

# IVA-2 Comprehensive Report

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## OVERVIEW OF THE IVA-2 CPT AND GENERAL INTERPRETIVE GUIDELINES

This IVA-2 Comprehensive Report was created in order to help the examiner interpret the IVA-2 test results. The Detailed Report provides important information needed to help guide the clinician in formulating likely diagnoses for individuals who have ADHD-type symptoms. The relevant strengths and weaknesses for each of the Attention and Response Control Primary Scales will be systematically reviewed. Detailed descriptions of the test scales are provided in this report. Detailed descriptions of the test scales are provided in this report. Suggested recommendations based on identified strengths and deficits are also provided that may prove helpful for this individual.

The IVA-2 CPT (Integrated Visual & Auditory 2 Continuous Performance Test) is a test of attention and impulsivity that measures responses to 500 intermixed auditory and visual stimuli spaced 1.5 seconds apart. The task is to click the mouse to the target stimuli which is either an auditory or visual "1" and to refrain from clicking when the foil stimulus (i.e., an auditory or visual "2") is presented. The quotient scores for all of the IVA-2 scales are reported as standard scores (Mean = 100, SD = 15). The percentile ranks for the standard scores are also reported. The test lasts about fifteen minutes.

This interpretive report is designed to aid qualified healthcare professionals in their diagnostic decision making process. It is confidential and is only distributed for use in accordance with professional guidelines. The report provides possible suggestions and hypotheses for the examiner to consider, but it is not to be construed as prescriptive, definitive, or diagnostic. These psychological test results and the interpretative guidelines provided can to be used by examiners in formulating "working" diagnoses, but are by no means conclusive. Examiners will need to exercise their clinical judgment in determining if the test is fully valid and to integrate it with other clinical data in preparing their signed interpretive report. If in the examiner's judgment, these IVA-2 test results are incongruent with the individual's clinical history and other test data, it is recommended that less weight be given to these test results in the determination of a diagnosis. The authors and publisher of this test are not responsible for any inaccuracies or errors that may result from its usage.

## VALIDITY OF IVA-2 TEST RESULTS

There are two separate validity checks for this test. First, during the Warm-up and Cool-down phases of the test, the individual must demonstrate comprehension of the test instructions by clicking correctly to simple visual and auditory test targets at least three times. Second, there is a validity check during the main section of the test that evaluates whether the individual's response pattern was erratic. This would indicate numerous random responses and a failure to respond in accordance with the test instructions.

The first validity check is based on whether or not this individual can adequately respond to the simple tests on which the Auditory and Visual Sensory/Motor scales are based. During both the Warm-up and Cool-down phases of this test, this individual made valid responses to auditory stimuli. He also made valid responses to visual stimuli during the Warm-up and Cool-down phases. The quotient scores and simple reaction times for these scales are provided in the Standard Scale Analysis. Since he was able to validly respond to both sensory modalities during the Warm-up and/or Cool-down phases, the examiner can interpret the Sensory/Motor validity test as showing that he was able to adequately understand the basic instructions of this test.

The main test results were found to be valid. All global and primary test scale scores can be interpreted without reservation. This individual's response pattern did not reveal any apparent abnormalities in his responses to either visual or auditory test stimuli. The examiner can proceed in an interpretation of all visual and auditory test scores without reservation.

### **IVA-2 INTERPRETIVE GUIDELINES MALINGERING EVALUATION**

In respect to the IVA-2, malingering is defined as deliberately making test responses that feign impairments of attention or response control for personal gain. Published research has found that individuals who malingering on this test produce extreme quotient scale scores. Such intentionally impaired scores result from an excessive number of omission, commission, or idiopathic response errors. This pattern of response errors is rarely observed for individuals who have been diagnosed as having ADHD, unless they have severe to extreme ADHD symptoms or other significant cognitive deficits.

Nevertheless, the determination of malingering requires that a clinical decision be made by the examiner. In most cases, additional tests of malingering will need to be administered in order to accurately identify its occurrence.

Neither the Visual nor the Auditory Malingering Indicators identified this individual as malingering on the IVA-2.

### **SUMMARY OF TEST RESULTS FOR THE IVA-2 GLOBAL SCALES**

The Full Scale Response Control Quotient is a global measure of the overall ability for this individual to regulate his responses and respond appropriately. Factors that load on this scale include the ability to inhibit responses to non-targets, the consistency of recognition reaction times and the person's ability to maintain his mental processing speed during the IVA-2 test. This individual's overall global quotient scale score for the **Full Scale Response Control** scale was 112 (PR=79). This score fell in the above average range. His **Auditory Response Control** quotient scale score was 97 (PR=42). This global scale score fell in the average range. The **Visual Response Control** quotient scale score for this individual was 122 (PR=93). This global scale score fell in the superior range.

The Full Scale Attention Quotient provides a measure of an individual's overall ability to accurately and quickly respond while maintaining focus. This global scale primarily measures performance under low demand conditions. This individual's overall quotient score on the **Full Scale Attention** scale was 83 (PR=14). This global scale score fell in the mildly impaired range.

