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ABSTRACT

At present, there are no formal tests to assess adequately the ways in which a child processes information. Furthermore, scores on current measures cannot be directly interpreted, with few exceptions, as direct measures of cognitive processes, and results are difficult to translate directly into remediation goals or instructional objectives. Testing-the-limits is suggested as a means to establish methods a child uses to solve a problem, providing insight about a child's metacognition. In testing-the-limits, the examiner: (1) provides additional clues; (2) changes modality; (3) establishes methods used by the examinee; (4) eliminates time limits; and (5) asks probing questions. The technique is also useful in finding the child's zone of proximal development (degree of competence that can be achieved with aid). Such information can help psychologists provide more relevant instructional strategies for children. (Contains 15 references.) (Author/SLD)

# Testing the Limits: Tool for Assessing Metacognitive Skills and the Zone of Proximal Development

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Running Head: Testing The Limits

Abstract

At the present time, we do not have formal tests to adequately assess ways in which a child processes information. Furthermore, scores on current measures cannot be directly interpreted, with few exceptions, as direct measures of cognitive processes, and results are difficult to translate directly into remediation goals or instructional objectives. Testing-the-limits is suggested as a means to establish methods a child uses to solve a problem and thus provides insight about a child's metacognition. The technique is also useful in finding the child's zone of proximal development (degree of competence that can be achieved with aid). Such information can help psychologists provide more relevant instructional strategies for children.

Testing the Limits: Tool For Assessing metacognitive Skills

and the Zone of Proximal Development

## Introduction

The thesis offered is not new as it is based on the theories of information processing psychologists such as Campione & Brown, (1978); Flavel, (1985); and Sternberg & Davidson, (1983) which have been in the literature for almost two decades and are now gaining increasing momentum.

The definition of intelligence according to these psychologists is that it is a set of developed thinking and learning skills used in academic and every day problem solving (Sternberg, 1981). According to Sternberg, the way to go about assessing true ability is to put emphasis on the process and not the product. For example, during testing of a bright, preschool four-year-old, with the Stanford-Binet Form LM (1960) several years ago, a question requiring the child to divide 18 pennies among three boys was asked. The child could not yet divide, but spotting a bag of candy, he emptied the contents on the table, counted 18 pieces and divided them into three piles. While counting the number in one of the piles, his immature eye hand coordination caused him to err and he said the answer was seven. In the product oriented mode of testing, the answer would of course, have to be counted wrong, and in fact, the process the child used would never have come to light because the problem must be solved mentally in order to adhere to standardized procedure. But surely, the process the child used is far more valuable information to have about his ability. At the present time, we have no tests to adequately assess a child's information processing skills and according to Reschley and Grimes (1990), there are no current IQ tests which directly assess any of the cognitive processes. Furthermore, they assert scores on current measures are virtually impossible to translate directly into remediation goals or instructional objectives. They represent the products rather than the process whereby individuals recall information, explain concepts, or solve problems (Reschley & Grimes, 1990). But if we wish to assess and understand the information processing bases of intelligent performance, then research

on instrumentation will have to move in the direction of process measurement rather than in the direction of refining the instruments we now have (Sternberg, 1981).

## Testing-the-Limits

In the meantime, testing-the-limits is one way which holds promise for being able to tap a child's information processing skills. In testing-the-limits, the examiner:

1) provides additional clues
2) changes modality
3) establishes methods used by the examinee
4) eliminates time limits and
5) asks probing questions (Sattler, 1988).

## Testing The Limits and Metacognitive Skills

Learning about how a child processes information through testing the limits puts the examiner in touch with the child's metacognitive skills. Metacognition is being aware of how one thinks or how one goes about using information more effectively; sometimes called the executive function of the brain (Flavell, 1976). It involves:

1. Selecting and understanding appropriate strategy
    - Focusing attention on what is needed
    - Relating what is known to material to be learned
    - Testing the correctness of a strategy
2. Monitoring Task Performance
    - Keeping place sequence
    - Detecting and correcting errors
    - Pacing of work

(Brown, 1978, Brown & Campione, 1980, Flavell & Wellman, 1977)

Asking a child how he went about solving a problem is the next best thing to getting inside his or her head. For example, a child's approach to Digit Span can help determine if he is chunking the numbers, using auditory rehearsal, imagery, or his kinesthetic sense (tracing on the desk) to

aid in recall. Another application of tapping metacognitive skills to make more efficient learners occurs in Cross Out, one of the tests for Processing Speed in the Woodcock-Johnson Tests of Cognitive Ability (1989). In Cross Out, the child marks the five drawings in a row of 20 drawings that are identical to the first drawing in the row. The time limit to complete as many rows as possible is three minutes. Less efficient learners, check each drawing in the row with the stimulus drawing. More efficient learners remember what the stimulus drawing looks like, cross off each like drawing, then count the number that have been crossed off to see if they add up to five. The most efficient learners remember what the stimulus picture looks like and count as they cross off. Other tests of Processing Speed are Coding and Symbol Search on the WISC-III (1991), and Visual Matching on the WJ-R. Although they appear to be simply tests of clerical speed requiring scanning and comparing visual information quickly, they are also related to symbol-processing problems and the ability to sustain concentrated attention. According to Woodcock (1990), processing information quickly allows attentional resources to be switched rapidly and to be used for incoming information from various sources. When information is processed quickly, the mind is often able to handle more information and thus develop larger stores of information over time. Processing Speed is an important component of reading, math, and written language aptitude. Performance on these types of tasks can be improved through helpful tips on more efficient scanning techniques after determining how the child approaches the task.

## Testing The Limits and The Zone of Proximal Development

In addition, testing-the-limits provides clues to ascertaining a child's zone of proximal development (Vygotsky, 1978) or potential development (Luria, 1961) which assesses learning potential based on graded feedback given to the child being tested in order to help him/her arrive at a solution to a problem. A distinction is made between a child's development as measured on a standardized test, and his level of potential development, the level which can be achieved with help. For example: A typical testing session would consist of the initial presentation of a test item exactly as it would occur on an IQ test with the child being asked to solve the problem independently. If s/he fails to reach the correct solution, clues are progressively added until

solution and the amount of additional information needed to solve the problem is assessed. The amount of help needed for a child to solve the problem is an indication of the width of his potential zone (Brown & French, 1979).

Although Vygotsky's theory has not been quantified nor has a test been developed which measures what he proposes, some miniature learning subtests which provide graded feedback are presently found in use on the WJ-R Cognitive Battery. They are Memory for Names and Visual-Auditory Learning

## Application to Instructional Strategies

Strategic learners 1) are actively involved in what they are learning and 2) are able to access a wide range of strategies which they can select appropriately. Nonstrategic learners on the other hand, are 1) passive, 2) dependent, 3) lack knowledge of strategies, and tend to use the same strategies over and over again whether they are successful or not. The child should be made aware of what s/he is doing and how s/he is doing it. There should be no distraction by other inputs which might compete for attention. Someone should model the skill and use frequent feedback correction. Time should be taken to discuss what one did while engaged in the skill and the learner should have opportunities to practice it in contexts other than that in which the skill was introduced.

The most important advantage of the information processing theory of learning is that the information acquired about the child's potential to learn and the way s/he learns has almost direct application to effective ways to instruct the child. These information strategies include 1) encouraging self-communication, self cueing, and self-questioning; 2) providing experiences and discussions that are concerned with the thinking process and not with the amount of material to be covered; 3) giving students time to "double think" their answers by waiting five seconds instead of the usual one and one-half seconds for a response.

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