

## **Detailed Assessment Report**

### **Double Decision**

Cognitive domain: Useful field of view (UFOV), the visual area over which information can be rapidly extracted without eye or head movements.a

Assessment description: In a dual-task paradigm, users discriminate a visual stimulus presented in the center of gaze while simultaneously locating a target in the peripheral visual field. The adaptive dimension is display exposure duration.

Everyday examples:

- Driving safely at intersections while monitoring both central traffic signals and peripheral hazards.
- Detecting pedestrians or cyclists in the periphery while walking in crowded environments.
- Monitoring instruments centrally while maintaining awareness of peripheral visual cues in aviation or military operations.

### **Target Tracker**

Cognitive domain: Visuospatial working memory, the ability to temporarily maintain and update multiple spatial representations while filtering distractors.

Assessment description: In a multiple object tracking paradigm, users track a set of targets (defined by their spatiotemporal onset) among visually-identical distractors. The adaptive dimension is set size (the number of objects tracked).

Everyday examples:

- Tracking the locations of moving teammates during team-based sports.
- Navigating through a busy environment while holding spatial landmarks in memory.
- Monitoring the positions of multiple vehicles when merging or overtaking in traffic.

### **Mixed Signals**

Cognitive domain: Audiovisual cognitive control, the ability to flexibly suppress irrelevant information across modalities in order to act on task-relevant information.

Assessment description: In an audiovisual Stroop paradigm, users listen to auditory information and determine whether visual information presented on screen is an exact match. The adaptive dimension is display exposure duration.

Everyday examples:

- Ignoring a loud conversation on the car radio to focus on reading and responding to road signs.
- Concentrating on a zoom speaker's words while ignoring distracting chat notifications that appear on the screen.
- Tuning out background chatter and irrelevant images on nearby screens to follow along with the audio instructions in an online lecture.

### **Freeze Frame**

Cognitive domain: Tonic and phasic attention, the ability to sustain vigilance over time while flexibly engaging or withholding responses to sequentially-presented information.

Assessment description: In a reverse go/no-go paradigm, users remember a target image presented at the start of the trial after which a continuous stream of targets and foils are interleaved with unequal probability. Users give a motor response to all foils, but withhold a motor response to targets. The adaptive dimension is target/foil frequency.

Everyday examples:

- Maintaining readiness for infrequent but critical signals while monitoring displays or radar.
- Sustaining attention during monotonous activities such as long-distance driving.
- Rapidly suppressing an automatic response when unexpected or infrequent events occur.

### **Divided Attention**

Cognitive domain: Inhibitory control, the ability to withhold or stop automatic responses in situations where they are inappropriate. Response inhibition supports self-control, safety, and decision-making.

Assessment description: In a continuous performance paradigm, users rapidly determine whether flashing colors, shapes, or patterns meet a pre-specified rule. The adaptive dimension is display exposure duration.

Everyday examples:

- Stopping yourself from pressing the accelerator when a light turns yellow because you notice a pedestrian crossing.
- Resisting the urge to grab a cookie even though it is right in front of you.
- Stopping yourself from interrupting someone even when you have a thought to share.

## **Hear, Hear**

Cognitive domain: Auditory distractor inhibition, the ability to focus on relevant sounds while suppressing competing or distracting auditory information.

Assessment description: In an auditory distractor suppression paradigm, users remember a target tone and report whether a set of similar tones presented contain the target. The adaptive dimension is similarity of the foil tones to the target tone.

Everyday examples:

- Focusing on your friend's voice despite clattering dishes and conversations around you in a busy restaurant.
- Concentrating on the sound of a siren in the distance even though the radio is playing loudly.
- Following the professor's words even when classmates whisper nearby.

## **Mind's Eye**

Cognitive domain: Visual distractor inhibition, the ability to filter competing visual stimuli and selectively attend to important information.

Assessment description: In a visual distractor suppression paradigm, users remember the orientation of a set of moving dots and report whether a set of similar images presented contain the target. The adaptive dimension is similarity of the foil orientations to the target orientation.

Everyday examples:

- Focusing on road signs and signals while ignoring irrelevant billboards.
- Ignoring unrelated faces and outfits searching for a friend in a crowd.
- Concentrating on the numbers that matter on a data spreadsheet without being distracted by unnecessary formatting.