His **Auditory Attention** quotient scale score was 102 (PR=54), and this global scale score fell in the average range. The **Visual Attention** quotient scale score for this individual was 67 (PR=1). This global scale score was classified as falling in the severely impaired range.

The Combined Sustained Attention quotient scale score provides a global measure of a person's ability to accurately and quickly respond in a reliable manner to stimuli under low demand conditions. In addition, it includes the ability to sustain attention and be flexible when things change under high demand conditions. This global measure of sustained attention is comprised of the following scales: Acuity, Dependability, Elasticity, Reliability, Steadiness, and Swiftness. These are reported as separate scale scores for both the auditory and visual modalities. This individual's global quotient score on the **Combined Sustained Attention** scale was 88 (PR=21). This score fell in the slightly impaired range.

His global **Auditory Sustained Attention** quotient scale score was 123 (PR=93), and it fell in the superior range. The global **Visual Sustained Attention** quotient scale score for this individual was 51 (PR=1). This score was found to fall in the extremely impaired range.

The identified strengths, weaknesses, and interrelationships of the Auditory and Visual Response Control and Attention scales are reported and discussed below. The specific scales that comprise the Auditory and Visual Sustained Attention scales and their meanings are discussed in the sections related to the Primary Response Control and Attention scales. Also, a discussion is included in the sections below for the three Symptomatic scales: Comprehension, Persistence, and Sensory/Motor.

## ATTENTION PRIMARY SCALES

### Vigilance, Acuity, and Elasticity

Vigilance is a Primary scale that measures general attentional ability. Deficits in Vigilance result from errors of omission that occur under both high and low demand conditions. Analyzing the Acuity and Elasticity scales can help pinpoint the conditions when the problems are most prevalent. Acuity measures errors of omission that occur when targets are infrequently presented (i.e., low demand conditions). Elasticity assesses the person's ability to click to a target that immediately follows a non-target under high demand conditions (i.e., when targets are frequent) and is described as a propensity error of omission.

This person's **Auditory Vigilance** quotient scale score was 105 (PR=62), which falls in the average range. This individual did not show any problems with his general auditory attentional functioning. He did not miss many key auditory stimuli. He is likely to demonstrate good attentional functioning and listening skills in the work environment. If problems do exist that suggest attentional difficulties, the impact of environmental stimuli and social distractors needs to be considered. Also, if this individual shows attentional problems, other emotional, cognitive, or psychological causal factors may exist. Further clarification is provided below regarding any variability in his auditory attentional functioning as well as any identified strengths in auditory attention.

This individual's quotient score was 105 (PR=62) on the **Auditory Acuity** scale. This quotient score was in the average range. The Auditory Acuity scale showed that he did not have any difficulty paying attention under low demand conditions.

This individual's **Auditory Elasticity** quotient scale score was 104 (PR=62). This quotient score fell in the average range. The Auditory Elasticity scale showed that he did not have any difficulty being accurate and mentally flexible in his attentional functioning under high demand conditions.

This individual's auditory performance was essentially the same under both the high and low demand conditions that comprise the Auditory Vigilance scale. No significant difference was found between his Auditory Elasticity and Auditory Acuity quotient scale scores. His ability to respond accurately to auditory test targets was relatively stable and consistent and was not affected by the frequency of the target presentation or whether targets were preceded by a non-target.

This person's **Visual Vigilance** quotient scale score of 36 (PR=1) fell in the extremely impaired range. His general visual attentional functioning showed significant problems that are likely to have a major impact on his ability to perform successfully in many areas of his life. He was not able to sustain his visual attention during periods of the test. Unless he is engaged and the demand to perform is made evident to him, he is likely to have problems in the work environment in maintaining his visual attention. Further discussion on his specific problems with visual attention and whether there is any difference between his functioning on low and high demand conditions will be provided below.

He had a severely impaired **Visual Acuity** scale with a quotient score of 66 (PR=1). He had a severe impairment in his ability to pay attention to visual targets under low demand conditions. Unless actively engaged in the task at hand, he is likely to "tune out" when there is little demand to perform. Behavioral interventions may help keep him on task and make him more aware of "drifting off." Cognitive behavioral exercises may assist him in developing his ability to sustain his attention to routine tasks or work assignments that don't interest him. Referral to an appropriate health professional may be warranted for medication to help him improve his visual attentional functioning.

This individual's **Visual Elasticity** quotient scale score was extremely impaired with a score of 0 (PR=1). He showed frequent problems with failing to click to the "1"s which immediately followed a "2" under high demand conditions. His lapses in attention showed difficulty in his visual attentional functioning which impaired his ability to quickly get "back on track." Cognitive training that focuses on improving his speed of mental processing may be helpful for him. He is likely to be very easily distracted and report difficulty with mental alertness. Compensatory techniques need to be considered to increase his awareness of his problems with accurately responding to changes in his environment.

