Resource Consultant Training Program Research Report No. 2



The Factor Structure of Direct, Objective Writing Indices for Students in Compensatory and Special Education Programs

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Published by Resource Consultant Training Program Division of Teacher Education College of Education University of Oregon

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Acknowledgements

Preparation of this document was supported in part by the U.S. Department of Education, grant number G008715106. Opinions expressed herein do not necessarily reflect the position or policy of the U.S. Department of Education, and no official endorsement by the Department should be inferred.

Cover design: George Beltran

THE FACTOR STRUCTURE OF DIRECT, OBJECTIVE WRITING INDICES FOR STUDENTS IN COMPENSATORY AND SPECIAL EDUCATION PROGRAMS

Richard Parker Gerald Tindal

Abstract

For this study, eight methods were used to objectively score 6-minute writing samples from students in compensatory and specialized educational programs. Each sample also was evaluated subjectively by four trained judges who used a holistic judgment of "communicative effectiveness." Direct counts were made of the number of words (a) written, (b) written legibly, (c) spelled correctly, (d) written in correct sequence, and (e) written in continuous correct sequences (averaged over sequences). Secondary calculations produced the percentage of words (a) written legibly, (b) spelled correctly, and (c) written in correct sequence. In both a cluster analysis and factor analysis of the eight measures, two factors were identified, with the first four measures clustering together (representing a production-dependent factor) and the latter four measures clustering together (reflecting a production-independent factor). Regression of holistic ratings on objective scores produced moderately strong results for two production-independent indices—percent of words correctly spelled and percent of words correctly sequenced. The production-independent factor scores were much stronger predictors of holistic ratings than were production factor scores but were weaker than each of the two strongest individual predictors.

WRITTEN EXPRESSION IN SPECIAL EDUCATION

Written expression involves a complex array of curricular skills ranging from handwriting and spelling to mood and tone. All of these skills, when combined, have a common aim: "Essentially the concern is... effective communication" (Polloway, Patton, & Cohen, 1981, p. 2). Research on the assessment of written expression reflects the diversity of skills needed. The two most common research concerns, however, are (a) whether the assessment is direct or indirect (employs actual writing samples or not) and (b) how samples of writing should be scored (Isaacson, 1985; Stiggins, 1982).

Direct, Objective Scoring and Holistic Judgments of Writing

Direct assessment of writing typically possesses much stronger content validity than published tests, which employ indirect methods such as objective multiple-choice, cloze, or sentence-combining test formats. Indirect measures have been criticized for not resembling typical class-room writing tasks in either response format or content (Charney, 1984; Cooper & Odell, 1977; Diederich, 1974; Greenberg, Wiener, & Donovan, 1986; Moran, 1987; Spandel & Stiggins, 1981).

When writing samples are assessed directly, two scoring approaches are possible: objective and subjective. Objective scoring involves tallies of countable features, while subjective scoring includes judgments of quality. A number of dimensions can be counted, including total words written, unique words, and infrequent words (see Grobe, 1981 for a list of 24 countable indices).

Three types of subjective assessments have appeared in the professional literature. If the subjective judgment is brief and represents a general impression, it is referred to as *holistic*. If several characteristics of writing are analyzed separately, the judgment is referred to as *analytical*. If the judgment is how well a particular audience has been addressed or a purpose has been accomplished, it is referred to as *primary trait* (Mullis, 1984; Spandel, 1981). Most of the research investigating relationships with objective measures has focused on holistic subjective judgments.

Objective and Subjective Measures of Written Expression

Occasionally, the focus of research has been on the relationship between objective and subjective direct scoring methods, involving the prediction of holistic judgments through features such as spelling errors and length of essay (Hiller, Marcotte, & Martin, 1969; Moss, Cole, & Khampalikit, 1982; Nold & Freedman, 1977; Page, 1968; Slotnick & Knapp, 1971). Most of these studies have produced moderate correlations for samples of regular education students across several grade levels. For example, Stewart and Grobe (1979) found that teachers were influenced more by composition length and mechanical errors than by syntax. The former two variables accounted for about 25% of the variance in teacher quality ratings. Grobe (1981) corroborated these findings: The total number of words written accounted for the most variance (23% to 29% across three grade levels) in teacher ratings. But when several other vocabulary variables were added to the prediction equation, the total number of words written accounted for much less variance; teachers perceived "good" narrative writing as closely associated with vocabulary characteristics, syntax, and mechanics.

Subjective evaluations involving both analytical judgments of specific features and holistic judgments of overall quality also have been compared for the same writing samples, focusing on readability and surface appearance as influential factors in judgments of quality (Chase, 1966; Klein & Hart, 1968; Marshall & Powers, 1969; McColly & Remstad, 1965; Remondino, 1959).

Embedded in much of this research has been

the attempt to define a measure that is both reliable (can produce consistent results, either across time, setting, or judges) and valid (includes relevant and critical behavior sampling and scoring techniques). Subjective measures, although they possess more "apparent" (face) validity, often have poor reliability, while those measures with higher reliability (i.e., objective, countable indices) have been seriously questioned in terms of validity. McColly (1970) has commented on this irony: The same features that allow high interrater agreement may also reduce the validity of the same ratings "because handwriting ability and writing ability are not the same thing" (pp. 153-154).

Although moderate relationships may exist between subjective holistic judgments of writing quality and objective measures of the same samples, few studies have investigated these relationships with students in compensatory or specialized programs. In fact, all of the research addressed above was completed on students in regular programs. Furthermore, in all of these studies, objective measures were investigated as separate variables, with no attention given to their interrelationships.

Assessment Procedures for Students in Specialized Programs

Although "communicative effectiveness" has been used widely to define good writing in regular education (Poteet, 1980), the term may need to be redefined at a more basic, literal level for students in special education and compensatory programs. For these students, McColly's comment that "handwriting ability and writing ability are not the same thing" may not be applicable. In writing samples produced by such students, handwriting, spelling, punctuation, and word sequencing skills may be so deficient as to impede the reader's basic, literal understanding at the word, phrase, and sentence level. "Communicative effectiveness" may be determined largely by one or more objective, countable indices for students in specialized programs.

