A Problem-Solving Version of the Allen Cognitive Level Test

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Key Words: adolescence • cognitive development (assessment) • psychiatry • tests, by title, Allen Cognitive Level Test

The purpose of this study was to construct and validate a problem-solving version of the existing Allen Cognitive Level Test (ACL) (Allen, 1985). The new problem-solving version of the ACL (ACL–PS) follows the theoretical developments of the cognitive disability theory and the information processing approach. It was constructed to provide a more accurate assessment of the problem-solving process as well as task performance, especially at the higher cognitive levels. Both tests were administered to a psychiatric adolescent group (n = 49) who were subdivided according to diagnosis and to a matched nondysfunctional control group (n = 29).

The results showed that both the ACL and the ACL–PS differentiated significantly between the patients and the control subjects and among the patient groups. At Level 6 of the ACL, none of the subjects needed any demonstration, with all scores distributed between independent performance or performance following verbal instructions only. That is, problem-solving phases that were added with the ACL–PS. The scoring of the ACL–PS is provided in addition to detailed scoring of the cognitive levels. It is suggested that the ACL–PS be implemented as a clinical evaluative tool with adolescents.

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The purpose of this study was to construct and validate a problem-solving version of the existing Allen Cognitive Level Test (ACL) (Allen, 1985). The new version was developed to enable more accurate evaluation of planning, problem solving, and deduction abilities with the ACL.

Problem solving is a process by which one (a) recognizes a problem, (b) defines the problem, (c) identifies alternative plans, (d) selects a plan, (e) organizes steps in a plan, and (f) implements a plan and evaluates the outcome (American Occupational Therapy Association, 1989). Problem solving is defined as the transformation of an initial state into a goal state by a set of operations. To accomplish this, problem-solving behavior involves the interaction between (a) the information processing system (the problem solver), (b) the task environment, and (c) the problem space.

In approaching a task, the problem solver (the information processing system) represents the situation in terms of a problem space, which is his or her perception of the task environment (Greeno, 1978). The term problem refers to a situation in which a person is called on to perform a task not previously encountered. In addition, externally provided instructions do not comprehensively specify the mode of solution. Thus, the particular task is considered novel for the person, although available processes or knowledge may be summoned for a solution (Resnick & Glaser, 1976). Cohen (1983) categorized these processes into four stages of information processing: (a) problem representation, (b) selection of operators, (c) implementation of selected operators, and (d) evaluation of current state.

Problem solving is thus conceived as “a complex form of cognitive activity that is engaged in to achieve a goal that cannot be reached directly or automatically” (Szekeres, Ylvisaker, & Cohen, 1987, p. 99).

Information processing encompasses all of the mental (i.e., cognitive) processes that underlie human action (Mayer & Stone, 1988). It explains “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). Cognition has been defined as the “processing of information for particular purposes and within certain mental structures” (Dodd & White, 1980, p. 8), including components of structure, systems or processes, and functional integrative performance (Szekeres et al., 1987).

Allen (1987) used an information-processing-system model to explain how this process guides voluntary motor actions in human activities. According to this model, sensory cues are the input to the system; this input is influenced by the disability. Sensorimotor associations are the throughput or the internal process of the system;
this throughput is influenced also by the purpose and meaning the person attributes to the information processed. The output observed is a voluntary motor action that is guided by the specific activity performed. This functional output provides feedback, which enters as new sensory cues into the person's information processing system. In contrast to most models, Allen's model portrays an information processing system that does not use language as the main mediator of cognitive processes.

Mayer and Stone (1988) defined Allen's Cognitive Disability Model as a behavioral hierarchy in which a relationship among mental diseases, functional capabilities, and cognitive capacities is presented. According to these researchers, the quality of a person's information processing system (cognition) in the brain can be inferred from observing that person's task behavior. The degree of thought used to guide different functional states is arranged into 6 levels, ranging from profoundly impaired (Level 1) to normative behavior (Level 6), as assessed with the ACL.

