Analysis of Information Processing and Cognitive Disability Theory

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Key Words: problem solving • psychiatry • psychometrics

This study used the information-processing approach to conceptualize planning and problem-solving abilities and to expand the theoretical and empirical data base of Claudia Allen’s cognitive disability model. The congruent validity of the Allen Cognitive Levels (ACL) test as a measure of cognition, specifically of the fluid information-processing abilities that underlie learning, was investigated. Criterion measures used were subtests of the Wechsler Adult Intelligence Scale—Revised edition (WAIS-R). Forty adult psychiatric patients participated in the study. Spearman r coefficients showed moderately high correlations between the ACL test and the WAIS-R subtests measuring fluid abilities, and Performance scale IQ. These results indicate that Allen’s model and test can be useful in guiding occupational therapy planning when expected outcomes depend on the patient’s learning potential.

Patients hospitalized with psychiatric disorders usually exhibit changes in their performance compared with their premorbid levels of function. The occupational therapist’s task includes assessing performance, competency, and potential for community adjustment. To complete this task, instruments that measure known skill components and classify the level of disability are needed.

The primary purpose of this study was to investigate the congruent validity of the Allen Cognitive Levels (ACL) test by correlating psychiatric inpatients’ ACL scores with scores on the Wechsler Adult Intelligence Scale—Revised edition (WAIS-R) (Wechsler, 1981). A secondary purpose was to use the information-processing paradigm to explain cognitive disability. The domain of concern of this paradigm is the way man collects, stores, modifies, and interprets environmental information or information already stored internally . . . how he adds information to his permanent knowledge of the world, how he accesses it again, and how he uses his knowledge in every facet of human activity (Lachman, Lachman, & Butterfield, 1979, p. 6).

Information processing was operationally defined in this study by means of the WAIS-R, a psychometric device that infers the level and pattern of intelligent, adaptive behavior through the measurement of various abilities. Adaptive behavior is considered to comprise fluid and crystallized abilities, which are correlated and used to determine general ability (Horn & Cattell, 1966). Fluid abilities, or perceptual-integrative skills, are “dependent on the neural-physiological intactness and efficiency of the brain” (Maloney & Ward, 1976, p. 82) and subsume information-processing functions such as attention, perception, flexibility, and problem solving. Crystallized abilities are dependent on previous training, education, and acculturation (e.g., vocabulary).

The WAIS-R Performance and Verbal scales have been associated with fluid and crystallized abilities, respectively (Cattell, 1963, 1968). Differences in Performance and Verbal IQ indicate discrepancies in fluid and crystallized abilities rather than in verbal and nonverbal thinking (Kaufman, 1979).

This study specifically investigated the correlation between the ACL test and standard WAIS-R Performance scale subtests to test the hypothesis that the ACL test measures fluid abilities, and thus can be used as an indicator of adaptation.

Theoretical Framework of the Study

Allen’s Cognitive Disability Model

Claudia Allen’s (1985) model represents an information-processing and neuroscientific perspective of the etiology of the disability accompanying psychiatric

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illness. Allen viewed the brain as an information-processing system and defined cognitive levels by qualitative differences in input (sensory cues that capture and sustain attention), output (resultant voluntary motor actions), and throughput (the sensorimotor association formed in the brain between the sensory cue and motor action).

The ACL test measures the functional limitations associated with major mental disease (Allen, 1985). The test score indicates the patient’s cognitive level. The cognitive levels form a functional classification system, hierarchically arranged with the levels representing increasing ability to attend to and use the available task environment. The levels delineate behaviors ranging from gravely disabled to normal.

Since Allen’s (1976) heuristic study of the patterns of performance displayed by psychiatric patients recovering from psychosis, several researchers have attempted to describe the complex relationship between psychiatric disease states and their social and functional sequelae. Allen (1985) summarized this work, along with studies investigating the validity and reliability of the cognitive levels for selected diagnostic groups.

To date, greater emphasis has been placed on developmental analysis rather than on information-processing analysis of the cognitive levels. Katz’s (1979) study of cognition in depressed patients established congruent validity between the ACL and WAIS Block Design tests. However, because this study preceded the recent theoretical refinements of the model, Katz did not use an information-processing framework.

