

Independent Instrumental Activities of Daily Living (IADLs) in Successful Cognitive Aging versus MCI

Virginia G. Wadley, PhD

University of Alabama at Birmingham

Department of Medicine

Division of Gerontology, Geriatrics and Palliative Care



Disclosures

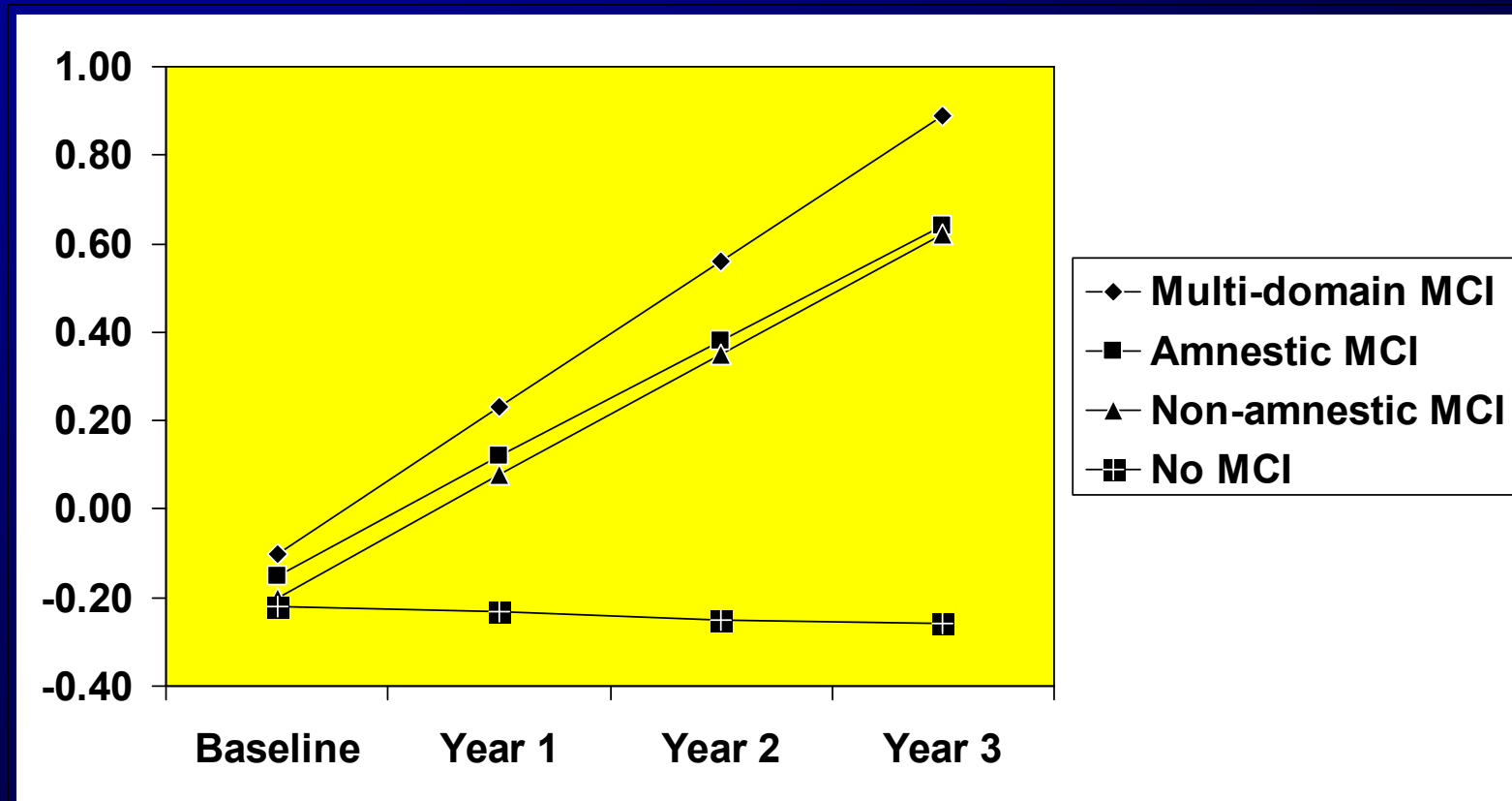
- **Processing Speed Training to Preserve Driving and Functional Competencies in MCI, R01 AG045154 (Wadley Bradley, PI), NIA**
- **Carotid Revascularization Endarterectomy vs. Restenting Trial (CREST-2), U01NS080165 (G Howard, PI), NINDS**
- **Reasons for Racial and Geographic Differences in Stroke, U01 NS51488 (G. Howard, PI), NINDS**
- **Determinants of Midlife & Longitudinal Change in Cognitive Function: CARDIA Study R01 HL122658 (Lewis, PI), NHLBI**
- **UAB Edward R. Roybal Center for Translational Research on Aging and Mobility, P30 AG022838 (Ball, PI), NIA**
- **Systolic Blood Pressure Intervention Trial (SPRINT) and Memory and Cognition IN Decreased Hypertension Substudy (SPRINT MIND), HHSN268200900047C (Oparil, PI), NHLBI, NIA, NINDS, NIDDK**
- **Predicting Long-Term Mobility Outcomes for Older Adults, R01 AG021958-04 (Ball,PI), NIA**
- **Childhood SES Factors: Impact on Age-Related Cognitive and Vascular Health, R01 AG039588 (V. Howard, PI), NIA**
- **Impact of Disordered Mineral Metabolism on Stroke and Cognitive Impairment, R01 NS080850-01 (Gutierrez, PI), NIDDK**
- **Understanding Racial and Ethnic Differences in Weight Loss Maintenance and Regain, R03 DK101795-02S1 (Dutton, PI), NIDDK**

