

IVA-AE2 Comprehensive Report - Extended Test

Name: Case, Sample

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Comment:

OVERVIEW OF THE IVA-AE2 CPT AND GENERAL INTERPRETIVE GUIDELINES

This IVA-AE2 Detailed Report was created in order to help the examiner interpret the IVA-AE2 test results. This report provides the essential 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. The IVA-AE2 CPT (Integrated Visual & Auditory Continuous Performance Test - Advanced Edition) in this Extended Test version, is a test of attention that measures responses to 1000 intermixed auditory and visual stimuli spaced 1 second apart. The task is to only click the mouse when the target stimulus is a visual "3" or an auditory "5." A correct response is defined as exactly one click to a target stimulus. The individual taking the test must be able to discriminate between 3s and 5s, switch between sensory modalities, and maintain attention for about twenty minutes. The targets occur frequently during some sections of the test and rarely during other sections, thus testing attention under both high and low demand conditions.

The high demand condition is defined as a "block" of 50 trials when the targets are frequent. However, the first two target presentations are excluded from the measurement of performance under high demand conditions and are categorized as being part of the previous low demand conditions block. The reason that these first two targets are categorized in this way is that they are still pulling for errors of inattention as the test-taker has not yet made the transition to the mode of rapid clicking that is characteristic of the high demand block.

The quotient scores for all of the IVA-AE2 scales are reported as standard scores. Standard scores have a mean of 100 and a standard deviation of 15. The Wechsler Intelligence tests, which are commonly used in schools to assess Full Scale, Verbal and Performance IQ, also use standard scores (i.e., Mean = 100, SD = 15). Thus, it is possible to easily compare and contrast an individual's scores on the IVA-AE2 Full Scale Response Control scale and the Full Scale Attention scale with all three of the Wechsler Intelligence IQ scores. The relationship between the global Wechsler IQ scores and the IVA-AE2 Full Scale Response Control and Attention global scales has not been fully determined at this time.

In addition to reporting standard scores for the IVA-AE2 scales, the narrative report below also provides percentile rank. A person with a standard score of 100 has a percentile rank of 50, meaning that about half the people taking the test scored higher on that scale, and about half scored lower. In this narrative report, percentile rank is given in the following format, "(PR=50)," immediately following each standard score that is reported. For example, "John's Auditory Vigilance Score of 80 (PR=9) fell in the mildly impaired range."

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. 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-AE2 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 making 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-AE2 TEST RESULTS

There are two separate validity checks for this test. First, during the Warm-up phase of the test, the individual must demonstrate comprehension of the test instructions by clicking correctly to simple visual and auditory test targets at least five 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 the Warm-up phase of this test, this individual made valid responses to both auditory and visual stimuli. The quotient scores and simple reaction times for these scales are provided in the Standard Scale Analysis. Since she was able to validly respond to both sensory modalities during the Warm-up phase, the examiner can interpret the Sensory/Motor validity test as showing that she 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 her responses to either visual or auditory test stimuli. The examiner can proceed in an interpretation of all visual and auditory test scores without reservation.

SUMMARY OF TEST RESULTS FOR THE IVA-AE2 GLOBAL SCALES

The Full Scale Response Control Quotient is a global measure of the overall ability for this individual to regulate her 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 her mental processing speed during the IVA-AE2 test. This individual's overall global quotient scale score for the **Full Scale Response Control** scale was 81 (PR=10). This score fell in the mildly impaired range. Her **Auditory Response Control** quotient scale score was 88 (PR=21). This global scale score fell in the slightly impaired range. The **Visual Response Control** quotient scale score for this individual was 77 (PR=7). This global scale score fell in the mildly to moderately impaired 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 70 (PR=2). This global scale score fell in the moderately to severely impaired range. Her **Auditory Attention** quotient scale score was

