

## SENTENCE-COMBINING IMPROVES WRITING — CAN IT IMPROVE READING COMPREHENSION?

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Sentence-combining (S-C) as an instructional technique involves combining several kernel sentences into a longer, more complex sentence containing adjective and adverbial modifiers, phrases, dependent clauses, etc. S-C has recently been proposed as an instructional technique useful in improving student performance in writing and in reading comprehension. Research into the efficacy of this technique has already been conducted in the disciplines of English, social studies, science, and foreign languages. Logically, sentence-combining would appear to be applicable to any discipline which involves writing and reading skills.

The purposes of this paper are: (a) to provide background information containing an overview of the theoretical base, an examination of the initial research in the field, and a definition and illustration of S-C as an instructional technique; and (b) to summarize the results and analyze the methodology of the empirical research from 1968 to 1981, including data from a meta-analysis of the studies.

### Background Information

S-C has its roots in the generative-transformational (g-t) theory of grammar as developed by Chomsky (1957). Two particular aspects of g-t theory led to the initial research in S-C. Chomsky hypothesized that there were two levels of language, the "surface structure" and the "deep structure." The surface structure consisted of the linear sequence of words, phrases, and clauses which constituted a sentence; the deep structure consisted of one or more underlying propositions, or units of meaning, which the surface structure represented. The relationship between deep structure and surface structure was not one-to-one since underlying propositions could be represented by a number of different surface structures. Secondly, Chomsky described the way in which surface and deep structures were related through transformations. One type of transformational rule designated the operations affecting two underlying propositions so as to join them or embed one in the other. O'Donnell, Griffin and Norris (1967) referred to these operations as sentence-combining transformations, because the effect was to produce one sentence where otherwise there would have been two.

Although Chomsky provided the theoretical base for S-C, it was Hunt (1965) who supplied the impetus and initial methodology for much of the subsequent research. In order to provide a systematic procedure for the quantitative analysis of syntactic structures, Hunt devised the "minimal terminable unit," or "T-unit," which he defined as "one main clause plus the subordinate clauses attached to or embedded within it" (p. 49). In his study of syntactic development in the writing of schoolchildren between grades 4 and 12 and in the writing of skilled adults, Hunt found that older writers used a much larger number of sentence-combining, sentence-embedding transformations per T-unit than did younger writers. Although Hunt did not attempt to validate S-C as an instructional strategy, he suggested the possibility that a "sentence-building program" could be designed to promote the attainment of the developmental stages in syntactic maturity which he had identified.

Following Hunt's suggestion, Mellon (1969) explored the effects of transformational S-C practice on the development of syntactic fluency in English composition of seventh-graders. However, Mellon also gave his experimental group instruction

in g-t grammar terminology. Thus, while the results did indicate a growth in syntactic fluency, the relative contribution of learning the g-t terminology and of the practice in S-C to that growth was not clear.

In order to examine the effects of S-C practice alone, O'Hare (1973) disposed of the teaching and use of grammatical terminology in performing combining operations by devising a method of providing written cue words for selected types of S-C transformations. O'Hare's experimental group of seventh graders experienced highly significant growth at the .001 level on all measures of syntactic maturity.

The two types of S-C exercises most used since 1973 have been modeled after the methods proposed by O'Hare (1973) and Strong (1973). O'Hare's method has been designated as "signaled" S-C exercises. In the example which follows, the A form is the S-C problem and the B form is the acceptable student answer.

- A. Edna was amazed at SOMETHING.  
Ron had forgotten the combination. (THE FACT THAT)
- B. Edna was amazed at the fact that Ron had forgotten the combination.
- A. Julio should admit SOMETHING.  
He was there. (THAT)
- B. Julio should admit that he was there. (O'Hare, 1975, p. 20)

As an alternative to O'Hare's "signaled" method, Strong (1973) developed what he termed "open" S-C exercises. Kernel sentences were presented in clusters but without signals to indicate the particular transformations to be used, or even which of the sentences to serve as the base clause. Students were told to combine the kernel sentences into complex sentences; versions generated by different students were then compared. Here is an example.

