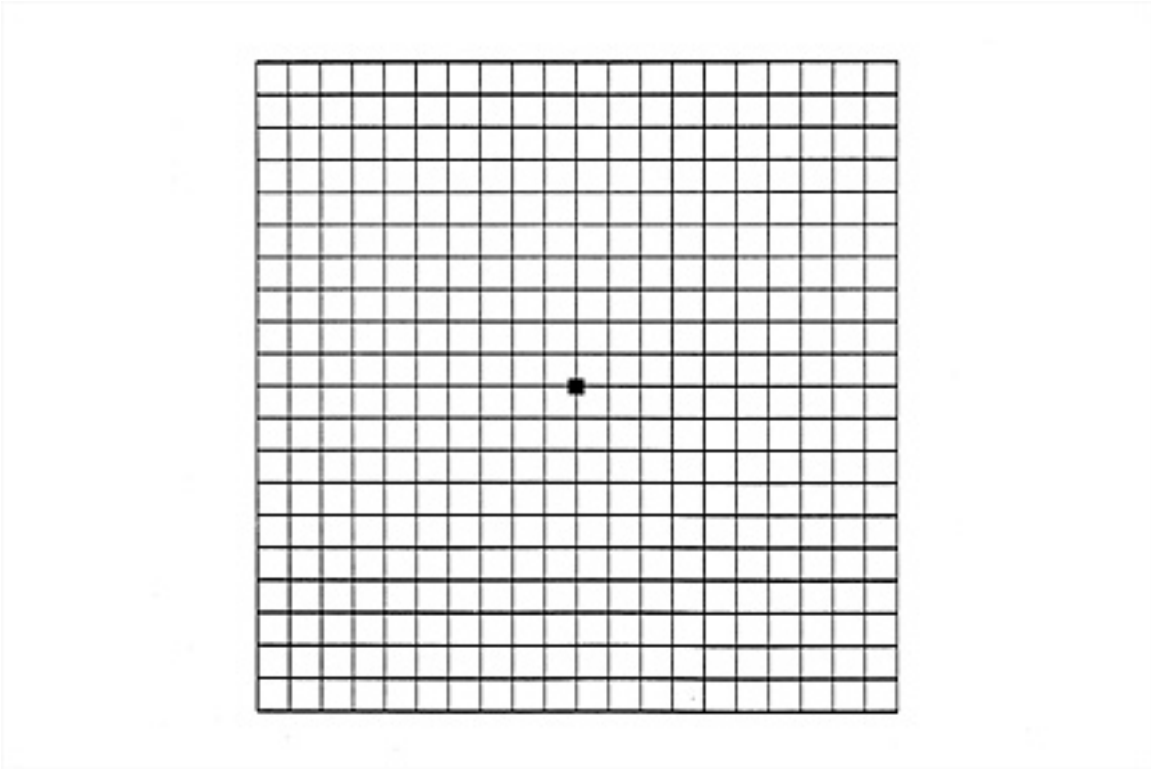


Figure 7: The Amsler Grid.

Ruler Drop Test

Materials: 30 cm ruler.

Assessment Area: Reaction time.

Instructions: The administrator holds the ruler near the 30 cm mark, letting it hang vertically, while the subject places their thumb and index finger on either side of the 0 cm mark ready to catch it when it falls. The subject's fingers should not be touching the ruler. Without warning, the administrator holding the ruler will let it go while the subject tries to catch it between their thumb and index finger as soon as he or she possibly can. In order to prevent anticipation of the drop, the administrator will vary the time before the release of the ruler.

Scoring: The level (in cm) just above the subject's first finger where the ruler was caught is recorded. The test is run 5 times and a mean average of the trials is then found. There are seven categorizations of reaction time according to the distance the ruler dropped and the concurrent time in milliseconds. These range from "ultra-fast" (0-50 ms) to "slow" (251+ ms).

Source: The Fighter Pilot Challenge: In the Blink of an Eye (www.open2.net/labrats).

Reliability/Validity: Utena & Miyake, 1997.



Figure 8: Finger positioning in the Ruler Drop Test.

Jamar Hand Dynamometer – Grip Strength Test

Materials: Jamar Hand Dynamometer.

Objective: This instrument tests the grip strength/muscle strength of the subject.

Instructions: The administrator will have the subject sit with his or her shoulder adducted and neutrally rotated, elbow flexed at 90°, forearm in neutral position, and wrist between 0° and 30° dorsiflexion and between 0° and 15° ulnar deviation. The administrator will set the Jamar Hand Dynamometer to the second handle position from the inside and lightly hold around the readout dial to prevent inadvertent dropping during testing. After the subject is positioned properly, the administrator will then say, “Squeeze as hard as you can...harder!...harder!...relax.”

Scoring: Scores will be recorded for three successive trials for each hand tested. The average score of the three trials can be compared to the normative data for the corresponding age group, which is presented in a table within the instrument’s owner’s manual. From a statistical perspective, scores within two standard deviations of the mean are considered within normal limits. In addition, the individuals’ ability to use his or her hand functionally needs to be considered when interpreting a grip strength performance.

Sources: Sammons Preston Rolyan Owner’s Manual for the Jamar Hydraulic Hand Dynamometer; Mathiowetz, Weber, Volland, & Kashman, 1984. Mathiowetz, Kashman, Volland, Weber, Dowe, & Rogers, 1985; Mathiowetz, Weimer, & Federman, 1986.

Reliability/Validity: Schaubert & Bohannon, 2005.



Figure 9: The Jamar Dynamometer and carrying case.

Health Questionnaire

Materials: Printed Health Questionnaire.

Assessment Areas: Physical and mental well-being.

Development: The Health Questionnaire was comprised of items from several existing health-related questionnaires and scales. Specifically, the Medical Outcome Study Short Form 36 (MOS SF-36; Snow, Kosinski, & Gandeh, 1983) was used in its entirety, as were a short scale for measuring loneliness (Hughes, Waite, Hawkley, & Cacioppo, 2004), and the emotional support subscale of the Perceived Social Support Scale (Krause & Markides, 1990). Selected items were used or adapted with minor modification from the Alcohol Use Disorders Identification Test developed by the World Health Organization (see Babor, Higgins-Biddle, Saunders, & Monteiro, 2001) and an out-of-home activity measure (see Marottoli, Mendes do Leon, Glass, Williams, Cooney Jr., & Berkman, 2000). New items were developed to ask about the existence of various medication conditions and the use of medications and over-the-counter supplements.

Sources: Babor, Higgins-Biddle, Saunders, & Monteiro, 2001; Hughes, Waite, Hawkley, & Cacioppo, 2004; Krause & Markides, 1990; Marottoli, Mendes de Leon, Glass, Williams, Cooney, & Berkman, 2000; Ware, Snow, Kosinski, & Gandek, 1993.

