DRIVING READINESS SCREEN

AND ACTIVITIES

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DRIVING IS ONE OF THE MOST COMPLEX OCCUPATIONS

Activity Analysis of a Driving Task

Driving is a complex activity that requires the integration of motor, cognitive, and visual skills. While scoring well on a paper cognitive assessment is a positive indicator of certain cognitive abilities, real-world driving demands the simultaneous execution of multiple tasks under dynamic conditions, often stretching cognitive capacity.

SCENARIO: DRIVING IN URBAN TRAFFIC ON A RAINY DAY

COGNITIVE DEMANDS:

Attention and Focus:

- Continuously monitor the road, traffic signals, pedestrians, and other vehicles.
- Rapidly shift focus between various stimuli, such as traffic lights, signs, and sudden movements by other road users.

Decision Making:

- Make quick decisions, such as when to change lanes, overtake, or stop at an intersection.
- Evaluate the safest and most efficient routes to the destination.

Working Memory:

- Hold and manipulate information, such as the route, traffic conditions, and GPS directions, while driving.
- Recall the rules of the road and apply them appropriately.

MOTOR DEMANDS:

Steering Control:

- Maintain steady control of the wheel to navigate through traffic.
- Make precise adjustments to avoid obstacles and stay within the lane.

Pedal Control:

- Coordinate the use of the accelerator, brake, and clutch (if driving a manual transmission).
- Modulate speed appropriately in response to traffic conditions.

Body Coordination:

- Use hand-over-hand steering techniques for tight turns.
- Manage head and eye movements to check mirrors and blind spots.

VISUAL DEMANDS:

Visual Scanning:

- Continuously scan the environment for potential hazards.
- Read and interpret road signs and signals quickly.

Depth Perception:

- Judge distances accurately to maintain a safe following distance.
- Assess the speed and distance of oncoming traffic when merging or turning.

Peripheral Vision:

- Monitor the sides of the vehicle for pedestrians and cyclists.

- Be aware of vehicles in adjacent lanes

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Cognitive Load and Cognitive Capacity

COGNITIVE LOAD

Cognitive Load refers to the amount of working memory resources used. There are three types of cognitive load:

- **Intrinsic Cognitive Load:** The effort associated with understanding a specific task or topic.
- **Extraneous Cognitive Load:** The way information or tasks are presented, which can either facilitate or hinder learning and performance.
- **Germane Cognitive Load:** The mental effort involved in integrating new information with existing knowledge, thereby creating long-term memory stores (schemas).

COGNITIVE CAPACITY

Cognitive capacity in dual tasking, or dual-task interference, is a way to evaluate how cognitive load affects performance when performing two tasks simultaneously. If the cognitive load exceeds cognitive capacity, performance on either or both tasks may be reduced. This effect demonstrates the limitations of cognitive capacity.

EXAMPLE 1: NAVIGATING THROUGH HEAVY TRAFFIC

Scenario: Driving through a congested urban area while trying to find a new restaurant.

Cognitive Load: High due to continuous decision-making, route-finding, and monitoring multiple sources of information (e.g., GPS, street signs).

Motor Load: High, requiring frequent stops, lane changes, and precise control of the vehicle.

Visual Load: High, needing constant scanning for pedestrians, cyclists, and other vehicles.

Impact: If it starts to rain, the increased visual demands and cognitive load can exceed cognitive capacity, leading to slower reaction times and poorer decision-making. An unexpected event, like a car cutting them off, could further deplete cognitive reserve, causing delayed motor responses and difficulty navigating safely.

EXAMPLE 2: DRIVING ON A FAMILIAR ROUTE

Scenario: Driving home from work on a well-known route.

Cognitive Load: Moderate, with some decision-making but mostly routine.

Motor Load: Moderate, involving regular acceleration, braking, and steering.

Visual Load: Moderate, requiring scanning for changes in the usual environment.

Impact: Even on a familiar route, unexpected events such as heavy rain, road construction, or an emotional trigger (like an argument or stressful phone call) can increase cognitive load and exceed cognitive capacity. This can lead to slower information processing, delayed reactions, and difficulty adapting to new navigation challenges.

How will this impact your driving when your brain is injured or is experiencing degeneration?

Driving is an inherently dual-task activity, combining continuous motor actions with constant cognitive and visual processing. The brain must integrate sensory input, make rapid decisions, and execute precise motor actions simultaneously. Factors such as adverse weather conditions, unexpected obstacles, or emotional stress can significantly increase cognitive load. When cognitive capacity is exceeded, and cognitive reserve is exhausted, drivers may experience:

DELAYED MOTOR RESPONSES:

- Slower reaction times to braking or steering, increasing the risk of accidents.

REDUCED WORKING MEMORY CAPACITY:

- Difficulty holding and manipulating information, such as directions and traffic conditions, leading to errors.