What is the Gold Standard for Assessing IADLs?

- Self report
- Informant report
- Performance-based assessment
- Corroborating evidence

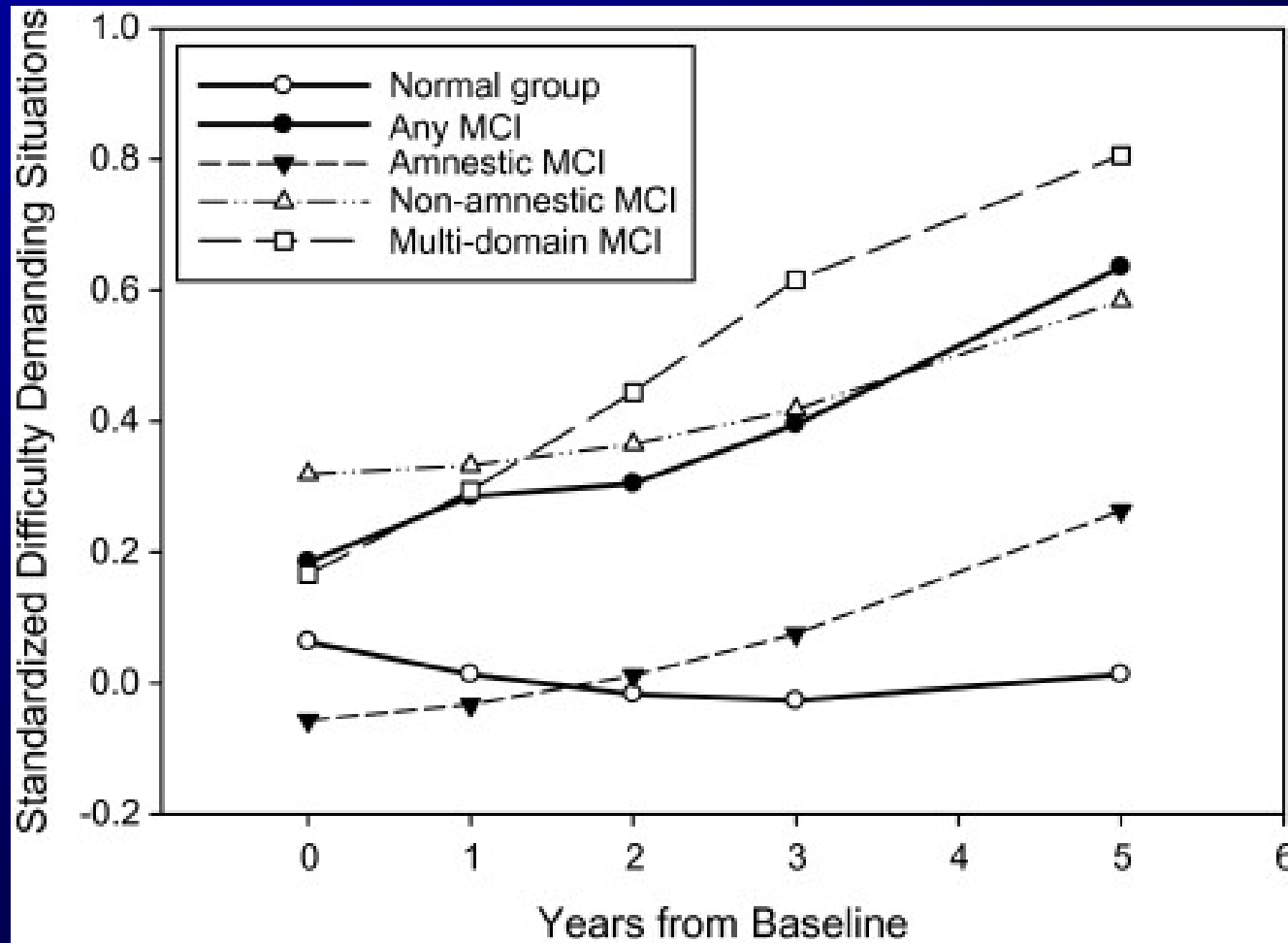
Trajectories of Functional Change: The ACTIVE Study