Information-Processing Theory
The information-processing approach grew largely from research in the areas of attention, perception, memory, problem solving, and concept formation. In developing a theory of human problem solving, Newell, Shaw, and Simon (1958) proposed the term “system for information-processing” (p. 163). Newell et al. conceived of intelligence as problem-solving ability based on strategies for processing information within the intrinsic cerebral systems that have been established in the course of previous experience. They assumed that an organism consists of receptors, which take in information in coded form; of effectors, which engage in action; and of a control system joining these. This control system consists of condition-action sequences. If a certain condition is met, then a certain action is performed (i.e., if A, do B). These sequences, called production systems, underlie planning and problem-solving behavior.

Planning and problem-solving behavior use the general cognitive system. Planning occurs when sequences are executed in order to achieve a desired outcome. Anderson (1983) defined planning in the following way:

The system sets forth a sequence of intended actions, notes a conflict in the sequence, and reorganizes it. If it can be shown that a system reorders a preferred sequence of actions in anticipation of goal conflict, then that system is engaged in planning. Two demands are placed on the system to permit successful planning. First is the architectural feature of being able to span forth a goal structure without acting upon it. Second, working memory has to be reliable enough to maintain the goal structure for operation. If these two preconditions are satisfied, it is possible to operate on the plan. (p. 167)

Problem solving is defined as using a set of operations to transform an initial state into a goal state. Problem-solving behavior involves the interaction between the information-processing system (the problem solver), the task environment, and the problem space. The problem space is the problem solver’s representation of the situation, that is, his or her perception of the task environment. Greeno (1972) proposed that the relative ease of solving a problem depends on how successful the solver has been in representing critical features of the task environment in the problem space. The structure of the problem space, in turn, determines the operations to be used. Several problem spaces may be involved in the representation and solution of a problem, evolving as operations are executed, with the solver working back and forth between these problem spaces.

Planning continues throughout the problem-solving process. The stages of this process are summarized by Cohen (1983):

Representation of the problem involves representing both the initial state and the goal state, understanding the instructions and constraints on the problem, retrieving relevant information from long-term memory, or gathering additional information about the task.

Selection of operators involves selecting the operations for transforming the initial state; the selection of operators requires a heuristic search. A common heuristic for the selection of operators is means-end analysis. The search system finds differences between the current state and the goal state and selects the operators which will reduce these differences. A strategy or plan is needed that guides selection of operations to avoid a haphazard, e.g., trial and error approach to solving a problem.

Implementation of the selected operators results in a new current state which may or may not correspond with the goal state. In some problems, the solution is reached in a single step, in others a series of operations is required.

Evaluation of the current state. If this is judged to correspond to the goal, a solution is reached, and the solving process terminates. If not, further transformation operations must be selected and implemented. (pp. 160–161)

Allen’s Six Cognitive Levels
Allen’s (1985) view that patterns of thought used to guide behavior are evident in patterns of performance is congruent with information-processing and psy-
chometric approaches. Her six cognitive levels indicate differences in patterns of performance, presumably due to differences in information-processing abilities.

Cognitive Level 6 (Symbolic Actions) theoretically describes the absence of disability. At this level, symbolic cues are used to plan action sequences and anticipate errors. In contrast, at all other levels, adequate visuospatial conceptualization and planning are dependent on external structures, visuomotor activity, or both.

At Cognitive Level 5 (Exploratory Actions), patients spontaneously attempt planning and problem solving. However, these patients seem not to consider the consequences of their actions before they act. Actions are basically stimulus driven, although much less so than at the lower cognitive levels. The neuro-psychological literature identifies levels of performance associated with various brain states that appear parallel to Allen’s formulation of this level. For example, Lezak’s (1983) description of deviant Block Design and Object Assembly test performance seems to illustrate Cognitive Level 5 disability. She wrote,

>These patients seem unable to form visuospatial concepts before seeing the actual objects, but their perceptions are sufficiently accurate and their self-correcting abilities sufficiently intact that as they manipulate the pieces they can identify correct relationships and thus use their evolving visual concepts to guide them. (p. 278).