Significant impairment was found in his attentional functioning under both high and low demand conditions. The impairments in both Visual Elasticity and Visual Acuity were considered severe enough that any relative difference between them was not considered important. He is likely to have problems paying attention to visual stimuli when the demand to perform is minimal. He

also showed problems shifting sets and, thus, will generally show difficulty getting back "on track" when distracted by visual stimuli.

This individual's impairments in Vigilance occurred only in the visual modality.

Consequently, he is likely to learn best if he is first given spoken instructions about a topic and then later shown what to do. Other ways to draw out his auditory strengths need to be explored in order to help him compensate for his dysfunction in the visual domain. The errors he is likely to make due to his problems in Visual Vigilance will most likely be reflected in careless mistakes, failure to follow written directions and misperception of key visual information. Given the severity of his inability to be vigilant and to process visual stimuli accurately, emotional and psychological problems are likely to be exacerbated.

Appropriate interventions will need to be considered with respect to his problems.

Recommended interventions and accommodations for his deficits in the auditory modality are identified above.

### **Focus, Dependability, and Stability**

The Focus scale reflects an individual's ability to sustain attention reliably and not "drift off" or "tune out." It is a Primary scale that is an important contributing factor in the assessment of global attentional functioning. Impairments in Focus result from relatively frequent slow response times to test stimuli that occur sporadically. These delays in response may occur due to momentary lapses in attention, confusion caused by deficits in working memory, episodic mental fatigue or deficits in sustaining attention.

This individual's **Auditory Focus** quotient scale score of 70 (PR=2) fell in the moderately to severely impaired range. At times this individual showed difficulty due to delays and variability in his response time to auditory test stimuli. His pattern of responding indicated that his attention frequently "drifted off." This problem may be due to deficits in auditory working memory or to difficulty in maintaining focus to auditory stimuli during the test. His type of problem is likely to manifest in the work environment as difficulty following directions accurately or the misunderstanding of verbal instructions. Some memory problems may also result due to his failure to process detailed information accurately. Problems with self-esteem or self-confidence and "giving up" may be evident in his psychosocial life. Cognitive behavioral exercises are likely to help enable this individual to improve his focus. He needs to learn to overcome any negative or worrisome thoughts that distract him and impair his ability to do work-type activities. Learning how to focus on the task at hand can be accomplished through cognitive training or other therapeutic interventions. Medication may prove beneficial in helping him stay better focused. The potential benefit of medication will need to be considered by the appropriate health professional within the framework of a comprehensive evaluation and treatment plan.

He showed a relative strength with respect to the **Auditory Dependability** scale. His quotient score on this scale was 114 (PR=82), which falls in the above average range.

Thus, he was able to remain focused under low demand conditions when the pace to pay attention was less demanding.

He was identified to have some problems with respect to the **Auditory Stability** scale.

His quotient score on this scale was 90 (PR=24), which falls in the average range. Generally, he was slightly better in being able to maintain his processing speed reliably under high demand conditions when the targets were prevalent. Thus, the variability of his responses was average when he was required to perform quickly. This pattern of responding indicates that he will occasionally be somewhat erratic in his responses to auditory stimuli and that he is prone to make some errors when the demand for him to perform is high. Systematic cognitive training needs to be considered in order to help him improve the stability of his auditory attentional functioning.

This person's **Visual Focus** quotient scale score of 89 (PR=24) fell in the slightly impaired range. Most of the time this individual is able to process and stay focused on visual stimuli. Infrequent lapses in visual response times were found. These lapses in visual processing may be due to slight fatigue or to a preoccupation with distracting thoughts. He needs to be encouraged to ask for any information he misses due to his slight problems with visual focus, and he should learn to ask others for help when necessary. Generally, his problems with visual focus will only manifest in highly distracting environments or when he is emotionally upset. Cognitive training exercises can help him learn to be better focused to visual stimuli and to recognize how to maintain his visual attention.

His **Visual Dependability** scale indicated a relative strength. His quotient score was above average with a score of 116 (PR=86).

A strength was found for him with respect to the **Visual Stability** scale. His quotient score on this scale was 96 (PR=38), which falls in the average range. He demonstrated the ability to make reliable responses to visual stimuli under high demand conditions.

### **Speed, Quickness, and Swiftness**

The Speed scale is based on the mean recognition reaction time (RRT) for all correct responses. This Primary scale is an important measure of global attentional functioning. The recognition reaction time (RRT) of individuals, either to the visual or to the auditory stimuli used in IVA-2, can be conceptualized as three separate brain functioning processes. RRT is the total time it takes the individual (1) to see the target, (2) to recognize that it is a target requiring the initiation of a response, and (3) to make the correct motor response.

Correct responses are defined as one or more clicks occurring at 125 ms or more to the auditory or visual target. Spurious clicks exhibiting response times of less than 125 ms are excluded in the calculation of the mean recognition reaction time for the Speed scale.

