REVIEW ARTICLE

SCHEMA THEORY: HOW IS IT ACTIVATED IN L2 READERS?

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ARTICLE INFO	ABSTRACT
	A fundamental tenet of all recent theories of comprehension, problem solving and decision making is that success in such cognitive arenas depends on the activation and appropriate application of relevant pre-existing knowledge (Spiro *et al.,* 1987; Cited in Richards and Renandya, 2002). In this sense, understanding texts is based on the reader's general knowledge of the world (schemata) and the extent to which the relevant pre-existing knowledge is activated during the actual process of reading. But few empirical data are available about the processes by which schemata are evoked (Carrell, 1987).This study is an attempt to see how much of the schema is activated in L2 reading by adult ESL students who are proficient readers in their native language. An experiment is designed to investigate to see the 'how' of schema activation to see whether the relevant part of the schema or the whole schema is activated. Sixty third semester students (30 males and 30 females) studying ESL at Isfahan teacher training centers (Teachers' university), participated in the experiment. The subjects were first told to read a list of ten sentences (Read list) about the kitchen in English. To forget what they had already read, they were given some math problems. Then, the subjects were asked to search in the Test list (consisting of the ten sentences in the Read list and other sentences not existing in the Read list concerning both the kitchen or other parts of the house) and check the sentences they had already read in the Read list. The mistakes they made in checking the ten sentences were of two kinds: Relevant (about the kitchen but not existing in the Read list) and irrelevant (about other parts of the house). The results of t-value computation indicated that most subjects activated the relevant part of the schema (the kitchen). It also showed that significantly more male subjects activated the relevant part of the schema than females.

INTRODUCTION

Concept of schema theory was first used by the British psychologist Sir Frederic Bartlett to explore how the knowledge that we have about the world is organized into interrelated patterns based on our previous knowledge and experience (1932:201). Some suggest it was first introduced in 1926 by Jean Piaget. The concept was further developed mostly in 1977 by American educational psychologist Richard Anderson. Schema theory refers to the role of background knowledge in reading comprehension. Within this framework, **Perkins (1983)** refers to a process of 'semantic constructivity', that readers use to create meaning from a written or spoken text. Meaning in this regard is the result of the interaction between one's schema (background knowledge) and the reading. This implicitly indicates that one's linguistic knowledge alone is not enough in determining text comprehension. Rather as **Anderson *et al.* (1977)** point out 'every act of comprehension involves one's knowledge of the world as well (369). In the case of reading some suggest that what one brings to the text is actually more important than

what is in the text. **Anderson (1980)** defines schemata as "Large, complex units of knowledge that organize much of what we know about general categories of objects, classes of events ,and types of people" (129). In this view, the brain performs two functions: first, it receives and organizes information and then assembles it into organized and interrelated units available for immediate retrieval. **Widdowson (1983:34-5)** refers to schemata as "cognitive constructs which allow for the organization of information in long term memory which provide a basis for prediction". According to **Vacca and Vacca (1999)** schemata" reflect the experiences, conceptual understanding, attitudes, values, skills and strategies we bring to a text situation (p.15). Since schemata represent elaborate networks of information that people use to bring to make sense of new stimuli, events and situations, they are called "the building blocks of cognition "by **Rumelhart (1980)**. In addition to schemata, other terminologies such as plans, frames, scenarios and scripts are used for the representation of background knowledge in the production and understanding of discourse. Subsequent to the mid 1970s, the above related notions have been emphasized in cognitive science (**Chafe, 1976; Filmore, 1975; 1985, Rumelhart, 1975; Schank and Abelson, 1975**).

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Schema and Reading Comprehension

Reading comprehension, within the framework of schema-theoretical view is an interactive process between the reader and the text (**Carrell, 1983a, 1983b; Carrell and Wallace 1983; Carrell and Eisterhold 1983**). Thus, readers develop a coherent interpretation of text through the interactive process of "combining textual information with the information a reader brings to a text" (**Widdowson in Grabe 1988**). Viewed in this way, the interaction between knowledge already stored in memory and the new information is referred to as comprehension. In other words, as **Adams and Bruce (1982:23)** contend, "Comprehension is the use of prior knowledge to create new knowledge". To understand the role of schema in comprehending texts, it will be more beneficial to point to different types of schemata, that is 'formal', 'content' and 'general world knowledge' schemata.