While accurate assessment is needed for those who teach students with severe writing deficiencies, few assessment tools are available for measuring status or growth in communicative effectiveness (Phelps-Gunn & Phelps-Terasaki, 1982). As noted earlier, indirect measures have been criticized for their lack of content validity (Charney, 1984; Cooper & Odell, 1977; Diederich, 1974; Greenberg, Wiener, & Donovan, 1986; Moran,

1987; Spandel & Stiggins, 1981). Teachers usually rely instead on the two types of direct writing assessment: (a) a global qualitative judgment, which often is reflected in a single letter grade or score, and/or (b) feedback on several specific errors (e.g., handwriting, mechanics, word usage, spelling, and syntactic features).

The relationship between these two types of feedback is usually not clear, however. Unless a teacher has devised and validated a scheme for equating them, neither teacher nor student probably is aware of the extent to which the holistic judgment of quality and the identification of more specific errors are equivalent or even related. This relationship is important for classroom practice. Even though teachers' holistic judgments may be a valid indicator of a composition's communicative adequacy, remedial or special education instruction most often focuses on correction of specific, objectively identifiable errors.

A second problem faced by classroom teachers is the need to gauge instructional effectiveness, which is one of the three major purposes of special education assessment outlined by Moran (1987). Proponents of Curriculum-Based Measurement (CBM) (Deno, Marston, & Mirkin, 1982) have set forth direct, objective scoring methods as the most promising tools for regular monitoring of student progress.

An important research question is: Which and how many objectively scorable features of writing samples will make a difference in teachers' holistic ratings of the communicative effectiveness of the written product? For this study, writing skill assessment of students identified as learning disabled or low achieving and enrolled in special education and compensatory programs was investigated. The focus is on (a) the interrelationships among objective measures and (b) the relationships between the objective measures of writing and holistic judgments of "communicative effectiveness."

Objective Measures for Investigation

For this study, objectively scorable writing features were operationalized that could potentially discriminate among the compositions and stories of students with serious writing problems. Five of eight indices were selected to loosely represent a skill development sequence. First, as a prerequisite to written communication, students must produce a sufficient number of words or letter groupings ("Total Words": Tot.Wd). Second,

letters must be identifiable, and letter groupings must approximate known words ("Legible Words": Leg.Wd). Third, for improved readability, words should be not only legible but spelled correctly ("Correctly Spelled Words": CSWd). Fourth, for further improvements in communicative effectiveness, the correctly spelled words must be sequenced in a sensible manner ("Correct Word Sequences": CWSeq). Fifth, longer strings of syntactically correct word pairs should be produced to approximate clauses and sentences. The average or mean length of all clause-like, continuous strings of CWSeq is represented by "Mean Length of Correct Word Sequences": ML/CWSeq.

The last three indices-%Leg.Wd, %CSWd, and %CWSeq—are referred to as "productionindependent." They were selected to measure legibility, spelling, and word sequencing, respectively, independent of the amount written. These measures are arithmetically derived from three of the measures already defined. Dividing both Leg.Wd and CSWd by Tot.Wd, and CWSeq by the total number of word sequences (including incorrect sequences), three proportions were produced that are mathematically independent of the length of a writing sample. Their counterparts (Leg.Wd, CSWd, and CWSeq), on the other hand, are directly influenced by the overall length of the composition. One of the five indices first discussed, ML/ CWSeq, is also "production-independent." The distinction between production and productionindependent is considered relevant, given the timed nature of the writing task.

To date, little research has been conducted on any of these measures. Stewart and Grobe (1979) and Grobe (1981) established a substantial relationship of (a) total number of words written and (b) number of correctly spelled words with holistic judgments of quality. Three of the eight indices used in this study were researched at the University of Minnesota's Institute for Research in Learning Disabilities; a number of the studies performed there supported the reliability and certain limited forms of validity for CWSeq, as well as Tot.Wd and CSWd (Deno et al., 1982; Marston & Deno, 1981; Marston, Lowry, Deno, & Mirkin, 1981; Videen, Deno, & Marston, 1982). Within these studies, Tot.Wd and CSWd have not, however, been validated by teachers' holistic judgments. CWSeq has been validated by teachers' holistic judgments, but has not been applied to writing samples from a special education population. None of the three measures has been applied to the writing of middle school students.

The ML/CWSeq index was developed by the authors specifically for students with serious writing deficiencies as an analogue to Hunt's widely used and validated "T-unit" length (Isaacson, 1985). A T-unit is an independent clause, plus any subordinate dependent clause (Hunt, 1970). The T-unit length index depends, however, upon identification of syntactically correct clauses. Many of the writing samples gathered for this study did not contain intact clauses. The more fine-grained measure, ML/CWSeq, discriminated better among these lower level samples because it allowed credit for strings of correct sequences of words that fell short of intact clauses.

METHOD Student Participants

Students who contributed writing samples to this study were enrolled in four middle schools (Grades 6-8) in a West Coast, suburban school district of approximately 9,000 students. The school district serves a largely middle and lower-middle socio-economic class community and has a minority representation of less than 10%. Average performance across grade levels is usually within the upper 35% on national norms on the California Achievement Tests, Form E (CTB/McGraw Hill, 1985).

The four schools in this study were chosen because special education and remedial teachers in those buildings volunteered to participate. Each school offered remedial (Chapter I compensatory) and special education ("Learning Disabled" under PL 94-142) programs in language arts. In the remedial programs, supplemental pull-out assistance was offered for five 45-minute blocks per week, while complete language arts programs—from 5 to 10 blocks per week—were offered in special education programs for students on active IEPs.

Both programs focused on reading instruction. Less time was devoted to spelling, literature, study skills, reference skills, handwriting, sentence analysis, word usage, and written expression. (Although spelling instruction was prominent in several of the classrooms, none offered intensive instruction in written expression. Predictably, written expression was not the primary focus of any IEPs; if referenced at all, it was within the general category of language arts, a finding generally consistent with Schenck's [1981] survey of IEPs.)

The two programs offered similar instructional activities and used similar instructional

materials. The single most pronounced difference between the two programs was that only the special education classes contained students with severe writing disabilities. These students produced samples that would not compare favorably to the writing of most students in the primary grades. Samples of student writing are included in Appendix A.

Students selected for this study were all of those in attendance on the day selected for written assessment. No attempt was made to test absentees later. From the four schools, 172 students—30 in special education and 142 in remedial programs—were selected. This total included 118 males and 54 females from Grades 6 $(\underline{n}=53)$, $7(\underline{n}=73)$, and $8(\underline{n}=46)$.