Information-processing theory suggests that the process of means-end analysis is emerging, although deficient, at Level 5. In order to avoid a haphazard approach to problem solving, selection of strategies must be based on a plan. Clinical observations indicate that cuing can help patients at Level 5 plan. They can use verbal cues from the therapist (e.g., “stop and think about your next step”) to maintain a goal structure for operation. Although there is potential for new learning to occur at this level, the learning environment must be adapted to present concrete, visible, and meaningful stimuli.

At Cognitive Level 4 (Goal-Directed Actions), planning and problem-solving ability are considered to be deficient, despite a quality of goal-directedness that is lacking at lower cognitive levels. Allen emphasized familiarity as a critical factor in task selection to ensure satisfactory results at this cognitive level. Similarly, Anderson (1983) wrote, “Probably one can maintain larger fragments of plans where one has had extensive practice” (p. 167).

At Level 4, patients are considered dependent on a visible structure; that is, they are able to move toward goal completion only if the standard for performance is visible. A common clinical observation is the varying ability of patients to detect an error when comparing their performance with a sample. If the error is detected, it generally is not corrected unless the problem is familiar. Perhaps these patients are able to represent the problem space, but unable to move forward with selection of appropriate strategies (i.e., do not perform means-end analysis). A possible explanation for the ability of Level 4 patients to solve familiar problems more often than unfamiliar problems is provided by Greeno (1972). He wrote that “previous experience may allow the current state to be recognized as one that has appropriate operators associated with it” (p. 260).

At Level 3 (Manual Actions), attention to the task environment is emerging but limited to stimuli conducive to tactile exploration. The only sensory cues that can capture attention at this level are those that can be acted on. Thus, a basic precondition for planning—the ability to formulate a goal structure without acting on it—is not satisfied.

At Levels 1 and 2, patients attend primarily to internal stimuli, and thus are unable to attend to or represent the task environment.

Allen is one of a group of “ability theorists” (Cattell, 1963, 1968; Ferguson, 1954, 1956; Fleishmann, 1954, 1955; Hebb, 1949) who have attempted to describe and classify the ability patterns operant in learning and performing tasks.

Ferguson (1956) described ability as an “attribute of the state of the organism... identified with neurophysiological structure and process which is modified by environmental and genetic factors. The state of the organism is believed to be functionally related, somehow, to observable performance in particular tasks” (p. 123).

Ability theorists support the establishment of systems for task equivalence, that is, criteria that allow generalization from one task to another and recognition of tasks that are equivalent in terms of the actions and abilities required to perform them.

Psychometrics—The WAIS–R

Psychometrics is “the science or process of measuring abilities and personality through psychological tests and statistics” (Longman Dictionary of Psychology and Psychiatry, 1984, p. 603). Inherent in psychometric theory is the concept of ability as multifaceted and globally determined, for example, involving fluid and crystallized components.

The Wechsler Adult Intelligence Scale (WAIS) was first published in 1955, and its revision, the WAIS–R, in 1981. The battery is viewed as one of the best constructed and standardized psychological tests, and is the most commonly used (Lezak, 1983; Maloney & Ward, 1976). Eleven subtests make up the
battery—6 designated as the Verbal scale, and 5 as the Performance scale. The 11 subtests together constitute the Full Scale. For each scale there is a separate IQ score (Verbal IQ, Performance IQ, and Full Scale IQ).

Factor-analytic studies have identified WAIS-R subtest groupings. The first group shares a common Verbal factor, weighting on the Information, Comprehension, Similarities, Arithmetic, and Vocabulary subtests. The second group shares a common Perceptual Organization factor, weighting on the Block Design and Object Assembly tests, and often on the Picture Arrangement and Picture Completion tests. The third group shares a "minor, specific factor" believed to be a "measure of capacity to resist distraction" (Wechsler, 1958, p. 126). This Distractibility factor is weighted on the Digit Symbol test and, to a lesser extent, the Digit Span test. The Perceptual Organization and Distractibility factors are primarily associated with Performance IQ and fluid abilities, and the Verbal factor with Verbal IQ and crystallized abilities (Kaufman, 1979).