Based on this theoretical model, the following formula would apply:

$$RRT = PT + DT + MT$$

PT is perception time, DT is discriminatory/decision processing time, and MT is motoric reaction time. Perception time is a measure of the time between the presentation of the stimulus and the

individual's detection of that stimulus. Discriminatory/Decision processing time represents the amount of time it takes the individual to discriminate and decide whether the stimulus is the defined target or not and then whether to initiate a response or not. The motoric reaction time variable in this formula is the specific time needed for the muscles to implement a response when a "go" decision has been made. This individual's ability to process information and make decisions, as measured by the Speed scale, is an important variable that is likely to impact his performance in employment settings with respect to being able to get work done within a reasonable time frame and with an acceptable degree of accuracy.

This individual's **Auditory Speed** quotient scale score of 130 (PR=98) falls in the exceptional range. This individual showed a strength in his overall auditory processing speed. His recognition reaction time falls within the exceptional range. His processing speed shows that he is exceptional with respect to his ability to perceive and respond to auditory stimuli. If problems exist with respect to listening skills, organizational abilities, working memory, emotional self-regulation, reading, or the ability to finish work tasks in a timely manner, the impact of environmental stimuli and social distractions needs to be evaluated and considered. In addition, emotional, cognitive, or psychological problems may need to be considered as possible causal factors. Deficits that occur for other IVA-2 scales may also be contributory factors to any identified problems. Further clarification is provided below regarding other IVA-2 scales that may impact this individual's Auditory Speed.

This individual's **Auditory Quickness** quotient scale score of 129 (PR=97) falls in the superior range. His quotient score on the **Auditory Swiftness** scale was 130 (PR=98). This quotient score is interpreted as exceptional. No difference between the quotient scores for the Auditory Quickness and Auditory Swiftness scales was found. Thus, this individual's mean auditory reaction time was generally the same under both high and low demand conditions. He did not show any noticeable difference in his speed of responding to auditory stimuli when he had to process information quickly or the pace was slower. Consequently, it was determined that he could be mentally flexible and adapt to demanding situations, as well as, maintain his processing speed and performance when the pace to perform was slower.

He had an above average **Visual Speed** quotient scale score of 110 (PR=76). His recognition reaction time falls within the above average range. His processing speed shows that he is above average with respect to his ability to perceive and respond to visual stimuli. This represents a relative strength for him. If problems exist with respect to organizational abilities, visual memory, emotional self-regulation, or the ability to finish work tasks in a timely manner, the impact of other causal factors will need to be evaluated and considered. These factors may include environmental stimuli, social distractions, and emotional, cognitive, or psychological problems. Deficits that occur for other IVA-2 scales may also be contributory factors to any identified problems. Further clarification is provided below regarding other IVA-2 scales that may impact this individual's Visual Speed.

This individual's **Visual Quickness** quotient scale score of 111 (PR=76) falls in the above average range. He had an average **Visual Swiftness** scale score of 107 (PR=69). No significant difference was found between the quotient scores for the Visual Quickness and

Visual Swiftness scales. His mean visual reaction time was generally the same under both high and low demand conditions. He did not show any noticeable difference in his speed of responding to visual stimuli when he is required to process information quickly or when the pace is slower. Thus, he was found to perform the same in respect to his visual processing speed under both high and low demand conditions.

Strengths were found for this individual in both the auditory and visual domains of the Speed scale. These strengths are likely to enable him to get his tasks done quickly in the work environment. His ability to shift sets quickly and process multi-modal information at a fast pace is likely to help him be a better learner. When he is challenged in the auditory modality, his visual strength with respect to processing speed is likely to help him compensate and vice versa.

## **RESPONSE CONTROL PRIMARY SCALES**

### **Prudence and Reliability**

Prudence is a measure of impulsivity as defined by errors of commission. It is an important measure of performance related to response control and a Primary scale. Three types of commission errors load on this scale. The first type of error occurs when an individual clicks to a non-target during the test period when the targets are prevalent. The second type is the propensity error of commission which is defined as clicking to the foil, immediately after a target is presented during the period of the test when the non-targets are prevalent. The third type is a subtle impulsivity error called a "mode shift" error of commission. A visual mode shift error occurs when the individual clicks to a visual

non-target that immediately follows a minimum of two auditory non-targets. The auditory mode shift error is defined as clicking to an auditory non-target that immediately follows a minimum of two visual non-targets. All of these prudence errors reflect difficulty in making the correct response to an unexpected change in environmental stimuli.

This individual's **Auditory Prudence** quotient scale score of 105 (PR=62) fell in the average range. This individual was found to be functioning in the average range with respect to his ability to inhibit responses to non-target auditory stimuli. Thus, he is able to control his responses and not be excessively distracted by auditory stimuli in his environment. He can shift sets well. If there are identified functional problems with inhibition or self-control involving auditory stimuli, these may be due to psychological or emotional factors other than ADHD.