Mayer (1988a) analyzed the cognitive disability theory as representative of the information processing approach. She used this approach to conceptualize planning and problem-solving abilities, incorporating Cohen's (1983) analysis to expand the theoretical and empirical database of the Cognitive Disability Model. Mayer also established congruent validity of the ACL—Expanded (Allen, 1988) as a measure of cognition, by correlating it with the Wechsler Adult Intelligence Scale—Revised (WAIS-R) (Wechsler, 1981). She found that the fluid information processing abilities defined as the perceptual organization factor in the WAIS-R were significantly correlated with the ACL, as was the distractibility factor. Furthermore, in an analysis of variance, these two factors made the strongest contribution to ACL performance, which suggests that fluid or perceptual integrative abilities and not necessarily verbal information processes are central to this task performance and, by extrapolation, are central to routine task performance. This is in keeping with Allen's (1985) theoretical approach.

Mayer (1988a) further compared information processing with the cognitive levels. In her analysis, she included the attributes used by Allen (1985) to describe the levels, adding social consequences elaborated on by Allen and Allen (1987) with treatment indicators in the form of assistance needed.

Our major concern in this study was problem-solving abilities. As part of higher cognitive functioning, we focused our attention on Allen's cognitive Levels 5 and 6 and centered the investigation on adolescents' performance.

In the treatment of adolescent mental health patients, clinicians' major emphasis is on improving problem-solving abilities. The rationale underlying this approach is taken from Piagetian theory, which states that problem-solving capability is fully attained only in adolescence, and formal operational thinking is the major concern and interest of adolescence. Because problem-solving ability influences treatment, this ability should be assessed at the initial evaluation.

In a previous study, when a psychiatric adolescent group and a matched nondysfunctional control group were tested with the ACL, significant differences between the two groups were found (t = 2.71, p < .01) (Katz, Josman, & Steinmetz, 1988). The patients' ACL scores ranged from 2 to 6; half of them scored 5, but the other half were divided between low levels and the highest level, 6. All subjects in the control group scored 5 or 6. These results are also supported by the present study and suggest that both nondysfunctional and mentally ill adolescents score higher on the ACL than do many nondysfunctional and mentally ill adults (Allen, 1985; Katz et al., 1988; Katz & Heimann, in press). Further investigation of the use of the ACL for this population, therefore, is needed.

Moreover, it is questionable whether the ACL accurately evaluates cognitive Level 6. Allen termed Level 5 exploratory actions and Level 6 planned actions, which implies problem-solving ability. As stated by Katz (1988), the requirement of the ACL is lower than the normative performance described at Level 6, due to several discrepant aspects in the validity of the measurement of this level:

1. Level 6 tasks do not require attention to symbolic cues.
2. Level 6 tasks do not require independent planning.
3. The task demand is to imitate, which is unnecessary at Level 6.
4. Deductive reasoning is not evaluated in Level 6 tasks.
5. There are patients who perform at Level 6 on the ACL but who seem to have cognitive difficulties in planning, problem solving, and paying attention to such symbolic cues as verbal or written instructions.

Tolchinsky-Landsmann and Katz (1988) argued that the analysis of cognitive levels should be extended to include higher-order cognitive structures. Their findings suggested that when tested on classic Piagetian cognitive tasks, the adult psychiatric outpatient population retained some higher level abstraction and deductive abilities but lost lower functions. This validates Allen's (1985) focus on lower-level structures but also suggests that the ACL may have a ceiling effect. (Namely, it shows a Type II error, in which we decide that a patient has no disability [Level 6], while in fact the patient has undetected cognitive deficits.)

To exemplify the points raised above, the following case of a 16-year-old girl with anorexia nervosa is reported. The patient described her functioning for the 6
months before admission as intact. Social isolation started when she began losing weight. Her ACL score at admission was Level 6, and her score on the new problem-solving version of the ACL (ACL-PS) was 16 (see the Appendix). On the basis of this result, the patient was asked in treatment to choose a task by herself from available suggestions in a book and to perform that task according to the written instructions. She chose a patchwork and said that she understood the instructions. When she started working, however, she could not figure out how to plan and put together the various cloth pieces. The therapist provided verbal explanations, which were not helpful. Only when a demonstration was given could the patient grasp the idea and continue the task by herself. The score of 6 on the ACL was not accurate in predicting this patient’s functional ability, whereas the score of 16 on the ACL-PS indicated that she was able to use covert processes of problem solving, but only after receiving an initial demonstration of the process. Using this scoring procedure, the therapist would not ask the patient to start the task without showing her at least once how to do it. Clinical problems like this are seen frequently in patients who are still unable to plan or identify solutions to more complex or unfamiliar tasks, even though they score at Level 6.