California Achievement Test, Form E (CTB/McGraw Hill, 1985) subtest percentile scores were available only for students in the special education programs. The relevant mean scores (n=30) were Vocabulary, 7.9 (SD=10.8); Spelling, 6.5 (SD=8.8); Language Mechanics, 9.5 (SD=8.9); Language Expression, 12 (SD=14.3); and Total Language, 9.5 (SD=10.2). Individual CAT scores were not available for students in remedial programs, but district policy dictates that students scoring within the third and fourth stanines on national norms in reading and language arts skills receive priority for Chapter I placement.

Assessment Administration Procedures

The following story starter was administered to students: "I went up to the old, deserted house. The door was open, so I walked in. Suddenly... "Administration instructions were scripted following the procedures outlined by Marston et al. (1981) and Videen et al. (1983):

I want you to write a story. I am going to read the beginning of a story to you first. Then I want you to write a story about what happens. You will have 30 seconds to plan what you will write. Use that time to decide what will happen in your story. You will have 6 minutes to write it. At the end of 3 minutes, I will say "Time." Right then, I want you to make a slash mark on your paper after the last word you wrote. [Demonstrate on the board.] Then you may continue writing. After 3 more minutes, I will again say "Time" and you will make a second slash. Then you will have a few more minutes to finish up your story. Start the story with your own words. Do not write the words that I read to you. You don't need to write a title. Are there any questions?

Objective Indices

The stories were analyzed both subjectively, through holistic judgments, and objectively, using five primary indices. Arithmetic operations on these five produced an additional three summary metrics, for a total of eight. Following are definitions for each of the eight indices:

- 1. Total Words Written (Tot.Wd). The sum of all word-like units containing letters physically grouped together; correct spelling, usage, and syntax were disregarded. Symbols and numbers were not counted as words.
- 2. Correctly Spelled Words (CSWd). The sum of all words spelled correctly; homonyms had to be spelled according to the usage in the sentence.
- 3. Correct Word Sequences (CWSeq) (Videen et al., 1982). The sum of all immediately adjacent, correctly spelled word pairs that make sense together, given the context of the sentence. Correct beginning and ending punctuation replaced correctly spelled words for scoring word sequences at the start and end of sentences.
- 4. Legible Words (Leg.Wd). The sum of all words that are recognizable as particular, real English words. The composition was read from the *end* to the *beginning*, with only one word presented at a time through a mask window, for word selection. Legible words did not have to be spelled correctly.
- 5. Mean Length of Correct Word Sequence Strings (ML/CWSeq). The number of CWSeq in a continuous string, summed over all strings and divided by the number of different strings.
- 6. Percentage of Correctly Spelled Words (%CSWd). The ratio of the number of words spelled correctly (CSWd) to the total number of words written in the composition (Tot.Wd).
- Percentage of Correct Word Sequences (%CWSeq). The number of correct word sequences (CWSeq) divided by the total number of words written.
- 8. Percentage of Legible Words (%Leg.Wd). The number of legible words (Leg.Wd) divided by the total number of words written.

It should be noted that several interdependencies exist among the eight indices because they all were performed on the same writing sample. The five "number of" indices are related through the overall length of the writing sample. In addition, CWSeq and ML/CWSeq include only correctly spelled words (CSWd), and CSWd requires legibility (Leg.Wd) as a prerequisite. These interdepend-

encies should be considered in interpreting the factor analysis results.

Scoring Procedures

Two graduate students were trained in a 2-hour session to apply the first five assessment methods (Tot.Wd, CSWd, CWSeq, Leg.Wd, ML/CWSeq) to 28 separately solicited writing samples. The remaining three indices (%CSWd, %CWSeq, %Leg.Wd) were produced by arithmetic operations on a computer. The following coefficients of agreement between the two raters were calculated: Tot.Wd, .99; CSWd, .98; CWSeq, .87; LegWd, .95; ML/CWSeq, .83; %CSWd, .98; %CWSeq, .87; and %Leg.Wd, .92.

Initially, each writing sample required approximately 15 minutes for marking. With practice, the markers reduced this time to approximately 8 minutes per paper for all five primary indices. For both objective scoring and holistic judgments, the raters were blind to student names, schools, grade levels, and program placements. More complete scoring procedures are provided in Appendix B.

Holistic Judgments

Writing samples were rated holistically according to their communicative effectiveness, scaled from 1 (very poor) to 7 (very effective), with no intermediate descriptors. Protocols that had been rated previously by 16 experienced special education and remedial teachers served as range finders. Three of those protocols were selected for each of the 7 points on the holistic rating scale. Range finders were chosen on the basis of their average ratings and by low variability of ratings among the 16 raters. Sample range finders are included in Appendix C.

Raters also were assisted by the following definition of good writing, produced by a team of four practicing special education teachers after reading through and discussing a representative set of writing samples:

Good writing clearly communicates to the reader the ideas/story of the writer. Good writing requires legible handwriting or printing, as well as distinguishable words, phrases, and sentences. Coherent linking of ideas from one sentence to the next also contributes to good writing. (Hasbrouck, 1987, p. 2)

After they had been given the definition and the range finders, four judges were trained to (a)

read each paper in its entirety and judge how well the writer had communicated his/her story or ideas through writing and (b) holistically rate the paper (1 to 7). Prior to assessing the 172 writing samples, all judges were trained in a 40-minute session on a set of 28 separately solicited protocols. An inter-judge agreement check after training yielded average Pearson correlations of r=.87, .83, .82, .78, .75, and .74 (.79 average). The holistic ratings used in analyses were the averages from the four judges.

Data Analysis

Four analyses were completed for this study. First, descriptive statistics were computed separately for students in remedial and special education programs, and t tests were conducted to determine significant differences in writing scores between special education and remedial program subsamples. Second, the eight objective indices were intercorrelated across the entire sample, followed by hierarchical cluster analysis of the matrix to identify clusters of indices. Third, a principal axes factor analysis with varimax rotation was conducted on the eight objective scoring variables. Finally, the holistic ratings were regressed on (a) the eight individual objective scoring indices and (b) factor scores from the principal axis analysis.

RESULTS

Descriptive statistics for the sample are reported in Table 1, along with independent t tests for differences between the special education and remedial programs. Highly significant differences between the two samples were obtained in holistic ratings, with remedial students receiving nearly double the scores of special education students. Significant differences between the two groups also existed on three production-independent indices: percent of correct word sequences (%CWSeq), percent of correctly spelled words (%CSWd), and mean length of correct word sequences (ML/CWSeq). No significant differences between the two groups were found on the production counterparts to these three indices.