The Health Questionnaire Text:

Health Questionnaire

1. In general, would you say your health is:

₁ Excellent ₂ Very good ₃ Good ₄ Fair ₅ Poor

2. Compared to 1 year ago, how would you rate your health in general now?

₁ Much better
₂ Somewhat better
₃ About the same
₄ Somewhat worse
₅ Much worse

3. The following items are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?

a. Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports?

₁ Yes, limited a lot ₂ Yes, limited a little ₃ No, not limited at all

b. Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf?

₁ Yes, limited a lot ₂ Yes, limited a little ₃ No, not limited at all

c. Lifting or carrying groceries?

₁ Yes, limited a lot ₂ Yes, limited a little ₃ No, not limited at all

d. Climbing several flights of stairs?

₁ Yes, limited a lot ₂ Yes, limited a little No, not limited at all

e. Climbing one flight of stairs?

₁ Yes, limited a lot ₂ Yes, limited a little ₃ No, not limited at all

f. Bending, kneeling, or stooping?

₁ Yes, limited a lot ₂ Yes, limited a little ₃ No, not limited at all

g. Walking more than a mile?

₁ Yes, limited a lot ₂ Yes, limited a little ₃ No, not limited at all

h. Walking several blocks?

₁ Yes, limited a lot ₂ Yes, limited a little ₃ No, not limited at all

i. Walking one block?

₁ Yes, limited a lot ₂ Yes, limited a little ₃ No, not limited at all

j. Bathing or dressing yourself?

₁ Yes, limited a lot ₂ Yes, limited a little ₃ No, not limited at all

4. During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

a. Cut down on the amount of time you spent on work or other activities?

₁ Yes ₂ No

b. Accomplished less than you would like?

₁ Yes ₂ No

c. Were limited in the kind of work or other activities?

₁ Yes ₂ No

d. Had difficulty performing work or other activities (for example, it took extra effort)?

₁ Yes ₂ No

5. During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

a. Cut down on the amount of time you spent on work or other activities?

₁ Yes ₂ No

b. Accomplished less than you would like?

₁ Yes ₂ No

c. Did work on other activities less carefully than usual?

₁ Yes ₂ No

6. During the past 4 weeks, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbors, or groups?

₁ Not at all ₂ Slightly ₃ Moderately ₄ Quite a bit ₅ Extremely

7. How much bodily pain have you had during the past 4 weeks?

₁ None ₂ Very mild ₃ Mild ₄ Moderate ₅ Severe ₆ Very severe

8. During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?

₁ Not at all ₂ A little bit ₃ Moderately ₄ Quite a bit ₅ Extremely

9. These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the past 4 weeks...

a. Did you feel full of pep?

- ¹ All of the time
- ² Most of the time
- ³ A good bit of the time
- ⁴ Some of the time
- ⁵ A little of the time
- ⁶ None of the time

b. Have you been a very nervous person?

- ¹ All of the time
- ² Most of the time
- ³ A good bit of the time
- ⁴ Some of the time
- ⁵ A little of the time
- ⁶ None of the time

c. Have you felt calm and peaceful?

- ¹ All of the time
- ² Most of the time
- ³ A good bit of the time
- ⁴ Some of the time
- ⁵ A little of the time
- ⁶ None of the time

d. Did you have a lot of energy?

- ¹ All of the time
- ² Most of the time
- ³ A good bit of the time
- ⁴ Some of the time
- ⁵ A little of the time
- ⁶ None of the time

e. Have you felt downhearted and blue?

- ¹ All of the time
- ² Most of the time
- ³ A good bit of the time
- ⁴ Some of the time
- ⁵ A little of the time
- ⁶ None of the time

f. Did you feel worn out?

- ¹ All of the time
- ² Most of the time
- ³ A good bit of the time
- ⁴ Some of the time
- ⁵ A little of the time
- ⁶ None of the time

g. Have you been a happy person?

- ¹ All of the time
- ² Most of the time
- ³ A good bit of the time
- ⁴ Some of the time
- ⁵ A little of the time
- ⁶ None of the time

h. Did you feel tired?

- ¹ All of the time
- ² Most of the time
- ³ A good bit of the time
- ⁴ Some of the time
- ⁵ A little of the time
- ⁶ None of the time

10. During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (such as visiting friends, relatives, etc.)?

- ¹ All of the time
- ² Most of the time
- ³ A good bit of the time
- ⁴ Some of the time
- ⁵ A little of the time
- ⁶ None of the time

11. How true or false is each of the following statements for you?

a. I seem to get sick a little easier than other people.

- ₁ Definitely true ₂ Mostly true ₃ Don't know ₄ Mostly false ₅ Definitely false

b. I am as healthy as anybody I know.

- ₁ Definitely true ₂ Mostly true ₃ Don't know ₄ Mostly false ₅ Definitely false

c. I expect my health to get worse.

₁ Definitely true ₂ Mostly true ₃ Don't know ₄ Mostly false ₅ Definitely false

d. My health is excellent.

₁ Definitely true ₂ Mostly true ₃ Don't know ₄ Mostly false ₅ Definitely false

12. How often do you have a drink containing alcohol?

₁ Never
₂ Monthly or less
₃ 2-4 times a month
₄ 2-3 times a week
₅ 4 or more times a week

13. How often do you feel that you lack companionship?

₁ Hardly ever ₂ Some of the time ₃ Often

14. How often do you feel left out?

₁ Hardly ever ₂ Some of the time ₃ Often

15. How often do you feel isolated from others?

₁ Hardly ever ₂ Some of the time ₃ Often

16. Thinking back over the past year, how often has someone been right there with you (physically) in a stressful situation?

₁ Never ₂ Once in a while ₃ Fairly often ₄ Very often

17. Thinking back over the past year, how often has someone comforted you by showing physical affection?

₁ Never ₂ Once in a while ₃ Fairly often ₄ Very often

18. Thinking back over the past year, how often has someone listened to you talk about your private feelings?

₁ Never ₂ Once in a while ₃ Fairly often ₄ Very often

19. Thinking back over the past year, how often has someone expressed interest and concern in your well being?

₁ Never ₂ Once in a while ₃ Fairly often ₄ Very often

20. The following items are about your participation in various activities outside the home. How often do you participate in the following?

a. Shopping?

₁ Never ₂ Sometimes ₃ Often

b. Going to a movie, restaurant, or sporting event?

₁ Never ₂ Sometimes ₃ Often

c. Day trips?

₁ Never ₂ Sometimes ₃ Often

d. Overnight trips?

₁ Never ₂ Sometimes ₃ Often

e. Unpaid community or volunteer work?

₁ Never ₂ Sometimes ₃ Often

f. Exercising (including walking) or other recreational sports/athletic activities?

₁ Never ₂ Sometimes ₃ Often

g. Playing cards, games, or bingo?

₁ Never ₂ Sometimes ₃ Often

h. Religious services?

₁ Never ₂ Sometimes ₃ Often

i. Social activities?

Never Sometimes Often

j. Paid employment?