79 (PR=8), and this global scale score fell in the mildly to moderately impaired 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 Swiftiness. 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 75 (PR=4). This score fell in the moderately impaired range. Her global **Auditory Sustained Attention** quotient scale score was 85 (PR=16), and it fell in the slightly impaired range. The global **Visual Sustained Attention** quotient scale score for this individual was 71 (PR=3). This score was found to fall in the moderately to severely 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, Stillness, 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 83 (PR=14), which falls in the mildly impaired range. This individual showed some problems with her general auditory attentional functioning that is likely to occasionally impact her ability to perform successfully in some areas of her life. At times she was found to be inattentive to key auditory stimuli. Consequently, she is likely to demonstrate occasional problems in the work environment in maintaining her auditory attention and in her efforts to listen. Environmental stressors and social distractors may exacerbate her auditory attentional problems at times. She may also have "good and bad days" with respect to her attentional abilities. Further clarification is provided below regarding the specific problems she has with auditory attention and whether her difficulty functioning occurs specifically under high or low demand conditions. In some cases, relative strengths may be pointed out in auditory attentional functioning as well.

This individual's quotient score was 95 (PR=38) on the **Auditory Acuity** scale. This quotient score was in the average range. The Auditory Acuity scale showed a strength in her ability to pay attention under low demand conditions. In other words, this individual was able to maintain her attention and remain alert when the demand to perform was

relatively low. However, under high demand conditions, she showed significant problems in auditory attentional functioning that will need to be addressed.

This individual's **Auditory Elasticity** quotient scale score was 75 (PR=4). This quotient score fell in the moderately impaired range. This individual often failed to click under high demand conditions to the "5"s that immediately followed the non-targets. Her lapses in attention were found to occur immediately after being required to inhibit a response to the non-target. These problems in auditory attentional functioning indicated that she had difficulties in being able to quickly get "back on track." Cognitive training focusing on improving the speed of mental processing and mental flexibility may prove beneficial for her in correcting this "shift-set" deficit in auditory attentional functioning. An individual with these specific types of problems is likely to be easily distracted at times and may have problems with mental alertness, as well. Compensatory techniques to increase her awareness of her problems in maintaining and in accurately responding to changes in her environment need to be considered. In addition, cognitive training exercises to enhance attentional focus and response accuracy when the demand to perform is high are likely to benefit her. Medication may also need to be considered by the appropriate health professional in order to help her improve her auditory attentional functioning.

This individual's ability to attend under high demand conditions significantly differed from her ability to respond accurately to auditory targets under low demand conditions. This aspect of her attentional functioning applies specifically to the Auditory Vigilance scale. Her higher Auditory Acuity quotient scale score in comparison to the Auditory Elasticity quotient scale score indicated that she was relatively better in the accuracy of her responses to the auditory targets under low demand conditions. When the pace to perform was higher, she showed relatively greater difficulty shifting sets and responding accurately to the targets that immediately followed a non-target, as revealed by the impairment in her Auditory Elasticity quotient scale score. Thus, this individual is likely to have problems with respect to her auditory attentional functioning more often when she has to shift sets or under conditions that distract her. When the pace is slower, she showed the ability to attend relatively better and her response accuracy was higher. Individuals with this pattern are likely to benefit from accommodations that minimize auditory distractions in their environment and will generally do better if provided additional time to get work done, so that they do not feel pressured to perform.

This person's **Visual Vigilance** quotient scale score of 63 (PR=1) fell in the severely impaired range. Her general visual attentional functioning showed significant problems that are likely to have a major impact on her ability to perform successfully in many areas of her life. She was not able to sustain her visual attention during periods of the test. Unless she is engaged and the demand to perform is made evident to her, she is likely to have problems in the work environment in maintaining her visual attention. Further discussion on her specific problems with visual attention and whether there is any difference between her functioning on low and high demand conditions will be provided below.