Reported Difficulty/Dependence on the Minimum Data Set Daily Functioning Composite



Wadley, V.G., Crowe, M.G., Marsiske, M., Cook, S., Unverzagt, F.W., Rosenberg, A., Rexroth, D. Changes in everyday function among individuals with psychometrically-defined Mild Cognitive Impairment in the ACTIVE study. *Journal of the American Geriatrics Society*, 2007; 55: 1192-1198, 2007. PMC2153444

Driving Habits Questionnaire in MCI



O'Connor M.L., Edwards, J.D., Wadley, V.G., Crowe M. (2010). Changes in mobility among older adults with psychometrically defined Mild Cognitive Impairment. *J of Geront: Psychological Sci*, 65: 306-316. PMC2853603.

Measuring Independent Living in the Elderly Study—MILES

| | MCI n=84 | CONTROLS n=91 |
|----------------|-----------------------------|-----------------------------|
| Gender | 40 women 44 men | 59 women 32 men |
| Race | 16 Black 68 White | 19 Black 72 White |
| Mean Age | 70.54 (7.29) range 47-88 | 68.15 (7.35) range 50-85 |
| Mean Education | 15.03 (3.03) range 8-20 | 14.99 (2.54) range 10-20 |

Objective Functional Assessments: Financial Capacity Instrument



- Measures performance in multiple domains of financial ability, simple to complex
- Prior and current abilities in same domains gathered from participants and informants

Marson, D. C., S. M. Sawrie, Snyder S, McInturff B, Stalvey T, Boothe A, Aldridge T, Chatterjee A, Harrell LE. (2000). Assessing financial capacity in patients with Alzheimer disease: A conceptual model and prototype instrument. Arch Neurol, 57, 877-884.