Given a larger special education sub-sample, these significant differences would have provided a rationale for conducting separate factor analyses for data from the two sub-samples: special education and remedial. Besides the limited sample-size, there are other rationales for aggregating the two

Table 1: Descriptive Statistics and Comparisons Between Students Enrolled in Special Education (n=30) and Remedial Programs (n=142) on Holistic Ratings and Eight Objective Indices of Writing Quality

Index	Special Ed. Program		Remedial Program			
	Mean	<u>SD</u>	Mean	SD	<u>t</u> test	<u>p</u> value
Tot.Wd	47.50	18.90	46.30	17.10	.35	.720
Leg.Wd	39.70	16.50	38.80	14.60	.33	.740
CSWd	38.30	17.40	41.60	15.60	1.05	.290
CWSeq	28.20	14.70	33.00	13.60	1.76	.080
ML/CWSeq	3.90	2.10	4.90	1.90	2.61	.009
%Leg.Wd	.84	.09	.84	.11	.23	.820
%CSWd	.79	.12	.89	.09	5.88	<.0001
%CWSeq	.64	.19	.81	.15	5.57	<.0001
Holistic Ratings	2.19	.92	4.02	1.47	6.71	<.0001

Tot.Wd = Total number of words written.

Leg.Wd = Number of legible words.

CSWd = Number of correctly spelled words.

CWSeq = Number of correct word sequences.

ML/CWSeq = Mean length of continuous strings of correct word sequences.

%Leg.Wd = Percentage of all words that are legible.

%CSWd = Percentage of all words that are correctly spelled.

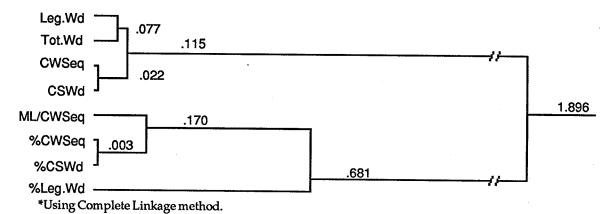
%CWSeq = Percentage of all possible contiguous pairs of words that are correctly sequenced.

Table 2: Correlations Among Eight Direct, Objective Measures of Written Expression, with Supplemental Cluster Analysis (N=172)

Index	Leg.Wd	CSWd	CWSeq	ML/CWSeq	%Leg.Wd	%CSWd	%CWSeq
Tot.Wd Leg.Wd CSWd	.924	.950 .944	.845 .894	.121 .27	051 .309	.074	.064 .255
CSWa CWSeq ML/CWSeq			.963	.333 .511	.113 .231 .398	.358 .523	.341 .530
%Leg.Wd %CSWd					.330	.701 .517	.737 .538 .963

Note: All correlations above .20 are significant at the .01 level.

Hierarchical Cluster analysis*, with standardized joining distances:



Tot.Wd = Total number of words written.

Leg.Wd = Number of legible words.

CSWd = Number of correctly spelled words.

CWSeq = Number of correct word sequences.

ML/CWSeq = Mean length of continuous strings of correct word sequences.

%Leg.Wd = Percentage of all words that are legible.

%CSWd = Percentage of all words that are correctly spelled.

%CWSeq = Percentage of all possible contiguous pairs of words that are correctly sequenced.

sub-groups in factor analysis. First, the special and remedial populations were defined by a combination of the CAT tests and local, curriculumbased assessments, plus teacher judgment. Second, the existing instructional programs for both types of students were similar in use of instructional time and in their opportunities for improving instruction.

The third rationale for aggregating groups is that at this stage in writing research, we are seeking potentially important differences between special and/or remedial populations and the broader school population. The research base on students enrolled in the regular program is substantial, and we perceive a danger in overgeneral-

izing those results to students enrolled in both special and remedial programs.

The correlation matrix for the eight indices is presented in Table 2. All but one coefficient was positive, and most were moderate to strong. The supplemental cluster analysis of the matrix reflects two main groupings: production versus production-independent indices. The production indices are tightly clustered, as indicated by their short linkage distances. The production-independent indices are clustered more loosely into three sub-groups: (a) ML/CWSeq, (b) %CWSeq and %CSWd, and (c) %Leg.Wd. Interestingly, correlations between production measures and their production-independent counterparts were only

low to moderate in strength (CSWd & %CSWD: .358; CWSeq & %CWSeq: .53; Leg.Wd & %Leg.Wd: .309; CWSeq & ML/CWSeq: .511).

In the third analysis, the eight objective scores were factor analyzed using principal axis factor extraction with varimax rotation. Relatively clear, simple structure was found; two major factors accounted for 83% of the matrix variance. Four production variables (number of words written, spelled correctly, written in correct sequence, and written legibly) loaded highly on the first factor and negligibly on the second. The first factor accounted for 55.6% of the matrix variance. The second factor, accounting for 27.2% of the matrix variance, represented the average number of words per sequence and three percentage variables: words spelled correctly, words in correct sequence, and words legibly written. The loadings of these variables on Factor 2 ranged from .54 to .99, while their loadings on Factor 1 were all less than .20.

The fourth set of analyses investigated the relationship between the eight objective measures and holistic judgments of communicative effectiveness. Holistic judgments were regressed on each of the eight objective indices separately, as well as on factor scores for Factor I and II. The two production-independent variables, %CWSeq and %CSWd, produced moderately strong coefficients (.75, .73) with holistic ratings, followed by ML/CWSeq (.59). The lowest coefficients were produced by three production variables: Tot.Wd, .10; Leg.Wd, .24; and CSWd, .31.

The eight variables were entered stepwise into a regression formula, with holistic judgments as the criterion. Five analyses were completed—one for each judge, and one for the judges' combined (average) judgments. Only the latter is displayed in Table 4. For Judges 1, 2, and 4 as well as for the average of all four judges, only one variable, %CWSeq, was stepped into the equation at p = .05entry level. Standardized regression weights for Judges 1, 2, 4, and the average of all four judges were .74, .70, .68, and .76, respectively. For Judge 3, three variables made significant contributions, in the following order of importance: %CWSeq, ML/CWSeq, and CSWd. The multiple R for these three variables was .7, somewhat lower than the coefficients produced for the other judges by the lone predictor, percentage of words in correct sequences. Holistic judgments were regressed next on factor scores from the two-factor orthogonal solution. The largest contribution to holistic judgments came from the second factor, with a stan-

Table 3: Rotated Two-Factor Solution for Principal Axis Analysis of Eight, Direct, Objective Measures of Writing

