

**IVA - Advanced Edition
Comprehensive ADHD Interpretive Report - Extended Test**

Prepared for Curly Sue on 6/20/2007

Test Date: 12/21/2004 **Test Time:** 10:40:00 AM **Age:** 24 years 7 months **Sex:** F **On Meds:** N

Diagnosis: **Group Code:** **ID Code:**

Medications:

Comment:

End Note:

OVERVIEW OF THE IVA-AE CPT AND GENERAL INTERPRETIVE GUIDELINES

The IVA-AE 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 click the mouse when the target stimulus is a visual "3" or an auditory "5" and to refrain from clicking when the stimulus is a visual "5" or an auditory "3." 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-AE 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-AE 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-AE 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-AE 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 report is designed to aid qualified professionals in evaluating auditory and visual attention. It is confidential and should be distributed in accordance with professional guidelines. The report provides possible suggestions and hypotheses for the examiner, but it is not to be construed as prescriptive, definitive or diagnostic. Only "working" diagnoses are indicated by the test results. A working diagnosis is defined as the first diagnosis that the clinician should consider, but it is by no means conclusive. The IVA-AE test does not make a diagnosis, but is designed to help the examiner to make a diagnosis. Given the complexity of ADHD symptoms and the limitations of a single test, this working diagnosis is inherently limited and may be incorrect. The clinician should review the report in the context of other information such as behavioral ratings of attention, behavior, social and educational background, emotional state, physical health, medication effects, recent environmental stressors, and data from other tests. As with all mental and performance tests, test conditions and inadequate motivation can significantly compromise a test's validity.

VALIDITY OF TEST RESULTS

This individual demonstrated sufficient understanding of the task for the test results to be considered valid in both the auditory and visual modalities for the Global and Primary scales. The Fine Motor Regulation Quotient and Comprehension scales are also considered valid. All of the IVA-AE Global and Primary scales will be included in the analysis and interpretation of these test results.

Also, both the Auditory and Visual Sensory/Motor quotient scale scores were identified to be valid. She responded sufficiently during the Warm-up period such that it was possible to calculate her simple reaction time for both auditory and visual stimuli. These scales will be discussed below.

The validity of the IVA-AE CPT is assessed by determining whether an individual's responses are characteristic of random responding. An individual may randomly respond for a number of reasons. For example, some individuals may forget the test rules as the test progresses. Other individuals may "give up" or have very low motivation to perform to the best of their abilities. It is also possible that individuals may fail to comprehend and remember the test rules fully or be cognitively incapable of performing the test task.

There are two validity checks for IVA-AE. Test responses to the auditory and visual stimuli are separately evaluated for their validity. In interpreting the test results, it is best if both sensory modalities are valid. However, it is possible to interpret an individual's test responses if she responds validly only in one sensory modality.

The validity check is based on a statistical calculation. The test is considered valid only when the individual's decision to click to targets and inhibit clicking to non-targets is based on self-directed responses in accordance with the test rules. Statistically, the test results for a specific sensory modality are considered invalid when the probability of the individual's response pattern being self-directed in accordance with the test rules is less than 1 in 1000.

IVA-AE DIAGNOSTIC INTERPRETIVE GUIDELINES

These test results do not support a working diagnosis of ADHD. No significant impairment was found in respect to this individual's overall response control, attentional functioning or ability to sustain her attention based on all the global IVA-AE quotient scale scores.

If the clinical history or other clinical data strongly indicate behavioral symptoms consistent with a working diagnosis of ADHD, then an examiner may decide to discount these test findings in making his or her clinical diagnostic decision. In this case, when the IVA-AE test results are incongruent with the other assessment data based on self-report, behavioral rating scale scores, clinical history, behavioral observations, general clinical impressions and/or other psychological test results available to the examiner, alternative diagnoses and/or causal factors that may impact self-control and attentional functioning will need to be considered. Even when the IVA-AE test data is not in agreement with the examiner's clinical judgment, the following review and discussion of the various scales that comprise the IVA-AE test may prove useful in clarifying factors that are likely to influence positively or negatively this individual's functioning in her life.