₁ Never ₂ Sometimes ₃ Often

k. Visiting with friends or family?

₁ Never ₂ Sometimes ₃ Often

21. In the past year, have you had or have you been told by a doctor or other health professional that you have the following?

- | | | | |
|-----|---|---|--|
| a. | High blood pressure..... | <input type="checkbox"/> ₁ Yes | <input type="checkbox"/> ₂ No |
| b. | Myocardial infarction (heart attack)..... | <input type="checkbox"/> ₁ Yes | <input type="checkbox"/> ₂ No |
| c. | Stroke or TIA (transient ischemic attack)..... | <input type="checkbox"/> ₁ Yes | <input type="checkbox"/> ₂ No |
| d. | Coronary angioplasty (PTCA)..... | <input type="checkbox"/> ₁ Yes | <input type="checkbox"/> ₂ No |
| e. | Coronary bypass surgery (CABG)..... | <input type="checkbox"/> ₁ Yes | <input type="checkbox"/> ₂ No |
| f. | Carotid artery surgery (endarterectomy)..... | <input type="checkbox"/> ₁ Yes | <input type="checkbox"/> ₂ No |
| g. | Peripheral artery surgery..... | <input type="checkbox"/> ₁ Yes | <input type="checkbox"/> ₂ No |
| h. | Melanoma..... | <input type="checkbox"/> ₁ Yes | <input type="checkbox"/> ₂ No |
| i. | Coagulation disorder (e.g. Von Willebrand's disease)..... | <input type="checkbox"/> ₁ Yes | <input type="checkbox"/> ₂ No |
| j. | Gout..... | <input type="checkbox"/> ₁ Yes | <input type="checkbox"/> ₂ No |
| k. | Migraine headaches..... | <input type="checkbox"/> ₁ Yes | <input type="checkbox"/> ₂ No |
| l. | Diabetes mellitus..... | <input type="checkbox"/> ₁ Yes | <input type="checkbox"/> ₂ No |
| m. | Multiple sclerosis..... | <input type="checkbox"/> ₁ Yes | <input type="checkbox"/> ₂ No |
| n. | Amyotrophic lateral sclerosis (ALS)..... | <input type="checkbox"/> ₁ Yes | <input type="checkbox"/> ₂ No |
| o. | Systemic lupus erythematosus (SLE)..... | <input type="checkbox"/> ₁ Yes | <input type="checkbox"/> ₂ No |
| p. | Rheumatoid arthritis..... | <input type="checkbox"/> ₁ Yes | <input type="checkbox"/> ₂ No |
| q. | Other arthritis..... | <input type="checkbox"/> ₁ Yes | <input type="checkbox"/> ₂ No |
| r. | Joint pain or joint swelling..... | <input type="checkbox"/> ₁ Yes | <input type="checkbox"/> ₂ No |
| s. | Hip replacement..... | <input type="checkbox"/> ₁ Yes | <input type="checkbox"/> ₂ No |
| t. | Knee replacement..... | <input type="checkbox"/> ₁ Yes | <input type="checkbox"/> ₂ No |
| u. | Osteoporosis..... | <input type="checkbox"/> ₁ Yes | <input type="checkbox"/> ₂ No |
| v. | Scleroderma..... | <input type="checkbox"/> ₁ Yes | <input type="checkbox"/> ₂ No |
| w. | Atrial fibrillation..... | <input type="checkbox"/> ₁ Yes | <input type="checkbox"/> ₂ No |
| x. | Deep vein thrombosis..... | <input type="checkbox"/> ₁ Yes | <input type="checkbox"/> ₂ No |
| y. | Pulmonary embolism..... | <input type="checkbox"/> ₁ Yes | <input type="checkbox"/> ₂ No |
| z. | Fracture of the hip or forearm..... | <input type="checkbox"/> ₁ Yes | <input type="checkbox"/> ₂ No |
| aa. | Diabetic retinopathy..... | <input type="checkbox"/> ₁ Yes | <input type="checkbox"/> ₂ No |
| bb. | Glaucoma..... | <input type="checkbox"/> ₁ Yes | <input type="checkbox"/> ₂ No |
| cc. | Fainting..... | <input type="checkbox"/> ₁ Yes | <input type="checkbox"/> ₂ No |
| dd. | Brain tumor..... | <input type="checkbox"/> ₁ Yes | <input type="checkbox"/> ₂ No |
| ee. | Dementia..... | <input type="checkbox"/> ₁ Yes | <input type="checkbox"/> ₂ No |
| ff. | Alzheimer's..... | <input type="checkbox"/> ₁ Yes | <input type="checkbox"/> ₂ No |
| gg. | Movement disorders..... | <input type="checkbox"/> ₁ Yes | <input type="checkbox"/> ₂ No |
| hh. | Parkinson's disease..... | <input type="checkbox"/> ₁ Yes | <input type="checkbox"/> ₂ No |
| ii. | Peripheral neuropathy..... | <input type="checkbox"/> ₁ Yes | <input type="checkbox"/> ₂ No |

- | | | | |
|-----|---|---|--|
| jj. | Seizure disorder..... | <input type="checkbox"/> ¹ Yes | <input type="checkbox"/> ² No |
| kk. | Sleep disorders (e.g., sleep apnea)..... | <input type="checkbox"/> ¹ Yes | <input type="checkbox"/> ² No |
| ll. | Tourette's syndrome..... | <input type="checkbox"/> ¹ Yes | <input type="checkbox"/> ² No |
| mm. | Traumatic brain injury..... | <input type="checkbox"/> ¹ Yes | <input type="checkbox"/> ² No |
| nn. | Vertigo..... | <input type="checkbox"/> ¹ Yes | <input type="checkbox"/> ² No |
| oo. | Depression..... | <input type="checkbox"/> ¹ Yes | <input type="checkbox"/> ² No |
| pp. | Anxiety disorder..... | <input type="checkbox"/> ¹ Yes | <input type="checkbox"/> ² No |
| qq. | Psychotic disorder (e.g. schizophrenia, bipolar)..... | <input type="checkbox"/> ¹ Yes | <input type="checkbox"/> ² No |
| rr. | Personality disorder..... | <input type="checkbox"/> ¹ Yes | <input type="checkbox"/> ² No |
| ss. | Substance abuse/alcohol dependency..... | <input type="checkbox"/> ¹ Yes | <input type="checkbox"/> ² No |
| tt. | Attention deficit disorder (ADD)..... | <input type="checkbox"/> ¹ Yes | <input type="checkbox"/> ² No |
| uu. | Attention deficit hyperactivity disorder (ADHD)..... | <input type="checkbox"/> ¹ Yes | <input type="checkbox"/> ² No |
| vv. | Thyroid imbalance..... | <input type="checkbox"/> ¹ Yes | <input type="checkbox"/> ² No |
| ww. | Chronic renal failure..... | <input type="checkbox"/> ¹ Yes | <input type="checkbox"/> ² No |
| xx. | Asthma..... | <input type="checkbox"/> ¹ Yes | <input type="checkbox"/> ² No |
| yy. | Chronic obstructive pulmonary disease (COPD)..... | <input type="checkbox"/> ¹ Yes | <input type="checkbox"/> ² No |
| zz. | Other major illness _____ (specify)..... | <input type="checkbox"/> ¹ Yes | <input type="checkbox"/> ² No |

22. What medications prescribed by a doctor or other health professional do you currently take?

Please list them all inside this box.

