THE IMPACT OF VISUAL-VERBAL RELATIONSHIPS ON NATIVE-NONNATIVE ENGLISH SPEAKERS' READING PROCESSES AND COMPREHENSION

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SUMMARY

The aim of this study was to comparatively investigate the impact of visual-verbal relationships that exist in expository texts on the reading process and comprehension of readers from different language background: native speakers of English (LI) and speakers of English as a foreign language (EFL). The study focused, in this respect, on the visual elements (VEs) mainly graphs and tables that accompanied the selected texts.

Two major experiments were undertaken. The first, was for the reading process using the post-reading questionnaire technique. Participants were 163 adult readers representing three groups: 77 (LI), 56 (EFL postgraduates); and 30 (EFL undergraduates). The second experiment was for the reading comprehension using cloze procedure. Participants were 123 representing the same above groups: 50, 33 and 40 respectively. It was hypothesised that the LI readers would make use of VEs in the reading process in ways different from both EFL groups and that use would enhance each group's comprehension in different aspects and to different levels.

In the analyses of the data of both experiments two statistical measurements were used. The chi-square was used to measure the differences between frequencies and the t-test was used to measure the differences between means.

The results indicated a significant relationship between readers' language background and the impact of visual-verbal relationships on their reading processes and comprehension of such type of texts. The results also revealed considerable similarities between the two EFL groups in the reading process of texts accompanied by VEs. In the reading comprehension, however, the EFL undergraduates seemed to benefit from the visual-verbal relationships in their comprehension more than the postgraduates, suggesting a weak relationship of this impact for older EFL readers. Furthermore, the results showed considerable similarities between the reading process of texts accompanied by VEs and of whole prose texts.

Finally an evaluation of this study was undertaken as well as practical implications for EFL readers and suggestions for future research.

Key words

visual elements - reading process - comprehension - LI/EFL - cloze.

To My Parents

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CHAPTER ONE

INTRODUCTION

1.1 Background

The embedding of visual elements (VEs) in a wide range of written discourse and their relationships to their accompanying verbal texts have attracted the attention of many scholars and researchers in the last twenty years or so. Widdowson (1978: 73), for example, states:

> In a very wide range of written discourse we will find such non-verbal devices as drawings, flow-charts, tables, graphs, charts and so on which are incorporated into the discourse and relate to the actual verbal text to form a cohesive and coherent unit of communication.The interpreting of written discourse involves the processing of these non-verbal elements and a recognition of their relationship to the verbal text.

Research (notably in the field of English for Specific Purposes) has examined this phenomenon from different angles. Some researchers investigated the interaction between VEs and their accompanying texts in different content area subjects (for a fuller review on this see Chapter Two, Section Two). These investigations often yield different communicative functions which VEs perform in relation to their texts. Those investigations were generally undertaken for pedagogical purposes in the context of needs analysis and syllabus design.

There are other researchers, however, who made attempts towards working out the possible intentions of authors behind their strategies in incorporating VEs in texts. This trend stems from the fact that many textbooks authors tend to exploit VEs as a presentation factor. This is true not only for textbooks but for other materials as well, eg. newspapers and articles. So among the scholars who make efforts to advance possible reasons for authors' exploitation of VEs in presenting their materials are Trimble (1985) and Smith (1986). Trimble (ibid), for example, focuses on the location of the visual element on the page as a clue to the possible author's intentions behind its use.

It looks as though he is suggesting that authors tend to locate VEs on the page with their texts when they are of direct importance to their accompanying texts. Similarly authors tend to locate VEs at the end of the total discourse because they believe that they are of indirect importance to their texts. Smith (ibid, p242) also suggests:

> if we consider situations where the linguistic input per se is impoverished: here, especially, there is an obvious need for rich, non-linguistic input.

Smith's explanation is based on the fact that the Chomskyan line of research has always been that second language learners profit from a rich linguistic environment and that this notion can be extended to cover non-linguistic input.

The attempts to work out authors' possible intentions in using VEs are not restricted to written texts only. There are for example other attempts made in the area of oral presentations. Nesi and Skelton (1987) consider the use of visual material in the context of oral presentations structure given by postgraduate students.

In this context they outline four possible reasons which underlie the students' use of visual material (VEs) in their oral presentations. These reasons are (I quote Nesi and Skelton, ibid, p12):

> First, it assists the process of organisation.Second,visual material is a useful way of reminding students that they must think, as a student and as a professional person, not of something as narrow as language, but of all aspects of communication.Thirdly, there is, quite simply, a lot of material in the subject discipline which is either graphic by its very nature - like a circuit diagram - or which cannot be presented without some form of visual display as a back-up - a computer program,or a formula, for example. Fourthly, and most obviously, where language is limited, a picture, a diagram, a graph or even language prepared and written down at leisure can be of vital assistance.
>
> (Underlining is the original).