SUMMARY OF TEST RESULTS FOR THE IVA-AE 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-AE test.

This individual's overall global quotient scale score for the **Full Scale Response Control** scale was 111 (PR=76). This score fell in the above average range. Her **Auditory Response Control** quotient scale score was 107 (PR=69). This global scale score fell in the average range. This individual's **Visual Response Control** quotient scale score was 112 (PR=79). This global scale score fell in the above average range.

The Full Scale Attention Quotient provides a measure of an individual's overall ability to make accurate responses, stay focused and sustain her attention. This global scale's factors include the ability to be attentive and accurately respond under low demand conditions, remain focused and stay reliably "on task," and, at the same time, respond quickly when appropriate.

This individual's overall quotient score on the **Full Scale Attention** scale was 114 (PR=82). This global scale score fell in the above average range. Her **Auditory Attention** quotient scale score was 114 (PR=82) and this global scale score fell in the above average range. This individual's **Visual Attention** quotient scale score was 111 (PR=76). This global scale score was classified as falling in the above average 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 115 (PR=84). This score fell in the above average range. Her global **Auditory Sustained Attention** quotient scale score was 115 (PR=84) and it fell in the above average range. This individual's global **Visual Sustained Attention** quotient scale score was 112 (PR=79). This score was found to fall in the above average 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 relating to the Primary Response Control, Attention scales, and the Symptomatic scale called Comprehension. Also, a discussion is included in sections below for the three Symptomatic scales: Comprehension, Stillness and Sensory/Motor.

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 thus, 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 91 (PR=27) 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 105 (PR=62), 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/or 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 106 (PR=66) 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 positive 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-AE test which demonstrated self-control for visual stimuli when the environment frequently changes. If there are other functional problems with inhibition or self-control involving the visual sensory modality, emotional and/or psychological disorders, other than ADHD, may need to be considered.

She did not demonstrate any problems with respect to the **Visual Reliability** scale. Her quotient score on this scale was 112 (PR=79), which falls in the above average range. Thus, she was able to avoid making impulsive idiopathic errors that would lead to careless or inappropriate responses in her home or work environments. This individual is likely to be able to be accurate in detailed visual tasks and to remember and follow rules well.

This individual was found to have strengths in both auditory and visual sensory modalities of the Prudence scale in terms of her inhibition abilities. Given this profile, she is likely to be capable of inhibiting over-reactivity to both auditory and visual stimuli, and generally avoid making careless errors.

Consistency

The Consistency scale is a measure of an individual's ability to respond reliably based on her reaction time. Consistency is a Primary scale, and is considered an important measure in understanding and evaluating response control. It specifically excludes rare cases in which the individual drifts off or suffers a momentary attention lapse, unless these episodes are highly frequent. 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 superior in her ability to be consistent in her responses to auditory stimuli. Her **Auditory Consistency** quotient scale score was 127 (PR=96). This strength indicates the ability to sustain attention without being distracted by internal or external stimuli. This individual is likely to be able to use her working memory well. She is not prone to making careless errors, and is also likely to be able to "catch her own mistakes." Even when the pace becomes quick, she is generally able to keep up and grasp new concepts quickly.

Her ability to be consistent in her responses to visual stimuli was above average. The **Visual Consistency** quotient scale score for this individual was 115 (PR=84). Even under distracting conditions or when stressed, this individual is likely to be consistent in her 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 her written work and to identify any careless errors by herself. Due to her strengths in visual consistency, she is likely to more quickly grasp and retain new concepts presented in a visual format.

This individual was able to use her cognitive strength as shown on the Consistency scale in both the auditory and visual domains to make sustained and consistent responses to test stimuli. She is likely to be able to use this strength to help her compensate when stressed. This stability and strength in her functioning is likely to help facilitate her functioning in a wide variety of different learning environments.