23. What over-the-counter supplements and medications do you currently take?

Please list them all inside this box.

Randot Stereotest

Materials: Test booklet, polarizing viewers.

Assessment Area: Depth perception.

Instructions: The administrator will advise the subject to put on the viewers (over prescription glasses if necessary) and hold the test upright to maintain the proper axis of polarization without letting the subject's head to tilt to the side. For the bifocal wearer, position the test properly for near-point viewing. Although the tests are graded for 16 inches, some variation in distance should have little effect on the score. Reflection upon the surface of the test should be avoided if at all possible.

In the Randot forms, simple geometric shapes and the familiar E are central in each area except one, which acts as a control. For a direct procedure, the administrator should ask which area does not appear to have any shape in it. The perceptual response may develop slowly, so the subject should be allowed to study the form for awhile with the aid of encouragement and suggestions.

The multiple-choice series of circles assesses depth perception. Only one of the circles has disparity, which when seen binocularly through the polarized glasses, should appear to float above from the other two. The administrator should ask which one seems to float forward or appears "different" from the others in the left, middle, or right position.

Scoring: Reference for scoring is available in chart form within the test manual. The administrator will record the level of stereopsis of the last one chosen correctly. If one is missed, the subject will be asked to go back and attempt the preceding line again to determine whether the subject can achieve this or is just guessing.

Sources: Randot Stereotests manual.

Reliability/Validity: Fawcett & Birch, 2003.



Figure 10: Booklet and polarized glasses for the Randot test.

Motor Free Visual Perception Test (MVPT)

Materials: MVPT test stimulus booklet.

Assessment Area: Visuospatial skills.

Instructions: With the subject seated and facing the administrator, a practice figure will be shown. The administrator points to the four alternative figures, saying, *“If we finished drawing these figures, which one would look just like this one? Just point to the correct one.”* After the subject responds, the administrator will point to the correct alternative saying, *“Yes (No), if we connected these lines, this one would look just like this.”* Pointing to the stimulus figure, the subject will be told, *“Now I’d like you to do the same thing for the figures I am about to show you.”* During this test, the subject is not allowed to trace any figures. The MVPT is not a timed test, and the subject should be given a reasonable amount of time (e.g. 15 seconds) to make a selection. No confirmation or explanation is given for the trial items. At the conclusion of the test, the total number of correct responses given by the subject is recorded.

Scoring: According to the GRIMPS Score Sheet & Practitioner Summary, average or above average is 0 to 2 incorrect responses and below average is 3 or more incorrect responses.

Sources: GRIMPS Instruction Sheet, revised March 10, 1999; GRIMPS Score Sheet and Practitioner Summary, revised March 12, 1999; Colarusso & Hammill, 1995.

Reliability/Validity: Mazer et al., 1998.

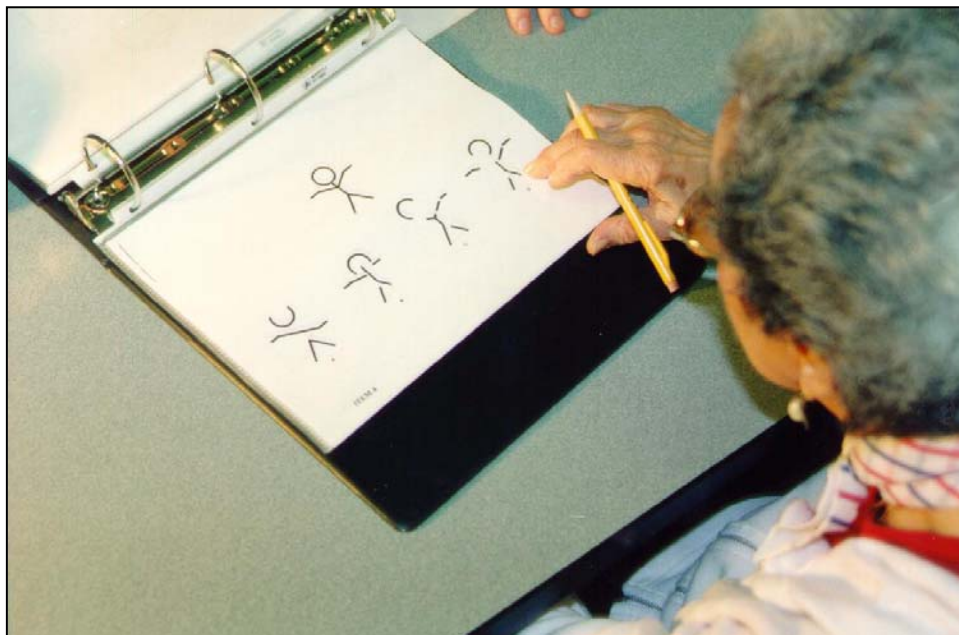


Figure 11: An example page from the MVPT.

9-Hole Peg Test

Materials: 9-Hole Peg Test Kit, stopwatch, score sheet.

Assessment Area: Hand coordination and dexterity.

Instructions: The dominant hand should be tested first with the board positioned horizontally so that the round container is next to the hand being tested. Once in the proper position, the administrator should instruct the subject by saying, *“This will be a practice test. Pick up the pegs one at a time using the hand to be tested only. Place them in the holes until all nine holes are filled. Then remove all of them one at a time. The pegs can be placed in the holes in any order. This is a practice test. Are you ready? Begin!”* If the subject does not understand the instructions, the administrator will then demonstrate the test.

Once the subject completes the practice test, the administrator will say the following: *“This will be the actual test. Pick up the pegs one at a time using the hand to be tested only. Place them in the holes until all nine holes are filled. Then remove all of them one at a time. The pegs can be placed in the holes in any order. Ready? Begin!”* The administrator should start the stopwatch as soon as the person touches the first peg, and stop the stopwatch as soon as the last peg hits the container. Once the test is complete, reposition the unit so the round container is next to the non-dominant hand. Repeat this test the same way for the non-dominant hand.

Scoring: The subject’s score is the time required to complete the task.