## **Memory Grid**

Cognitive domain: Auditory spatial working memory, the ability to hold sound-based information in mind and remembering its placement across locations.

Assessment description: Users visuo-spatially match cards representing auditory syllables. The adaptive dimension is set size (the number of syllable pairs to match).

Everyday examples:

- Remembering where different people sat around a table after they introduced themselves.
- Keeping track of which rooms in a house different sounds (like music, laughter, or a microwave beep) came from.
- Following along in a group conversation and recalling who said what, linked to where they were sitting.

## **Rhythm Recall**

Cognitive domain: Time estimation, the ability to perceive, encode, and reproduce timing information.

Assessment description: Users listen to tonal beats played over a melody and later replay how long each beat was played and where in the melody beats changed. The adaptive dimension is set size (the number of beats remembered).

Everyday examples:

- Remembering and clapping back a rhythm that was played on a drum.
- Keeping time while dancing so that movements match the beat of a song.
- Estimating how long it takes to boil an egg without checking a clock.

## **Scene Crasher**

Cognitive domain: Change detection, the ability to notice new or altered items within a visual scene.

Assessment description: In a change-detection paradigm, users select the item added to a visual scene. The adaptive dimension is set size (the number of non-targets in the visual scene).

Everyday examples:

- Spotting that a new item has been added to a cluttered desk.

- Noticing that a car has entered your blind spot while driving.
- Realizing that a colleague has rejoined a meeting after stepping away for a few minutes.

## **Syllable Stacks**

Cognitive domain: Auditory memory span, the ability to hold and recall sequences of verbal information in the correct order.

Assessment description: In a span paradigm, users report the order of presented syllables in a serial memory span task. The adaptive dimension is set size (the number of syllables remembered).

Everyday examples:

- Repeating back a phone number after hearing it once.
- Remembering the steps in a recipe that a friend reads aloud.
- Remembering the lyrics when learning a new song.

## **To-Do List Training**

Cognitive domain: Auditory delayed memory, the ability to retain and recall auditory instructions after a short delay.

Assessment description: Users see a grid of everyday items and select the items in accordance with spoken instructions. The adaptive dimension is set size (the number of instructions remembered in sequence).

Everyday examples:

- Remembering to grab milk, eggs, and bread from the store after hearing the list from a partner.
- Carrying out a set of verbal directions when navigating through a building.
- Following a sequence of household chores given verbally by a parent.

## **Eye for Detail**

Cognitive domain: Eye movement speed, the speed and efficiency of scanning visual environments to identify relevant targets among distractors.

Assessment description: Users identify which peripheral targets were identical among a variable number of distractors. The adaptive dimension is display exposure duration.

Everyday examples:

- Quickly finding your friend group in a crowded stadium.
- Spotting the ingredients you need for a recipe on a packed grocery store shelf.
- Detecting peripheral threats in dynamically-changing scenes.

## **Fine Tuning**

Cognitive domain: Auditory phonemic processing, the ability to discriminate between similar-sounding phonemes.

Assessment description: Users indicate which one of two confusable syllables was presented. The adaptive dimension is stimulus similarity.

Everyday examples:

- Understanding the difference between “bat” and “pat” in a noisy environment.
- Learning the pronunciation of new words in a foreign language.
- Correctly identifying similar-sounding names, such as “Brian” versus “Ryan.”

## **Hawk Eye**

Cognitive domain: Selective attention, the ability to focus on relevant visual information while ignoring irrelevant items.

Assessment description: In a visual search paradigm, users identify the location of a target among distractors. The adaptive dimension is display exposure duration.

Everyday examples:

- Searching for your luggage on a busy airport carousel.
- Carefully searching for spelling errors or misplaced punctuation marks while ignoring the bulk of correctly written text in a document.
- Concentrating on finding Waldo’s striped shirt while filtering out hundreds of distracting items.

## **Sound Sweeps**

Cognitive domain: Auditory speed, the ability to rapidly discriminate between sounds that vary in frequency (higher vs. lower pitch).

Assessment description: In a time-order-judgement paradigm, two successive frequency-modulated tone sweeps are presented and users indicate whether the frequency increased or decreased within each tone. The adaptive dimension is sweep speed.

Everyday examples:

- Quickly understanding what someone says even if they speak very fast on the phone.
- Immediately detecting changes in pitch between the notes while listening to a new song.
- Recognizing the difference between the higher-pitched sound of an ambulance siren and the lower-pitched sound of a truck horn.