Our objective in the present study was to investigate the validity of the ACL-PS in differentiating among adolescent patients’ performance according to diagnoses, as well as to differentiate their performance from that of a nondysfunctional control group. A further aim was to obtain information concerning adolescent psychiatric patients’ planning and problem-solving abilities.

The ACL-PS: Rationale

We used a modified version of the ACL, the ACL-PS, which was designed to examine the process whereby a patient reaches his or her test result. The ACL-PS does not change the test materials or the task itself; instead, it influences the sequence of instructions given, the observation of performance, and the ultimate scoring of the test. It does not excessively increase test duration. In this way the test became more process oriented, but still did not require verbalization of the process and was therefore not used as a comprehensive dynamic assessment, as suggested by Lidz-Schneider (1987).

The following sequence of performance, arranged hierarchically according to level of solution, was examined (the performance may be with or without a problem-solving method): (a) independent problem solving (highest level), which is defined as the ability to perform the task by oneself without any instruction or additional cues except for the existing end result, which has to be repeated; (b) problem solving following verbal instructions; and (c) performance by imitation (lowest level).

At each level of the problem-solving method, the therapist is able to differentiate between types of performance on the basis of overt processes of trial and error or on covert processes in which mental images are used to solve the problem. An overt trial-and-error process is defined as “an empirical method of establishing a satisfactory solution to a problem for which there is no existing or conveniently applicable theory, consisting of repeating experimental trials of various hypotheses until error is sufficiently reduced or eliminated” (Morris, 1976, p. 1369). In this process, “the relationship between an exploratory action and its effect on material objects is established after the action has been performed” (Allen, 1985, p. 38) and “errors are understood after the action has been performed” (p. 56). Overt trial and error, therefore, is related also to an inductive reasoning process that goes from the specific to the general. Inductive reasoning is “a principle of reasoning to a conclusion about all the members of a class from examination of only a few members of the class” (Morris, 1976, p. 671). It consists of reasoning from the particular to the general.

Allen (1985) conceptualized the process of overt trial and error as part of cognitive Level 5 ability. In the modified ACL-PS version, we suggest that at Levels 3, 4, 5, and 6, this process can be seen and differentiated from covert processes. At Level 5, however, trial and error expands to incorporate the ability for new learning that does not occur at the lower levels.

Covert processes are defined as “bodily events which are not readily observable without the use of equipment or apparatus to extend the scope of our senses” (McGuigan, 1978, p. 463). Allen (1985), however, defined in the same manner covert trial-and-error problem solving, a concept which is inherently contradictory because, as defined above, an empirical action is essential in trial and error. “The relationship between anticipated action and its effect on material objects is established before the action is performed. Several possibilities can be considered, and many errors can be avoided” (Allen, 1985, p. 38). On the basis of this definition, we assume that Allen refers also to covert processes, which use images to test solutions to problems.

Covert processes together with deductive reasoning are used in new learning and higher cognitive levels. Deductive reasoning is defined as going from the general to the specific. “The general classes of motor actions are used to generate hypothetical possibilities. One selects the best possibility for an unknown situation. The possibility selected is a planned or designed mode of action” (Allen, 1985, p. 38). Deduction is “the process of reasoning in which a conclusion follows necessarily from the stated premises; inference by reasoning from the general to the specific” (Morris, 1976, p. 344).

According to Allen (1985), cognitive Level 6 is exemplified by the abilities of covert processes and deductive reasoning to solve problems; we therefore suggest a way to test these processes with the ACL-PS that the ACL does not allow. Moreover, the evaluation of trial-and-error ver-
sus covert processes in relation to familiar or new tasks has significant implications for treatment planning in occupational therapy. Thus, the use of the ACL–PS contributes additional essential information for the evaluation of the cognitive levels, which further reflect functional performance.