Reliability/Validity: Smith, Hong, & Presson, 2000

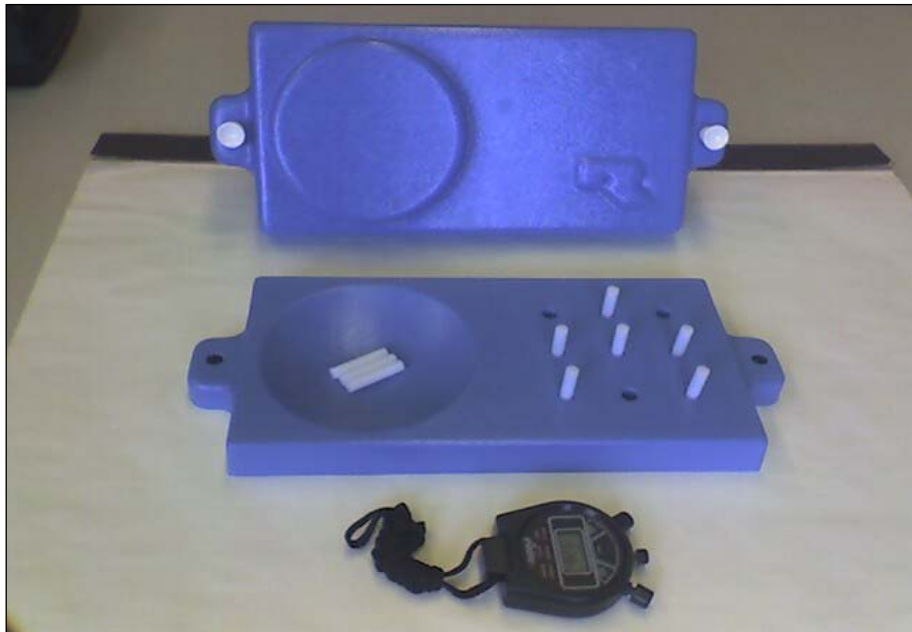


Figure 12: Peg-board, pegs, and stopwatch for administering the 9-peg test.

Trail Making A & B

Materials: Trails A & B stimulus sheets, pencil, stopwatch.

Assessment Area: Trail Making A and B assess attention/concentration ability as well as executive functions.

Instructions: The subject is seated at a desk/table and given a pencil. Spoken instructions are, *“Now I will give you paper and pencil. On the paper are the numbers 1 through 8, scattered across the page. Starting with 1, draw lines to connect each number to the next highest number. I will time how fast you can do this. Ready? Go.”*

After this is completed, the administrator places the practice Trails B sample in front of the subject and says, *“Now we’re going to do the same thing, only this time with numbers and letters like you see in this example. This time, start with 1, then draw a line to A, then draw a line to 2, then to B, then 3-c, 4-d, alternating back and forth between numbers and letters. I will not be timing this practice.”*

The administrator will point out errors, if any, on the practice sheet. After the sample is completed, the administrator will say, *“On the other side of this sheet of paper the numbers 1 through 13 and the letters A through L are mixed up in the same way. Draw a line alternating between numbers and letters until you finish with the number 13. Again, I will time how fast you can do this. Do you have any questions?”* When subject is ready, administrator turns over test sheet, confirms subject’s pencil is at the starting point (number 1) then says, *“Ready? Go.”*

For part A, the administrator will record the time to complete the entire test. For part B, the last item completed after 30 seconds and at each subsequent 30 second interval, and also records the time to complete the entire test. On a side note, mistakes are pointed out by the test administrator as they occur and are corrected; their effect is to increase the overall time to perform the test.

Scoring: The score is the time required to complete each task. Times longer than 30 sec (Trail Making A) or 180 sec (Trail Making B) is considered failing.

Sources: GRIMPS Instruction Sheet, revised March 10, 1999; GRIMPS Score Sheet and Practitioner Summary, revised March 12, 1999; Partington & Leiter, 1949.

Reliability/Validity: Mazer et al., 1998.

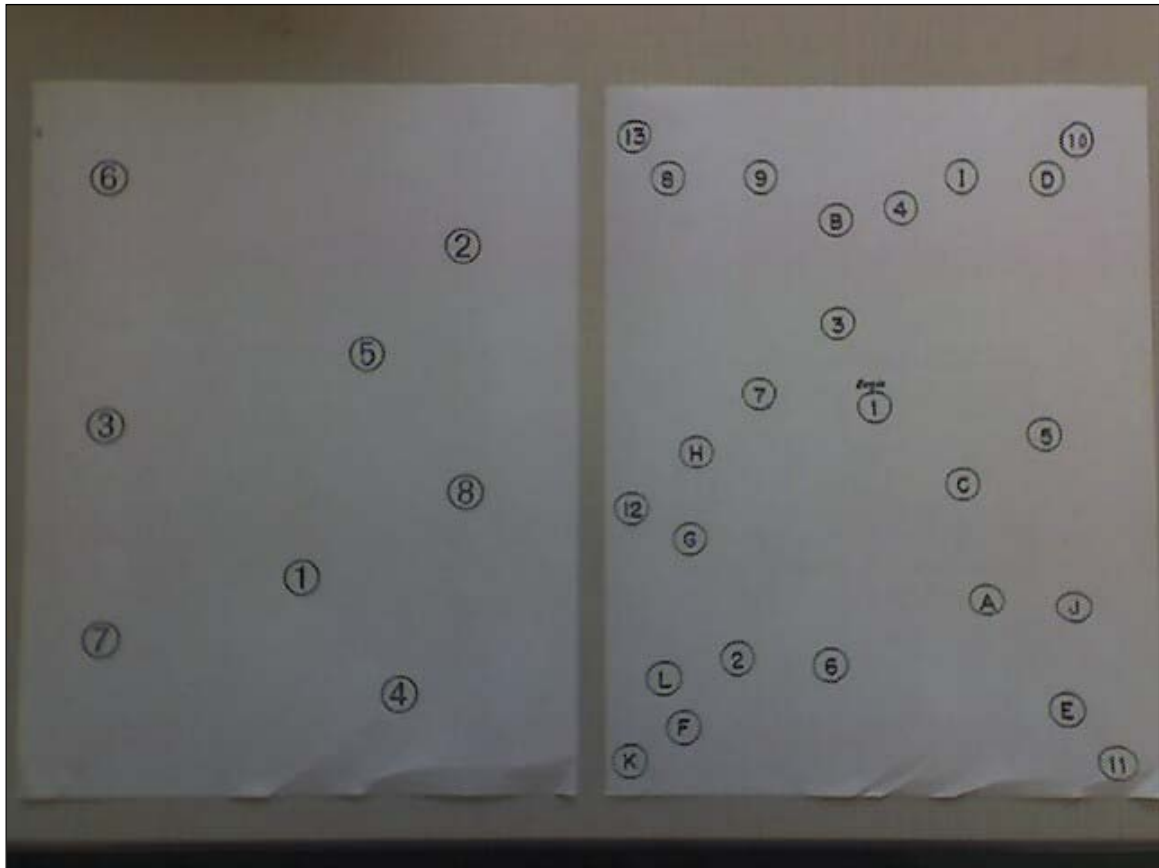


Figure 13: The Trail Making A (left) and B (right) tests.