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 94 (PR=34) 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. 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.

This person's **Visual Stamina** quotient scale score of 102 (PR=54) fell in the average range. 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. It would be rare for her not to get her work done, unless other psychological or emotional factors are present that impair her functioning. Her work habits are likely to reflect the ability to persevere with respect to her visual processing speed, even when she is faced with challenging tasks.

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

her work done quickly because of her strengths in stamina. She showed the ability to process and maintain her attention to both visual and auditory information over time.

Fine Motor Regulation

The Fine Motor Regulation 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 older individuals (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-AE. 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-AE, 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-AE 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-AE 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 Regulation 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-AE test results.

Spurious errors are also made by some IVA-AE test-takers. This type of error, which is only measured during the main test, 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 125ms. Extensive testing has shown that it is not possible for individuals to perceive and initiate their responses to the IVA-AE visual or auditory stimuli faster than 125ms. For most people, simple reaction time speed has been found to range between 200 and 600ms. Thus, clicking the mouse such that the reaction time speed is less than 125ms. would comprise an invalid, anticipatory, spurious response.

The most common type of fine motor hyperactivity error is an impulsive one and is due to the test-taker's making one or more additional clicks either to target or non-target stimuli during the main test.

This person's **Fine Motor Regulation** quotient scale score was 109 (PR=73). Her score fell in the average range. She made no spontaneous responses while the instructions preceding the Warm-up or Practice sessions were being delivered. During the test, she held down the mouse button 14 times. She made 3 spurious errors, defined as reaction times of less than 125 ms., which is faster than is possible. She did not click the mouse button more than once for any response during the main test.

This average quotient score for the Fine Motor Regulation scale indicates no significant problems in fine motor regulation. She is unlikely to exhibit problems with inappropriate off-task behavior 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 or impulsive behaviors to any significant degree. She may be reasonably tolerant of "boring" tasks. 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 Fine Motor Regulation 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 Regulation 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 Fine Motor Regulation scale does not by itself rule out the possibility of gross motor hyperactivity either during the test or in other environments.

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. Errors of omission occur when the individual fails to click to the target when the non-targets are frequent. Also, a failure to click to a target that immediately follows a non-target when the targets are frequent is labeled a propensity error of omission. In general, Vigilance provides a measure of a person's ability to maintain and make directed attentional efforts and appropriate responses to detailed, important stimuli in their environment.

This person's **Auditory Vigilance** quotient scale score was 108 (PR=69), which falls in the average range. This individual did not show any problems with her general auditory attentional functioning. She did not miss many key auditory stimuli. She 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/or 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 her auditory attentional functioning, as well as, any identified strengths in auditory attention.

This individual's quotient score was 99 (PR=46) on the **Auditory Acuity** scale. This quotient score was in the average range. The Auditory Acuity scale showed that she did not have any difficulty paying attention under low demand conditions.

This individual's **Auditory Elasticity** quotient scale score was 116 (PR=86). This quotient score fell in the above average range. The Auditory Elasticity scale showed that she did not have any difficulty being accurate and mentally flexible in her attentional functioning under high demand conditions.

This individual performed significantly differently under low demand conditions as compared to high demand conditions. This aspect of her attentional functioning applies specifically to the Auditory Vigilance scale. Her Auditory Elasticity quotient scale score was relatively higher than her Auditory Acuity quotient scale score which showed that under low demand conditions, she was significantly less accurate in her responses to the auditory test targets. Her auditory attentional ability appeared to be relatively weaker when she had to sustain her attention when targets were more infrequent. Thus, she showed in a relative strength in her ability shift sets and respond to the targets that immediately followed a non-target. Since her overall Auditory Vigilance score fell in the average range, this relative difference between Elasticity and Acuity is not likely to have much impact on her functioning in the home or work settings.