The Block Design and Object Assembly tests correlate more highly with one another than any other subtests and are considered to be relatively pure measures of perceptual organization. Taken together, the Picture Arrangement and Block Design tests are considered to provide the best measure of nonverbal intelligence (Maloney & Ward, 1976). In hemiplegic patients, Block Design performance has been correlated with ability to perform self-care activities and used to predict rehabilitation outcomes (Ben-Vishay, Gerstman, Diller, & Haas, 1970; Lorenz & Cranco, 1962). Psychiatric groups that display impairment on the Perceptual Organization factor include patients with affective disorders, substance abuse disorders, schizophrenic disorders, and organic brain syndromes. Patients with these disorders frequently manifest depressed Performance IQ (Chelune, Heaton, Lehman, & Robinson, 1979; Parsons & Farr, 1981).

Performance on the Distractibility factor especially on the Digit Symbol test and the Digit Backwards portion of the Digit Span test, is also consistently depressed with minimal brain impairment (Lezak, 1983). Problems in immediate or working memory, attention, and concentration show up in depressed performance on both the Digit Symbol and the Arithmetic tests, the latter involving a degree of fluid abilities. Birren and Morrison (1961) have demonstrated decrements in fluid abilities with normal aging using the Digit Symbol test. They reported that impairment on this test may be due to an inability to retain mental perceptions while simultaneously searching to translate symbols using a decoding system. In contrast, the same study also showed that performance on crystallized ability measures remains intact until late in life.

**Methods**

**Subjects**

Forty psychiatric inpatients in southeastern New England participated in the study (see Table 1). Subjects were drawn from two private acute care psychiatric hospitals that were similar in their patient populations and clinical services. Potential subjects were patients who had been referred by their psychiatrists for routine psychological testing, specifically the WAIS-R. Inclusion criteria were presence of a DSM-III Axis I diagnosis (American Psychiatric Association, 1980); absence of a vision, hearing, or physical disorder that impaired function; absence of mental retardation (defined as Full Scale IQ below 70); and ability to speak and comprehend the English language.

**Instruments**

Subtests representative of both the fluid and the crystallized ability constructs served as criterion measures. The subtests representing the Perceptual Organization factor were Block Design, Object Assembly, Picture Arrangement, and Picture Completion. These tests measure the fluid abilities of visuospatial conceptualization and organization, mental analysis and synthesis, sequential thinking, reasoning, and visuomotor coordination. The subtests representing the Distractibility factor were Digit Span and Digit Symbol. These tests measure the fluid abilities of efficiency of attention, concentration, and working memory, sus-

![Image](http://ajot.aota.org/pdfaccess.ashx?url=/data/journals/ajot/930357/ on 10/12/2018 Terms of Use: http://AOTA.org/terms)
tained attention; and visuomotor coordination. The subtests representing the Verbal factor were Vocabulary and Arithmetic. The Vocabulary test covers speaking and recall vocabulary and verbal and general mental ability. The Arithmetic test measures crystallized information as well as the fluid abilities of attention, memory, and conceptual manipulation. The reader is referred to Wechsler (1981) for a detailed description of these WAIS–R subtests.

The ACL test is a standardized leather-lacing task. Scoring is based on the complexity of the lacing stitch that the patient is able to imitate. The revised ACL test scale (C. Allen, personal communication, March 1986) was used, representing an expanded range of test behaviors (i.e., 42), which encompasses the six cognitive levels. The expanded scale enables more precise statistical analysis than the 6-point scale originally described by Allen (1985). Levels 1 and 2 were not represented in the universe of potential subjects because of the general untestability of persons at these levels. The subjects scored at Levels 3 through 6.6 ($\bar{X} = 4.8$), with the 6.0 to 6.6 range representing absence of disability.

### Procedure

The ACL test was administered within 24 hours of administration of the WAIS–R by the testing psychologist. Before the administration of the ACL test, the study was explained to the subject and the subject’s informed consent was obtained. After the test subjects were debriefed. After their discharge from the hospital, the subjects’ medical records were reviewed for diagnostic and demographic data.