Clock Drawing Test

Materials: Sheet of paper and pencil.

Assessment Areas: Visuospatial skills and cognitive functioning.

Instructions: The subject is verbally instructed to draw a clock, put all the numbers in their correct locations, and then set the time at ten minutes after 11. The instructions are also printed at the top of the blank page in 16 point font. Instructions may be repeated to the subject verbatim as needed. However, there are no cues allowed. When the subject indicates that they are finished, the administrator will say, “*Now tell me what time this clock says.*” Self-correction is permitted.

Scoring: There are 3 categories used in order to score the drawn clock. The “time” category refers to the time shown on the clock, the “numbers” category refers to the labeling of the clock, and the “spacing” category refers to the distance of the numbers from each other and the edge of the circle. In all, there are 7 total elements of the clock which are evaluated to reach a final score.

Source: Freund, Gravenstein, Ferris, Burke, & Shaheen, 2004.

Reliability/Validity: Freund, Gravenstein, Ferris, Burke, & Shaheen, 2004.

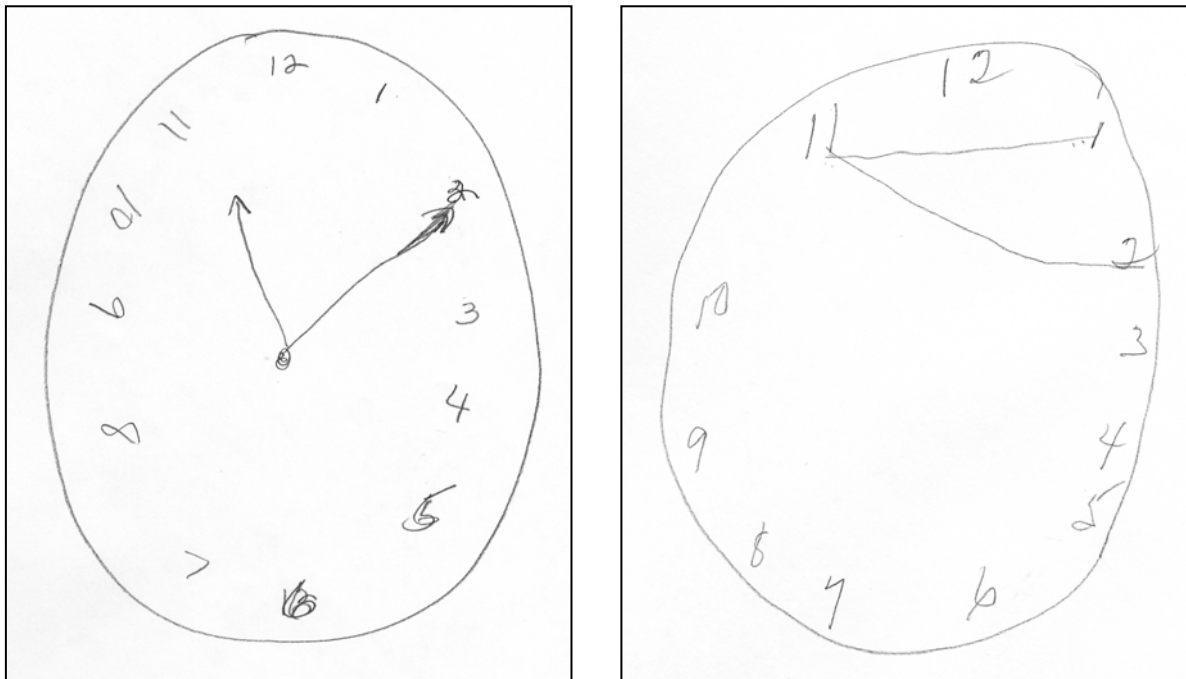


Figure 14: Examples of a passing (left) and a failing (right) clock drawing.

Mini Mental State Examination

Materials: MMSE scoring sheet, pentagon sheet, “close your eyes” sheet, pencil, watch.

Assessment Area: Cognitive function.

Instructions: There are 11 standard items on the MMSE, most of which have subsequent items within them. The administrator will ask the questions listed or take the required actions, as described on the scoring sheet, to administer all parts of the examination.

Scoring: In total, there are 30 possible points. The scoring ranges from 25 to 30 for those older adults with normal cognitive functioning, 21 to 24 for those who exhibit mild cognitive deficiency, 14 to 20 for those who exhibit moderate cognitive deficiency, and 0-13 for those with severe cognitive deficiency.

Sources: Folstein, Kristjansson, & McHugh, 1975; Han, Cole, Bellavance, et al., 2000.

Reliability/Validity: Lopez et al., 2005

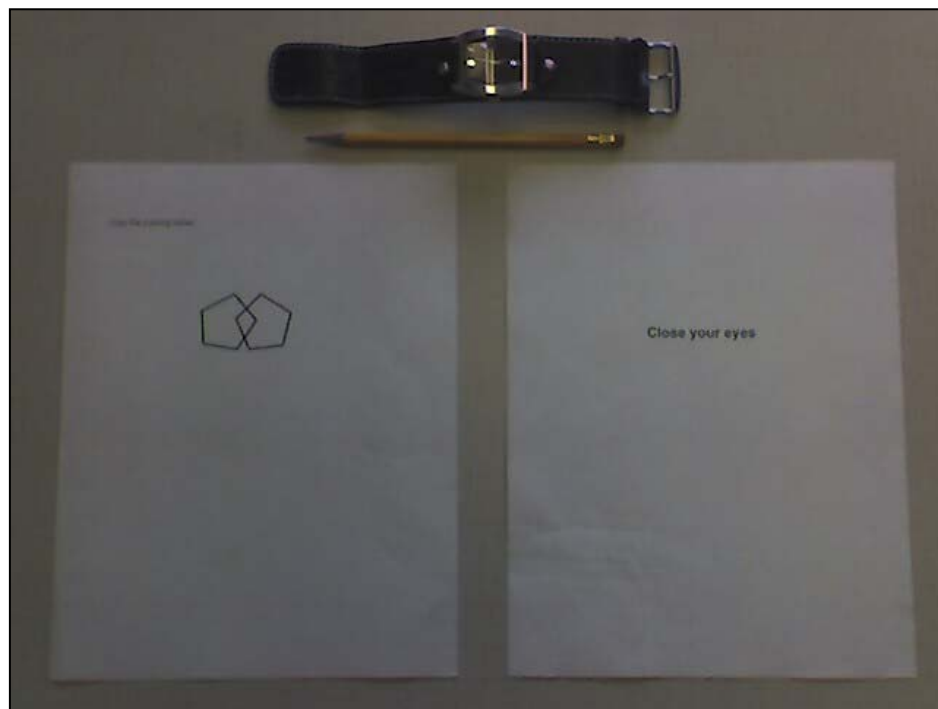


Figure 15: Materials needed for administration of the MMSE.

d. Driven to more distant towns?