He did not demonstrate any problems with respect to the **Auditory Reliability** scale. His quotient score on this scale was 100 (PR=50), which falls in the average range. Thus, he was able to avoid making impulsive idiopathic errors that would lead to careless or inappropriate responses in his home and work environments. This individual is likely to be able to be accurate in detailed tasks and to remember and follow rules well.

This person's **Visual Prudence** quotient scale score of 95 (PR=38) fell in the average range. No problems with inhibition to non-target visual stimuli were identified. This individual demonstrated an average ability to control his responses and inhibit appropriately to non-target visual stimuli.

This score on the Prudence scale indicates that he is unlikely to be distracted by visual stimuli. He showed the ability to regulate and shift sets on the IVA-2 test which demonstrated self-control for visual stimuli when the environment frequently changes. If there are identified functional problems with inhibition or self-control involving visual stimuli, these may be due to psychological or emotional factors other than ADHD.

No problems were found for his **Visual Reliability** scale. The quotient score on this scale was 104 (PR=62), which falls in the average range. He was able to avoid making impulsive idiopathic errors that would lead to careless or inappropriate responses in his home and work environments. This individual is likely to be able to be accurate in detailed tasks and to remember and follow rules well.

### **Consistency**

The Consistency scale is a general measure of an individual's ability to respond reliably based on his reaction time. Consistency is an important Primary scale for understanding and evaluating response control. It provides a means to assess the variability of the majority of the responses that a person makes to test targets. In order to do so it is calculated by specifically excluding both the very fast and very slow responses. In contrast, the Focus scale is a measure of the variability of the reaction time responses to all of test targets. Consistency is considered indicative of an individual's ability to sustain his attention in order to produce responses that reflect stable, reliable, integrated brain functioning.

This individual was mildly impaired in his ability to be consistent in his responses to auditory stimuli. His **Auditory Consistency** quotient scale score was 80 (PR=10). This individual will need to learn to ignore internal or external auditory distractions in order to improve his performance when sustained attention is required. Cognitive training exercises may help improve his ability to listen, attend, and follow multi-step directions. Training in auditory processing is likely to improve memory and functioning in a variety of other tasks as well. Written or taped presentation materials need to be provided to this individual so that he can review the concepts and ideas presented in order to "fill in the gaps." Reinforcement of "double-checking" his work is also recommended in order to minimize careless errors.

This individual's ability to be consistent in his responses to visual stimuli was exceptional. The **Visual Consistency** quotient scale score for this individual was 133 (PR=99). Even under distracting conditions or when stressed, this individual is likely to be consistent in his reaction time to visual stimuli. Working memory and the ability to sustain internal attention are indicated as areas of strength. This individual would probably be able to review his written work and to identify any careless errors by himself. Due to his strengths in visual consistency, he is likely to more quickly grasp and retain new concepts presented in a visual format.

### **Stamina**

The Stamina scale is a measure of the individual's ability to sustain his speed of response time during the course of the test. This scale is a Primary scale and is an important measure of response control. It is derived by comparing the mean reaction time of the first 200 trials to that

of the last 200 trials. The raw score for this scale is based on a ratio of these two mean scores and is expressed as a percent. If the individual is slower in his response times at the end of the test, the raw score will be reflected in a percent score of less than 100%. In the rare case where the individual performs faster in the latter half of the test, the raw score will be greater than 100%.

This individual's **Auditory Stamina** quotient scale score of 110 (PR=76) fell in the above average range. This person's response time to auditory stimuli became faster over the course of the test. He was able to increase his mental processing speed in the auditory domain during the test. In a work setting, he is likely to be capable of meeting the demand to perform and to achieve goals in a timely manner. It would be rare for him not to get his work done unless other psychological or emotional factors are present that impair his functioning. In respect to his auditory processing speed, his work habits are likely to reflect the ability to increase his efforts and to "rise to the occasion" even when he is faced with challenging tasks.

He had an above average **Visual Stamina** quotient scale score of 114 (PR=82). He was able to increase his mental processing speed in the visual domain during the test. He is unlikely to have any significant deficits in terms of meeting the demand to perform and to achieve goals in a timely manner. It would be rare for him not to get his work done unless other psychological or emotional issues exist that impair his ability to function well. In his work habits, he is likely to double his efforts and meet the demand even when he is faced with visually challenging work.

Strengths were found in this individual for both the auditory and visual domains of the Stamina scale. This individual is likely to be able to get his work done quickly because of his strengths in stamina. He showed the ability to process and maintain his attention to both visual and auditory information over time.

### **Fine Motor Hyperactivity**

The Fine Motor Hyperactivity Quotient measures off-task, spurious, impulsive, and inappropriate fine motor activity using the mouse input device. Errors on this Primary scale are considered reflective of problems with fine motor self-control but do not reflect gross motor hyperactivity (i.e., "out of seat" behavior). A person who is squirmy, restless, or who doodles or fiddles with small objects may score low on this scale. These kinds of response tendencies may be described as fidgetiness and restlessness. Generally, high incidences of these behaviors are atypical, except for children age 13 and under and individuals over age

55. Quotient scores above the average range are considered reflective of better controlled and more self-regulated responses.