		Matrix Variance Accounted for by Eigenvalues		
Factor	Eigenvalue	Percent	Cum. Percent	
I	4.45	55.6	55.6	
П	2.17	27.2	82.8	
Variable		Factor I		
Total words written (Tot.Wd)		.99 .95	09 .16	
	Number of legible words (Leg.Wd)			
Number of correctly spelled was Number of correct word sequences.	.98 .90	.19 .40		
Mean length of continuous C	.19	.81		
Percentage of words which a	.02	.69		
Percentage of words correctly	.16	.93		
Percentage of words correctly	.15	.95		

Table 4: Prediction of Holistic Ratings from Individual Indices of Written Expression and from Factor Scores Derived from these Indices

Predictors	Pearson <u>r</u>	<u>p</u> value	
Total words written (Tot.Wd)	.10	.20	
Number of legible words (Leg.Wd)	.24	.001	
Number of correctly spelled words (CSWd)	.31	<.0001	
Number of correct word sequences (CWSeq)	.45	<.0001	
Mean length of continuous CWSeq (ML/CWSeq)	.59	<.0001	
Percentage of words that are legible (%Leg.Wd)	.42	<.0001	
Percentage of words correctly spelled (%CSWd)	.73	<.0001	
Percentage of words correctly sequenced (%CWSeq)	.75	<.0001	

Orthogonal Factors:

<u>Multiple R</u>	Factor I b	<u>p value</u>	Factor II	p value
.72	.24	<.001	.69	<.001

dardized regression (β) weight of .69. The β weight of the first factor, representing the four production variables, was significant but small: β = .24.

DISCUSSION

For this study, eight direct scoring indices of written expression were intercorrelated, factor analyzed, and used to predict holistic judgments of the same writing samples. The indices were selected to loosely represent a skill development sequence of increasing complexity. Cluster analysis of a correlation matrix defined two clusters: (a) production variables ("number of" indices), and (b) production-independent variables ("percent of" and "mean length" indices). This dichotomy also was supported by a principal axis factor analyses, in which clear simple structure was obtained. Two orthogonal factors emerged. The first was interpreted as a production factor since all variables loading on it related to the amount written (i.e., number of words in total, spelled correctly, or in correct sequence). The second factor was production-free since it loaded only with "average" and "percent" variables (percentage of words spelled correctly, in correct sequence, or legibly written; average number of words in correct sequence), all of which are mathematically independent of sample length. Together, the two factors accounted to a large degree for student writing performance. Furthermore, when holistic judgments were regressed on these factors, 49% of the subjective judgment variance was accounted for.

Within the loose skill development sequence

hypothesized for the eight indices by the authors, the three production variables were weakly related to holistic ratings. In contrast, two production-independent variables, percentage of words spelled correctly and written in correct sequence, were highly related to judgments of "communicative effectiveness." Regression of holistic ratings on objective scoring indices resulted in moderately large coefficients (.59 to .75) for three production-independent indices: "CWSeq, "CSWd, and ML/CWSeq (in decreasing order). This finding may in part be due to the dependency between these variables since correct sequencing includes an element of spelling correctness.

An interesting finding was the discrepancy between the matrix variance accounted for by the two factors and their relative strength as predictors of holistic judgments. Factor 1, comprised of four production variables, explained double the variance (56%) among the objective performance measures that the production-free Factor 2 explained. Yet when holistic judgment was regressed on the two factors, Factor 2 had a b value nearly 3 times the size of that for Factor 1. Furthermore, when raw holistic scores were regressed on factor scores, the multiple R was smaller than two of the largest individual coefficients (%CSWd and %CWSeq). Within the multiple regression, the production-independent factor explained most of the variance, primarily due to the influence of one variable.

It appears that a production-independent factor, including words legibly written, spelled correctly, and sequenced correctly, is a moderate-tostrong predictor of teacher judgments of the communicative effectiveness of student writing. Students are spread out easily on a distribution by counting the number of words (a) written, (b) spelled correctly, (c) in correct sequence, and (d) written legibly within their writing samples. Furthermore, these production variables are highly related to each other, so that students with higher scores on one variable also have higher scores on other variables within this cluster. But when compositions are evaluated for their communicative merit, judges are not swayed by length of the composition, unless most of those words are legible, spelled correctly, sequenced correctly, and in longer continuous correct sequences.

Stewart and Grobe (1979) and Grobe (1981) also found that production variables initially accounted for most of the variance but became less influential when analyzed in conjunction with a number of vocabulary variables. Apparently, although production variables allow easy discrimination among students, they are not of major importance if compositions are judged as a whole, when the focus is on "communicative effectiveness."

The results of this study generally are consistent with literature on the relationship between objective and holistic written expression assessment within regular education (Chase, 1966; Grobe, 1981; Hiller et al., 1969; McColly, 1970; Nold & Freedman, 1977; Page, 1968; Slotnick & Knapp, 1971; Veal & Hudson, 1983). For a special and remedial education sample of 172 students, this study demonstrated correlations for about half of the eight indices in the low to low-moderate range. Three objective indices, however, indicated predictive strength much larger than found in most of the above studies. A probable explanation for this fact is twofold: (a) In this study, communicative effectiveness was clearly targeted and defined for the holistic scorers, and (b) in special and remedial education, communicative effectiveness is more strongly determined by errors in objectively scorable features of writing than is the case in regular education with students who have stronger writing skills. It is possible that these results would not be obtained for separate special education and remedial writing With only 30 special education samples, however, the authors did not pursue separate analyses.

Generalizations beyond this sample should be limited because the present study differs from

other studies in two major respects. First, most other studies have focused on regular education students, while we examined only the writing of low-achieving students and those served in special education. Second, while most studies have focused on holistic or primary trait judgments of higher order composition skills (Mullis, 1980), judges in this study attended only to the simple ability to communicate.

In summary, two direct scoring indices each can explain more than half of the variance in holistic judgments by experienced special education and remedial teachers of the "communicative effectiveness" of their students' 6-minute creative writing samples. These two indices-percent of words correctly sequenced (%CWSeq) and percent of correctly spelled words (%CSWd)—both are independent of the total number of words written, as is the third strongest predictor, the mean length of correct word sequences (ML/ CWSeq). They are quite efficient together, requiring 30 minutes for initial training of scorers, and then only about 5 minutes to score each paper. The strongest of these predictors, %CWSeq, is the more complex, including both spelling and correctly sequencing individual words. The second strongest predictor, %CSWd, reflects spelling only. Both indices gauge accuracy in applying specific, teachable skills to a natural classroom task. The classroom writing sample, as a terminal performance, can be used repeatedly over time, and may be useful for progress monitoring.