IMPAIRED INFORMATION PROCESSING SPEED:

- Slower processing of new information, making it hard to respond promptly to changing road conditions.

NAVIGATION DIFFICULTIES:

- Trouble following directions, making safe lane changes, or adjusting to detours and unfamiliar routes.

Driving Readiness Screen

Preparation for Driving Simulator and Assisted Driving Evaluation

- ☐ Montreal Cognitive Assessment (MoCa) score greater than 27
- ☐ Clock Drawing Test (CDT) score 6 or greater
- ☐ Trail Making Test B less than 3 minutes and/or less than 3 errors
- ☐ Road Sign Worksheet 85% or greater (51/59)
- ☐ Divided attention for greater than 30 minutes without distraction, fatigue, and/or confusion.

Montreal Cognitive Assessment (MoCA)

MoCA score of between 12 and 27 could be referred for on-road evaluation.
Esser, P., Dent, S., Jones, C., et al (2016). Utility of the MoCA as a cognitive predictor for fitness to drive. Journal Neurology, Neurosurgery, and Psychiatry. 87: 567-568.

Clock Drawing Test (CDT)

scoring less than five (seven point scoring system) on the CDT made more errors during tasks on the simulator (looked at hazardous errors that may indicate medical impairment along with traffic violation errors).
Freund, B., Gravenstein, S., Ferris, R., Burke, B. & Shaheen, E. (2005). Drawing clocks and driving cars. Journal of General Internal Medicine. 20(3). 240-244.

Tail Making Test A and B (TMT-A; TMT-B)

Assesses visual scanning, planning, processing speed, divided attention
Excellent psychometric properties, some evidence associating with on-road performance. (Vrkljan, McGrath & Letts, 2011)
Full normative data stratified for age and education can be found in an article by Tombough, T. (2004).

"Physicians to consider reporting findings to their Ministry of Transportation if the Trails B score is worse than 3 minutes or 3 errors, provided the test results are felt to be a valid reflection of function" (Roy, M. & Molnar, F. (2013)

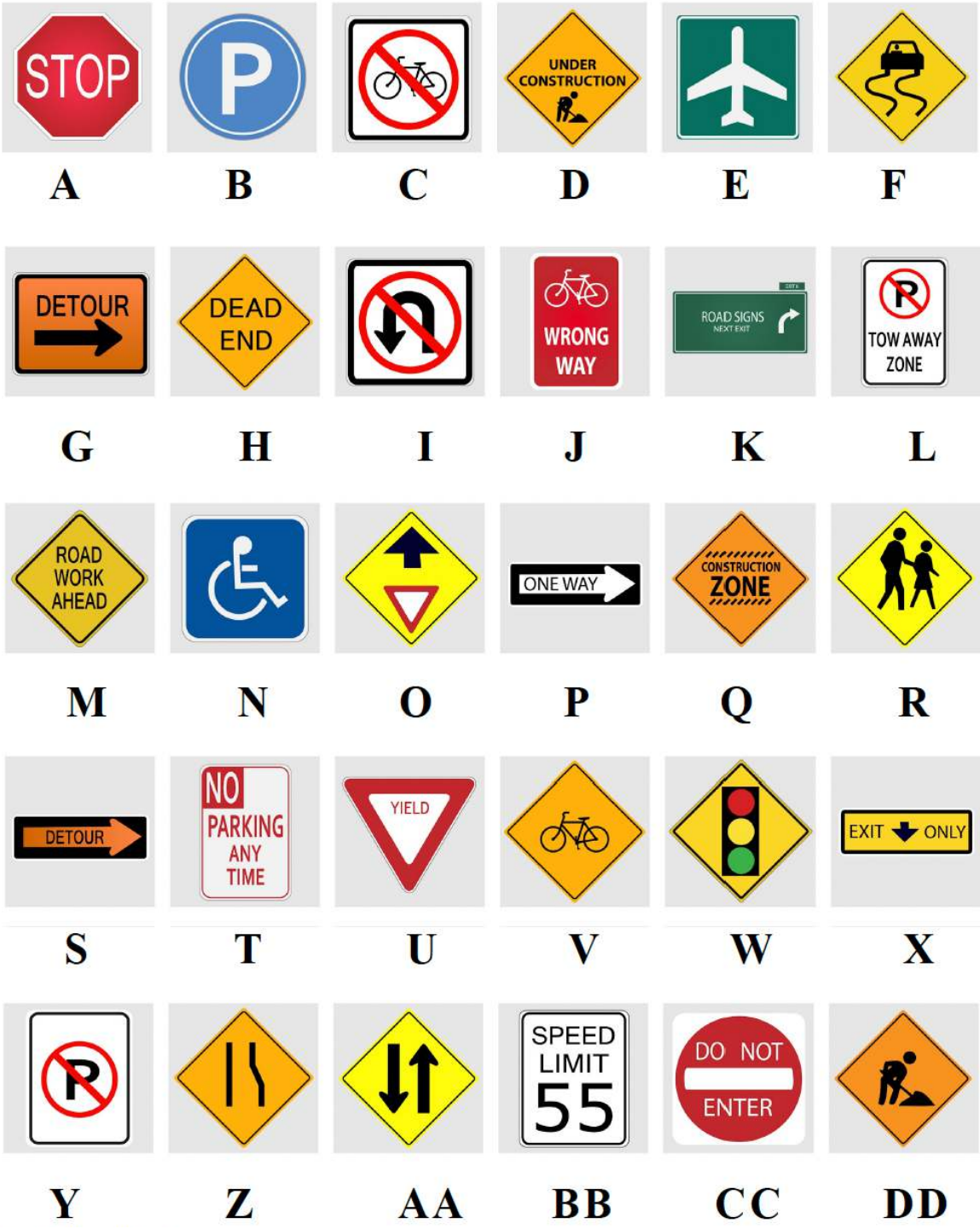
Tombaugh, T.M. (2004). Trail making test A and B: Normative data stratified by age and education. Archives of Clinical Neuropsychology, 19. 203-214.
Vrkljan, B., McGrath, C., & Letts, L. (2011). Assessment tools for evaluating fitness to drive: A critical appraisal of evidence. Canadian Journal of Occupational Therapy, 78. 80-96.
Roy, M. & Molnar, F. (2013). Systematic review of the evidence for Trails B cut-off scores in assessing fitness-to-drive. Canadian Geriatrics Society. 16(4): 1-23.