### Results

The accepted level of significance for the statistical analysis was $p < .01$. Table 2 shows the Spearman $r$ correlations between ACL scores, scores on the WAIS–R subtests, and IQ scores. The table demonstrates moderate to high correlations between ACL performance and scores on the individual subtests weighting on Perceptual Organization, with the exception of the Picture Completion test ($r = .280$, $p = .083$). As in numerous previous studies, the Block Design and Object Assembly tests correlated more highly than any other subtests ($r = .729$, $p = .0001$).

<table>
<thead>
<tr>
<th>Table 2</th>
<th>Spearman’s Correlation Coefficients for Scores on the ACL Test and WAIS–R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test</td>
<td>ACL</td>
</tr>
<tr>
<td>Perceptual Organization factor</td>
<td></td>
</tr>
<tr>
<td>BD</td>
<td></td>
</tr>
<tr>
<td>OA</td>
<td>.618*</td>
</tr>
<tr>
<td>PA</td>
<td></td>
</tr>
<tr>
<td>PC</td>
<td>.280</td>
</tr>
<tr>
<td>Distractibility factor</td>
<td></td>
</tr>
<tr>
<td>DSym</td>
<td>.586*</td>
</tr>
<tr>
<td>DSpan</td>
<td>.540*</td>
</tr>
<tr>
<td>Verbal factor</td>
<td></td>
</tr>
<tr>
<td>Vocabulary</td>
<td>.230</td>
</tr>
<tr>
<td>Arithmetic</td>
<td>.387</td>
</tr>
<tr>
<td>PSIQ</td>
<td>.551*</td>
</tr>
<tr>
<td>VSIQ</td>
<td>.414*</td>
</tr>
<tr>
<td>FSIQ</td>
<td>.465*</td>
</tr>
</tbody>
</table>

* $p < .01$. Numbers in parentheses are probability values.
The ACL test score correlated most highly with Block Design score ($r = .618$, $p = .0001$).

On the Distractibility factor, moderately high correlations were found between the Digit Symbol and Digit Span tests ($r = .599$, $p = .0001$) and between these subtests and the ACL test. As expected, a significant relationship was not demonstrated between ACL and Vocabulary scores ($r = .230$, $p = .164$). However, correlation between ACL and Arithmetic scores approached significance ($r = .387$, $p = .014$).

As expected, ACL scores were more highly correlated with Performance IQ ($r = .551$, $p = .0003$) than with Verbal IQ ($r = .414$, $p = .008$), although both correlations were significant. This result is consistent with the view that fluid and crystallized abilities are correlated components of general adaptive ability.

Table 3 shows the Spearman $r$ correlations between test scores and demographic variables. The table demonstrates a significant negative correlation between fluid abilities and age. The three measures most sensitive to age effects were Block Design score ($r = -.611$, $p = .0001$), Picture Arrangement score ($r = -.506$, $p = .0009$), and ACL score ($r = -.478$, $p = .001$). Digit Symbol and Digit Span scores also had a significant negative correlation with age. The correlations of age with Object Assembly and Picture Completion scores were statistically significant at the .02 level, but not at the .01 level required by this study. In contrast, crystallized abilities were not negatively correlated with age, although the correlation for the Arithmetic test approached significance ($r = - .339$, $p = .03$), presumably because of the fluid abilities involved in this subtest. This pattern of results replicates neuropsychological findings. In general, older adults tend to score less well on measures of fluid ability than younger adults, but score much the same on measures of crystallized ability until late in life.

Chronicity had less of a general effect on performance, showing only two significant negative correlations at the .01 level: with Block Design score ($r = - .377$, $p = .01$) and ACL score ($r = - .396$, $p = .01$).

Wechsler (1981) used a social and educational position scale to standardize the WAIS-R, and this scale was also used in this study. As expected, level of education was not correlated with ACL score or fluid measures, with the exception of Digit Symbol score ($r = .443$, $p = .007$). In contrast, level of education correlated with performance on measures of crystallized ability as expected. Occupational status had a significant negative correlation with ACL score ($r = - .439$, $p = .004$) and approached significance with Picture Completion score ($r = - .405$, $p < .01$). More advanced occupational status was associated with improved performance on these measures. However, this finding is inconclusive because 27.5% of the sample were not in the labor force at the time of the study.

