

REFERENCE:

LEFFA, Vilson J. Compensation and interaction in the reading process of L2 students. *The ESPecialist*. São Paulo, v. 9, n. 1/2, p. 85-95, 1988.

COMPENSATION AND INTERACTION IN THE READING PROCESS

OF L2 STUDENTS.

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RESUMO

Esta pesquisa investigou a hipótese de compensação de Stanovich (1980), que sugere que o leitor pode compensar uma deficiência eventual por meio de outras capacidades que tenha mais desenvolvidas. 165 alunos leram em L1, português, variantes de textos de tópico conhecido/desconhecido, com/sem título, com/sem palavras alteradas, e responderam a perguntas, de pontos principais, de detalhes, e de inferência. Os resultados apóiam a hipótese, e sugerem que o fator tipo de pergunta afetou mais o desempenho que o conhecimento prévio de tópico ou das palavras do texto.

1 INTRODUCTION

The study reported here was conducted to test compensation and interaction (Stanovich, 1980) between two knowledge sources which are assumed to play a decisive role in comprehension: word recognition skills and previous knowledge. Assuming that the controversial results found in previous studies (Johnson, 1981; Hudson, 1982; Adams, 1982; Freebody & Anderson, 1983; Carrell, 1987) are due to problems of internal validity, special measures were taken in an attempt to attenuate these problems.

2 METHODOLOGY

2.1 SUBJECTS

Six classes of secondary-school students, ranging from 8th to 11th grade, were chosen for the study, making up a total of 165 subjects, of which 70 were boys and 95 girls. Their mean age was 16 years. The subjects belonged to two schools in Porto Alegre, a major city in Southern Brazil, and should be regarded as typical secondary-school students from middle and lower-middle classes.

2.2 MATERIALS

Six small reading passages were prepared for the study, using a series of manipulations, intended to

control both previous knowledge and word recognition.

For the control of previous knowledge, three aspects were considered: (1) use of titles, (2) use of different texts, (3) use of different questions. The first manipulation was to provide three of the passages with a title, leaving the other three without it. Care was taken to use titles that neither reproduced the main idea of the passages nor misled the reader into false expectations. The purpose of the title was just to activate the adequate general schema, where the reader would anchor further information from the text.

Previous knowledge was also controlled through the use of different texts. For this purpose, two passages were considered; one involving concepts that should be very familiar to the subjects, opposed to a passage that was specifically selected for its assumed difficulty.

The first passage was on milk production and was considered to be easy because the basic idea discussed was that science should be credited for the increase in production. The second passage was on sound propagation and was based on two concepts which

according to our intuition, was against our subjects' idea of sound, namely, that sound propagates on solids and that it does not propagate by itself. It was expected that this passage would produce lower scores than the first one. Since both texts underwent the same language treatment, differences in comprehension scores would be attributed to differences in previous knowledge.

Previous knowledge was finally controlled by using different question types. Three types were considered: (1) main idea questions, (2) detail questions, and (3) interpretation questions. The main purpose of these question types was to evaluate comprehension in general, but it was also expected that the interpretation questions would be more demanding, in terms of reader's reasoning abilities and might produce lower scores than the other two types.

Word recognition was manipulated by using three types of passages: (1) intact, (2) 20%-altered, and (3) 50%-altered. For the altered passages a word substitution procedure was used on two levels of difficulty. On the easier level, every fifth word was replaced by a nonsense word, producing a passage that was 20% altered. On the more difficult level, every second word was replaced, producing a 50%-altered text. These nonsense words were described to the subjects as foreign language words. The reason for choosing nonsense words - instead of real low-frequency words, for example, - was the possibility it offered to manipulate not only the open system of the language (nouns, verbs, etc.) but also the closed system (pronouns, articles, etc.). It was also assumed that the use of these artificial passages, although it provided strange-looking texts, had the advantage of putting all subjects on the same knowledge level in terms of word recognition, that is, the ability to give meaning to these words depended on other knowledge sources (ability to use context, to activate the adequate schema, etc.) rather than word recognition.