₁ Yes ₂ No

e. Driven to places outside the state?

₁ Yes ₂ No

f. Driven to places outside the USA?

₁ Yes ₂ No

g. Driven when it is raining?

₁ Yes ₂ No

h. Driven alone?

₁ Yes ₂ No

i. Parallel parked?

₁ Yes ₂ No

j. Made left-hand turns when there might be oncoming traffic?

₁ Yes ₂ No

k. Driven on interstates or expressways?

₁ Yes ₂ No

l. Driven on high-traffic roads?

₁ Yes ₂ No

m. Driven during rush-hour traffic?

₁ Yes ₂ No

n. Driven at night?

₁ Yes ₂ No

o. Backed up your car?

₁ Yes ₂ No

4. How comfortable are you driving in the following situations?

a. In your immediate neighborhood?

₁ Very comfortable
₂ Somewhat comfortable
₃ Somewhat uncomfortable
₄ Very uncomfortable

b. To places beyond your neighborhood?

₁ Very comfortable
₂ Somewhat comfortable
₃ Somewhat uncomfortable
₄ Very uncomfortable

c. To neighboring towns?

₁ Very comfortable
₂ Somewhat comfortable
₃ Somewhat uncomfortable
₄ Very uncomfortable

d. To more distant towns?

₁ Very comfortable
₂ Somewhat comfortable
₃ Somewhat uncomfortable
₄ Very uncomfortable

e. To places outside the state?

₁ Very comfortable
₂ Somewhat comfortable
₃ Somewhat uncomfortable
₄ Very uncomfortable

f. To places outside the USA?

- ¹ Very comfortable
- ² Somewhat comfortable
- ³ Somewhat uncomfortable
- ⁴ Very uncomfortable

g. When it is raining?

- ¹ Very comfortable
- ² Somewhat comfortable
- ³ Somewhat uncomfortable
- ⁴ Very uncomfortable

h. Alone?

- ¹ Very comfortable
- ² Somewhat comfortable
- ³ Somewhat uncomfortable
- ⁴ Very uncomfortable

i. Parallel parking?

- ¹ Very comfortable
- ² Somewhat comfortable
- ³ Somewhat uncomfortable
- ⁴ Very uncomfortable

j. Making left-hand turns when there might be oncoming traffic?

- ¹ Very comfortable
- ² Somewhat comfortable
- ³ Somewhat uncomfortable
- ⁴ Very uncomfortable

k. Merging onto interstates or expressways?

- ¹ Very comfortable
- ² Somewhat comfortable
- ³ Somewhat uncomfortable
- ⁴ Very uncomfortable

l. Driving on interstates or expressways?

- ¹ Very comfortable
- ² Somewhat comfortable
- ³ Somewhat uncomfortable
- ⁴ Very uncomfortable

m. Driving on high traffic roads?

- ¹ Very comfortable
- ² Somewhat comfortable
- ³ Somewhat uncomfortable
- ⁴ Very uncomfortable

n. Driving in rush-hour traffic?

- ¹ Very comfortable
- ² Somewhat comfortable
- ³ Somewhat uncomfortable
- ⁴ Very uncomfortable

o. Driving at night?

- ¹ Very comfortable
- ² Somewhat comfortable
- ³ Somewhat uncomfortable
- ⁴ Very uncomfortable

p. Backing up your car?

- ¹ Very comfortable
- ² Somewhat comfortable
- ³ Somewhat uncomfortable
- ⁴ Very uncomfortable

5. How many accidents have you been involved in over the past year where you were the driver, and police were called to the scene?

_____ accidents

6. How many times in the past year have you been pulled over by the police, regardless of whether or not you received a ticket?

_____ times

7. How many times in the past year have you received a traffic ticket (other than a parking ticket) where you were found to be guilty, regardless of whether or not you think you were at fault?

_____ times

8. How often do you do each of the following? Check the response most appropriate for you.

a. Pass a slow driver on the right.

Never Hardly ever Occasionally Quite often Frequently Nearly all the time
1 2 3 4 5 6

b. Drive especially close to the car in front of you as a signal to its driver to go faster or to get out of the way.

Never Hardly ever Occasionally Quite often Frequently Nearly all the time
1 2 3 4 5 6

c. Attempt to pass someone that you hadn't noticed to be signaling a left turn.

Never Hardly ever Occasionally Quite often Frequently Nearly all the time
1 2 3 4 5 6

d. Forget where you left your car in a parking lot.

Never Hardly ever Occasionally Quite often Frequently Nearly all the time
1 2 3 4 5 6

e. Switch on one thing, such as the headlights, when you meant to switch on something else, such as the wipers.

Never Hardly ever Occasionally Quite often Frequently Nearly all the time
1 2 3 4 5 6

f. Sound your horn to indicate your annoyance to another driver.

Never Hardly ever Occasionally Quite often Frequently Nearly all the time
1 2 3 4 5 6

g. Realize that you have no clear recollection of the road along which you have just been traveling.

Never Hardly ever Occasionally Quite often Frequently Nearly all the time
1 2 3 4 5

h. Cross an intersection knowing that the traffic light has already turned red.

Never Hardly ever Occasionally Quite often Frequently Nearly all the time
1 2 3 4 5 6

i. Fail to notice that pedestrians are crossing when turning onto a side street from a main road.

Never Hardly ever Occasionally Quite often Frequently Nearly all the time
1 2 3 4 5 6

j. Become angered by another driver's behavior, and give chase with the intention of giving him/her a piece of your mind.

Never Hardly ever Occasionally Quite often Frequently Nearly all the time
1 2 3 4 5 6

k. Disregard the speed limit on a residential road.

Never Hardly ever Occasionally Quite often Frequently Nearly all the time
1 2 3 4 5 6

l. On turning right, nearly hit a cyclist who has come up on your right.

Never Hardly ever Occasionally Quite often Frequently Nearly all the time
1 2 3 4 5 6

m. Pull out into an intersection so far that the driver with the right of way has to stop and let you out.

Never Hardly ever Occasionally Quite often Frequently Nearly all the time
1 2 3 4 5 6

n. While waiting in line to turn onto a main road, you pay such close attention to the main stream of traffic that you nearly hit the car in front of you.

Never Hardly ever Occasionally Quite often Frequently Nearly all the time
1 2 3 4 5 6

o. Drive even though you realize that you may be over the legal blood-alcohol limit..

Never Hardly ever Occasionally Quite often Frequently Nearly all the time
1 2 3 4 5 6

p. Have an aversion to a particular class of road user and indicate your hostility by whatever means you can.

Never Hardly ever Occasionally Quite often Frequently Nearly all the time
1 2 3 4 5 6

q. Underestimate the speed of an oncoming vehicle when passing.

Never Hardly ever Occasionally Quite often Frequently Nearly all the time
1 2 3 4 5 6

r. Hit something when backing up that you had not previously seen.