Motor Free Visual Perceptual Test (MVPT)

Mazer et al. (1998) suggested individuals who score less than or equal to 30 would benefit from a more comprehensive evaluation.
Mazer, B., Korner-Bitensky, L., & Sofer, S. (1998). Predicting Ability to Drive After a Stroke. Archives of Physical Medicine and Rehabilitation. 79: 743-750.

Traffic Signs

Directions : After reading/hearing the question, choose which sign is the most appropriate answer.



ROAD SIGN PROBLEM SOLVING QUESTION ACTIVITY

Question	Answer
You are driving on a busy city street and suddenly see children playing near the sidewalk. Which sign would best alert drivers to be extra cautious and prepared to stop?	_____
You're approaching a hospital and need to find parking that is suitable for individuals with disabilities. Which sign indicates the appropriate parking area?	_____
While driving in a residential area, you see that the street is blocked off, and you need to find an alternate route. Which sign would help you navigate this situation?	_____
You are approaching a busy intersection with a history of accidents and need to warn drivers to slow down and be prepared to yield. Which sign would be best?	_____
You are traveling on a highway and see that the road ahead is slippery due to rain. Which sign should be posted to alert drivers to this condition?	_____
You are driving in a bike-friendly city and need to warn drivers that there are many cyclists in the area. Which sign would be appropriate?	_____
You're on a narrow road where only one lane goes in each direction. Drivers must be careful not to cross into oncoming traffic. Which sign would you use?	_____
You're managing traffic in a construction zone where workers are actively working on the road. Which sign should be used to ensure drivers are aware of this?	_____
A road ahead is blocked off for repairs, and drivers need to take an alternate route through a smaller detour. Which sign would you use to guide them?	_____

You are in a downtown area where parking is not allowed at any time due to traffic regulations. Which sign should be posted to inform drivers?

_____

While driving, you approach an area where making a U-turn is dangerous and not allowed. Which sign would indicate this restriction?

_____

You are about to enter a one-way street and need to inform drivers that they can only go in one direction. Which sign would you use?

_____

You are managing a road where merging traffic must be aware of their surroundings and adjust accordingly to avoid collisions. Which sign would be suitable?

_____

As you approach a busy intersection, you need to alert drivers that a traffic light is ahead. Which sign would you choose?

_____

You are in a parking lot where unauthorized vehicles will be towed away. Which sign indicates this policy?

_____

You need to ensure drivers are aware that a certain lane is for exit only, and continuing straight is not allowed. Which sign would you use?

_____

In a construction area where heavy machinery is operating and the road conditions can change quickly, which sign would warn drivers appropriately?

_____

You are on a road where traffic must yield to other drivers at an upcoming intersection. Which sign should be used?

_____

You need to ensure that no bikes are allowed in a certain pedestrian-heavy area. Which sign would you use?

_____

You're installing a sign to indicate that no parking is allowed, and violators will be towed. Which sign would you choose?