So the authors of textbooks or oral presentations seem to use VEs in their textbooks or presentations as a presentation factor perhaps due to an impoverished linguistic input (Smith, 1986) or perhaps they want to exploit other possible aspects of communication apart from language (Nesi and Skelton, 1987). In both cases authors and oral presenters

may probably think that the way they present their materials is best for them and perhaps for their audience.

These researchers, and others, who tried to work out the intentions of authors behind using VEs in texts, however, had no direct feedback from the authors, nor did the readers of the texts. So it appears that the role of VEs in texts was either assumed by authors or elicited by researchers. Hence in this study, it is believed, the role of VEs in texts could be fruitfully investigated by involving the readers. It is believed that, out of experience with EFL students as they had linguistic reading problems of prose, they also had reading problems of non-prose, ie. VEs. Specifically, they lacked the ability to relate the information presented in VEs to that presented in accompanying verbal texts. These problems usually arise from the lack of awareness of suitable non-linguistic reading skills. For example, some readers tended to focus their attention on VEs in the reading process more than necessary and at the expense of the accompanying verbal text in which case this reading behaviour tended to affect their overall comprehension. Other readers tended to ignore VEs altogether not because they found the verbal texts sufficient for their purposes, but, perhaps, they did not possess the suitable skills to use the VEs to their advantage in reading. Another group seemed to lack the ability in discriminating between the important and the less important information presented in VEs. In other words they lacked selectivity when reading VEs.

All these problems which are supported by experience and observations made by many ESP teachers led me to raise the following two questions:

(1) Are VEs important for adult readers?

(2) If so, what is the relationship between their importance in reading and readers' language background?

These questions in turn led to the formulation of the central research hypothesis (see 1.2 below) and the questions related to it.

As mentioned earlier, this topic has been for the most part treated as part of research

in the area of discourse analysis. This study attempts to develop it in the area of reading. This development emanates from the widely accepted view that reading is an interaction between thought and language (Cooper and Petrosky, 1976) where the meaning-derivation is central to the process. Thus the presence of VEs in texts could affect this sort of interaction and could constitute a further source of meaning-derivation on top of the verbal text. As such, it is believed, the reading strategies which are normally selected by readers when they deal with texts which are made of pure prose would be affected when the same readers encounter texts accompanied by VEs. In other words they will be interacting with such type of texts with two types of strategies: linguistic and non-linguistic. Thus in order to allow for a maximum profitable interaction between reader and text, he or she needs to select not only the linguistic effective reading strategies but also the non-linguistic ones. Thus the reading strategy concept whether linguistic or non-linguistic refers to the operation with which the reader deals with the various types of information presented in the text at his/her disposal.

In this sense "reading strategies" refer to the "process" of reading itself rather than the "product". Thus reading is a meaning-centred and selective process. So any purposeful attempt to obtain meaning from a text/visual devices may be termed a reading strategy though not all types of strategies are efficient or productive. This of course applies to all linguistic as well as non-linguistic reading strategies where the latter are concerned with reading tables, graphs etc because according to Anderson (1976: 1) "reading consists of a collection of different skills".

Previous research in language teaching has traditionally concentrated on the linguistic skills to the neglect of the non-linguistic skills of reading VEs (Widdowson, 1978). Anderson (ibid), for example, reviewed previous research on reading skills and that was exclusively on the linguistic skills. Among those studies was Gray's (1937) who concluded that the process of reading involved accuracy in recognising the words that make up a passage, span of recognition rate at which words and phrases are recognised, rhythmical progress of perception along the lines etc. Factor analytic studies also revealed a number of linguistic reading skills, ie. verbal, perceptual, word, number

and relationships. Apart from Krantz (1957) there seems to be no researcher in the area of social studies who attempted to focus on the non-linguistic reading skills. Perhaps the reason was that in the area of social sciences the use of VEs in texts is relatively infrequent, hence, the concentration seemed to be on the linguistic reading skills because the connected verbal prose is the dominant mode of written communication in this area.

Thus the present study attempts to investigate the non-linguistic behaviour of readers when they approach texts accompanied by VEs in the area of social sciences and humanities. That is in terms of the reading tactics and strategies they use in dealing with such type of texts. This is an attempt to find links between this feature of text, ie. the VEs and the reading process and comprehension of the whole text. These assumptions emanate from the fact that the use of VEs is a writing strategy influenced by some characteristics which the writer assumes in his readers. In this study the use of VEs in texts will be investigated from the readers' stand in the context of reading process and reading comprehension.