Wadley, V.G., Harrell, L.E., Marson, D.C. (2003). Self- and informant-report of financial abilities in Alzheimer's disease: reliable and valid? J Am Geriatr Soc, 51, 1621-1626. PMID:14687393.

| <i>Domain</i> | <i>Score range</i> | <i>Controls, n = 43</i> | <i>MCI, n = 43</i> | <i>p value</i> |
|-----------------------------------|--------------------|-------------------------|--------------------|----------------|
| Conceptual Knowledge | 0-32 | 29.70 (2.10) | 27.33 (3.71) | .001 |
| Understanding concepts | 0-13 | 11.95 (0.87) | 10.93 (1.68) | |
| Applying concepts | 0-19 | 17.74 (1.62) | 16.40 (2.69) | |
| Cash Transactions | 0-24 | 22.00 (2.21) | 21.09 (2.82) | .101 |
| One-item purchase | 0-4 | 3.81 (0.59) | 3.84 (0.61) | |
| Multi-item purchase | 0-6 | 5.35 (1.09) | 5.05 (1.41) | |
| Vending machine | 0-6 | 5.88 (0.54) | 5.88 (0.54) | |
| Tipping | 0-8 | 6.95 (1.31) | 6.33 (1.91) | |
| Bank Statement Management | 0-39 | 35.44 (3.78) | 32.77 (4.97) | .006 |
| Understanding bank statement | 0-18 | 15.86 (2.04) | 14.60 (2.53) | |
| Using bank statement | 0-21 | 19.58 (2.21) | 18.16 (3.34) | |
| Bill Payment | 0-46 | 43.67 (4.55) | 40.70 (5.52) | .008 |
| Understanding bills | 0-6 | 5.70 (0.74) | 5.37 (1.07) | |
| Identifying/prioritizing bills | 0-13 | 12.35 (1.09) | 12.04 (1.31) | |
| Preparing bills for mailing | 0-27 | 25.63 (3.98) | 23.28 (5.31) | |
| Speed of task completion | | | | |
| Preparing bills for mailing (sec) | 0-300 | 131.19 (48.87) | 160.60,(50.48) | .007 |

Okonkwo, O.C., Wadley, V.G., Griffith, H.R., Ball, K., Marson, D.C. (2006). Cognitive correlates of financial capacity decrements in Mild Cognitive Impairment. J Am Geriatr Soc, 54, 1745-1750. PMID: 17087703

Objective Functional Assessments: Timed Instrumental Activities of Daily Living



- Telephone use
- Managing medications
- Finding nutrition information
- Counting coins
- Grocery shopping

Owsley, C., G. McGwin, Sloane M.E., Stalvey, B.T., Wells, J. (2001). "Timed instrumental activities of daily living (TIADL) tasks: Relationship to visual function in older adults." Optometry and Visual Science 78(5): 350-359.

Owsley, C., Sloane, M., McGwin Jr., G., Ball, K. (2002). "Timed Instrumental Activities of Daily Living tasks: Relationship to cognitive function and everyday performance assessments in older adults." Gerontology 48: 254-265.

Timed IADL Completion Time

| TIADL variable | Controls n = 59 | MCI n = 50 | p value |
|--------------------------------|--------------------|----------------|---------|
| Overall time (secs) | 89.00 (56.16) | 131.05 (56.65) | .001 |
| Telephone use | 27.22 (25.15) | 41.53 (25.64) | .006 |
| Counting coins | 9.41 (6.32) | 11.48 (6.38) | .108 |
| Locating nutrition information | 10.04 (10.82) | 15.63 (10.88) | .012 |
| Grocery shopping | 8.44 (7.32) | 13.98 (7.42) | .001 |
| Medication management | 6.88 (4.27) | 9.06 (4.30) | .014 |