Never Hardly ever Occasionally Quite often Frequently Nearly all the time
1 2 3 4 5 6

s. Intending to drive to destination A, you “wake up” to find yourself on the road to destination B, perhaps the latter is your more usual destination.

Never Hardly ever Occasionally Quite often Frequently Nearly all the time
1 2 3 4 5 6

t. Stay in a highway lane that you know will be closed ahead until the last minute before forcing your way into the other lane.

Never Hardly ever Occasionally Quite often Frequently Nearly all the time
1 2 3 4 5 6

u. Get into the wrong lane approaching an intersection.

Never Hardly ever Occasionally Quite often Frequently Nearly all the time
1 2 3 4 5 6

v. Miss “Yield” signs, and narrowly avoid colliding with traffic having the right of way.

Never Hardly ever Occasionally Quite often Frequently Nearly all the time
1 2 3 4 5 6

w. Fail to check your rear view mirror before pulling out, changing lanes, etc.

Never Hardly ever Occasionally Quite often Frequently Nearly all the time
1 2 3 4 5 6

x. Get involved in unofficial “races” with other drivers.

Never Hardly ever Occasionally Quite often Frequently Nearly all the time
1 2 3 4 5 6

y. Brake too quickly on a slippery road, or steer the wrong way in a skid.

Never Hardly ever Occasionally Quite often Frequently Nearly all the time

1

2

3

4

5

6

z. Disregard the speed limit on the highway.

Never Hardly ever Occasionally Quite often Frequently Nearly all the time

1

2

3

4

5

6

9. Currently, how important is driving a car to you?

Very important Important Unimportant Very unimportant

1

2

3

4

10. If you could not drive, how much would it affect what you want to do?

A lot Somewhat A little Not at all

1

2

3

4

11. How much would it affect what you need to do?

A lot Somewhat A little Not at all

1

2

3

4

12. If you had to stop driving, how upset would you be?

Very upset Somewhat upset A little upset Not at all upset

1

2

3

4

13. How much would stopping driving interfere with things that are important to you?

A lot Somewhat A little Not at all

1

2

3

4

14. Is there a real chance that your driving ability could become a problem within the next 5 years?

Yes No

1

2

15. To what extent have you thought about a time when you might have to stop driving?

A lot Some A little Not at all

1

2

3

4

16. How long do you think you will keep driving?

Less than 1 year 1-3 years 3-5 years 5-10 years 10 years or more

1

2

3

4

5

17. Has anyone suggested over the past year that you limit your driving or stop driving?

₁ Yes ₂ No

18. How would you rate your driving?

₁ Excellent ₂ Good ₃ Average ₄ Fair ₅ Poor

19. If you had to go somewhere and didn't want to drive yourself, what would you do?

- ₁ Ask a friend or relative to drive you
- ₂ Call a taxi
- ₃ Take the bus
- ₄ Drive yourself regardless of how you feel
- ₅ Cancel or postpone your plans and stay home
- ₆ Other

20. Overall, how satisfied are you with your ability to get to the places you want to go?

₁ Very satisfied ₂ Somewhat satisfied ₃ Not very satisfied ₄ Not at all satisfied

21. How important is it for you to keep driving as long as you can?

₁ Very important ₂ Somewhat important ₃ Not very important ₄ Not at all important

22. How do you feel about driving?

- ₁ Have always enjoyed driving
- ₂ Used to enjoy driving, but don't enjoy it as much now
- ₃ Never liked driving that much
- ₄ Neither like nor dislike

23. How likely is it that you might one day need to drive more?

₁ Very likely ₂ Somewhat likely ₃ Not very likely ₄ Not at all likely

24. Assuming you needed to do so, how easy or difficult would it be for you to drive more?

₁ Very easy ₂ Somewhat easy ₃ Somewhat difficult ₄ Very difficult

The Demographics Questionnaire

Materials: The printed demographics questionnaire.

Assessment Area: Demographic characteristics.

Development: This questionnaire was developed by the UMTRI researchers.

Sources: None.

The Demographics Questionnaire Text:

Demographic Questionnaire

1. What is your birthdate?

__ __ / __ __ / __ __ __ __
M M D D Y Y Y Y

2. Are you male or female?

Male Female
1 2

The next few questions are about you and your household.

3. Are you currently...?

- ¹ Married
- ² Separated
- ³ Divorced
- ⁴ Widowed
- ⁵ Single (never married)

4. Do you live...?

- ¹ In a home, condominium, or apartment that you rent
- ² In a home, condominium, or apartment that you own
- ³ In a family member's home, condominium, or apartment

5. Do you live in...?

- ¹ In a senior or retirement community that provides transportation
- ² In a senior or retirement community that does NOT provide transportation
- ³ Other (Specify _____)

6. How long have you lived at your current location?

- ¹ Less than a year

- ² One to 5 years
- ³ More than 5 years

7. How many people NOT INCLUDING YOURSELF live in your household?

_____ people

8. Do you work outside the home for pay?

- ₁ Yes
- ₂ No

9. If you work outside the home for pay, is this full-time, part-time, or occasional work?

- ¹ Full-time
- ² Part-time
- ³ Occasional

The last few questions are for statistical purposes.

10. What is your race?

- ¹ White/Caucasian
- ² African American/Black
- ³ Asian
- ⁴ Native American
- ⁵ Other, please specify _____

11. Which of the following ethnic categories best describes you?

- ¹ Hispanic
- ² Non-Hispanic

12. Which of the following income groups includes your TOTAL HOUSEHOLD INCOME last year before taxes?

- ¹ Less than \$20,000
- ² \$20,000 to \$49,999
- ³ \$50,000 to \$79,999
- ⁴ \$80,000 to \$99,999
- ⁵ \$100,000 or more

13. What is the highest grade or level of school you completed?

- ¹ Some high school or less
- ² High school degree or equivalent
- ³ Some college or technical
- ⁴ College degree
- ⁵ Some graduate education
- ⁶ Graduate degree or higher

APPENDIX C

Structured Interview Questions

SUBJECT CODE _____

**Feedback Interview
Older Driver Assessment Study
(Administered by Experimenter)**

We are interested in your reactions to the tasks that you have just completed.

1. In general, how acceptable were the tasks? By acceptable, we mean how tolerable were they; to what extent were they okay for you?
2. Were there any tasks that you had a particular problem with?
3. Were there any tasks that you think others would have a problem with even though you did not?
4. Did the order of the tasks make sense to you? Could the tasks have been done in a better order? What order is that?
5. Was the time required for the tasks acceptable? What time period would be more acceptable to you?
6. What did you especially like about the tasks?
7. What did you especially dislike about the tasks?
8. Do you think you could have remembered all your medications without having brought them in?
9. Would there have been a better way for us to find out about the medications you are taking?
10. Was the written format of the questionnaires acceptable? Would you have preferred to have someone ask you the questions?
11. Do you have any other thoughts or comments about the entire process you just completed?