### Table 3

Spearman's Correlation Coefficients for Demographic Variables and Scores on the ACL Test and WAIS-R

<table>
<thead>
<tr>
<th>Test</th>
<th>Age</th>
<th>Chronicity</th>
<th>Occupation</th>
<th>Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACL</td>
<td>$- .478^*$</td>
<td>$- .396$</td>
<td>$- .439^*$</td>
<td>1.35</td>
</tr>
<tr>
<td></td>
<td>(.001)</td>
<td>(.01)</td>
<td>(.004)</td>
<td>(.40)</td>
</tr>
<tr>
<td>Perceptual Organization factor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BD</td>
<td>$- .611^*$</td>
<td>$- .377$</td>
<td>$- .233$</td>
<td>2.27</td>
</tr>
<tr>
<td></td>
<td>(.0001)</td>
<td>(.01)</td>
<td>(.14)</td>
<td>(.13)</td>
</tr>
<tr>
<td>OA</td>
<td>$- .355$</td>
<td>$- .241$</td>
<td>$- .284$</td>
<td>2.20</td>
</tr>
<tr>
<td></td>
<td>(.02)</td>
<td>(.13)</td>
<td>(.07)</td>
<td>(.17)</td>
</tr>
<tr>
<td>PA</td>
<td>$- .506^*$</td>
<td>$- .227$</td>
<td>$- .189$</td>
<td>1.16</td>
</tr>
<tr>
<td></td>
<td>(.0009)</td>
<td>(.15)</td>
<td>(.24)</td>
<td>(.47)</td>
</tr>
<tr>
<td>PC</td>
<td>$- .352$</td>
<td>$- .314$</td>
<td>$- .405$</td>
<td>1.05</td>
</tr>
<tr>
<td></td>
<td>(.02)</td>
<td>(.05)</td>
<td>(.01)</td>
<td>(.75)</td>
</tr>
<tr>
<td>Distractibility factor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DSym</td>
<td>$- .458^*$</td>
<td>$- .339$</td>
<td>$.285$</td>
<td>2.43</td>
</tr>
<tr>
<td></td>
<td>(.005)</td>
<td>(.42)</td>
<td>(.09)</td>
<td>(.007)</td>
</tr>
<tr>
<td>DSpan</td>
<td>$- .461^*$</td>
<td>$- .234$</td>
<td>$.19$</td>
<td>1.97</td>
</tr>
<tr>
<td></td>
<td>(.003)</td>
<td>(.15)</td>
<td>(.24)</td>
<td>(.22)</td>
</tr>
<tr>
<td>Verbal factor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vocabulary</td>
<td>$.332$</td>
<td>.141</td>
<td>$.284$</td>
<td>5.17</td>
</tr>
<tr>
<td></td>
<td>(.84)</td>
<td>(.39)</td>
<td>(.08)</td>
<td>(.0009)</td>
</tr>
<tr>
<td>Arithmetic</td>
<td>$- .339$</td>
<td>$- .074$</td>
<td>$- .340$</td>
<td>3.85</td>
</tr>
<tr>
<td></td>
<td>(.03)</td>
<td>(.65)</td>
<td>(.03)</td>
<td>(.01)</td>
</tr>
</tbody>
</table>

Note. ACL = Allen Cognitive Levels test. BD = Block Design test. DSym = Digit Symbol test. DSpan = Digit Span test. OA = Object Assembly test. PA = Picture Arrangement test. PC = Picture Completion test. $^*$ $p < .01$. Numbers in parentheses are probability values.
Analysis of Variance in ACL Test Performance (N = 40)

