THE PASS THEORY OF COGNITIVE PROCESSING

By

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ABSTRACT

Traditional IQ technology, crystallized by the seminal work of Binet and Wechsler as well as others, has played a critical and profound role in psychology, making intelligence testing among the most important contributions psychology has made to society (Anastasi & Urbina, 1997). But this technology has limits; it has not had the advantage of increased understanding of specific human abilities. There has been a significant movement toward measuring specific abilities as alternatives to traditional IQ tests (Naglieri, 1997). This new breeds of tests include the CAS (Naglieri & Das, 1997), Differential Ability scales (DAS; Elliott, 1990),Kaufman Adolescent and Adult Intelligence Test (KAIT; Kaufman & Kaufman,1993), K-ABC (Kaufman & Kaufman,1983), and Woodcock-Johnson Revised Test of Cognitive Ability (WJ-R; Woodcock and Johnson,1989). The authors of these tests have made efforts to modernize the traditional IQ test technology that has dominated most of the 20th century. This paper discusses about the IQ tests, history and its evolution. The latter half focuses on Cognitive Assessment System which is based on PASS theory of cognitive processing and its educational Implications.

Keywords: PASS-Planning, Attention and Simultaneous and Successive Processing CAS- Cognitive Assessment System, Cognitive Processing.

INTRODUCTION

Individuals differ from one another in their ability to understand complex ideas, to adapt effectively to the environment, to learn from experience, to engage in various forms of reasoning, to overcome obstacles by taking thought. Although these individual differences can be substantial, they are never entirely consistent. A given person's intellectual performance will vary on different occasions, in different domains, as judged by different criteria. Concepts of "intelligence" are attempts to clarify and organize this complex set of phenomena. Although considerable clarity has been achieved in some areas, no such conceptualization has yet answered all the important questions and none commands universal assent. According to David Wechsler Intelligence is the aggregate or global capacity of the individual to act purposefully, to think rationally, and to deal effectively with his environment. Intelligence is always measured using IQ tests. There has been a considerable change in IQ testing from the earlier half of the 20th century to the later half.

Wechsler and Binet scales defined the construct of intelligence ever since they were developed in the early part of the 20th century, as they provided structured and useful methods by which to evaluate children and adults. The Wechsler and Binet tests have been applied in virtually all areas of psychology especially in clinical, developmental, educational and industrial areas. Although the Wechsler and Binet tests are widely used and the most well known measures of intelligence , they have one essential limitation-they represent a technology that has not changed since Binet and Simon introduced their first scale in 1905 and Wechsler published his first test in1939.The Fourth Edition of the Stanford Binet and the latest revisions of the Wechsler scales(WAIS-Third edition;Wechsler,1997) are essentially the same as their respective early versions despite cosmetic modifications and improved standardization samples.

The content of these tests became solidified at the early stages of IQ test development, mainly because of the profound impact of the work of Alfred Binet. Following Binet and Simon's 30 item scale published in 1905, they further refined their tests, resulting in several versions of the Binet-

Simon scale. The Army mental testing programme also relied heavily on the work of Binet for the examination of large number of adults entering the military service during the World War I. Perhaps the most important utilization of common professional or scientific pool of techniques for individual IQ tests occurred when David Wechsler adapted the group and individual tests utilized by the Army into single measure which became the Wechsler–Bellevue Intelligence scale (Wechsler,1939).Wechsler incorporated tests such as object assembly, Maze test, Digit symbol, Picture arrangement and completion. Since the initial formulation of Wechsler and Binet scales there has been consolidation of thinking that intelligence is what these tests measure. Their similarity of content, and the way each is used demonstrate the validity of the other, reinforce the view that intelligence is best measured by the tests that have been in existence for about 100 years.