Sometimes, individuals will click impulsively when the instructions are being given to them during the Warm-up section of the IVA-2. Generally, this type of error may be attributed to a person's difficulty listening accurately to instructions. It may also occur for people who have impulsive tendencies and are more impatient than most other people. In the IVA-2, this type of error is labeled as a "spontaneous" mouse click and is defined as occurring only during the instructional periods that precede the Warm-up and Practice Sessions.

Some IVA-2 test-takers will exhibit off-task behavior in another way. These individuals "play" with the mouse by holding the mouse button down. If this behavior occurs during the Warm-up section of the IVA-2 test, the test-taker is warned and instructed not to repeat this error. Only during the main section of the test do errors of this type load onto the Fine Motor Hyperactivity scale. These actions generally occur when the individual engages in inappropriate, "testing the limits" behavior. Occasionally, a high incidence of this type of fine motor error is due to the fact that an individual holds down the right mouse button while he uses his index finger to click the left mouse button. If the examiner sees a high number of "holding" errors, he or she needs to be sure that the individual being tested did not keep the right button held down during the course of the test. Such behavior, if done frequently, is very likely to result in invalid IVA-2 test results.

Spurious errors are also made by some IVA-2 test-takers. This type of error only occurs during the main test. It is defined as clicking the mouse in a haphazard, anticipatory, or random manner, such that the reaction time speed for that particular trial is less than 125 milliseconds (ms). Extensive testing has shown that it is not possible for individuals to perceive and initiate their responses to the IVA-2 visual or auditory stimuli faster than 125 ms. For most people, simple reaction time speed has been found to range between 200 and 600 ms. Clicking the mouse such that the reaction time speed is less than 125 ms is considered an invalid response that is reflective of the individual making anticipatory or spurious responses.

The most common type of fine motor hyperactivity error is described as a fidgety, impulsive response. It occurs whenever the test-taker makes one or more additional clicks either to a target or non-target stimuli during the main test.

This person's **Fine Motor Hyperactivity** quotient scale score was 108 (PR=69). His score fell in the average range. He made one spontaneous response while the instructions preceding the Warm-up and Practice sessions were being delivered. During the test, he never held the mouse button down. Thus, no mouse button holding errors were identified. He made no spurious errors. This type of error is defined as making a response with a reaction time less than 125 milliseconds. He did not click the mouse button more than once for any response during the main test.

This average quotient score for the Fine Motor Hyperactivity scale indicates no significant problems in fine motor hyperactivity. He is unlikely to exhibit problems with fidgety, impulsive, or off-task behavior in his home or work environment. It would be rare for this individual to be distracted by feelings of restlessness. He may be reasonably tolerant of "boring" tasks. Unless other impairments in response control or attentional functioning are identified, it is very likely that he can sit reasonably still and be quiet.

The lack of problems shown on the Fine Motor Hyperactivity scale suggests that he is likely to be able to follow simple general rules and not demonstrate fidgetiness. In many cases, this average score on the Fine Motor Hyperactivity scale is considered a positive indicator regarding his ability to refrain from distracting others while they are working.

However, he may possibly have problems related to gross motor hyperactivity that will be evident in social situations that may negatively impact his interactions with others. A high score

on the Fine Motor Hyperactivity scale does not by itself rule out the possibility of gross motor hyperactivity either during the test or in other environments.

## SYMPTOMATIC SCALES

### Comprehension, Steadiness, and Reliability

The Comprehension scale is a measure of idiopathic errors both of commission and omission occurring under both low and high demand conditions. It is one of the three Symptomatic scales and is useful in identifying factors that may impact performance or possibly reflect the test-taker's motivation toward taking and understanding the IVA-2 test.

The Comprehension scale is a composite scale based on the Steadiness and Reliability scales. The Steadiness scale is comprised of idiopathic errors of omission that occur under high demand conditions; in other words, the individual fails to click to a target when the targets are frequent. The Reliability scale is comprised of idiopathic errors of commission that occur under low demand conditions. For example, a Reliability error occurs when the individual clicks one or more times to a non-target under low demand conditions.

When an individual responds in a random, impulsive manner to test stimuli, there will be a high frequency of idiopathic errors of commission. This random pattern will be evident to the examiner in most cases, because the individual's Reliability quotient score will be very low. As discussed above, the Reliability scale is a measure solely of idiopathic errors of commission. An extremely high degree of random, impulsive responding may result in an invalid test profile for either the auditory or visual sensory modality or for both. When one or more of the sensory modalities is found to be invalid, the Comprehension score is still reported and in almost all cases, will fall in the extremely impaired range.

When the Comprehension scale quotient score is very low, it may also be the result of very careless responding or extreme inattention. In some cases, when an individual frequently fails to respond to test targets or stops responding altogether, this response pattern will invalidate the IVA-2 results due to the very high degree of idiopathic errors of omission. The Steadiness scale provides a measure of these idiopathic errors of omission. It needs to be pointed out that errors on the Prudence and Vigilance scales are not included on the Comprehension scale. Comprehension errors may be described as "oddball" errors and are not specifically pulled for by the IVA-2 test pattern design.