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>DF</th>
<th>Sum of Squares</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceptual Organization factor</td>
<td>1</td>
<td>96.4</td>
<td>6.27</td>
<td>.018</td>
</tr>
<tr>
<td>Distractibility factor</td>
<td>1</td>
<td>57.9</td>
<td>3.76</td>
<td>.062</td>
</tr>
<tr>
<td>Verbal factor</td>
<td>1</td>
<td>5.5</td>
<td>0.25</td>
<td>.636</td>
</tr>
</tbody>
</table>

Table 4 presents the results of the analysis of variance in ACL test performance. Results show that 41% of the variance in ACL performance is accounted for by the three WAIS-R factors (independent variables) ($R^2 = .41$). Correlation significance levels (sum of squares) demonstrate the relative contribution of each of the independent variables to ACL performance. Of the three factors, those representative of fluid abilities contributed the most to ACL performance. Perceptual Organization was weighted in ACL performance ($p = .018$), and Distractibility approached a lower level of significance ($p = .062$). These results provide evidence that a relationship between fluid abilities and the ACL test exists above the chance level. The abilities of visuospatial conceptualization and organization, mental analysis and synthesis, sequential thinking, reasoning, and visuomotor coordination, are primarily involved, but, to a lesser degree, so are attention, concentration, and working memory.

The Verbal factor, representative of crystallized abilities, was shown not to affect ACL performance significantly ($p = .636$).

Discussion

The results of this study demonstrate a relationship between the ACL test and the information-processing factors of Perceptual Organization and Distractibility. Also termed fluid or perceptual-integrative abilities, these factors are considered essential in organizing and processing information, that is, in learning (Craik & Lockhart, 1972). Fluid abilities are primarily represented in the subtests of the WAIS-R Performance scale and Performance IQ, which significantly correlated with ACL score in the present study.

These results support Allen’s assumption that the difference in patterns of performance between the six cognitive levels are due to differences in information-processing capabilities. Furthermore, the results operationalize the information-processing performance components of cognitive disability.

As a demonstrated measure of fluid abilities, the ACL test may serve as an indicator of learning potential during episodes of psychiatric illness when impairment is likely. The importance of this is highlighted by the following neuropsychological assumption: “Learning in complex situations is related not to the unimpaired skills (as measured psychometrically) but to the residual skills affected by the disability” (Diller & Weinberg, 1962, p. 4).

The cognitive disability model is a taxonomic system that describes affected residual skills, that is, social and functional sequela, and guides the use of therapeutic activity. Task analysis and task equivalence guidelines prescribe environmental adaptations that compensate for disability at lower cognitive levels and facilitate learning and skill acquisition at higher cognitive levels. Treatment objectives and methods are based on cognitive level and incorporate standard psychiatric principles such as diagnosis, functional history and expected prognosis, environmental complexity, alternative treatment effects, goals of treatment settings, and criteria for referral and discharge.

It is recommended that psychosocial theory and methods curricula focus on developing formulas for clinical reasoning based on these principles. In addition, information-processing theory and neuropsychological principles should be represented in entry level education if therapists are to understand the learning processes and performance patterns of the disabled.

Research synthesizing the cognitive disability model with the model of human occupation is recommended to strengthen both models. The cognitive disability model is extensively based on neuroscience, which is fundamental to performance but does not totally determine adaptive behavior. A social science orientation, such as is provided by the model of human occupation, provides a generic framework for understanding the cultural and social systems impacting on human behavior. Both models are necessary, but neither is sufficient to meet current practice demands.

Suggested areas for analysis and synthesis include: (a) levels of task complexity, environmental press, and performance; (b) cognitive disability as an etiological agent in habitation subsystem dysfunction; (c) the relative effects of cognitive disability and volition on role performance, that is, the “can’t” or “won’t” performance differential; (d) environmental adaptation as compensatory treatment; (e) analysis of learning and skills acquisition at various disability levels; and (f) analysis of theoretical assumptions and propositions.

Summary

This study used a theoretical and empirical approach to explain the nature of cognitive disability. Theoretically, it examined a synthesis between planning and problem-solving abilities and Allen’s cognitive levels. Empirically, it examined the relationship between standard psychometric information-processing measures and the ACL test. The ACL test was shown to be a
measure of fluid abilities which subsume functions related to an individual’s potential for purposeful, adaptive behavior.

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