She had a moderately to severely impaired **Visual Acuity** scale with a quotient score of 69 (PR=2). She had a moderate to severe impairment in her ability to pay attention to visual targets under low demand conditions. Unless actively engaged in the task at hand, she is likely to "tune out" when there is little demand to perform. Behavioral interventions may help keep her on task and make her more aware of "drifting off." Cognitive behavioral exercises may assist her in developing her ability to sustain her attention to routine tasks or work assignments that don't interest her. Referral to an appropriate health professional may be warranted for medication to help her improve her visual attentional functioning.

This individual's **Visual Elasticity** quotient scale score was severely impaired with a score of 67 (PR=1). She showed frequent problems with failing to click to the "3"s which immediately followed a "5" under high demand conditions. Her lapses in attention showed difficulty in her visual attentional functioning which impaired her ability to quickly get "back on track." Cognitive training that focuses on improving her speed of mental processing may be helpful for her. She is likely to be very easily distracted and report difficulty with mental alertness. Compensatory techniques need to be considered to increase her awareness of her problems with accurately responding to changes in her environment.

Significant impairment was found in her 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. She is likely to have problems paying attention to visual stimuli when the demand to perform is minimal. She also showed problems shifting sets and, thus, will generally show difficulty getting back "on track" when distracted by visual stimuli.

She was found to have strengths in both the auditory and visual domains with respect to her ability to remain vigilant. Consequently, she is not likely to lose her attention or make careless errors, even under demanding conditions. She has the potential to use her cognitive strength to perform well and be accurate and detailed in her work. These strengths are likely to enable her to function well in a variety of different learning environments.

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 77 (PR=7) fell in the mildly to moderately impaired range. It was a challenge for her to stay focused on the task at hand when it involved a repetitive auditory attention exercise. Her occasional lapses in auditory attention are likely, at times, to impair her ability to perform in demanding situations or when stressed. Her retention of information may also suffer when these lapses in auditory attentional functioning occur. At times this individual may be embarrassed in group situations due to episodes during which she "tunes out." Cognitive behavioral exercises are likely to help this individual to improve and focus her auditory attentional functioning. Other emotional and psychological factors may be contributing factors to her problems with auditory focus. If identified, these problems will need to be taken into consideration and addressed.

She showed a relative strength with respect to the **Auditory Dependability** scale. Her quotient score on this scale was 95 (PR=38), which falls in the average range. Thus, she was able to remain focused under low demand conditions when the pace to pay attention was less demanding. She may, though, be very challenged at times when the pace to perform is excessively demanding for her, as evidenced by the auditory attention problems that are discussed below. Her difficulties in functioning could easily manifest in terms of either withdrawn behavior, refusal to do work, irritability or feelings of frustration.

She was identified to have problems with respect to the **Auditory Stability** scale. Her quotient score on this scale was 71 (PR=3), which falls in the moderately to severely impaired range. These problems involved maintaining her processing speed reliably under

high demand conditions when the targets were prevalent. Thus, she showed variability in her responses when required to perform quickly. This pattern of responding indicates that she is likely to be erratic in her responses to auditory stimuli and make more errors when the demand for her to perform is high. Systematic cognitive training to improve her processing speed and reliability in responding is likely to be beneficial for her.

This person's **Visual Focus** quotient scale score of 72 (PR=3) fell in the moderately impaired range. This individual had problems staying focused to visual stimuli. These delays in processing visual test stimuli may have been due to deficits in her visual working memory or frequent momentary mental lapses. She would be expected to have some difficulty with processing written material due to lapses in her visual attention. She may have problems with visual memory to visual tasks especially if she finds the task to be repetitive or boring. She is also likely to make careless errors when making written responses or in interpreting and encoding information presented primarily in a visual format. These problems may lead to issues with self-esteem and self-confidence. Cognitive training exercises to train her speed, accuracy of visual processing and her ability to sustain her visual attention are likely to be of benefit to her. Based on her problems involving visual focus as well as other relevant factors, the appropriate health professional will need to evaluate her with respect to any potential benefit of medication.