_____

Road Sign Problem Solving Questions Answer Key:

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1. A
2. N
3. G
4. O
5. F
6. V
7. AA
8. DD
9. S
10. T
11. I
12. P
13. Z
14. W
15. L
16. X
17. Q
18. U
19. C
20. Y

TOPOGRAPHIC ORIENTATION/NAVIGATION

PROBLEM-SOLVING QUESTIONS

Instructions: Read each question carefully and choose the most appropriate answer from the options provided. These questions are designed to help improve your navigation and executive function skills.

1. You need to get to the grocery store and have been told it is on the northeast corner of Maple Street and Oak Avenue. You are currently on Maple Street, heading east. Which direction do you turn at Oak Avenue?

a) Left

b) Right

c) Straight ahead

d) Turn around

2. You are driving to work and encounter a detour sign. What is the best action to take?

a) Ignore the sign and continue on your usual route

b) Follow the detour signs to the alternate route

c) Stop and wait for the road to reopen

d) Turn around and go back home

3. You are at a stop sign and need to turn left onto a busy street. What should you do?

a) Wait until the street is completely clear

b) Turn left immediately

c) Inch forward slowly and merge into traffic

d) Turn right instead

4. You are driving in an unfamiliar area and your GPS stops working. How do you find your way?

a) Keep driving and hope to find familiar landmarks

b) Ask for directions from a passerby

c) Use a paper map or mobile map application

d) Turn around and go back the way you came

5. You need to merge onto a highway. What is the correct procedure?

a) Stop at the end of the on-ramp and wait for a gap

b) Accelerate to match the speed of the highway traffic and merge smoothly

c) Merge immediately without checking for traffic

d) Slow down and merge behind the nearest car

6. You missed your turn on a busy street. What should you do next?

a) Make an immediate U-turn

b) Continue to the next intersection and make a legal turn

c) Stop and reverse to the missed turn

d) Pull over and ask for directions

7. You are approaching an intersection with traffic lights, but the lights are out. How do you proceed?

a) Speed through the intersection

b) Treat it as a four-way stop

c) Follow the car in front of you

d) Turn around and find another route

8. You are driving in heavy rain and visibility is poor. What adjustments should you make?

a) Speed up to get to your destination faster

b) Turn on your headlights and slow down

c) Turn off your windshield wipers to avoid distraction

d) Stop in the middle of the road until the rain stops

9. You arrive at a roundabout. How do you navigate it?

a) Enter without yielding to traffic already in the roundabout

b) Yield to traffic in the roundabout and enter when safe

c) Stop in the roundabout to let other cars pass

d) Drive straight through the roundabout without turning

10. You see a pedestrian crossing the street ahead of you. What should you do?

a) Speed up to pass before they cross

b) Stop and wait for them to cross

c) Honk to alert them to hurry up

d) Swerve around them

11. You are approaching a school zone with flashing lights. How should you adjust your driving?

a) Maintain your current speed

b) Speed up to get through the zone quickly

c) Slow down to the posted school zone speed limit

d) Stop and wait until the lights stop flashing

12. You need to parallel park on a busy street. What steps should you follow?

a) Pull up beside the car in front of the space, reverse into the space, and adjust as needed

b) Drive into the space headfirst

c) Stop in front of the space and wait for traffic to clear

d) Avoid parallel parking and find another spot

13. You are driving at night and an oncoming car's high beams are blinding you. How do you respond?

a) Flash your high beams back at them

b) Look toward the right edge of your lane and reduce speed

c) Speed up to pass them quickly

d) Stop in your lane until they pass

14. You are on a highway and need to exit. What is the best way to approach the exit ramp?

a) Wait until the last moment and then cut across lanes to the exit

b) Signal early and move to the exit lane in advance

c) Slow down in your current lane before moving to the exit lane

d) Stop in the middle of the highway to wait for a gap

15. You are approaching a railroad crossing with no barriers or lights. What should you do?

a) Speed up to cross before a train comes

b) Stop, look both ways, and cross only if it's clear

c) Drive across without slowing down

d) Wait for another car to cross first

Topographic Orientation / Navigation Problem Solving Questions Answer Key:

1. a) Left

2. b) Follow the detour signs to the alternate route

3. a) Wait until the street is completely clear

4. c) Use a paper map or mobile map application

5. b) Accelerate to match the speed of the highway traffic and merge smoothly

6. b) Continue to the next intersection and make a legal turn

7. b) Treat it as a four-way stop

8. b) Turn on your headlights and slow down

9. b) Yield to traffic in the roundabout and enter when safe

10. b) Stop and wait for them to cross

11. c) Slow down to the posted school zone speed limit

12. a) Pull up beside the car in front of the space, reverse into the space, and adjust as needed

13. b) Look toward the right edge of your lane and reduce speed

14. b) Signal early and move to the exit lane in advance

15. b) Stop, look both ways, and cross only if it's clear