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# Research Brief

## **Predicting Cognitive Processing Abilities Using Construction Tasks from a Neurologically Impaired Sample**

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# Predicting Cognitive Processing Abilities Using Construction Tasks from a Neurologically Impaired Sample

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## Objective

Recent research has identified an increasingly powerful link between psychiatric disorders, such as anxiety and depression, and impaired neurological functioning. For example, anxiety has been linked to abnormalities in the areas of the limbic system, specifically the amygdala and the hippocampus. However, there is a paucity of research regarding the cortical and subcortical sensory and motor functioning of patients with anxiety disorders. Sensory and motor functions are a crucial part of the neuropsychological examination, as even one error may be pathognomic or indicative of dysfunction.

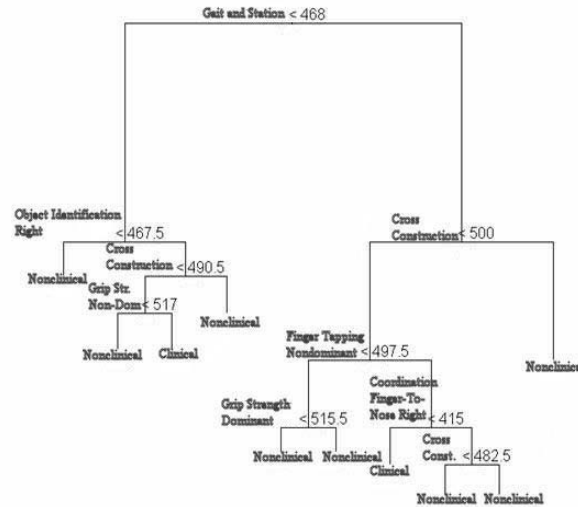
According to the *Diagnostic and Statistical Manual of Mental Disorders IV-TR* (APA, 2000), anxiety disorders are associated with a variety of problems and symptoms, such as difficulty concentrating, muscle tension, sleep disturbance, and impairment in social and occupational functioning. Changes in mood states can adversely affect cognitive and neuropsychological functioning and performance, such as during complex tasks with high information content, and can also affect balance, sensory information, and motor control (Bolmont, 2005).

Thus, it would not be surprising or unusual to find that individuals experiencing anxiety show impairment on measures designed to assess neuropsychological functioning, including sensory motor tasks. The purpose of this study was to investigate the extent to which sensory and motor skills can be used to determine placement in a clinical group.

## Data Selection

This study examined the sensory-motor performance of 146 individuals diagnosed with an anxiety disorder (mean age = 46.16 years, standard deviation = 21.1 years) and 950 normal individuals (mean age = 29.7 years, standard deviation = 21.3 years). All participants were administered the *Dean-Woodcock Sensory Motor Battery* (DWSMB), a comprehensive measure of sensory and motor functioning (Dean & Woodcock, 2003). Seven tests from the DWSMB were identified as being useful in differentiating individuals with and without anxiety. The resubstitution rate in this study was 90%.

## CART Results of Sensory and Motor Tasks



Note: W-scores less than cutoff score branch to the left

## References

- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders (4th ed.)*. Washington, D. C.: American Psychiatric Association.
- Bolmont, B. (2005). Role and Influence of Moods Including Anxiety on Motor Control. In In A. Clark (Ed.), *Causes, role and influence of mood states* (Ed). (pp.57-73). Hauppauge, NY, US: Nova Biomedical Books.
- Dean, R. S., & Woodcock, R. W. (2003). *Examiners manual: The Dean-Woodcock Neuropsychological Battery*. Itasca, IL: Riverside Publishing.

## Data Synthesis

Classification and Regression Tree Analysis (CART) is a statistical technique that uses a set of variables to differentiate subjects into clinically useful separation groups, which can be used to aid in clinical judgment in forming differential diagnoses. CART also develops a hierarchical tree that separates the disparate groups. A 10-node decision tree was found to be the most parsimonious and statistically powerful.

The primary separator variable was Gait and Station, which initially divided the sample into two major portions. Individuals with W-scores less than 468 on Gait and Station were differentiated into four distinct nodes. Object Identification Right and Cross Construction yielded predominantly non-clinical groups. However, individuals with W-scores greater than 490.5 on Cross Construction and less than 517 on Grip Strength Dominant were classified as predominantly clinical. Within this group, 87.5% of the individuals were classified correctly as experiencing anxiety.

Individuals with a W-score greater than 468 on the Gait and Station test were further subdivided depending on whether they received a W-score greater than 500 on the Cross Construction task. Individuals with a W-score greater than 500 on Cross Construction were classified in a predominantly non-clinical group (97.5% were correctly classified). Individuals with W-scores of less than 500 on Cross Construction were further divided into 5 groups. Individuals with a W-score less than 497.5 on the Finger Tapping Nondominant task were divided into two non-clinical groups. However, individuals with W-scores greater than 497.5 on Finger Tapping dominant but less than 415 on Coordination Finger-to-Nose were classified into a small (n=6) clinical group, all of which were correctly classified as experiencing anxiety.

## Conclusions

Sensory and motor variables were able to differentiate individuals with anxiety disorders from normal individuals using a clinically significant hierarchical decision tree. The primary separator variable was a subcortical motor task, Gait and Station. The CART analysis tree yielded two clinical groups. The first clinical group consisted of individuals with low W-scores on Gait and Station, Object Identification Right, and Cross Construction, but a W-score higher than 517 on Grip Strength Dominant. 87.5% of individuals within this group were classified correctly. Thus, individuals with high anxiety may perform poorer on some sensory motor tasks but seem to maintain upper extremity motor functioning. Individuals in the other clinical group had higher W-scores on Gait and Station and Finger Tapping Nondominant but lower scores on Cross Construction and Coordination Finger-to-Nose, which tend to require greater levels of concentration and thought. Individuals experiencing anxiety may not show impairment in simple walking or motor tasks, but impairment may be more apparent in tasks requiring a higher degree of focus and concentration.