### ROCK CONCERT

1. The singer was young.
2. The singer was swarthy.
3. He stepped into the spotlight.
4. The spotlight was red.
5. His shirt was unbuttoned.
6. The unbuttoning bared his chest.
7. Sound ballooned around him.
8. The sounds were of guitars.
9. The sounds were of drums.
10. The sounds were of girls.
11. The girls were screaming.

One student might generate the following: "The singer, who was young and swarthy, stepped into the red spotlight. His unbuttoned shirt bared his chest. Sounds of guitars, drums, and screaming girls ballooned around him." Another student might combine all 11 sentences into one sentence: "As the sounds of guitars, drums, and screaming girls ballooned around him, the young, swarthy singer stepped into the red spotlight, his shirt unbuttoned, baring his chest" (Strong, 1976, p. 62-63).

### Review of Research

The literature search resulted in locating 20 studies<sup>1</sup> reported from 1968 to 1981 which had used S-C as a treatment to improve written composition, reading comprehension, or both. Fourteen of the studies were concerned with the effect of S-C training on written composition only, with four containing measures of both writing and reading. Only two studies examined S-C's effect on reading comprehension alone.

Of the 20 studies examined, 19 contained subjects which ranged in age from grade 4 through college freshmen, and one study used Chinese students of unspecified adult level. Eight of the studies used subjects in grades 7-9, seven used college freshmen, and three used subjects in grades 4-6. One researcher,

Fisher (1973) used subjects in grades five, seven, and nine.

The studies generally suffered from several validity threats common to educational studies conducted in field settings. The samples used were, almost always, selected on the basis of convenience and/or availability. In fact, 17 of the studies did not specify how the samples were chosen, and in only one (Mellon, 1969) was any serious attempt made to claim representativeness.

Another validity threat common to this research was the method of assignment to treatment and comparison groups. Three of the studies used a single group design, eight used intact classes, three used a matched pair technique, one used matched groups, and only five used a random assignment technique.

The statistical technique represented most often in the twenty studies was the *t* test. It was used by nine of the researchers while ANOVA was used by four and ANCOVA by five. One study used a regression analysis and one did not specify the statistical procedure used. A clear weakness in relating statistical procedure to overall design is seen when one finds that, of the eight researchers using intact groups, three used inappropriate statistical procedures, i.e., *t* test or ANOVA. The others used the appropriate technique, ANCOVA.

The treatment time was also of interest. In several studies it was rather difficult to estimate. In only one study (Ney, 1976), however, was it not possible to make some calculation. The length of the treatment ranged from 20 minutes to 8 months, although most were more than 10 weeks. It was not possible to compute treatment times in the same units of measure so that more precise comparisons could be made. Also, it should be noted that 17 of the 20 treatments occurred within regular classrooms, decreasing the threat of novelty/description effects when applying these results to classroom practice.

In order to synthesize the results of this research a meta analysis was completed. Meta analysis is a procedure first suggested by Gene Glass in which the results of the studies were converted to effect sizes (ES). The ES is an expression which compares the gain made by the treatment group to that made by the comparison group. The simplest mathematical

expression of ES is:  $ES = \frac{\bar{X}_T - \bar{X}_C}{SD_C}$  (McGaw & Glass, 1981).

Thus, an ES of .73 would indicate that the treatment group made .73 standard deviations of progress more than the comparison group, while an ES of (-.73) would indicate the same amount of progress, with the comparison group exceeding the treatment group. It should be noted that in several of the following analyses the number of ES's were too small to provide valid results. However, the analysis was completed because the results could be valuable in generating hypotheses regarding the comparisons.