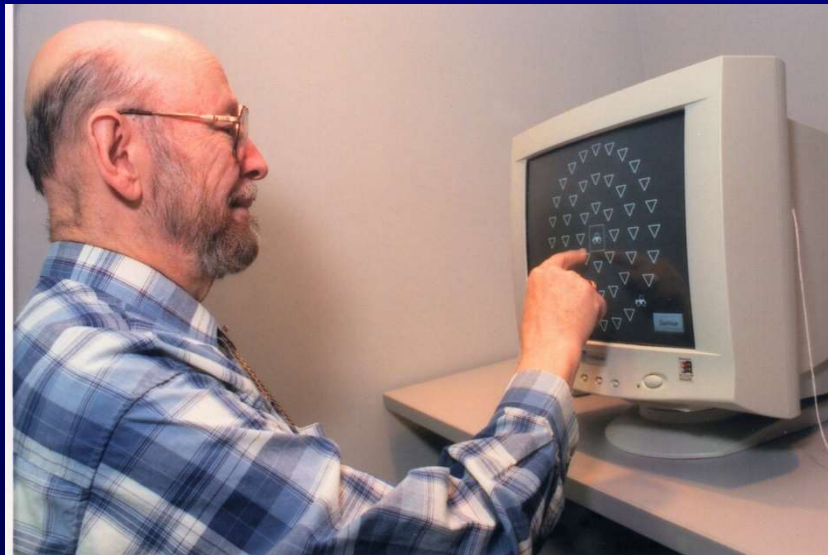
Lower values reflect faster performance. Values are mean (SD) secs.

Wadley, V.G., Okonkwo, O., Crowe, M., Ross, L.A. (2008). Mild Cognitive Impairment and everyday function: evidence of reduced speed in performing instrumental activities of daily living. American Journal of Geriatric Psychiatry, 16, 416-424. (PMID: 18448852)

Timed Tasks

- Deficits in visual attention and information processing speed are part of the neuropsychological profile of AD and MCI
- But task completion time is a function of motor speed, dexterity as well
- How can we tease apart these components?

Visual Attention and Processing Speed: Useful Field of View

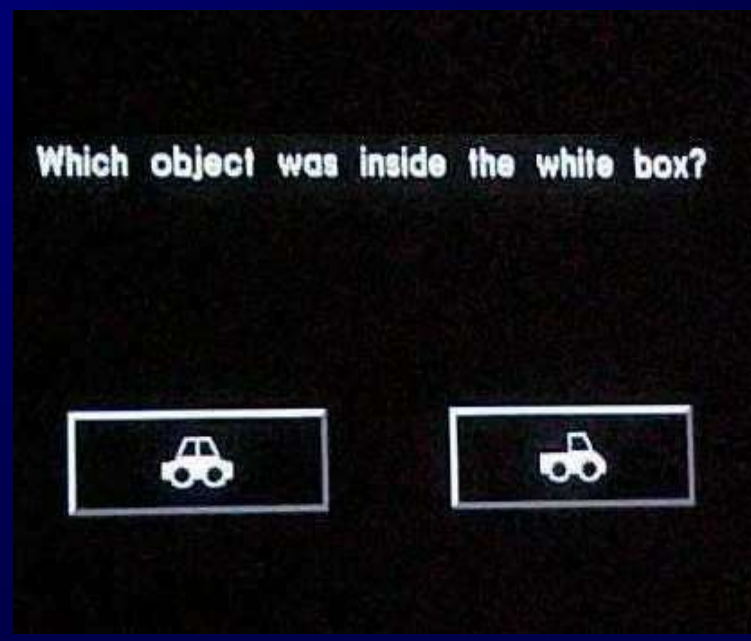


- UFOV® is strong predictor of driving safety (crash records)
- Assesses simple attention, divided attention, and selective attention
- Speed of processing is measured by the display duration associated with accurate performance on 75% of trials of a given task (16-500 ms)

Welcome to UFOV Test 1

This exercise will measure how fast you can identify a single object.

Touch continue for a demonstration



Welcome to UFOV Test 2

This exercise will measure how fast you can divide your attention between two objects.