She showed significantly greater problems in her variability of responding as evidenced by the **Visual Dependability** scale. Her Visual Dependability quotient scale score was 89 (PR=24), which falls in the slightly impaired range. She had some problems with maintaining her effort in her speed of responding to visual stimuli under low demand conditions where the targets are rare. Thus, this individual may be better able to make efforts and learn in the school and work environments, if the pace of instruction or presentation of new visual information is provided more slowly. Environmental modifications may help her stay more actively engaged in visual tasks. External reinforcement could also prove useful and will need to be considered as a way to stimulate her to be more resolute in sustaining her attention and perform more quickly. She may, though, be challenged at times by more routine tasks or tasks that are not boring to her. In these cases, the above modifications will need to be considered to help her.

She was identified to be moderately to severely impaired with respect to the **Visual Stability** scale which measures variability of response speed under high demand conditions when the targets were prevalent. Her quotient score on this scale was 69 (PR=2). Thus, she showed variability in her responses when required to perform quickly. She is likely to be erratic at times in her responses to visual stimuli and make more errors when the demand for her to perform is high. Cognitive training which is tailored towards improving processing speed and reliability in responding is likely to help her overcome this deficit in processing.

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-AE2, 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:

$$\text{RRT} = \text{PT} + \text{DT} + \text{MT}$$

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 her 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 105 (PR=62) falls in the average range. This individual did not show any problems with her overall auditory processing speed. Her recognition reaction time falls within the average range. Her processing speed shows that she is able to perceive quickly and respond adequately 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-AE2 scales may be contributory factors to any identified problems. Further clarification is provided below regarding other IVA-AE2 scales that may impact this individual's Auditory Speed.

This individual's **Auditory Quickness** quotient scale score of 107 (PR=69) falls in the average range. Her quotient score on the **Auditory Swiftness** scale was 97 (PR=42). This quotient score is interpreted as average. This individual's Auditory Quickness score is significantly higher than her Auditory Swiftness score. This indicates that she performed faster under high demand conditions (i.e., when the targets were frequent) as compared to low demand conditions (when the targets were rare). She was slower to a noticeable degree in her auditory processing speed under low demand conditions. She is likely to perform better in learning situations when the demand to perform is high and the tasks that she is required to do are engaging.

She had an average **Visual Speed** quotient scale score of 97 (PR=42). No problems were found with her overall visual processing speed. Her recognition reaction time falls within the average range. Her processing speed shows that she is able to perceive quickly and respond adequately to visual stimuli. 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-AE2 scales may also be contributory factors to any identified problems. Further clarification is provided below regarding other IVA-AE2 scales that may impact this individual's Visual Speed.

This individual's **Visual Quickness** quotient scale score of 97 (PR=42) falls in the average range. She had an average **Visual Swiftness** scale score of 106 (PR=66). For visual targets, she was significantly faster under low demand conditions, as reflected by her higher Visual Swiftness scale score in comparison to Visual Quickness. Her response speeds were much faster when the targets were infrequent than when the demand to

perform was high and she had to continually respond. Her ability to perform is likely to suffer when she is stressed or under pressure to work quickly. Instead, she is likely to do relatively better when visual information is presented to her more slowly; allowing her the time she needs to perform well.

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 her ability to inhibit responses to non-target auditory stimuli. Thus, she is able to control her responses and not be excessively distracted by auditory stimuli in her environment. She 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.

