The Role of Prior Knowledge in Reading Comprehension

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This article describes a reading experiment designed to investigate the effects on reading comprehension of prior knowledge. In the experiment, three groups of students in different disciplines and at different levels of competence in English were given a series of comprehension tests on four texts on a variety of topics. An inter-group comparison of their performance across the four texts revealed that knowledge of the language was a necessary but insufficient condition for reading comprehension, and that a significant variable was the resources the reader brought to bear on the text. This was confirmed by an examination of the performance of individual groups on each of the four texts. From the results follow some general principles for the teaching of reading.

INTRODUCTION

The importance of prior knowledge in the comprehension process has often been recognized by teachers and material writers: students are encouraged to relate what they read in the text to what they already know. This encouragement often takes the form of a 'warm-up' session before reading begins. Sometimes, texts are rejected on the grounds that the information they contain is too unfamiliar to the students.

In spite of this, prior knowledge is often forgotten or ignored in discussion of reading texts. The difficulty of texts is debated as if linguistic factors were the only ones applicable; 'general' texts are rated as being more suitable for all classes than 'specific' ones.

The main purpose of this paper is to produce empirical evidence of the importance of prior knowledge. Recently, there has been a considerable amount of interest in the part played by prior knowledge in the comprehension of discourse. Much work on the topic has taken place in the context of 'schema theory' (cp. Rumelhart 1975). The impetus behind the present paper is the work of Widdowson (1979a, 1979b) which represents a significant attempt to deal with the problem of meaning in relation to extended verbal interactions. I will begin with a consideration of his theory, empirically test the claims arising from it and then report the results.

In Widdowson's system (1979b:1) "written text can be regarded as a set of directions for conducting interaction ... Meanings ... are not contained in a text but are derived from the discourse that is created from it" by the reader. Meaning does not reside in the text nor is a discourse to be thought of as the sum total of meanings expressed by its

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constituent utterances. "Discourse is not just a patchwork of preordained sentential meanings; it is a dynamic process of meaning creation" (1979a:129). It is clear from an examination of Widdowson's statement, that readers in his conception of the reading event are not the perfectly efficient interpreters that Halliday (1977) seems to assume, but variable creatures with different purposes and states of knowledge. If the text is represented as "a set of directions" then the reader is actually involved in following these directions in interaction with the writer through the text. While in Halliday's model the reader is peripheral, in Widdowson's conception the language user has a central part to play because there can be no "dynamic process" without active participants. In essence then, Widdowson treats a text as a record of discourse which is set down by the writer, while the reader's task is in the first instance to reconstruct coherent discourse, partly from the evidence of the text. No text, whether spoken or written, is fully explicit. It is composed against the assumption that the reader can "fill in" what is not directly expressed. Widdowson (1979b:14) thus postulates that success in this will "crucially depend on writer and reader sharing knowledge of different kinds ...".

Implicit in discussing Widdowson's interactionist approach is acceptance of the view that interpretation of a linguistic input depends on the contribution a reader can make. Furthermore, that for readers to interact with a text so as to re-create the discourse of which it is the record, they must bring with them an adequate knowledge of the language, and certain other kinds of knowledge, all of which I have termed *prior knowledge.*

In this paper, I focus on the role of world and communicative knowledge in reading comprehension. By *world knowledge* is meant the conventional knowledge that people have in general of things, events, actions: that is, the frame of reference against which interpretation takes place. It includes both domain and culture-specific knowledge. The term *communicative knowledge* is used to refer to the knowledge speakers have about language and verbal communication other than that covered in linguistic competence.

When one speaks of the need for knowledge other than linguistic for language users to interpret and make necessary inferences in comprehension, one is committed to the view that any output of grammatical rules and a lexicon would be inadequate as a specification of the writer's (or speaker's) meaning. A language-oriented model tends to over-simplify interpretive strategies, ignoring the complex processes underlying interpretation and in particular the role of prior knowledge, so that readers' difficulties have often been attributed (mistakenly, in my view) solely to language problems.