This person's **Visual Vigilance** quotient scale score of 112 (PR=79) fell in the above average range. This individual showed strength in her general visual attentional functioning in comparison to others of her age and gender. She rarely missed key visual stimuli. She is likely to exhibit better attentional functioning than most other people. Her ability to pay attention visually will probably help her in the work environment. If attention problems do exist, the impact of environmental stimuli and/or social distractions needs to be considered, or other emotional, cognitive or psychological causal factors may need to be explored. Further clarification is provided below regarding any variability or other identified strengths in her visual attentional functioning.

On the **Visual Acuity** scale, this person's quotient score was 106 (PR=66). This quotient score falls in the average range. The Visual Acuity scale showed that she did not have any difficulty paying attention under low demand conditions.

This individual's **Visual Elasticity** quotient scale score was 114 (PR=82), which falls in the above average range. The Visual Elasticity scale showed that, under high demand conditions, she remained accurate and mentally flexible in her visual attentional functioning.

This individual's visual performance was essentially the same under both the high and low demand conditions that comprise the Visual Vigilance scale. No significant difference was found between her Visual Elasticity and Visual Acuity quotient scale scores. Thus, her ability to respond accurately to

visual test targets was found to be relatively stable and consistent under both high and low demand conditions and was not affected by the frequency of the target presentation or whether targets were preceded by a non-target.

She was found to have strengths in both the auditory and visual domains with respect to her ability to remain vigilant. Thus, 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. These delays in response may occur due to momentary lapses in attention, confusion caused by deficits in working memory, episodic mental fatigue or gross problems in sustaining attention.

This individual's **Auditory Focus** quotient scale score of 117 (PR=86) fell in the above average range. She demonstrated a strength in her ability to stay focused to auditory stimuli during the test and not to be distracted by either internal thoughts or external auditory distractions. She is likely to be able to maintain her focus and utilize her working memory to accurately process verbal information better than most other people. Errors due to lapses in auditory attention are not likely to occur for her. In a demanding environment, she is likely to "rise to the occasion" and stay on track.

Her ability to respond reliably to auditory stimuli was evidenced by the **Auditory Dependability** scale. Her quotient score on this scale was 126 (PR=96), which falls in the superior range. Her response times to auditory stimuli did not significantly vary under low demand conditions. Thus, she was found to show the ability to be intrinsically motivated and perform adequately in most school or work environments specifically with respect to the reliability of her processing speed.

In respect to recognition reaction time, she was able to respond in a reliable manner as evidenced by the **Auditory Stability** scale. Her quotient score on this scale was 117 (PR=86), which falls in the above average range. She demonstrated the ability to maintain her speed of response to auditory stimuli well under high demand conditions. This ability is likely to help her in both the school and work environments with respect to processing auditory stimuli. When it is clear to her that she needs to perform quickly, she is more likely to do well.

This person's **Visual Focus** quotient scale score of 115 (PR=84) fell in the above average range. A strength was found for this individual in her ability to stay focused to visual stimuli during the test. This ability to maintain her focus reflects a potential strength in her visual working memory when she is required to encode and process complex visual stimuli. She was able to ignore both internal thoughts and external visual distractions in her environment. She is not likely to miss perceived visual details or to show

lapses in visual attention that would impair her functioning in performing relevant tasks. Even in a demanding environment, she is likely to perform well and not lose her visual focus.

Her ability to respond reliably to visual stimuli was evidenced by the **Visual Dependability** scale. Her score on this scale was average. Her response times to visual stimuli did not significantly vary under low demand conditions. Thus, she was found to show the ability to be intrinsically motivated and perform adequately in most school or work environments specifically with respect to the reliability of her processing speed.

In respect to recognition reaction time, she was able to respond in a reliable manner as evidenced by the **Visual Stability** scale. Her quotient score on this scale was 113 (PR=82), which falls in the above average range. She demonstrated the ability to maintain her speed of response to visual stimuli well under high demand conditions. This ability is likely to help her in both the school and work environments with respect to processing visual stimuli. When it is clear to her that she needs to perform quickly, she is more likely to do well.