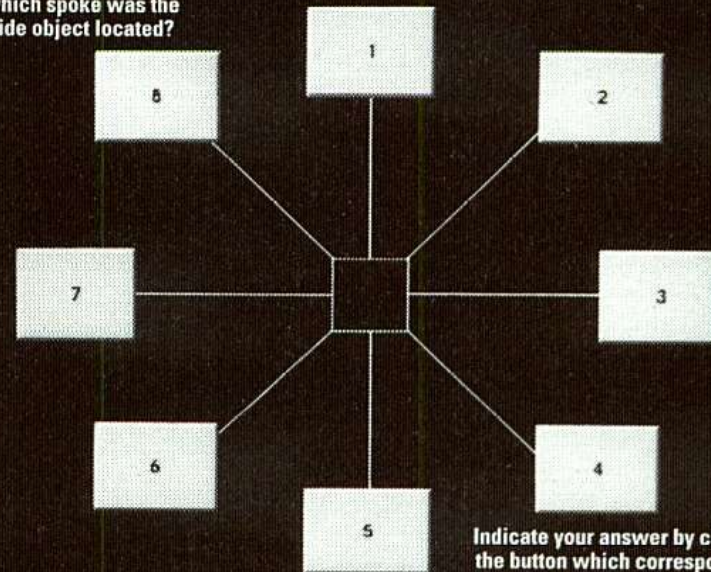
Touch continue for a demonstration



After each presentation you will be asked two questions.
Which object was inside the white box?



On which spoke was the outside object located?

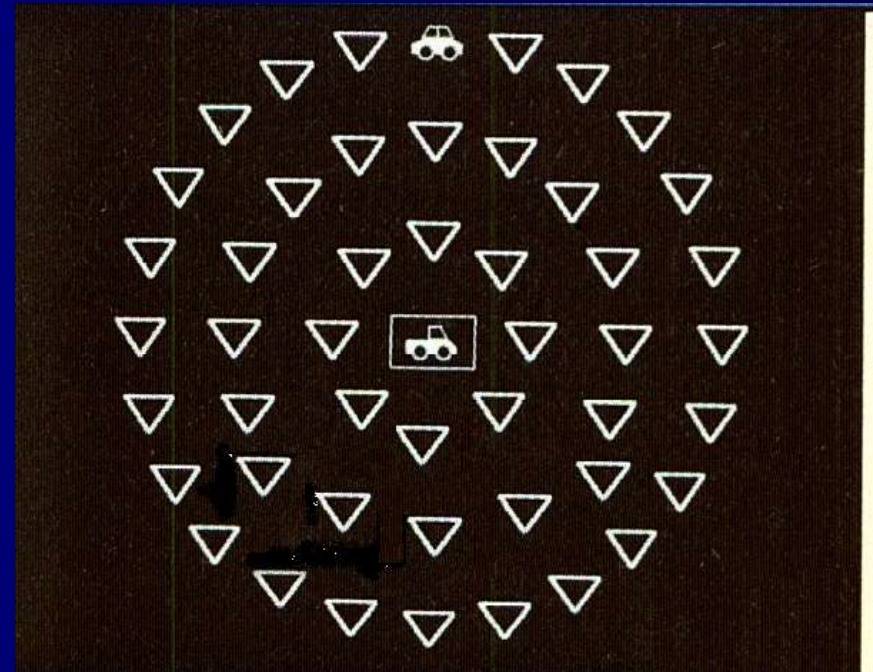


Indicate your answer by clicking the button which corresponds to the location of the target.

Welcome to UFOV Test 3

This exercise will measure how fast you can divide your attention between two objects when the outside object is surrounded by clutter.