She did not demonstrate any problems with respect to the **Auditory Reliability** scale. Her quotient score on this scale was 98 (PR=46), which falls in the average range. Thus, she was able to avoid making impulsive idiopathic errors that would lead to careless or inappropriate responses in her 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 99 (PR=46) fell in the average range. No problems with inhibition to non-target visual stimuli were identified. This individual demonstrated an average ability to control her responses and inhibit appropriately to non-target visual stimuli. This score on the Prudence scale indicates that she is unlikely to be distracted by visual stimuli. She showed the ability to regulate and shift sets on the IVA-AE2 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 her **Visual Reliability** scale. The quotient score on this scale was 95 (PR=38), which falls in the average range. She was able to avoid making impulsive idiopathic errors that would lead to careless or inappropriate responses in her home and work environments.

Consistency

The Consistency scale is a general measure of an individual's ability to respond reliably based on her 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 her attention in order to produce responses that reflect stable, reliable, integrated brain functioning.

This individual was mildly to moderately impaired in her ability to be consistent in her responses to auditory stimuli. Her **Auditory Consistency** quotient scale score was 77 (PR=7). This individual will need to learn to ignore internal or external auditory distractions in order to improve her performance when sustained attention is required. Cognitive training exercises may help improve her 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 she can review the concepts and ideas presented in order to "fill in the gaps." Reinforcement of "double-checking" her work is also recommended in order to minimize careless errors.

This individual's ability to be consistent in her responses to visual stimuli was extremely impaired. The **Visual Consistency** quotient scale score for this individual was 58 (PR=1). This individual's response times to visual stimuli were significantly inconsistent, reflecting her problems processing visual information. These problems could potentially impact visual memory and make it difficult for her to learn new tasks in the work environment. Being able to review of visual instructional material given is likely to help her to comprehend better what is being presented. Visual distractions in the environment could result in poor performance and need to be minimized. Accommodations to slow down the pace at which visual information is presented may be necessary in order to help her master new material. She is likely to make careless visual errors. Consequently, she needs to be encouraged to review and check her work after completing it. Time needs to be allowed for this review period. Visual processing training using cognitive behavioral exercises is likely to enhance this individual's ability to process instructional material, to sustain her attention, and to improve her visual memory skills. Medication may need to be considered as an additional intervention that could help her be more reliable and consistent in her ability to process visual information.

Significant impairments were identified for both auditory and visual stimuli on the Consistency scale. These low scores for both sensory modalities are likely to lead to problems with careless errors, misperception and an impairment in processing and acquiring new information, along with memory deficits. Depending on the severity of this individual's deficits, her problems are likely to be compounded by her low scores for both the auditory and visual modalities, more so than if her functioning were only impaired in one modality. She may have problems sustaining her attention and responding in a consistent manner when asked questions verbally or given written tests in the work environment. Reasonable accommodations for this individual's visual and auditory problems described will need to be identified and considered. A comprehensive cognitive training program could prove highly beneficial. Given the severity of her deficits a referral to an appropriate health care professional will need to be considered to determine if medications could possibly help her.

Stamina

The Stamina scale is a measure of the individual's ability to sustain her 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 her 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 98 (PR=46) fell in the average range. This person's response time to auditory stimuli did not change significantly over the course of the test. She was able to maintain her mental processing speed in the auditory domain during the test. In a work setting, she is likely to be capable of meeting the demand to perform and to achieve goals in a timely manner. It would be rare for her not to get her work done unless other psychological or emotional factors are present that impair her functioning in other ways. Her work habits are likely to reflect the ability to persevere with respect to her auditory processing speed even when she is faced with challenging tasks.

She had an average **Visual Stamina** quotient scale score of 98 (PR=46). This person's response time to visual stimuli did not change significantly over the course of the test. She was able to maintain her mental processing speed in the visual domain during the test. In a work setting, she is likely to be capable of meeting the demand to perform and to achieve goals in a timely manner. In her work habits, she is likely to double her efforts and meet most demands even when she is faced with challenging visual tasks.

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. 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-AE2. 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-AE2, 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-AE2 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-AE2 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 she uses her 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-AE2 test results.