She was found to have a strength in her ability to stay focused in both the auditory and visual domains. She is likely to maintain her concentration and to be reliable in her responses, even under demanding conditions. These cognitive strengths should help her to perform better in a variety of different learning situations.

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-AE, can be conceptualized as three separate brain functioning processes. Thus, 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 125ms or more either to the auditory or to the visual target. Spurious clicks exhibiting response times of less than 125ms 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:

$$RRT = PT + DT + MT$$

RRT is Recognition Reaction Time, PT is Perception Time, DT is Discriminatory/Decision Processing Time and MT is Motoric Reaction Time. PT is a measure of the time between the presentation of the stimulus and the individual's detection of that stimulus. DT 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 MT 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.

The Quickness scale is a measure of the mean recognition reaction time of correct responses when the targets are frequent and the demand to perform is high. When the targets are rare and the demand to perform is low, the mean recognition reaction time of correct responses forms the basis of the Swiftness scale. These two scales together complement each other and are components of the Speed scale. The Speed scale differs from Quickness and Swiftness in that it includes the mean recognition reaction for all correct responses.

This individual's **Auditory Speed** quotient scale score of 99 (PR=46) 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, and/or ability to finish work tasks in a timely manner, the impact of environmental stimuli, social distractions and/or emotional, cognitive or psychological problems will need to be evaluated and considered. Deficits that occur for other IVA-AE scales may also be contributory factors to any identified problems. Further clarification is provided below regarding other IVA-AE scales that may impact this individual's Auditory Speed.

This individual's **Auditory Quickness** quotient scale score of 98 (PR=46) falls in the average range. Her quotient score on the **Auditory Swiftness** scale was 101 (PR=54). This quotient score is interpreted as average. 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. She did not show any noticeable difference in her speed of responding to auditory stimuli under the two different test conditions. The interpretation of the Auditory Speed scale discussed above is applicable to her performance under both the high and low demand conditions.

This person's **Visual Speed** quotient scale score of 96 (PR=38) falls in the average range. This individual did not show any problems 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, and/or ability to finish work tasks in a timely manner, the impact of environmental stimuli, social distractions and/or emotional, cognitive or psychological problems will need to be evaluated and considered. Deficits that occur for other IVA-AE scales may also be contributory factors to any identified problems. Further clarification is provided below regarding other IVA-AE scales that may impact this individual's Visual Speed.

This individual's **Visual Quickness** quotient scale score of 94 (PR=34) falls in the average range. Her quotient score on the **Visual Swiftness** scale was 109 (PR=73). This quotient score is interpreted as average. Her score on the Visual Swiftness scale is significantly higher than her Visual Quickness score. This indicates that she performed faster under low demand conditions (i.e., when the non-targets were prevalent).

When the required pace to process visual test stimuli was slower, she was able to respond quicker than when the demand to perform was high. Consequently, this individual is less likely to respond well when pressured to perform. Instead, she is likely to do relatively better when visual information is presented to her slowly.

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

SYMPTOMATIC SCALES

Comprehension

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, thus, is useful in identifying factors that may impact performance and possibly reflect the test-taker's motivation toward taking and understanding the IVA-AE test. These errors occur when an individual clicks to a non-target or does not click to a target. These idiopathic errors are divided into separate auditory and visual scales. In designing the test, the test authors identified specific trials under both high and low demand conditions when these types of errors may occur. There are a number of possible causes for these errors.

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-AE 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 do not "load" in any way on the Comprehension scale. Comprehension errors may be described as "oddball" errors and are not specifically pulled for by the IVA-AE test pattern design.

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.