Formal Schema

Readers are said to possess formal schema that is "background knowledge of the formal, rhetorical organizational structures of different types of texts" (**Carrell and Eisterhold, 1983**). In other words, readers are assumed to possess background knowledge about differences among rhetorical structures of different texts such as differences in the structure of fables, simple stories, scientific texts, newspaper articles, poetry and so forth (Ibid:79). Readers are also assumed to possess different expectations of each of these genres. For example, they expect a story to have a setting, a beginning, a development and an ending (op.cit, 79).

Content Schema

Content Schemata refers to Knowledge of topics and concepts for reading in particular subject areas such as history, physics, biology…..etc. Teachers often assist students in developing the knowledge required for understanding the technical and specialized vocabulary of their fields of study. Research by Johnson (in **Carrell and Eisterhold 1983**) suggested that a text on a familiar topic is better recalled than a similar text on an unfamiliar topic.

General World Knowledge Schema

The third type of schema, world knowledge schema, concerns with understanding social relationships, activities and causes that are relevant to many specific situations or cultures. It enables us as readers to engage in appropriate inferences while reading and to relate with persons and situations. Studies by (**Steffensen** *et al.,* **1979; Johnson 1981; Carrell 1981**) have all shown that the implicit cultural knowledge presupposed by a text and the reader's own cultural knowledge interact to make texts based on one's own culture easier to read and understand than syntactically and rhetorically equivalent texts based on a less familiar culture (**Carrell, 1987; Cited in Carrell,** *et al.,* **1988).**

The present study

Recent studies in second and foreign language reading indicate that the best predictors of comprehension are reader factors.

That is, the topic of a text and the extent to which readers have knowledge of that topic appears to be a much more powerful force in text understanding than text-based factors (**Allen** *et al.,* **1988**). In this view, the topic of a text appears to activate the relevant schema. But as **Carrell (1987 in Carrell 1988)** argues, the processes by which schemata are evoked are not well understood. The purpose of the present study was to examine schema activation to see how much of the schema is activated in L2 comprehension if the conditions that hinder adequate comprehension, that is absence of relevant schema, failure in schema activation, skill deficiencies……etc. are controlled. In other words, this paper investigates whether the whole schema or the relevant part of the schema is activated if ,for example, one reads some sentences about the wheels of the car ,does he/she activate the whole schema (the car) or the relevant part of the schema (the wheels) ? Or if one reads a set of sentences about the Kitchen (which is a subschema of the house schema) does he/she activate the kitchen, that is the relevant-to-topic schema, or the whole schema, the house?

METHODS

Subjects

Subjects, 30 males and 30 females, aged 19 to 25 participated in the study. The subjects were third semester students majoring English in Teacher Training Centers in Isfahan, Iran (Teachers' University). They were all Farsi native speakers and were naïve with respect to the purpose of the study. They were tested in group. Twenty of them had either no mistakes or didn't exactly follow the instructions. So they were excluded from the study. Therefore, from among sixty subjects participated in the study only 40 who had completed the Test list were carefully chosen and equally distributed in the two male and female groups (20 each).

MATERIALS

Two lists of sentences were constructed, 'Read list' and 'Test list'. The Read list consisted of ten sentences about one part of the house (here the kitchen). The Test list consisted of twenty three sentences about different parts of the house including the ten sentences in the Read list ,sentences about the bedroom, the yard, the hall,……etc., and other sentences about the kitchen not existed in the Read list. The sentences in the Test list were randomly ordered. The sentences in both lists were in English.