I have postulated above that understanding is related to the reader's prior knowledge. An empirical exercise will test the validity of this claim. If two groups of subjects at different levels of linguistic competence are given a series of tests, using different types of materials, and if subjects and materials are matched carefully so that some topics will be known to be familiar and others unfamiliar to different groups, then linguistically competent subjects would be expected to consistently and systematically achieve higher scores than those who are less competent, if the only resource readers

bring to bear is linguistic. Moreover, the scores of the linguistically competent groups would not differ significantly. Neither should there be any significant differences in the scores of the subjects over the texts. However, another possible outcome is that scores may vary with the *type* of text as well. Then their language competence alone could not be an accurate predictor of performance. Such an inter-group comparison of scores across all texts would satisfactorily eliminate the effect of text difficulty on results. Next, a group level analysis based on each group's performance on the texts should show a general consistent level of global comprehension. If group scores are consistently higher on familiar texts (i.e. texts on which subjects have some degree of prior knowledge of the subject-matter), then an important link between comprehension and prior knowledge would have been established. Comprehension would then have been established as a resource-based activity, and the richer the resources (both linguistic, communicative and other kinds of knowledge) the better the level of comprehension performance. The current investigation is summed up in two null hypotheses:

1.   There is no significant difference in the level of comprehension between groups, except in terms of linguistic proficiency.

2.   There is no significant difference in the level of comprehension of subjects on familiar and unfamiliar texts.

SUBJECTS

Three groups of 60 students each, from the National University of Singapore, took part in the experiment. The first group had come from Chinese-medium (CM) schools and were now studying business; the second group had also come from Chinese-medium secondary schools and were now studying science; and the third group had come from English-medium schools (EM), and were also now studying science. In this paper these groups are referred to as Business-CM, Science-CM and Science-EM respectively. Because of their school experience, the Science-EM group were markedly more proficient in English.

TEXTS

Four texts were used in the experiment, each approximately 400 words long. They differed in content, but were all typically academic/expository, centering on a single theme. The texts were classified generally as neutral or domain-related. Neutral texts were not specifically related to any particular course of study the subjects or any group of them had followed. Domain-related texts were directly related to a specific academic course of study of all or some of the groups. One text, *Business,* was in the domain of business. It dealt with the notion of control in organization and was familiar to the Business-CM group. Another text, *Science,* an extract from a journal on current issues, dealt with the subject of nuclear energy, a topic familar to all Science students. Hence it was familiar to groups Science-CM and Science-EM. The other two texts were neutral, or unfamiliar, for all the subjects. One text, *History,* was a discussion of the second world war. The fourth text, *Politics,* from an international scholarly journal, discussed a political issue. Both *History* and *Politics* addressed topics outside the formal educational experience of all three groups.

The relationship between group and familiarity of text is set out in Table 1.

Table 1 Group Familiarity/Unfamiliarity with Texts

Text / Group	Business	Politics	Science	History
Business-CM (non-proficient in English)	F	UF	F*	UF
Science-CM (non-proficient in English)	UF	UF	F	UF
Science-EM (proficient in English)	UF	UF	F	UF

F   Familiar
UF Unfamiliar
F* intended to be unfamiliar but subsequently found to be familiar to about half the group (see following discussion)

TEST INSTRUMENT

Cloze was used as a test instrument for the experiment. Admittedly there are problems related to the use of cloze. For instance, the passive vocabulary of EL2 readers is always higher than their active vocabulary so that failure to perform well on cloze may not mean the reader cannot make sense of the text. However, this difficulty is not critical to the present experiment because our interest is not in the readability of the texts, but in comparing how the three groups performed on each of the texts, and in how a particular group performed on each of the four texts. (For a further justification of cloze as a test instrument, see Koh 1984). For each text, every 7th word was deleted to yield 50 blanks for each text.

METHOD

A set of the four cloze test passages was distributed to each of the subjects. To reduce the effect of order on performance, the order in which the texts were placed in each set was varied. There was no time limit. However, most of the subjects completed the tests within one-and-a-half hours. In scoring, only exact-word replacements were accepted, as the texts were of a specialist nature and many of the content words were technical for which substitutes simply could not be accepted.