This individual's **Auditory Comprehension** quotient scale score of 112 (PR=79) fell in the above average range. Her high quotient score on the Auditory Comprehension scale reflects a strength in her ability to sustain her attention and to avoid making impulsive responses. In her life she is unlikely to make careless or impulsive errors, and she is very likely to be able to sustain her attention to demanding tasks and to "keep up the pace." Further discussion regarding her specific strengths and any relative differences between the Steadiness and Reliability scales is provided below.

Her **Auditory Steadiness** quotient scale score was 112 (PR=79). This quotient score fell in the above average range. A relative strength was found for this individual with respect to her ability to sustain attention extremely well under high demand conditions. This strength may enable her to compensate for any of her other attentional deficits.

On the **Auditory Reliability** scale, she had a quotient score of 105 (PR=62). This quotient score was in the average range. She did not have problems with respect to the Auditory Reliability scale. She did not make an excessive number of impulsive idiopathic errors of commission. She was not impulsive in this way and made few "oddball" responses to auditory stimuli under low demand conditions.

This person's **Visual Comprehension** quotient scale score of 108 (PR=69) fell in the average range. No major problems with functioning and performing adequately on the IVA-AE test were found for the Visual Comprehension scale. Overall, she performed well with respect to her ability to follow the test rules. She did not demonstrate any significant problems with respect to the Visual Comprehension scale that would impact her life. Further discussion regarding any relative weaknesses or strengths is presented below for the Steadiness and Reliability scales that comprise the Comprehension scale.

Her **Visual Steadiness** quotient scale score was 105 (PR=62). This quotient score fell in the average range. No significant problems with attention to visual stimuli under high demand conditions were identified. This individual understood the rule that required her to respond to visual targets, and she did this well.

On the **Visual Reliability** scale, she had a quotient score of 112 (PR=79). This quotient score was in the above average range. She did not demonstrate any problems with respect to the Visual Reliability scale. She did not make an excessive number of impulsive idiopathic errors of commission. She was not impulsive in this way and made few "oddball" responses to visual stimuli under low demand conditions.

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 is 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 108 (PR=69). 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 three Symptomatic scales and can be useful in identifying factors that may affect performance on other IVA-AE scales. The simple reaction time of the five fastest trials on the Warm-up section of the IVA-AE test is computed and becomes the raw score for the Sensory/Motor scale. During the Warm-up test period, twenty visual targets are presented, followed by twenty auditory targets. There are no foils presented during either of these two periods. Thus, the simple reaction time used as the raw score for the Sensory/Motor scale is theoretically based on PT (Perception Time) + MT (Motoric Reaction Time).

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 and/or Global Attention scale scores. In some rare cases, a very slow reaction time may indicate possible 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 the 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 (given that 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-AE test performance and/or life functioning.

This individual's **Auditory Sensory/Motor** quotient scale score of 85 (PR=16) fell in the slightly impaired range. Her auditory simple reaction time was slightly slower compared to her peers. Fatigue, psychological or emotional problems will need to be considered as possible causal factors for her slower auditory reaction time. However, based on her Auditory Sensory/Motor quotient score, her slow auditory reaction time is not considered to be a significant factor that would impact her auditory test performance or her functioning in life.

This person's **Visual Sensory/Motor** quotient scale score of 106 (PR=66) fell in the average range. Her visual simple reaction time showed her to be very similar to most of her peers. Her quotient score on the Sensory/Motor scale did not reveal any difficulties with functioning that would impair her test performance or affect her in her general life. Given that her Visual Speed quotient score fell in the average range, she was not found to have problems related to her recognition reaction time. These two aspects of her functioning indicate that she is able to sustain her effort and to process information acceptably under both simple and demanding conditions. She demonstrated good mental processing speed for visual stimuli on the test and is likely to be able to perform visual tasks well in life.

I have reviewed the findings of this automated IVA - Advanced Edition Interpretive report. Any changes in the interpretation, based on my clinical judgment, are noted above and initialed.

Signature: _____

Examiner's Name: _____
Please Print

Date: _____