## **Face to Face**

Cognitive domain: Emotion recognition, the ability to quickly and accurately identify facial expressions that convey emotional states.

Assessment description: Users select the face with the same emotional expression as a target face presented previously. The adaptive dimension is display exposure duration.

Everyday examples:

- Recognizing that your friend is upset even before they say anything.
- Noticing that a colleague looks confused during a meeting and adjusting how you explain your idea.
- Identifying characters' emotions in a movie by their facial expressions when the volume is low.

## **In the Know**

Cognitive domain: Episodic memory, the ability to encode, store, and recall meaningful verbal information.

Assessment description: Users listen to a conversation and recall facts through a series of multiple-choice questions. The adaptive dimension is set size (the number of sub-topics discussed).

Everyday examples:

- After hearing a friend tell a funny story, you can retell the main details to someone else later in the day.
- When you hear a news report on the radio, you remember the key facts well enough to discuss them later with a colleague.
- After listening to instructions at a meeting, you recall the important points when completing the task hours later.

## **Mental Map**

Cognitive domain: Spatial working memory updating, the ability to hold multiple visual items in mind while continuously updating their positions as they change.

Assessment description: In a spatial mental rotation task, users remember the relative location of objects in a grid and then reconstruct the grid from memory after it has been rotated, flipped, or translated. The adaptive dimension is complexity of the scene transformations.

Everyday examples:

- Remembering landmarks to find your way back when hiking on a trail.
- Using the layout of streets and buildings to keep track of where you are when exploring a new city.
- Continuously tracking the positions of nearby cars as they change lanes.

## **True North**

Cognitive domain: Allocentric spatial orientation, the ability to use visual and spatial cues to orient oneself and navigate through environments.

Assessment description: In an allocentric spatial rotation task, users remember directions while the cardinal orientation of the scene is manipulated. The adaptive dimension is set size (the number of directions remembered).

Everyday examples:

- Using a compass to return to your car after a long hike.
- Keeping track of where your teammates and opponents are on the basketball court as they move.
- Remembering where the entrance in a large shopping mall is so you can return to the parking lot.

## **Mind Bender**

Cognitive domain: Cognitive flexibility, the ability to flexibly switch between rules, categories, or strategies in response to changing demands.

Assessment description: In a task-switching paradigm, users make decisions on competing stimuli based on changing rules. The adaptive dimension is display exposure duration.

Everyday examples:

- Quickly switching from following GPS directions to taking a detour when you encounter road construction.
- Substituting the ingredients in a recipe as needed based on availability.
- Smoothly shifting from a work-related topic to a social topic when the context changes.

## **Visual Sweeps**

Cognitive domain: Visual speed, the ability to rapidly detect and process visual information to support accurate perception of motion and fast-changing environments.

Assessment description: In a time-order-judgement paradigm, two drifting gratings are presented and users indicate the direction of drift for each grating. The adaptive dimension is drift speed.

Everyday examples:

- Quickly tracking the ball as it moves rapidly across the court during a tennis match.
- While walking through a busy street, you process the entire scene quickly enough to avoid unexpected collisions.
- When driving, you identify motion patterns in your peripheral vision that signal approaching vehicles.

## **Face Facts**

Cognitive domain: Face-name associative memory, the ability to link a person's appearance with relevant facts or contextual details in order to recall them later.

Assessment description: Users remember a set of facts associated with a person. The adaptive dimension is set size (the number of person-factoid associations remembered).

Everyday examples:

- Remembering that the woman you just met at a social gathering is named Sarah and that she works as a teacher.
- Linking a new colleague's face with the detail that he recently joined the finance department.
- When bumping into a neighbor, recalling both their name and the fact that they own a golden retriever.

## **Recognition**

Cognitive domain: Face recognition, the ability to identify and distinguish between individuals based on facial features, even when contexts or conditions change.

Assessment description: Users select the face with the identity of a target face presented previously. The adaptive dimension is display exposure duration.

Everyday examples:

- Spotting a friend in a crowded airport and recognizing them immediately despite the large number of people.
- Distinguishing between two colleagues who look similar at work.
- Recognizing your child's teacher outside of a school setting.

## **Optic Flow**

Cognitive domain: Psychomotor speed, the ability to integrate sensory input with rapid motor responses in order to react efficiently to changing conditions.