Method

Subjects
Seventy-eight subjects between the ages of 12 and 18 years participated in the study. The sample consisted of two groups: (a) 49 adolescents with mental illness who were admitted to a psychiatric hospital during a 6-month period and (b) a nondysfunctional control group comprising 29 adolescents proportionally matched with the research group for age, sex, education, and place of residence. From the original sample of 80 subjects, 1 subject from each group was excluded because of insufficient demographic data.

The sample was almost evenly divided between male \( (n = 36) \) and female \( (n = 42) \) subjects. Of the patients, 24 were male; 25, female. Of the control subjects, 12 were male; 17, female. All were high-school students. Seventy-six subjects were born in Israel, 1 in Europe, and 1 in Africa. Approximately 65% of the subjects were from the older group (16–18 years), 21% from the middle group (14–15 years), and 13% from the youngest group (12–13 years).

The patient group was divided into two subgroups according to diagnosis, with use of the Diagnostic and Statistical Manual of Mental Disorders (3rd ed.) (American Psychiatric Association, 1980), as follows: (a) schizophrenia or brief reactive psychosis (cognitive disabilities are assumed to be part of these diagnoses) \( (n = 19) \) and (b) conduct disorders, personality disorders, anorexia nervosa, affective disorders, and those under observation (cognitive disabilities were not assumed to be necessarily part of the patients’ personality or behavioral disorders) \( (n = 30) \). Twenty-five patients received antipsychotic medications, 5 received tranquilizers, and 19 received no medication.

Instrument

A problem-solving version of the ACL, the ACL–PS, was developed for this study. The testing and scoring procedures of the ACL were altered. Each subject initially received the leather lacing with the three different completed stitches—the running stitch (PS1), the whip stitch (PS2), and the single cordovan stitch (PS3). In the original ACL, for each stitch, verbal instruction with demonstration is provided. In the ACL–PS, for each stitch, the subject was first asked by the tester to independently repeat the stitch twice. Inability to perform the task independently elicited from the tester Allen’s (1985) standardized verbal instructions as to how the stitch was to be made. Further inability to complete the task led the tester to demonstrate the stitch, and the subject was then asked to imitate it (the imitation task is that of the original ACL). This three-step process was repeated, if necessary, for each stitch.

For each stitch, therefore, there are three different input modes. The highest level of problem solving is independent performance of the task, in which the input given is the end result (i.e., the three sample completed stitches), with no further instructions necessary as to the process. The subject is thus required to represent the problem internally and to process the information to achieve the desired outcome, which is stitches identical to the input samples.

In the next level of problem solving, the subject must perform the task after being given two forms of input: verbal instructions of the process and the end result. The subject is thus required to process the additional auditory verbal input to reach the desired output. At the lowest level of performance, the subject is given verbal and visual input of both the process and the end result. He or she is thus required to imitate the demonstrated process of the task performance.

It is assumed that when a subject is unable to solve the task independently, each additional process input provided adds to the subject’s ability to perform the task. Performance on the ACL–PS was scored according to the hierarchical sequence of solution. Scores range between 2 and 20. The subject’s final score would thus reflect not only his or her ability or inability to complete the task, but also the process of problem solving (see the research version in Table 1 and the analogous refined cognitive level).

Data Analysis

A Spearman correlation coefficient for each score was determined between the groups, and a Mann Whitney U test was used to compare the control group and the two patient subgroups. A Kendall tau correlation was used to
study the relationship of performance and the demographic variables.

**Results**

No significant correlations were found between the ACL or ACL-PS scores and demographic variables of age and sex with the use of the Kendall tau correlation.

Frequencies, means, and standard deviations on the ACL and ACL-PS for all subjects are presented in Table 1. All subjects in the control group scored 6 on the ACL. About half the subjects in the patient group scored at Level 6 and the other half scored either at Level 4 or Level 5. On the ACL-PS, the performance of the control group ranged from 17 to 20, indicating either independent performance or performance with verbal instructions. Among the patient group, 35 (71%) reached the PS3 levels, namely 5 or 6. Twelve of these subjects (24.5%) performed at Level 5, but the remaining 23 (47%) performed the stitch independently or with verbal instruction. This distribution is similar to that of the control group, thus suggesting that all subjects who scored at Level 6, whether patients or control subjects, were able to problem-solve without demonstration.