RESULTS

Table two presents mean scores of the three groups on the four texts. An analysis of variance of the scores shows that the groups were significantly different from each other with $F(2,177) = 177.63$, $p < .001$. Difference of text was also a significant factor, with $F(3,531) = 119.98$, $p < .001$. Interaction between group and text was also significant with $F(6,531) = 43.93$, $p < .001$.

Table 2   Mean Scores

Text \\ Group	Business	Politics	Science	History	Average
Business-CM	19.32	15.60	19.52	16.37	17.70
Science-CM	14.25	12.60	21.73	14.68	15.82
Science-EM	19.02	25.38	27.60	23.92	23.98
(Average)	17.53	17.86	22.95	18.32	19.17

DISCUSSION

Comparing group performance, taking the results of the two unfamiliar texts *Politics* and *History* first, it is obvious that the Science-EM (proficient in English) group did consistently better than the two non-proficient groups: Science-EM means of 25.38 and 23.92 compared favourably with Science-CM scores of 12.6 and 14.68, and Business-CM scores of 15.6 and 16.37. The outcome reflects the superiority of the linguistically more proficient group Science-EM. Business-CM's better performance over Science-CM in both unfamiliar texts can only be attributed to the fact that of the non-proficient groups, Science-CM was in fact less proficient than Business-CM.

Since the same subjects were being tested, a similar pattern of results could have been expected for texts *Business* and *Science*. We shall discuss *Business* first. On this text, the Business-CM group averaged 19.32, compared with 19.02 for Science-EM. Thus on the text which was familiar to them, the Business-CM group did at least as well as the Science-EM group, despite the higher proficiency of the latter hgroup. Business-CM also performed better than Science-CM but this might, as before, be explained in terms of their higher proficiency.

Turning to the *Science* text, Science-EM (the group with high proficiency and familiarity with the topic) scored 27.6, the highest score in the whole experiment. Moreover, in contrast to their consistently low scores on the other texts, Science-CM produced an impressive result of 21.73, compared with Business-CM's score of 19.52. Thus on this ONE text which was familiar to them, Science-CM performed at least as well as Business-CM, and narrowed the gap between themselves and Science-EM noted in the other texts. There appears, then, to be clear evidence that familiarity with topic, as well as linguistic proficiency, has an effect on scores.

If one examines individual performance across the four texts, a puzzling fact emerges. Both the Science groups, linguistically proficient and non-proficient, achieved their highest score on the *Science* text, as was to be expected. However, the Business-CM group *also* scored highest on this text - slightly higher, in fact, than the group achieved on the *Business* text. Subsequent to the running of the tests, however, it was discovered that 32 out of the 60 in the group had been science students in their secondary and post-secondary education and were familiar with the basic scientific concepts which made up the content of the passage. This unexpectedly lent further support to the view that readers use whatever resources they have in store, even in long-term memory, in the process of making sense of text.

The results of the present experiment are closely comparable with those obtained by Alderson and Urquhart in a series of similar experiments. (cp. Alderson and Urquhart 1983). All the experiments showed what appeared to be a combination of the factors of linguistic proficiency and prior knowledge, with the absence of one factor sometimes being compensated for by the presence of the other.

IMPLICATIONS FOR TEACHING

The insight gained from this experiment emphasises two broad general principles in reading instruction. First, the teacher must take into account the enabling knowledge underlying any written text. Secondly, the objective of the teacher should be to develop in the students a problem-solving, creative, interpretive strategy, exploiting whatever knowledge or resources (linguistic, communicative, schematic knowledge etc.) they may have. The pedagogical focus should not be so much on the *product* as on the *process*. In short, students must be made conscious of what is involved in successful reading - that they must activate their resources in the *recreation* of meaning from the text, rather than focus on futile and pernicious word-for-word deciphering, which characterises much EL2 reading today. The crucial difference in outcome is understanding *one* text and developing interpretive skills they can apply to *any* text.

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