Spurious errors are also made by some IVA-AE2 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-AE2 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 94 (PR=34). Her score fell in the average range. She made 2 spontaneous responses while the instructions preceding the Warm-up and Practice sessions were being delivered. During the test, she held down the mouse button 20 times. She made 12 spurious errors. This type of error is defined as making a response with a reaction time less than 125 milliseconds. She clicked the mouse button one extra time during the main test.

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

The lack of problems shown on the Fine Motor Hyperactivity scale suggests that she 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 her ability to refrain from distracting others while they are working. However, she may possibly have problems related to gross motor hyperactivity that will be evident in social situations that may negatively impact her 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-AE2 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-AE2 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-AE2 test pattern design.

This individual's **Auditory Comprehension** quotient scale score of 82 (PR=12) fell in the mildly impaired range. Some problems with functioning and performing adequately on the IVA-AE2 test were found for the Comprehension scale. These difficulties led to a mild degree of idiopathic errors during the test. Her response pattern suggests that she has some problems related to comprehension that may possibly affect her.

Her **Auditory Steadiness** quotient scale score was 80 (PR=10). This quotient score fell in the mildly impaired range. Some problems with respect to the Auditory Steadiness scale were identified. This individual had some difficulty paying attention to auditory targets under high demand conditions, but she was generally able to stay on task when she was engaged and the demand to perform was high.

On the **Auditory Reliability** scale, she had a quotient score of 98 (PR=46). This quotient score was in the average range. She did not have problems with respect to the Auditory Reliability scale. This individual made very few idiopathic errors of commission. The score on this scale showed that she was not impulsive under low demand conditions and responded well to auditory stimuli, as measured by this scale.

This individual's **Visual Comprehension** quotient scale score of 58 (PR=1) fell in the extremely impaired range. Severe problems were identified for this individual with respect to the **Visual Comprehension scale**. She made a large number of idiopathic errors, showing significant trouble with test performance and difficulties in following the test rules.

Her **Visual Steadiness** quotient scale score was 55 (PR=1). This quotient score fell in the extremely impaired range. When the requirement to perform is high her ability to respond appropriately to visual stimuli was found to be significantly impaired. Her pattern of responding suggested a number of possible factors that could account for her poor visual functioning, including gross negligence, an attitude of indifference, or visual working memory deficits. Regardless of the causal factors, she failed to respond accurately to visual stimuli under high demand conditions. This degree of impairment suggests the need for her to be evaluated in order to determine whether this extreme deficit in Comprehension is due to one of these causal factors or to other psychological factors that impaired her functioning. In either case, her scale scores on both the Visual

Comprehension and Steadiness scales reveal major impairments involving visual attentional functioning.

She had a quotient score of 95 (PR=38) on the **Visual Reliability** scale. This quotient score was in the average range. No problems with respect to the Visual Reliability scale were identified for her. She made few impulsive idiopathic visual errors of commission. She responded well to visual stimuli under low demand test conditions and was careful not to make errors.

Stillness

The Stillness Quotient measures the number of times the individual does not move the mouse input device during the main test section. Holding the mouse still while making a test response will increase the number of instances that are counted as positive, correct behavior, for the Stillness scale. The Stillness scale is reflective of the percent of time that the test taker does not move the mouse. If an individual does not move the mouse at all then the Stillness raw score will equal 100%. And if the individual moves the mouse half the time during the test, then the Stillness raw score will be 50%. Lower quotient scores on this scale are considered as reflective of fidgetiness. A person who is fidgety and frequently moves the hand that holds the mouse when responding will score low on this scale. These response tendencies indicate restlessness. Generally, high incidences of this behavior are atypical for most adults. Quotient scores above the average range are considered reflective of better controlled and more self-regulated responses.

This person's **Stillness** quotient scale score was 109 (PR=73). Her score fell in the average range. She kept the mouse still 99% of the time during the main test.