A mean comparison shows higher scores for the control group on all parts of the test. The Mann Whitney U test between the patients and control group on the ACL and ACL-PS significantly differentiated between the groups at the level of .0001 for all four scores (ACL, PS1, PS2, PS3).

Frequencies, means, and standard deviations for the two patient subgroups are shown in Table 2. Only 4 patients (21%) of Subgroup 1 scored 6 on the ACL, compared with 19 (65%) of Subgroup 2. Three subjects from Subgroup 1 scored 5, compared with 9 subjects in Subgroup 2, and 12 subjects in Subgroup 1 scored 4, compared with only 1 subject in Subgroup 2. The pattern on the ACL-PS at PS3 indicates that even the few patients from Subgroup 1 who performed at Level 6 were able to problem-solve without demonstration. A mean comparison between the patient subgroups shows higher scores for Subgroup 2 on all parts of the test. A Mann Whitney U test significantly differentiated between the subgroups at p < .0003 for ACL, p < .018 for PS1, and p < .0006 for PS3. Only PS2 failed to reach significance in differentiating between the patient groups.

With the use of Kendall tau correlations between the ACL and ACL-PS and medications, significant relationships were obtained (ACL, r = .57, p < .0001; PS1, r = .43, p < .0001; PS2, r = .39, p < .0001; PS3, r = .41, p < .0001). These results confirm the relationship found between the diagnoses and the test result, that is, an adolescent diagnosed as schizophrenic usually received antipsychotic medications. Patients who received a higher dosage of antipsychotic medication did worse on the test. The higher correlation of medications with the ACL stems perhaps from the larger sample, because it includes all subjects (n = 49), compared with only a partial group who reached PS3 (n = 35).

Intercorrelations between the four different test scores with the Kendall tau correlation were calculated for the combined groups. A strong correlation was found between the ACL and the PS3 scores (r = .78, p < .0001)
### Table 2
Frequencies, Means, and Standard Deviations of the Allen Cognitive Level Test (ACL) and the Allen Cognitive Level Test–Problem Solving (PS) for the Two Subgroups of Patients

<table>
<thead>
<tr>
<th>Variable</th>
<th>Subgroup 1 (n = 19)</th>
<th>Subgroup 2 (n = 30)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Value</td>
<td>Frequency</td>
</tr>
<tr>
<td>ACL</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>12</td>
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<tr>
<td></td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>PS1 (Running stitch)</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>1</td>
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<tr>
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<td>5</td>
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<tr>
<td></td>
<td>16</td>
<td>0</td>
</tr>
<tr>
<td>PS2 (Whip stitch)</td>
<td>17</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>18</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>19</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>1</td>
</tr>
</tbody>
</table>

Note: Diagnoses for Subgroup 1 were schizophrenia and brief reactive psychosis; for Subgroup 2, conduct disorders, personality disorders, anorexia nervosa, affective disorders, and observation.

*See (Allen, 1985).

and between the PS1 and PS2 scores ($r = .65, p < .0001$). Lower correlations are seen for the ACL and the PS1 score ($r = .43, p < .0001$) and the ACL and the PS2 score ($r = .48, p < .0001$). As expected, overall significant intercorrelations between the scores exist, because the scores are interdependent.

## Discussion

Both the ACL and ACL–PS significantly differentiated between the adolescents with mental illness and the nondysfunctional control group as well as between the two subgroups of patients. As in previous studies, Subgroup 1, which consisted mainly of persons with schizophrenia, performed significantly lower, mostly at Level 4, whereas Subgroup 2 performed at Levels 5 and 6. Thus, the ACL–PS was found to be valid, similar to the original ACL, in differentiating between two known groups. The ACL–PS, however, provides additional information. Inspecting the frequencies of the patient group, one can see that in PS1 and PS2, 85% of subjects performed the running and whip stitch independently, which suggests that there is no reason to start with a demonstration in each case, as in the original ACL’s instructions. Still, the patients that performed independently were divided into two groups: those who performed the stitch by trial and error and those who used covert processes to perform the task. This suggests two ways of processing the information with the same input, even at Levels 3 and 4 and also for patients who function at Level 6 (see Table 2). This finding has direct clinical implications for the treatment process. The demands the therapist sets for the patient and the kind of input provided should be planned accordingly.