Charney's statement that it is disconcerting to find holistic scores, which are supposed to be a qualitative measure, so directly predictable by such mundane quantitative measures as the length of the sample, the number of errors and the number of unusual vocabulary items (1984, p. 75) may miss an important point. For low-achieving students such as those receiving special education, these "mundane" features may be the minimum essentials for simple, literal communicative effectiveness.

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APPENDIX A STUDENT WRITING SAMPLES

Special Education Writing Samples

1 suddy - I herd a mass and it made me want to go lad but I didn't dwent a hed Jun I heard a mother nose it souded Lide summond was plaine aperione July dwent up I'm skurley stero then I feel throw and diget out of the pit Then ed got going agean I wen look down the strest and went To TW kighen and The Joster was on and Then Leddy The focal came on it freat ne out I men frest and out dwen't To su bothrome The Ju fact was on in Then and Du tould was flushing by it Il. I got icard agean doing aidn't more not so do / so I some out of Im Richer and I vent to the dor the front dor and elgot out see down home and my morn sind wer wer you are all denty how come be couse I was in Da wend how.

sundly a gostle hope walked toround me and I went throw her later of times and a shalten appeared angle a blrying disk with knife on it

but the was moveing nother our open and were a pig, madre tor 7 feart (1001) and from the hope a gust the rose,

17 .

Sad yey can not and hose, I can go in their if it want to no but es sisgeing to stop menthe gost sad I can stop yey if yey when me to. No you can Not the be caus you are a gost why can to you inthe hose becaus it is hanted, I will go in the hose and I find out Some one lives that I can not tell you his name of of I can not tell you his name

A gost popt out of no wer and I ran under a taball. The gost bid not see me then I locket behind me and I saw a dead man. Then the gost spoted me and came after me then I went in to a nuther room and then was a holl group of gost's that were around the tabt taill the were eating and tolking to ech other and then I stood on a chear and I so. a gost coming from behind It posht me of the hear chare and all of the gost herad me thay came after me and I fell boun in to a both the how had no botu m.

They sens a fat man and he said wont your name my mame is Scott. Sett sind want your mane is Scott. Sett sind want your mane my name is bill. bill sind do you want to her to night. Scott sind yes. bill sind y are spou up her. Scott sind was in a car bill sind to Scott come over geme. Satt sind yes I will come over som time in the sommer.

the door shut and it was pichtik in these and then I feal in a hole and then I knew I was + rap, at flist I was scard and then aperson jumpout and scard me and the he grap me and took me withhim I was scard! and trighend I didn't know want fo do so I Still welk withhim then he nocked me out and the and put handcuff on my hand, my foot so I couldn't move then/I woke up and then L seen a apre in his hand and he dromp the ax and let me fare and I ask him whay did you do that then.

Resource Consultant Training Program

I sow 4 big man, that man was vere big he was so big he hit his hed on the rit, and I ran to The back who to hid from Thay man he got up to gume autreme he had a meete he was goen to all me. alast I Lost he I hard he screm I run to my car it was smast I soll a neth car so I ran to it it must have be tow Mills at lest, the car was a 911 porshu. I got in sid w

I jest got hit with a bat and I did not fate wint Jest got hit by a Knifi wine he he he he he he did not be not he did not be with do you working to gent he did not lich I he d'The hours to live in the old brook hours senen strey liver there gooy cat:

and sed ZZZZ and grabed my hand and I peet my kenger/in a pensle sharper and grand it to the done of hid not now that my browther wat fallowing me and the the thing grade and grinded his face

Chapter I Writing Samples

crash from the back room. I few seconds later a heard another. It was even louder. I slowly walked closer to the door of the room in which the sound was coming from. Slowly, step by step, I got closer. It seemed like it was very for away because, I was walking so slow. Is I walked, it o boards under my feet creeked. I got to the door and put my hand on the door knot. It was eve cold. I slowly turned it and so the door opened, a light breeze come through. I continued organing it and the breeze got stonger! I spened the door and realized it was the wind opening and closing the shutters on the window.

The Door slamed that Behind me and I Jump. I heard SomeBodger Dlaying a Diano upstairs so I started to walk. when I got to the top of The stairs Thare was a door Off the The right of me. And It sounded like the music was in the room. So I opened The Door! And The Back of the Piano was facing me. Do I went up to it and it was Playing By its self. I Thought That it was one of Those PiAno's That Play By itself. But it Stoped and The Bedroom Door Shut. Then I heard A funny bugh. I got scared and Went to open the Door and it/would not open so I Took The chair That was By The DiAno. and Through iT

A great big harry
creature; umped out
and grabed me. As I was
being pulled into the house
by the harry creature, I took
out my Rambo knife and
cut him into creature steak.
That night we all had
creature steak, but nobody
knew what kind or steak
it was!

I was scared at first but then I went in. There was a floating sign. Itsed beware of the ghost who lives herefany tresposers will be elemented. I kept on going suddenly allh. I then a git of bones. The trapp door was apan so I pilled the bones and got out. I went a little farther and saw a ghost I was me so I ran and never went to that house again.

Resource Consultant Training Program

Suddenly the door closed. I coundn't open so

I went back and walked up the stairs. When I got

to the top of the stairs, there were these doors. I picked

the first door and went In- The room had furiture and a

table of The stair blass is a close t in the room so I moved closer

to it. I reached for the knob so I could open it when

I opened it a skelton fell out and landed on me. I

screammed and ran out of the 100m, and down the stairs.

After I got my senses back, I went into the kickten. I was looking for a knowle, so I could pick the lock and get out of here, but there was no Knowle only a touth pick and a pair of sun glasses. I started to pick the lock with the touth pick when I heard a click and the door opened and I was free.

I was going to nouse, when suddenly I heard. a scream, It was siry, I went into the house see what was the matter. when the door slowed, I de was spouked, and scared. Then I saw a lady in rags chased ver, up the status. Then She through me, di ran Islains. Their of giant enable. Short our, Then El. city But in the morning d know it was just

dell too the floor the door plansmed shut.

I got up and looked around notody was
there I started walking up stairs there
were ten doore I on one side and I on
the other. I desided to take the last
door on the left side. It was looked.

Then I tried the fith door on the right
side it was looked. Then I tried the first
door on the left side. It opened inside
was a spelatin on the wed puddenly it
otarted moving. It said come in have
a peat. I post down and suddenly chains
rop me to the chair. It raid, no locape
death to you, and the next thing I
now I m out front of the house the
door is closed. I never did so back
to that house again.