During the latter half of the 20th century considerable research has been done on the construct of intelligence. In particular there has been much examination of specific abilities that extend beyond the concept of general undifferentiated intelligence. In 1960's a growing number of cognitive theorists studied neuropsychology, neuroscience and higher mental processes described as the cognitive revolution (Miller, Galanter, Pribram, 1960), had a substantial influence in theoretical and applied psychology. The impact of cognitive revolution was first felt with the publication of Kaufman Assessment Battery for children (Kaufman & Kaufman, 1983) and more recently with the publication of CAS (Cognitive Assessment System) in 1997.

Theoretical Foundation of CAS

The development of CAS is based on PASS theory of intelligence. The PASS (Planning, Attention, Simultaneous and Successive) theory is based on neuropsychological, information processing and cognitive psychological research of A.R. Luria (1966, 1973, 1980, and 1982). This theory proposes that Planning, Attention, Simultaneous and Successive processes are the basic building blocks of human intellectual functioning. These four processes are interrelated and interact with an individual's base of knowledge.

The PASS model covers four kinds of competencies that are associated with areas of the brain.

- The Planning processes involve decision making, problem solving, and performing activities and requires goal setting and self-monitoring.
- The Attention/Arousal component involves selectively attending to a particular stimulus, ignoring distractions, and maintaining vigilance.
- Simultaneous processing involves the integration of stimuli into a group and requires the observation of relationships.
- Successive processing involves the integration of stimuli into serial order.

The Planning and Attention/Arousal components come from structures located in the frontal lobe of the brain, and the Simultaneous and Successive processes come from structures located in the posterior region of the cortex. The four PASS processes are interrelated abilities that function in a combined way. Effective functioning is accomplished through the integration of Planning, Attention, Simultaneous and successive processes as well as, a base of knowledge as demanded by the task.

Cognitive Assessment System

CAS is an individually administered battery measuring Planning, Attention, Simultaneous and Successive processes via 14 subtests - planned search, matching numbers, planned codes, planned connections, figure memory, matrices, etc. CAS is based on the following assumptions -

- A test of intelligence should be based on a theory of ability.
- A theory of ability should be based on the view that intelligence is best described as cognitive processes, and the term cognitive processes should replace the term intelligence.
- A cognitive process should inform the user about those specific abilities that are related to academic and job successes and difficulties, have relevance to differential diagnosis, and provide guidance to the selection and/or development of effective programming for intervention.

- A theory of cognitive functioning should be firmly based on a sizable research base and should have been proposed, tested, modified, and shown to have several kinds of validity.
- A test of cognitive processing should follow closely from the theory of cognition on which it is based.
- A test of cognitive processing should evaluate an individual through items that are as free from acquired knowledge as possible.

Development of CAS subtests by Das and his Colleagues was accomplished by following an experimental sequence involving item generation, data analysis, test revision, re-examination until the instructions; items and other dimensions were refined. The CAS planning subtest requires the child to consider how to solve each item, create a plan of action, apply the plan, verify the action taken conforms to the original goal, and modify the plan as needed. These subtests are relatively easy to perform but require the individual to make decisions about how to solve novel tasks.

The simultaneous processing scale requires the synthesis of separate elements into an interrelated group. The subtests use variety of contents-verbal, non verbal and some involve memory. The attention subtest requires the focus of cognitive activity, detection of a particular stimulus, and inhibition of responses to competing stimuli. These require subjects to look into the features of stimuli and a decision to respond to one and not respond to the other. The successive processing subtests involve the repetition or comprehension of the serial organization of events. All the successive subtests require the individual to deal with information that is presented in a specific order and for which the order drives the meaning.