All of the nondysfunctional adolescent subjects and 47% of the patients performed at Level 6 on the original ACL, but their performance on the ACL–PS indicates a difference in the process of performing the single cordovan stitch. None of these subjects, however, needed any demonstration.

These findings support the postulate that the ACL requirement is too low for the attributes described in cognitive Level 6 (Allen, 1985), but show that among the subjects who performed at this level, differences existed in their ability to solve a problem. Performing the task independently may indicate more precisely the attributes comprising Level 6, such as attention to symbolic cues, independent planning, and deductive reasoning.

Here too, implications for treatment are direct and important, because the evaluation provides the therapist with information on the kind of problem-solving processes the patient is using, thus enabling a better match of the task demands. Referring back to the case illustration in the introduction, the patient was performing at Level 5.2, according to the suggested refinement of the levels, which may indicate more accurately her performance at the time of testing. Interestingly, none of the subjects in this study received a score of 16 (see Tables 1 and 2), suggesting that scores 15 and 17 indicate Level 5.
performance more accurately with the use of trial-and-error processes with at least one process input in addition to the end result.

Hence, the major additions of the ACL-PS are in providing three modes of input hierarchically organized: first, a visual end result of the task without any instruction of the process; second, additional verbal instruction of the process; and third, verbal instruction with demonstration of the process. In this way, the task difficulty was generally increased, and the level of demands appears to more closely match the attributes of the higher cognitive levels without losing the evaluation of the lower levels. Furthermore, the evaluation of processes of problem solving in all parts of the test in addition to a measure of task performance allows refined inferences about the person's competence and performance.

On the basis of the results of this study, we recommend use of the ACL-PS with the scoring suggested in the Appendix. In this way, the appropriate cognitive level is clearer, including structure and process components, and a hierarchy of problem solving is provided. This breakdown of the levels differs from the modification in the ACL-Expanded (Allen, 1988), which aims to refine the precision of the original scoring based on an analysis of errors occurring during the task performance. The relationship of both modifications should be studied.

We also recommend that the validity of the ACL-PS be studied in various populations, especially concerning functional performance and the interpretation of the relationship between the distribution of scores at Levels 5 and 6.

Although the ACL-PS follows the theoretical development of the cognitive disability frame of reference and the information processing approach, it is theoretically based on Piagetian cognitive development theory. Information processing is not a developmental or a stage model, as is Piaget's, and unlike Piaget's cognitive theory, it focuses on the study of adult cognitive processes. However, taken together, information processing and Piagetian theory describe cognition over the life span. Continued work on the theoretical knowledge base and its clinical implications is warranted.

### Appendix

Stitches and Their Operational Definitions on the Allen Cognitive Level Test*—Problem Solving

<table>
<thead>
<tr>
<th>Stitch Type</th>
<th>Score</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Running stitch</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unable to imitate the running stitch</td>
<td>2</td>
<td>2.0</td>
</tr>
<tr>
<td>Able to imitate using trial and error, two demonstrations, two stitches</td>
<td>3</td>
<td>3.1</td>
</tr>
<tr>
<td>Able to imitate using covert processes, one demonstration, two stitches</td>
<td>4</td>
<td>3.2</td>
</tr>
<tr>
<td>Able to perform with verbal instructions, using trial and error, two stitches</td>
<td>5</td>
<td>3.3</td>
</tr>
<tr>
<td>Able to perform with verbal instructions, using covert processes, two stitches</td>
<td>6</td>
<td>3.4</td>
</tr>
</tbody>
</table>

Note: Scorers are instructed to circle the appropriate score for each stitch and to indicate the highest level.

### References


Katz, N., Josman, N., & Steinmetz, N. (1988). Relationship...