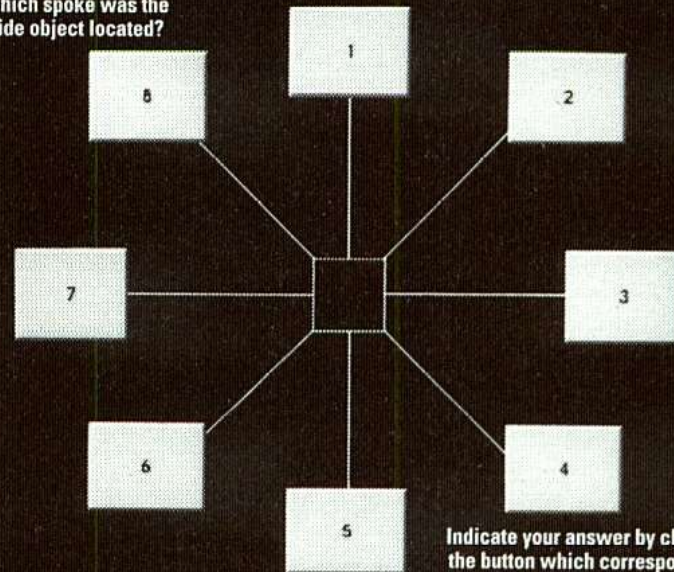
Touch continue for a demonstration



After each presentation you will be asked two questions.
Which object was inside the white box?

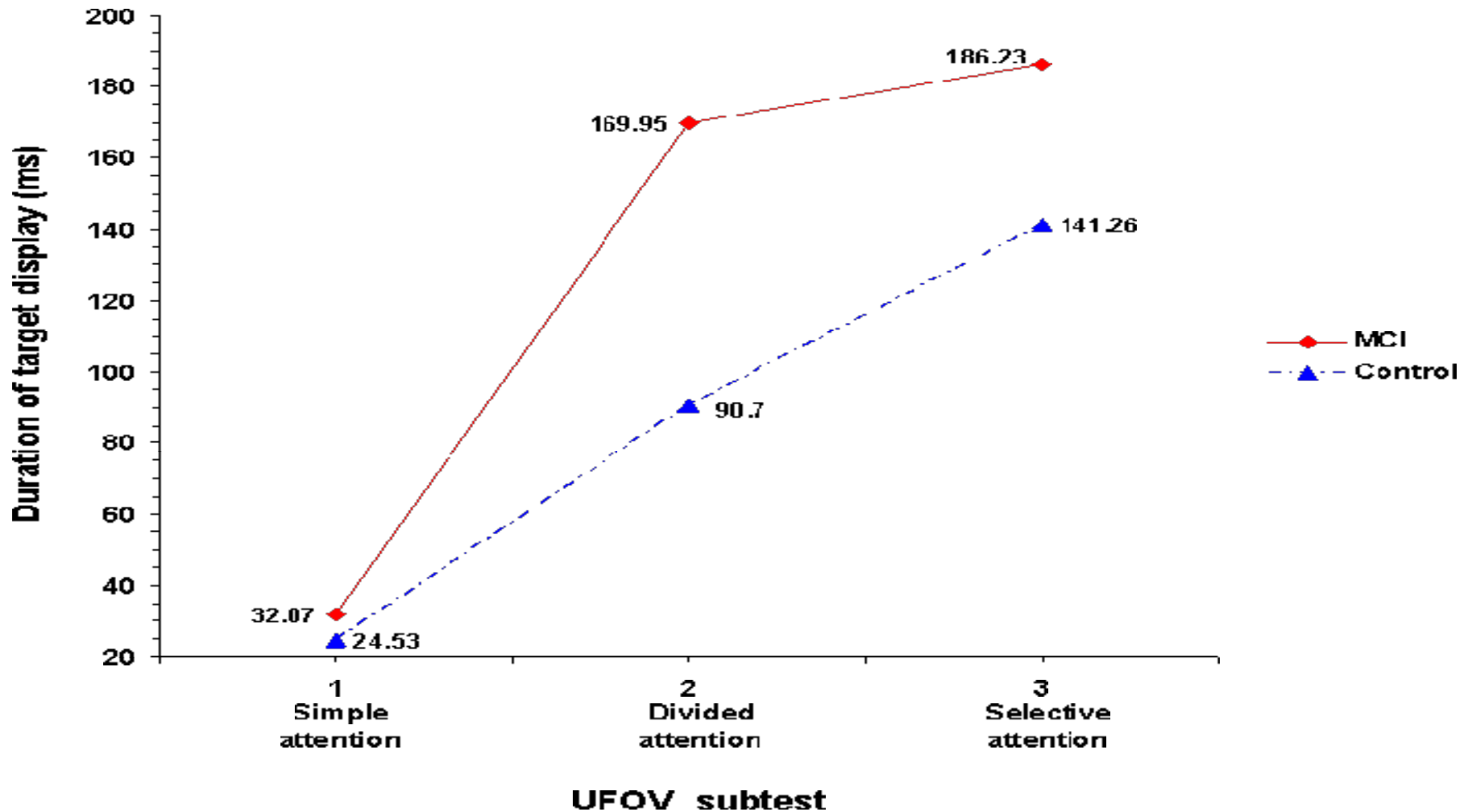


On which spoke was the outside object located?