The six topics of the passages - not the titles really used - were (1) sound propagation, (2) the difference

between butterflies and moths, (3) cat fighting, (4) the role of color in automobile safety, (5) the way fish sleep, and (6) the production of milk. These six passages were treated as follows: (1) intact passage with title, (2) 20%-altered passage with title, (3) 50%-altered passage with title, (4) intact passage, no title, (5) 20%-altered passage, no title, (6) 50%-altered passage, no title.

In order to counterbalance for possible unsought differences between passages or between treatments, the six topics were combined with the six types of treatment to form six rows, in such a way that each topic would have a different type of treatment in each of the rows. It was expected that the six rows would be helpful not only to prevent cheating during the testing sessions, but also to further validate the results, by comparing means of scores between rows (which should not be significant) with means of scores between passages and between types of passages (which should be significant).

The passages were followed by three multiple choice questions, which were always the same, regardless of the treatment given to the passage. The choices for each question, as far as possible, were worded in a way so as not to allow for the identification of passage topic.

Before administering the test, the passages were submitted to three Portuguese teachers. There was total agreement as to the suggested answers.

2.3 PROCEDURES

Subjects were tested in their regular Portuguese classes. Test sheets, four pages each, were organized into rows, from A through F, and were handed out in exactly that order. When all subjects in the room had their copies, the instructions were read

to them, two practice items were done, and the students started the test. There was no pressure to finish it. Three of the tests were administered by the author, the other three by the respective classroom teachers.

3 RESULTS

Subjects' responses were analyzed in terms of the working hypotheses implied in this investigation. The first hypothesis, in accordance with the interactive-compensatory model, was that the title would play a role in comprehension only when word identification failed. This hypothesis is supported by the findings, although not at a high level of significance.

Table 1 shows that the difference between means is not significant when the scores of the three titled passages are compared with the scores of the untitled ones. When the passages are isolated in terms of language treatment the difference still remains insignificant for both the intact passages and the 20% altered passages, vertically compared. This can be explained by the fact that the differences between means of those two passage types are not significant either, compared horizontally; in other words,

substituting a nonsense word for every fifth word does not affect comprehension for both titled and untitled passages. As was hypothesized, when the reader can read and understand a passage, there is usually no need to read the title.

Whereas comprehension is not affected at the 20% level of deterioration, something serious happens when deterioration reaches the 50% level. Horizontal differences are now significant for both titled and untitled passages, but more so for the untitled. Reading a title when the passage was deteriorated to the 50% level made a significant difference for readers in the experiment, even considering that the questions asked could not be directly answered from the title.

Although word recognition plays a more definite role in comprehension than the existence of a title, there is a visible interaction between the two variables.

Table 1 - Means for Passage Types (0% = intact passages, 20% = 20%-altered passages, 50% = 5U%-altered passages)

Titled	Overall	0%	20%	50%
Untitled	5.52	2.05	1.95	1.53
Significance	5.39	2.02	1.94	1.33
	n.s	n.s.	n.s.	p<.05

N = 165

Notes:

(a) Difference between 0% and 20% is not significant.

(b) Difference between 20% and 5U% is significant: (p<.01).

Apparently, the role of the title in accessing previous knowledge can be equally performed by other information sources from the text. Unless these sources are really deteriorated, the title can be dispensed with.

The second hypothesis was that different scores would be obtained with different texts, due to conceptual problems involving the topic of the passages. In order to test for this hypothesis, two texts were isolated; one on sound propagation, supposed to be more difficult, and one on milk production, supposed to be easier.

Results, as demonstrated in Table 2, confirm the expectations in terms of difficulty; the text on sound

propagation was almost twice as difficult as the one on

milk production. In fact, the difference in scores was highly significant and almost beyond expectation.

Rather coincidentally, conceptual knowledge turned to play exactly the same role in comprehension as word recognition, allowing for a perfect interaction to occur between the two variables. This can be seen by examining the data in Table 2. The mean (1.48) for the intact Sound Propagation passage is exactly the same as the mean for the 50%-altered Milk Production passage. In other words, scores are lowest (.96) when both word recognition and conceptual knowledge are truncated, higher to the same level of significance when either is facilitated (1.48), and highest (2.14) when both are facilitated.