The Door sudenly Hommed Lehind me.

It would not open. All the wendows

were Boorded up, and I could not known The

boordwort. I begon looking for another Exit.

I went upstairs thrower now way out

There Io I tried the Bosement. I remember seings

on & a door to the hosement wen I was outside.

I found the door it was shut tight I could not get it

open, I begon loking oround the bosemen and I found

and homer. I went up stakes and knocked

The boordier the wundows out, That the / lost

time I go Tier.

There was a big flash of light! Then a flash light Dropped from the ceilling. I let out aborribable scream! I flew toward the door at amazing speeds, subdenly! The Door Slammed that, that's when I hit it. Man did that hult. When I fucke up I had a horribable head acke. I got up wondering where I was, when this guy came up to me. He look whiter than a very clean Sheet. He soid, did you see my flashlight? I soid flashlight? OH yeahere it is I soid. He soid thankyou and when ton his way. Well me I ran out the Door and never came back. The dual Slams Behind

so you ask if sany bodyes hear.

Then you start to walk up start.

Now field in a trap down and go to

the base ment of the hous! you look

for a light switch you hound it

then someome years you scream.

It turn out to be a ald yesen!

I went in and the screeched open. It was very scary and I was scared. The house was deserted. After I went in I heard some noises in a room. I went into the room and there was, an old lady. The old lady was very eericland. she had spiders craling all over her. At the time I thought that she was dead, but then she moved closer and closer toward me. I stared to run up the stairs and the stairs disappered right in front of me. / I run into a another room and it had lot of people in it , But the people were dead she had sucked and all of their blood out. They were white with lots of holes be on their bodges. I run out of the room into the yord. My car was were it was hard to see it but I managed to get to at and I got in it and drove away.

siden diery think went black, wheated into my pecker tackout a match But the match was wet it must have had an accident when etwenthis ough the floor it heard turny it wind noises coming I trend allowed with the right think get know something the took my heard. I they took my heard. I they took my heard. I this beature was teld me to go with is so I clied, then I thought that I heard excluded the stand of the way allowed the well was a cleaning. The next thing at know at water slice. When I track up heard beaute was taking a mich had faith.

APPENDIX B SCORING PROCEDURES

Scoring Writing Samples

Score each sample from after the title, if one was written, up to the star on the student's paper. The scoring procedures must be used in the order presented. Note that while these scoring procedures are called "objective," teacher judgment and interpretation will sometimes be required. Scorers in initial pilot studies achieved interrater reliabilities of .92 calculating the percent of illegible words and .83 for mean length of correct word sequences after a one hour training session (Parker & Tindal, 1988). The scoring procedures presented here are condensed for space considerations from a complete scoring manual (Hasbrouck, 1988).

The last page of this document contains the results of these scoring procedures applied to the writing samples of two middle school students with learning disabilities. The markings used allow students to later edit and correct their work. The objective scoring procedures described below are demonstrated using these samples as guides.

Number of Legible Words (used to calculate the Percent of Legible Words)

The number of legible words must be counted first, since the scorer judges each word OUTSIDE OF ITS CONTEXT, and that judgment must be made before the sample is read.

For writing to communicate, it must first be legible. To determine legibility in an objective manner, teachers first count the number of illegible words. An illegible word is defined as a group of letters that cannot be recognized as a single, particular word outside of the context of the phrase or sentence.

Scorers should mask the surrounding words using a card with a small slot cut out, or block out adjacent words with their fingers. Either way, be certain to examine only one word or group of letters, in isolation, at a time. Begin with the *last* word written before the star and proceed *backward* one word at a time until the first word of the story is reached. You must be able to *clearly* identify the word at *first glance*. If not, mark it as illegible with a wavy line beneath the word. (See Lines 1, 3, 4, 6, 8, & 10 of scoring sheet).

Total Number of Words Written (used to calculate the Percent of Legible Words)

A word is defined as a group of letters which have at least a reasonable resemblance to real words and/or are separated on the line by spaces to the left and right. Both legible and illegible words are counted. Abbreviations are counted as words, but numerals are ignored for this scoring. Compound words written incorrectly as two separate words are counted as one word (see Lines 10 & 11 in scoring sheet).

Percent of Legible Words

Calculate the percent of llegible words first, subtracting the number of illegible words from the total number of words and then dividing by the total number of words.

Correctly Spelled Words (used to score Correct Word Sequences)

Correct spelling plays an important role in the ability of writing to communicate to a reader. Circle all the words which are spelled correctly, given the context of the sentence. Numerals are ignored for this scoring. Known slang words can be considered correctly spelled if the student used a reasonably close phonetic spelling. Words written in the incorrect tense for the context of the sentence are considered misspelled (see Lines 8 & 10: "seen"). Ignore capitalization and

punctuation errors and minor grammatical errors where me/I or a/an are misused (for example: "He gave the letter to I." or "She ate a apple.")

The number of correctly spelled is not calculated as one of the scores in this procedure. It is simply one step taken in the process of identifying the mean length of correct word sequences, below.

Number of Correct Word Sequences (used to calculate Mean Length of Correct Word Sequences)

After legibility and correct spelling have been assessed, the next aspects of writing to consider are (a) whether the words have been accurately used to convey meaning (semantics) and (b) whether words have been accurately combined using grammatical structures (syntax). This is measured objectively by counting the correct sequences of words.

A correct word sequence is defined as a sequence of two adjacent correctly spelled words which is acceptable within the context of the larger phrase/sentence to a native speaker of the English language. The term "acceptable" means that the scorer judges the word sequence as syntactically and semantically correct and appropriate (Videen, Deno, & Marston, 1982). A caret mark (^) is used to indicate each correct word sequence. A carat is placed above and between the two words. (See scoring sheet). Each correct word sequence is marked by one caret, and may continue in an unbroken sequence of carets as far as the end of the sentence. Sequences stop at the end of sentences, before an incorrect conjunction (see below), or whenever two adjacent words are not correctly spelled, and both syntactically and semantically correct. One caret is marked over the 3-minute star if the word on other side of the star is both correctly spelled and part of a correct word sequence (see Lines 7 & 12).