Assessment description: In a visuomotor paradigm, users view a road scene and make rapid visual discriminations in the center of gaze while staying alert to potential hazards in the periphery. The adaptive dimension is display exposure duration.

Everyday examples:

- Quickly braking when another car suddenly swerves into your lane.
- Reacting immediately to catch or avoid a ball that unexpectedly rolls toward you.
- Coordinating your movements rapidly in response to a fast-changing game environment like soccer.

## **Right Turn**

Cognitive domain: Mental rotation, the ability to mentally visualize, manipulate, and compare objects or shapes in space.

Assessment description: In a mental rotation paradigm, users report whether a set of images are identical or mirror-images. The adaptive dimension is display exposure duration.

Everyday examples:

- When assembling furniture, imagining how the pieces should fit together by rotating them in your mind.
- Mentally flipping a jigsaw puzzle piece to see if it will fit in the correct spot.
- Mentally rotating a map to align with the direction you are walking.

### **Auditory Ace**

Cognitive domain: Auditory executive function, the ability to update, monitor, and manipulate information held in auditory working memory.

Assessment description: In an auditory n-back paradigm, users report whether the current stimulus matches the stimulus presented n steps earlier in the sequence. The adaptive dimension is set size (the number of n back).

Everyday examples:

- When listening to a phone number, keeping the digits in mind and updating them as the person corrects themselves.
- Keeping track of your most recent steps (“turn left in two blocks, then take the second right”) and updating your working memory as each new instruction is provided.
- Flexibly adapting your responses as the other person adds new details in a conversation.

### **Card Shark**

Cognitive domain: Visual executive function, the ability to manage, monitor, and update visual information while adapting to changing task demands.

Assessment description: In a visual n-back paradigm, users report whether the current stimulus matches the stimulus presented n steps earlier in the sequence. The adaptive dimension is set size (the number of n back).

Everyday examples:

- Keeping track of where images appeared and adjusting accordingly as cards are turned over in a card game.
- Updating your strategy in response to rapidly changing visual cues on the screen while playing a video game.
- Visually monitoring each sentence and adjusting your focus when spotting inconsistencies while proofreading a document.

## **Juggle Factor**

Cognitive domain: Visual memory span, the ability to hold and recall sequences of visual items in their correct order.

Assessment description: In a visual span paradigm, users report the order of highlighted discs as they spatiotemporally move in concentric rings. The adaptive dimension is set size (the number of discs remembered).

Everyday examples:

- Retaining the correct order of movements in a sequence of dance steps.
- Tracking the order of a set of cards being manipulated as a magician shuffles the deck.
- Recalling the order of ingredients shown in a recipe video without needing to replay it.

## **Auditory Paired Associates**

Cognitive domain: Word-pair associative memory, the ability to form and retrieve links between words so that recalling one word cues retrieval of its pair.

Assessment description: In this associative memory paradigm, users recall the word that was associated with a cue during the learning phase. The adaptive dimension is set size (the number of word-pair associations).

Everyday examples:

- While learning a new language, you remember that the Spanish word “mesa” is paired with the English word “table.”
- In school, you recall paired vocabulary terms such as “photosynthesis” and “sunlight.”
- When introduced to a new game, you remember that a particular move is paired with a specific name or command.

## **Pattern Detective**

Cognitive domain: Visual matrix reasoning, the ability to detect, analyze, and apply logical rules to complete or extend patterns in visual information.

Assessment description: Using a visual matrix reasoning paradigm, users are presented with an incomplete pattern and must choose the correct image from four available options. The adaptive dimension is pattern complexity.

Everyday examples:

- Recognizing and applying logical patterns to fill in the missing numbers in a Sudoku puzzle.
- Detecting visual trends in data graphs and predicting what should come next.
- Noticing patterns in tiled flooring and mentally completing the design if a section is missing.

## **GradCPT**

Cognitive domain: Sustained attention, the ability to maintain consistent vigilance over extended periods of time.

Assessment description: In a go/no-go paradigm, users remember a target image after which a continuous stream of targets and foils are interleaved with unequal probability. Users withhold a motor response to all non-targets. The adaptive dimension is sensitivity.

Everyday examples:

- Remaining vigilant and noticing when a car brakes suddenly ahead on a long highway.
- Monitoring a child playing at the park and staying attentive for safety.
- Maintaining concentration and catching errors while proofreading a long document.