This individual's **Auditory Comprehension** quotient scale score of 106 (PR=66) fell in the average range. No major problems with functioning and performing adequately on the IVA-2 test were found for the Auditory Comprehension scale. Overall, he performed well with respect to his ability to follow the test rules. He did not demonstrate any significant problems with respect to the Auditory Comprehension scale that would impact his life.

Further discussion regarding any relative weaknesses or strengths is presented below for the Steadiness and Reliability scales that comprise the Comprehension scale.

His **Auditory Steadiness** quotient scale score was 109 (PR=73). This quotient score fell in the average range. This individual was not identified to have any significant problems with attention to auditory stimuli as measured by the Steadiness scale. This individual comprehended the rules fully that required him to respond to auditory targets when they were prevalent, and he did show any difficulty in performing the test task, as measured by the Steadiness scale.

On the **Auditory Reliability** scale, he had a quotient score of 100 (PR=50). This quotient score was in the average range. He was not found to have problems with respect to the Auditory Reliability scale. The number of errors he made was not excessive. His score showed that he was not impulsive in this way and made few "oddball" responses to auditory stimuli under low demand conditions.

This individual's **Visual Comprehension** quotient scale score of 101 (PR=54) fell in the average range. His Visual Comprehension scale did not indicate any major problems.

Overall, he performed well with respect to his ability to follow the test rules. No significant impacts in his life should be expected with respect to Visual Comprehension. No major problems with functioning and performing adequately on the IVA-2 test were found for the Visual Comprehension scale. Overall, he performed well with respect to his ability to follow the test rules. He did not demonstrate any significant problems with respect to the Visual Comprehension scale that would impact his life. Further discussion regarding any relative weaknesses or strengths is presented below for the Steadiness and Reliability scales that comprise the Comprehension scale.

He had an average **Visual Steadiness** quotient scale score of 100 (PR=50). No significant problems with attention to visual stimuli were identified under high demand conditions. He was able to respond accurately and maintain his effort when the targets were frequent. This individual understood the rule that required him to respond to visual targets when they were prevalent, and overall he showed good visual attentional attention.

On the **Visual Reliability** scale, he had a quotient score of 104 (PR=62). This quotient score was in the average range. No problems were found with respect to his Visual Reliability scale. He did not make an excessive number of "oddball" responses to visual stimuli under low demand conditions.

## **Persistence**

The Persistence Scale is one of the three Symptomatic scales and is used to compare the speed of simple reaction time at the beginning of the test to that measured at the end of the test. It is useful in helping to identify factors that may affect performance and/or possibly reflect underlying attitudinal or behavioral characteristics of the test-taker.

It is derived by dividing the mean simple reaction time of the fastest three responses occurring during the Warm-up by the mean simple reaction time of the fastest three responses occurring during the Cool-down. This calculation is done for both the auditory and visual modalities. The resulting ratio is converted into a percentile raw score. Percentile scores of less than 100% reflect that the individual's mean simple reaction time was slower during the Cool-down than

during the Warm-up period. In other words, the test-taker slowed down between the beginning and the end of the test. Likewise, if the percent raw score is greater than 100%, the individual's mean reaction time during the Cool-down period was faster than the mean reaction time measured during the Warm-up period.

The Warm-up period provides practice in using the mouse and establishes a baseline in terms of simple reaction time. When the mean reaction time of the Cool-down period is significantly slower than that measured during the Warm-up period, this score indicates possible problems performing after the main test task is completed. This slower mean reaction time may be due to motor or mental fatigue, an oppositional attitude, or a decrease in motivation to do any additional tasks. In contrast, when an individual demonstrates a faster mean reaction time after completing the IVA-2, this score is indicative of an effort to continue to perform well all the way to the end of the test.

This individual's **Auditory Persistence** quotient scale score of 92 (PR=31) fell in the average range. There was no significant difference in his auditory reaction time during the Cool-down as compared to the Warm-up. Thus, his quotient score on the Persistence scale did not indicate any problems with his motivation that would impair his functioning on the IVA-2 test. Given that his Auditory Stamina quotient score fell in the above average range, he was not identified by the test as being mentally fatigued in his ability to respond to auditory stimuli. This pattern of responding suggests that he does not get fatigued easily when required to process auditory stimuli.

This person's **Visual Persistence** quotient scale score of 104 (PR=62) fell in the average range. No significant difference was found in his visual reaction time during the Cool-down as compared to the Warm-up. Thus, his quotient score on the Persistence scale did not indicate any problems with his motivation that would impact his functioning on the IVA-2 test. Given that his Visual Stamina quotient score fell in the above average range, he was not found to show any mental or motoric fatigue in respect to his ability to respond to visual stimuli. This pattern of responding indicates that he is not likely to become easily fatigued when he has to process visual stimuli.