Procedure

The study included two tasks: Read task and Test task. First the subjects were told to read a list of sentences (Read list) about the kitchen, all appearing on a piece of paper. When finished reading, they were given a distracting activity (e.g. they were asked some math problems). The purpose of the activity was to help them forget what they had already read. After that, the subjects were asked to search in the Test list and check the sentences they had read in the Read list. Thirty seconds were allotted for the Read list, seven minutes for distracting activity and sixty seconds for the Test list. The allotted times were determined according to the pilot study.

RESULTS AND DISCUSSION

The test lists of the subjects were studied and scored. Each subject had two scores, one for his/her relevant mistakes and one for his/her irrelevant ones. For example, If one had three mistakes one relevant and two irrelevant, she/he scored 1 under the column of relevant and 2 under the column of irrelevant. Or if one had only two relevant mistakes, she/he was scored 2 under the column of relevant and 0(zero) under the column of irrelevant. So each subject had two scores, one under the column of relevant and another one under the column of irrelevant. Table 1 shows the scores obtained by the subjects (male and female) and the mean values of the relevant and irrelevant scores.

Table 1. The scores of each subject

Relevant	Irrelevant
2	0
2	0
2	0
1	2
2	0
1	0
2	0
1	0
1	2
3	1
1	1
1	0
1	1
1	0
1	0
1	1
3	2
1	0
1	0
1	0

Relevant	Irrelevant
2	0
1	0
2	1
1	0
0	1
1	0
1	0
1	0
1	0
1	0
1	0
1	0
1	0
1	0
1	1
1	1
0	1
0	1
0	1
0	1
0	2

N=40   40
Sx=45   20
$\overline{X}$ =1.12   0.5

In order to study the significance of the difference between the two means, the data was submitted to t-test, the results of which are shown in Table 2 below.

Table 2. The results of T. Value computation

	N	Mean	t-value	d.f	t-table level.05	t-table level.01
Relevant	40	1.12				
Irrelevant	40	0.5	4.17	78	2	2.65

To check to see whether this obtained 't'(4.17) is statistically significant or not, the t-table was checked. In this study, there were 80 subjects in the two groups (in fact 40 subjects but each had two scores for relevant and irrelevant mistakes). This gives a total of 78 d.f (40+40-2). The d.f (78) falls somewhere between 70 and 80. The experimenter chose 70 as being more conservative estimate, and checked the .05 and .01 levels of significance for rejecting the null hypothesis. The t-values needed for our selected significant levels of .05 and .01 are 2 and 2.65 respectively. Fortunately, our t-value (4.17) is high enough above the t-values of the table that we can safely claim that the relevant part of the schema had been activated for the second language readers. To see the difference between male and female subjects in this regard, the means of the scores of relevant mistakes of male and female subjects were computed and compared. The means of the scores, the t-value and the t-table are all shown in Table 3.

Table 3. The results of t-value computation of the means of the scores of male and female subjects

Scores	N	Mean	t-value	d.f	t-table level.05
Males	19	1.52			
Females	19	1	2.70	36	2.04

As shown in Table 3, the t-value (2.70) is high enough above the t-table (2.04) that we are quite safe in rejecting the null hypothesis below.

There is no significant difference between male and female ESL readers in activating the relevant part of the schema

This is support for the claim that more male subjects in the ESL reading activated the relevant part of the schema than female subjects. The results of the study and the analysis of those results presented in Tables 2 and 3 above showed how subjects utilized their schema (kitchen schema) in checking in the Test list the ten sentences they had read about the kitchen. It was shown that when the subjects made mistakes, the mistakes were relevant to the topic (the kitchen). That is, they checked sentences not existed or read in the Read list but were relevant to the topic of the Read list. In our conjecture that is schema which directed the subjects to be relevant to the topic (the kitchen). This study as an evidence to the role of schemata in reading comprehension, has implications for teachers. It implicitly indicates that teachers should provide the students with pre-reading activities to help them activate the relevant part of the schema. It has also implications for text book writers to design materials with topics that easily help the activation of relevant-to-topic schemata.

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