Indicate your answer by clicking the button which corresponds to the location of the target.

UFOV® in MCI



Okonkwo, O.C., Wadley, V.G., Ball, K., Vance, D.E., Crowe, M. (2008). Dissociations in visual attention deficits among persons with Mild Cognitive Impairment. *Aging, Neuropsychology, and Cognition*, 15, 492-505. (PMID: 18584341)



Objective Functional Assessments: On-road Driving Assessment

CDRS masked to diagnoses and cognitive data

45-min. drive, fair weather, 12:30-4:00

Turning, lane control, gap judgment, steering steadiness, maintaining proper speed, and global rating

5-point Likert ratings: 1 = evaluator took control of car; 2 = unsafe; 3 = unsatisfactory; 4 = not optimal; and 5 = optimal

Scores later dichotomized due to ceiling effects



Driving Assessment

Number (%) receiving less than optimal ratings

| Driving Variable | MCI (n=46) | Control (n=59) | p value |
|-------------------|------------|----------------|---------|
| Right turn | 10 (21.7) | 12 (20.3) | .861 |
| Left turn | 27 (58.7) | 22 (37.3) | .029 |
| Lane control | 18 (39.1) | 8 (13.6) | .003 |
| Gap judgment | 18 (39.1) | 14 (23.7) | .089 |
| Steer steadiness | 24 (52.2) | 24 (40.7) | .241 |
| Maintaining speed | 24 (52.2) | 21 (35.6) | .088 |
| Global rating | 20 (43.5) | 11 (18.6) | .006 |

Wadley, V.G., Okonkwo, O., Crowe, M., Vance, D.E., Ball, K.K., Elgin, J.W., Owsley, C. (2009). Mild Cognitive Impairment and everyday function: an investigation of driving performance. J Geriatr Psychiatry Neurol, 22(2): 87-94.

MILES Longitudinal Results

- Estimated longitudinal trajectories of change in speed and accuracy of performance on measures of everyday function over 5 years reveal a speed-accuracy tradeoff that preferentially affects persons with MCI

Self-report Functional Assessment UAB Life Space Assessment



- Measures extent and frequency of travel beyond the home by any mode of transport
- Correlates well with traditional measures of function, comorbidity and health
- High test-retest reliability (0.86)
- Retains a normal distribution over 8.5 yrs
- Restrictions in life space predicted future cognitive decline in UAB Study of Aging cohort of 1000 black and white older adults.

Crowe M, Andel R, Wadley VG, Okonkwo OC, Sawyer P, Allman RM (2008). Life-space and cognitive decline in a community-based sample of African American and Caucasian older adults. J Gerontol A Biol Sci Med Sci, 63, 1241-1245.

Informant Report Assessments: Functional Assessment Questionnaire

- 10 IADL tasks reported by informant
- Scores from 0-30 indicate functional difficulty, assistance, and dependence
- Assumes reliability of informant
- Validity depends on skill of interviewer

- Change in function is measurable, observable, and reliable
- The Gold Standard is a multimodal assessment

Richard Allman, MD
UAB Study of Aging
Life Space Assessment



Karlene Ball, PhD
Useful Field of View



Ozioma Okonkwo,
PhD

Dan Marson, JD, PhD
Financial Capacity Instrument



Cynthia Owsley, PhD
UAB Driving Assessment Clinic
Timed IADL
Driving Habits Questionnaire



Michael Crowe,
PhD