### **Sensory/Motor**

The Sensory/Motor scale provides a measure of an individual's simple reaction time. This scale is one of the two Symptomatic scales and can be useful in identifying factors that may affect performance on other IVA-2 scales. First, the mean simple reaction time of the three fastest trials is computed based on either the Warm-up or Cool-down sections of the IVA-2, selecting whatever section has the three fastest reaction times. The mean reaction time of these three trials becomes the raw score for the Sensory/Motor scale.

During both the Warm-up and Cool-down test periods, ten visual targets are presented, followed by ten auditory targets, and there are no foils presented during either of these periods. The simple reaction time used as the raw score for the Sensory/Motor scale is theoretically based on the person's Perception Time (PT) + Motoric Reaction Time (MT).

The purpose of the Sensory/Motor scale is to identify any problems related to the underlying integrity of an individual's sensory/motor system. A very slow simple reaction time may possibly influence the Speed or Global Attention scale scores. In some rare cases, a very slow reaction time may indicate underlying neurological problems. People can be challenged by the demand to focus and react quickly to stimuli for a variety of different reasons, including emotional, psychological, and learning difficulties. A person with a high level of anxiety may hesitate and respond more slowly than others, due to feelings of insecurity and fear of making mistakes. Individuals may also vary in their interpretation of the instructions given for the Warm-up and Cool-down. In response to the instruction to "Be as quick as you can, but be careful, too," some individuals may respond as soon as they see a target on the screen, since they are also told that they will only see targets. Others may wait just a little before clicking to be sure that they are seeing a target.

For these reasons, only the fastest three reaction times are used to derive the mean of the Sensory/Motor raw scale score in an effort to obtain a relatively accurate and reliable measure of simple reaction time for each individual. However, it is recommended that this scale be interpreted with some caution due to the numerous factors that may affect it and the limited number of trials used to derive it. Usually, only when the scores are in the severe or extreme range should the examiner give weight to this scale's possible impact on the IVA-2 test performance or relevance to life functioning.

This individual's **Auditory Sensory/Motor** quotient scale score of 119 (PR=90) fell in the above average range. This scale score was computed based on the mean of the three fastest reaction times of his auditory responses during the Warm-up test period. His auditory simple reaction time was faster than most peers his age. This above average score on the Sensory/Motor scale indicates that he is likely to be able to process and respond quickly to auditory stimuli. His quotient score on the Sensory/Motor scale did not reveal any problems with functioning that would impair his test performance or affect him in his life. Given that his Auditory Speed quotient score fell in the exceptional range, he was not found to have difficulties related to his auditory recognition reaction time. These two aspects of his functioning indicate that he is able sustain his effort and to process information as quickly as or more quickly than others under both simple and demanding conditions. He demonstrated good mental processing speed for auditory stimuli on the test and is likely to be able to perform well in life on tasks requiring auditory processing.

This person's **Visual Sensory/Motor** quotient scale score of 106 (PR=66) was in the average range. The mean of his three fastest visual reaction times during the Warm-up test period was used in determining this scale score. This individual's visual simple reaction time revealed him to be similar in performance to most other people his age. No significant difficulties were found on the Sensory/Motor scale for this person that would impair his test performance or affect him in his life. Given that his Visual Speed quotient score fell in the above average range, he was not found to have problems related to his visual processing reaction time. These two aspects of his functioning indicate that he is able sustain his effort and to process information well under a variety of conditions. He demonstrated good overall mental processing speed in responding to visual test targets and is likely to be able to perform well in respect to his speed of processing on visual tasks in his daily activities.

## IVA-2 CLINICAL INTERPRETATION

These test findings suggest that the examiner consider a working diagnosis of **Attention-Deficit/Hyperactivity Disorder, predominantly inattentive presentation**. This individual's pattern of responding was indicative of impairments likely to impact his functioning in the home and work settings. However, it is necessary to determine the occurrence of several inattentive or hyperactive/impulsive symptoms before the age of twelve in order to diagnose ADHD for adolescents or adults. Since the examiner did not identify whether this individual had ADHD symptoms when he was a child, it is essential that the examiner clarify this individual's clinical history in order to make a definitive diagnosis. It will also be necessary for the examiner to rule out **Mild neurocognitive disorder** and other mental disorders as possible underlying causes for this individual's ADHD symptoms.

His global Full Scale Attention quotient scale score indicated a mild impairment that supported the above working diagnosis. Even though this individual's global Full Scale Response Control quotient scale score did not indicate a significant impairment in functioning, his global Sustained Visual Attention quotient scale score did reveal an extreme impairment. While a problem was identified for this individual in respect to his Sustained Visual Attention quotient scale score, his Sustained Auditory Attention quotient scale score was not found to be impaired and fell in the superior range. He was also not identified as making an excessive number of impulsive errors during the test. In summary, these IVA-2 findings identified relevant impairments in functioning that provide support for the above working diagnosis under consideration.

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