Poor writers frequently write run-on sentences where conjunctions such as and, but, so, or then are used incorrectly to link too many clauses together. If a conjunction is used improperly to link 3 or more clauses, then the scorer must judge which pair of clauses fit best together, if any. The incorrect conjunction will be considered an error, even if it is correctly spelled. It may be crossed out to make scoring easier. Correct sequences will end at this "extraneous conjunction." (See Lines 9 & 12).

Mean Length of Correct Word Sequences

A widely accepted goal for written expression is for students to use expanded sentences to increase syntactic maturity (Isaacson, 1985). To score this aspect of students' writing, go back over the passage and put parentheses around each unbroken string of adjacent carets marking correct word sequences. (See scoring sheet). Count how many carets marking *unbroken sequences* are within each set of parentheses and add those numbers together. Divide the sum by the total number of sets for the "mean length of correct word sequences."

APPENDIX C SAMPLE RANGE FINDERS

I hike 79ted beoust have To men trins and a have go men trins and a have u grid hrend nam kim and she lie nislacind she is igned and has a sist x xx nam shah, she is ignad and she is lietidid.

like being in the 6th (or 7th) grade because ...

a like soverth greade Letter then the sixth greade, at soverthis speriod to to be seeth Loot and Tim & mike to furning to. I

like being in the 6th (or 7th) grade because ...

I like being in the 6th (or 7th) grade because ...

of like it is fun to be un this 6# prevole lut four tops to my frunc is fun to take to she is nucl to be well her name is lear she said that me and her is faired to be With fill have fun she past stuff for most and I bet for some stuff to she gave

I like being in the 6th (or 7th) grade because ...

Thave alstoped frend
his name is steft
ne has a Brother not mod
fray ne is gay and I
don't lick im that ray
I Lick thes scoole But
it ton't Lick me
it hat's me It I am
in trobb Becas i DiDent
snow for a metering I
naft to so to satr day
and the don't lick it

If I won the Lottery, ...

2

doue to be a hoppey mois and good would shake a fall soil my does a not suck a since my does a corp and a corp and a corp and a corp and a corp of to eat and I will list a wife to muly and I would have two Boys word & girls to and I have two Boys word & girls to and I have two words so one of the soil have two boys word & girls to and I have two

I like being in the 6th (or 7th) grade because ...

2

Docaunse I like the teacher.

and I like the fun thing they
give us and I like doing nomework
because it is neat to do and
I like doing brake* and the
teachers are nice and stuff

2

Fuould get a new Raider and Faloudget My Browth Ea new Raider and a watch and and fee would be like to go to a mobile and then I would go to california and see My gramma and then I would go the

If I won the Lottery, ...

3

if I wore the lorred of would buy A 228 and a t. U for new room and Done close and then I would tack a trip to Cal. for a year or to and Dand Done money on Jenny Hullert By hepe Done close and come hone and help get us a better house get my mon A 228 my dad & A. 4XY truck and my Dester a

3

If I won the Lottery

Of I won the lottery this
week I would buy me a horses
and a farm and work there or
I would go back to Idho and viset
my best best freind I would graduate
from High school & that would be
fun + so would stang a feel Horse

I went up to the old deserted house. The door was open so I walked in. Suddenly...

3

The Old Wall's house.
The door brut & screamed then & walked down three flites of stores, and on the right was a door I walked up to it and it was a dungen and people were hanging around as fin hanging from the ceating than I whent in another door to Mr. Doran, was cut in to since like a puzzlo.

If I won the Lottery, ...

3

Buy a new rowh and I also would Buy me a Mu fet and then & cludul Buy me a Mansion a dass would Buy soo a tielet to go to Hong Kong when I will go and Stay there and bravea good time I would come Back when my trip is over I would come buck when and sit fown and I would rest from

I went up to the old deserted house. The door was open so I walked in. Suddenly...



Started flying wound the room. Fit lights word offer a screamed them of hand mother. The lights still travent Carrie on yet was true or hought someone had been near recently. But ed queso of was wrong become mousene

a heard a morse and I went to was consing it. Then I saw a by room d went in Then the door shut behind me and a was seared, Someone pulled me over to the bed then ... I trued to get up I was sinking down on the bed. Then pulled in and It too to a / chocolote bactery

I went up to the old deserted house. The door was open so I walked in. Suddenly...

I hard something crash inside the old house. So I crept slowly apthe porch steps. I I walked ap to the door and waited. Then I pashed the door and it opened. I walked in and I saw

(5)

Suddenly the door Slamed of Jumped. It tried to get out bot the door was locked. I walked into the Kitchen and there was blood everywhere. After that it was getting ready to watk up the Slairs when the steps lurned into sticky/ marshmellows, Then I finally got up the Slairs

I went up to the old deserted house. The door was open so I walked in.

Suddenly...

Man walked out from belong the door

I couldn't see Mes face but I could

See what he was wearing he had

a beg knife Philipping I Started

running away from the house. I came

back thanker does the oor was open so I was

6

On elice feeling Came over me. It was pitch Block. I reached in Side my pocket I brought with me. I flicked the lighter once and it sparked I did this as I walked down the half the lighter lite / si it did a 1 ... an was on the floor shot in the Head-Drain out fast as did someone shot at me.

I went up to the old deserted house. The door was open so I walked in. Suddenly...

6

I heard a moise it was coming from supstairs. I went to invest agate. I went in a room it had chairs with old dustry sheets on them. I looked I heets on the closet not knowing if I sould of but it was to late mow I already had opened it, as I turned because

lfell through the porch! and that the broker boards that I had fell through mended themselves. I tried to best out but it was no use. On I was sitting for about a princetes a light was gloring about of mi, I had consign toward it, fingly a frenched the light and

I went up to the old deserted house. The door was open so I walked in. Suddenly...

No title

He walked in and saw an empty chair and radio. He searched through all of the rooms. In the last room he saw a man on the floor, now the kid was worried. He ran to the police station without a break. When he got there he was out of breath. The police there asked him, "what is

(7)

Cin ald pran come out italism Detrind a stack of baxon (Con he yellow It scaud me so bad I couldn't even scream. What are now doing here he appeal his voice who trough and cleep. I duding think anyone will here. I starmened, sureprised that I could wien talls. Well I do, now your treat.

I went up to the old deserted house. The door was open so I walked in.
Suddenly...

jumped out at me cond

Said "What are you doing

En my hows?". It said "I was just looking anound

and saw the house's down was open and So Cl went in!"

If I knew you were living here I wouldn't of Come in So he said "that's oh!" I'm Sorry I scared you, and clim sorry I yelled at you. He told me to take of my coat and Stay awhile. To a sayed he told