Some Reviews

Literature reviews in this area strongly suggest that CAS can be an alternative for the measurement of intelligence. Jack A. Naglieri etal(1993) in their study on "Confirmatory Factor Analysis of the Planning, Attention, Simultaneous, Successive (PASS) Cognitive Processing Model for a Kindergarten Sample" examined the relationships among experimental tasks developed by Das and Naglieri (1988) to measure Planning, Attention, Simultaneous, and Successive (PASS) cognitive processing and other tests that theoretically fit within the model of intelligence. Luria's theoretical model was examined by Lisrel confirmatory factor analysis to examine the congruence between the variables and the PASS model for kindergarten-aged normal males and females. The results demonstrated that the PASS model is a sound conceptualization of the relationships that underlie the tasks in this study. These results support other confirmatory factorial studies that have found the PASS model to be a viable alternative model of cognitive functioning.

Daley etal(1997) in their study "PASS model processes of children with Emotional Disability" examined the cognitive styles of 40 children (ages 8-17) with serious emotional disturbances (SED) were investigated via their performance on PASS model tasks as represented by the Das- Naggleri CAS. In this study children with SED and 40 typical children were administered the 14 subtests of the CAS standardized Edition. The two groups were matched according to age, race and sex. Findings revealed significant differences between the two groups, in favour of controls, across the four PASS model scales and 12 of the 14 CAS subtests, which demonstrated that the children with SED has consistent cognitive weaknesses relative to the controls. Cluster analysis of the performance of children with SED yielded a two profile solution which suggested the presence of a subgroup that was higher functioning and had attention disorders, and a lower functioning, more disturbed subgroup. Overall results from the study indicate that the CAS appears to provide alternative to the traditional assessment measure in acquiring a better understanding of the cognitive characteristics of children with SED, the nature of their abilities and disabilities and appropriate strategies for the students' academic remediation.

Naglieri, Jack A etal(1989) conducted a study titled "An Exploratory Study of Planning, Attention, Simultaneous, and Successive Cognitive Processes" Examined factorial validity of tasks designed to measure cognitive processing in each of Luria's three functional units. Fourth and fifth graders (N=112) were administered nine experimental tasks chosen or developed according to theoretical

components of planning, attention, simultaneous, and successive processes. Results obtained were in general support for feasibility of measurement of Luria's cognitive processing model.

Johnson A. Judy (2003) in his study "Discriminant Validity of the Cognitive Assessment System for Students with Written Expression Disabilities" explored the PASS cognitive processing theory in junior high students (aged 11-15 years) with and without written expression disabilities. Ninety-six students with (n = 48) and without (n = 48) written expression disabilities were administered the Das-Naglieri: Cognitive Assessment System (DN:CAS; 1997) and the writing subtests of the Wechsler Individual Achievement Test (WIAT; 1992). Discriminant analyses were utilized to identify the DN:CAS subtests and composites that contributed to group differentiation. The Planning composite was found to be the most significant contributor among the four composite scores. Subsequent efficiency of classification analyses provided strong support for the validity of the obtained discriminant functions in that the four DN:CAS composite scale scores correctly identified 83% of the students as members of their respective groups.

Educational Implications

The CAS mainly finds its application in the Special Education field. It has the following educational implications

- PASS scale represent a child's cognitive functioning and are used in identification of specific strengths and weaknesses in cognitive processing;
- Knowing children's cognitive performance can lead to diagnosis and early intervention;
- It focuses mainly on a child's ability in performing a task ` namely –planning the task, paying attention to it, which lead to simultaneous and successive processing of information to bring out the result;
- CAS can be used to draw out the ability and achievement comparison in children;
- It can be used as individualized assessment tool used in determination of discrepancies, eligibility, reevaluation and instructional planning.
- It can be used in identification of Learning disabled, hyperactive and attention deficit children.

Conclusion

PASS theory has been offered as an alternative to general intelligence, and is based on a description of neuropsychological processes. A unidimensional model with just intelligence fails to assist researchers and clinicians who study learning disabilities, disorders of attention, mental retardation, and interventions designed for special populations who face lot of challenges.

To summarize, although in its infancy, the CAS appears to provide a promising alternative to traditional assessment measures in acquiring better understanding of the cognitive characteristics of children, the nature of their abilities and disabilities and appropriate strategies for their remediation.

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