This average quotient score for the Stillness scale indicates no significant problems with motoric self-control. She is likely to exhibit good fine motor control and not fidget when making responses to the test. She is unlikely to exhibit problems with fidgetiness in her home or work environment. It would be rare for this individual to have problems concentrating or getting her work done on time, unless other impairments in response control or attentional functioning are identified. She does not engage in fidgety behavior to any significant degree. Unless other attentional, cognitive or emotional problems exist, it is very likely that she can sit still, be quiet, and maintain her efforts toward accomplishing any assigned or self-chosen work. The lack of problems shown on the Stillness scale suggests that she is likely to be able to follow simple general rules and not demonstrate fidgetiness. In many cases, this average score on the Stillness scale is considered a positive indicator regarding her ability to refrain from distracting others while they are working. However, she may possibly have problems related to gross motor hyperactivity that will be evident in social situations and will impact her interactions with others. A high score on the Stillness scale does not by itself rule out the possibility of gross motor hyperactivity either during the test or in other environments.

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-AE2 scales. First, the mean simple reaction time of the five fastest trials is computed based on the Warm-up section of the IVA-AE2, selecting the five fastest reaction times. The mean reaction time of these five trials becomes the raw score for the Sensory/Motor scale. During the Warm-up test period, ten visual targets are presented, followed by ten auditory targets, and there are no foils presented during this period. 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. 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 five 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-AE2 test performance or relevance to life functioning.

This individual's **Auditory Sensory/Motor** quotient scale score of 110 (PR=76) fell in the above average range. This scale score was computed based on the mean of the five fastest reaction times of her auditory responses during the Warm-up test period. Her auditory simple reaction time was faster than most peers her age. This above average score on the Sensory/Motor scale indicates that she is likely to be able to process and respond quickly to auditory stimuli. Her quotient score on the Sensory/Motor scale did not reveal any problems with functioning that would impair her test performance or affect her in her life. Given that her Auditory Speed quotient score fell in the average range, she was not found to have difficulties related to her auditory recognition reaction time. These two aspects of her functioning indicate that she is able sustain her effort and to process information as quickly as or more quickly than others under both simple and demanding conditions. She 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 109 (PR=73) was in the average range. The mean of her five 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 her to be similar in performance to most other people her age. No significant difficulties were found on the Sensory/Motor scale for this person that would impair her test performance or affect her in her life. Given that her Visual Speed quotient score fell in the average range, she was not found to have problems related to her visual processing reaction time. These two aspects of her functioning indicate that she is able sustain her effort and to process information well under a variety of conditions. She demonstrated good overall mental processing speed in responding to visual test targets and is likely to be able to perform well in respect to her speed of processing on visual tasks in her daily activities.

IVA-AE2 CLINICAL INTERPRETATION

These test findings suggest that the examiner consider a possible diagnosis of **Attention-Deficit/Hyperactivity Disorder, predominantly inattentive presentation**. This individual's pattern of responding was indicative of impairments likely to impact her functioning in the home and work settings. The Parent Rating Scales identified a significant number of inattentive and hyperactive/impulsive symptoms. The IVA-AE2 test results, combined with the rating scale data, suggest that the clinician consider the possible alternative diagnosis of **Attention-Deficit/Hyperactivity Disorder, combined presentation**. In making this diagnosis, the examiner will need to assess the validity of the hyperactive/impulsive behaviors identified by the Parent Rating scales, because the IVA-AE2 test results did not show impairments in response control.

In addition, 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 she was a child, it is essential that the examiner clarify this individual's clinical history in order to make a definitive diagnosis.

Her global Attention quotient scale score fell in the moderately to severely impaired range. Her global Response Control quotient scale score indicated a mild impairment. However, she was not identified as making an excessive number of impulsive errors during the test. These IVA-AE2 findings provide support for the above possible diagnosis.

I have reviewed this interpretive report and have modified it as necessary in accordance with my comprehensive evaluation, the client's history and other relevant clinical data.

Signature John A. Smith, Ph.D.

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