Table 1 shows the results of the computation of ES for several groups of studies. The purpose of the first group of ES's for writing and reading was to ascertain the overall effects of S-C as a treatment. To accomplish this, *t* tests for the differences between a sample mean and a population mean were computed. Since both of the *t* values related to writing were clearly less than the acceptable .05 level of significance, it seems safe to conclude that S-C has been effective as a measure to improve written composition. Also, the *t* value for reading with immediate recall was significant. However, the number of ES's available for analysis of the delayed measures of writing and for both reading measures was rather small, suggesting the need for continuing substantiation of S-C effectiveness in these areas.

A second question which was of interest was whether or not certain writing and/or reading measures resulted in ES's which were different from each other. Four types of writing measures were compared through ANOVA and a non-significant F ratio resulted. Two types of reading measures were also examined,

and it was found that the mean ES of the cloze measures was not significantly different from the mean ES of the standardized test measures. In both analyses the number of the ES's was small.

When a comparison of the three varying grade level classifications was made through ANOVA, followed by a Duncan Multiple Range Test, it was found that the mean ES for Grades 7-9 was significantly higher than that of the other two levels. There was no difference between the means of the College Freshmen and the Below Grade 7 classifications.

The final comparison was among the various types of comparison groups used, and it resulted in a non-significant F ratio. Here, again, the small number of ES's for some types of design would lead one to question the validity of this F ratio.

In summary, it appears that S-C has been shown to have a positive effect on written composition when the criterion measure is taken immediately upon completion of the treatment. The effect of S-C on reading comprehension is not as clear. While the mean ES was significant, there were only five studies and 17 ES's available for analyses and, of the 17 ES's, only six were significant. Several individual researchers who used standardized tests suggested that these tests did not measure the types of comprehension most likely to be affected by S-C practice. The research techniques used in these studies often failed to exercise rigorous controls over internal validity threats. Of the twenty studies examined, only ten used designs which would control adequately for internal threats. These ten studies used either random assignment to groups or intact groups with an ANCOVA statistical analysis. While it would be very desirable to achieve more representative samples, it seems unlikely that this weakness will be remedied in future research because of the realities of conducting research in schools. However, it would behoove future researchers to provide more complete descriptions of the samples used, regardless of the method of selection.

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<sup>1</sup>A list of the 20 studies may be obtained from the authors.

Table 1

## RESULTS OF EFFECT SIZE FOR SELECTED VARIABLES IN S-C RESEARCH

Variable	XES	St. Dev.	No. ES	No. Studies	Results of Analysis	df p level
Writing: Immediate Recall	.764	.736	84	16	t = 9.55	df = 83; p < .001
Writing: Delayed Recall	.649	.050	7	3	t = 5.41	df = 6; p < .01
Reading: Immediate Recall	.357	.545	17	5	t = 2.75	df = 16; p < .02
Reading: Delayed Recall	.179	.240	8	1	t = 2.08	df = 7; p < .10
<b>Writing Measures</b>						
Commonly Used Words/ T Unit	.975	.800	16	9	F = 1.54	df 3, 47; p = NS
Words/Clause	.617	.472	17	9		
Clauses/T Unit	.600	.718	11	5		
Holistic	1.186	1.057	7	5		
<b>Reading Measures</b>						
Cloze	.504	.814	4	3	F < .10	df=1,11; p = NS
Standardized Tests	.341	.341	9	4		
<b>Grade Level of Sample</b>						
Below Grade 7	.521	.421	12	3	F = 7.19	df 2, 89; p < .01
Grades 7-9	1.075	.929	36	6		
College Freshmen	.536	.394	44	7		
<b>Type of Design</b>						
No Comparison Group	.863	.645	7	2	F = 1.52	df 4, 107; p = NS
Matched Pairs	1.079	.965	10	3		
Random Assignment	.657	.870	41	5		
Intact (ANCOVA)	.526	.475	37	5		
Intact (ANOVA or t)	.559	.269	17	3		