TABLE 2 - Means for passage topics, considering the easiest and the most difficult passages (0% = intact passages, 20% = 20%-altered passages, 50% = 50% altered passages)

Sound Propagation	All	0%	20%	50%
N	1.25	1.48	1.32	.96
Milk Production	(165)	(54)	(57)	(54)
N	2.14	2.49	2.37	1.48
Significance	(165)	(57)	(54)	(54)
	p<.001	p<.001	p<.001	p<.002

A third measure of previous knowledge was taken by using different question types. These questions should assess three different skills, that is, the skills necessary (1) to integrate information into a main idea, (2) to identify a detail in the passage,

and (3) to interpret implicit information. The hypothesis was that questions aimed at getting the main idea of the passage would produce higher scores than detail questions. This difference should be largest when word recognition was most affected (50% level of deterioration). Interpretation questions, because they involved more elaboration, should produce the lowest scores. The results are displayed in Table 3.

TABLE 3 – Means for question types (0% = intact passages, 20% = 20%-altered passages, 50% = 50%-altered passages)

	All	0%	20%	50%
Main Idea	4.70	1.68	1.68	1.34
Detail	3.72	1.53	1.32	.87
Interpretation	2.49	.96	.89	.64

N = 165

The hypothesis is partly supported. The difference between means, when all passages for each category are considered (first column) is, in fact, more significant ($p < .01$) than was originally expected. Detail questions are also more affected by word recognition deficiency than main idea questions. It can be seen, for example, that main idea questions produce the same scores for both intact and 20%-altered passages. Statistically, the difference between intact and 50%-altered texts on the main idea line is half the difference for the same texts on the detail line,

thus confirming the hypothesis. What was not expected was that the difference between main idea and detail questions would occur with all versions, including the intact one.

The extremely low scores for the interpretation questions were also surprising. The mean (.96) for interpretation questions at the intact level was significantly lower ($p < .01$) than the mean for general idea questions at the 50%-altered level. In other words, the subjects were more successful finding the main idea in a text where 50% of the words could not be recognized than interpreting implicit information in normal texts where, in terms of vocabulary, all the words were familiar. Table 4 shows the significance level between different means for question types.

TABLE 4 - Significance levels between means for question types

		Main	Detail		Interpretation	
		50%	0%	50%	0%	50%
Main	0%	<.001	<.02	<.001	<.001	<.001
	50%			<.001	<.001	<.001
Detail	0%			<.001	<.001	<.01
	50%				n.s.	<.001
Inter.	0%					<.001
	50%					

4 CONCLUSION

The main conclusion of the study is that results support the interactive-compensatory hypothesis. This was demonstrated by comparing the roles of two knowledge sources which should affect comprehension: word recognition and previous knowledge. As either source was experimentally degraded, the other source was found to gradually take over and compensate for it.

This conclusion is arrived at by measuring previous knowledge along three degrees of complexity. The challenge was to find a difficulty level in terms of previous knowledge that would correspond to that of word recognition, regarded as one of the most decisive factors in comprehension.

Three levels of previous knowledge were considered: (1) knowledge of the topic to be read, (2) knowledge of the concepts involved in the passage, and (3) knowledge of certain reasoning skills.

Knowledge of the topic to be read was measured by controlling the title, which was either printed or omitted. This simply discriminated whether subjects knew beforehand what they were going to read about. As expected, this was found to play a small role in comprehension and was significant only when word recognition was extremely deteriorated.

Knowledge of the concepts involved in the passages played a more significant role than topic knowledge. When compared to word recognition, it was found to stand on the same level of importance, allowing for an interaction to occur. Although the text used in the experiment made the new concepts explicit, readers had trouble grasping them.

Finally, what we defined as reasoning skills was found to be the most important factor in comprehension, that is, the difference in scores due to the kind of reasoning involved in answering a question was much greater than word recognition skills.

The results of this study suggest that word recognition is not the most important factor in reading comprehension. Although the investigation was not designed to bring evidence to the Communicative Approach tenet that the task, not the text, should be simplified, the results, in a way, confirm such an orientation. Simplification here means using topics, concepts and reasoning skills that are familiar to the students.

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