1.2 The Hypothesis

The central research hypothesis consists of the following two complementary parts:

(a) That in the reading process of texts accompanied by VEs both native-speaker (LI) and non-native speaker (EFL) adult readers crucially make use of VEs in different ways, and

(b) that this use of VEs enhances their reading comprehension of expository texts to different levels.

The main thrust of the present thesis is then to examine how (if at all) LI and EFL readers' use of VEs differs. This leads to a series of other questions which I do not state formally as hypotheses but which are also of central significance:

(1) What strategies do LI/EFL adult readers use in attacking VEs in the reading process?

(2) What factors influence readers' strategies in 1 above?

(3) How often do readers consult VEs in the reading process?

(4) How do readers assess the importance and role of VEs in the reading process and what factors influence the assessment of each type of reader?

(5) What impact do VEs have on the overall reading comprehension?

It is worth noting that the first four questions are related to the first part of the hypothesis whereas the fifth one is related to the second part of it. There are two subhypotheses generated from question 4 above and discussed in Chapter Five, section 5.4.2. Similarly there are three subhypotheses related to question 5 and these are discussed in association with the cloze results in Chapter Six, section 6.3.5.3

The central hypothesis of this thesis stated above is supported partly by intuitive observations often advanced by ESP practitioners and partly by research evidence (eg. Widdowson, 1978; Levin et al, 1978; Donald, 1983). Widdowson (ibid, p73) states:

> ..... we cannot say that we have understood a piece of written discourse by reading if we have only pay attention to what is verbally composed when the discourse contains non-verbal elements as well.

Levin et al (ibid) and Donald (ibid) provide empirical research evidence on the role of VEs in reading comprehension. It is worth mentioning, however, that this evidence, especially in experimental psychology, has mainly been derived from children.

It has been reported in Estes (1972) that research identifying reading skills has provided some idea of the skill areas involved. These skill areas are found to include linguistic and non-linguistic ones. The latter include the skills involved in reading VEs and these are concerned with the first part of the present thesis's central hypothesis. It is also reported (ibid) that Kranz (1957), for example, in an attempt to identify the skills involved in social studies reading found that reading vocabulary and comprehension were

related to social studies achievement. He correlated subscores from the Iowa Tests of Basic Skills (a measure of reading achievement) of 471 seventh graders with the subscores of 256 of these same students at the 9th grade level and 215 of them at the 11th grade level on the Iowa Tests of Educational Development (a measure of content area achievement). From this study Krantz (ibid) comes to the conclusion that:

> Not only were reading vocabulary and reading comprehension found to be the two best predictors of success in the social studies, but study skills such map-reading; use of references; use of index; use of dictionary; and reading graphs, charts and tables were also found to be related to the success in social studie (Estes, 1972, p178)

So from Krantz's conclusion, it appears that reading of different types of VEs mentioned above (tables, graphs, charts) has been recognised as a study skill which could affect reading achievement same as the other linguistic skills. The same skill has been recognised by Rauch (1972) and reported in Lunzer and Gardner (1979: 42).

Being, therefore, supported by intuition as well as research evidence the present study attempts to address empirically the skill of reading VEs both at the level of reading process and reading comprehension and compare it with other linguistic reading skills. As well as that the study will also be comparative on the basis of readers' language background, ie. native speakers of English (LI) and non-native speakers who speak English as a foreign language (EFL).

1.3 Research Design

To examine the two parts of the research central hypothesis stated above, five texts have been selected from the area of social sciences and humanities for the first part of the hypothesis. Four out of them have been selected for the second part (for further details see cf. 3.2.4 and 3.3.7). All the texts were written in English and each included one visual element (a table, a graph, a diagram).

Two data-collection methods were adopted each to test one part of the main hypothesis. The questionnaire was used to test the reading process of VEs in relation to their accompanying verbal texts, and the cloze procedure was used to examine the impact

of VEs in four aspects of reading comprehension. These are:

(1) Speed: The time spent in completing the tests in both visual version (VV); and non-visual version (NVV).

(2) Completion rate: This is worked out by calculating the total number of attempted blanks for each subject as a percentage of the maximum possible.

(3) Item replacement: The replacement of function or content deleted items (for a definition of function or content words see Chapter Six, section 6.2.3).

(4) Comprehension: This issue was treated under two headings:

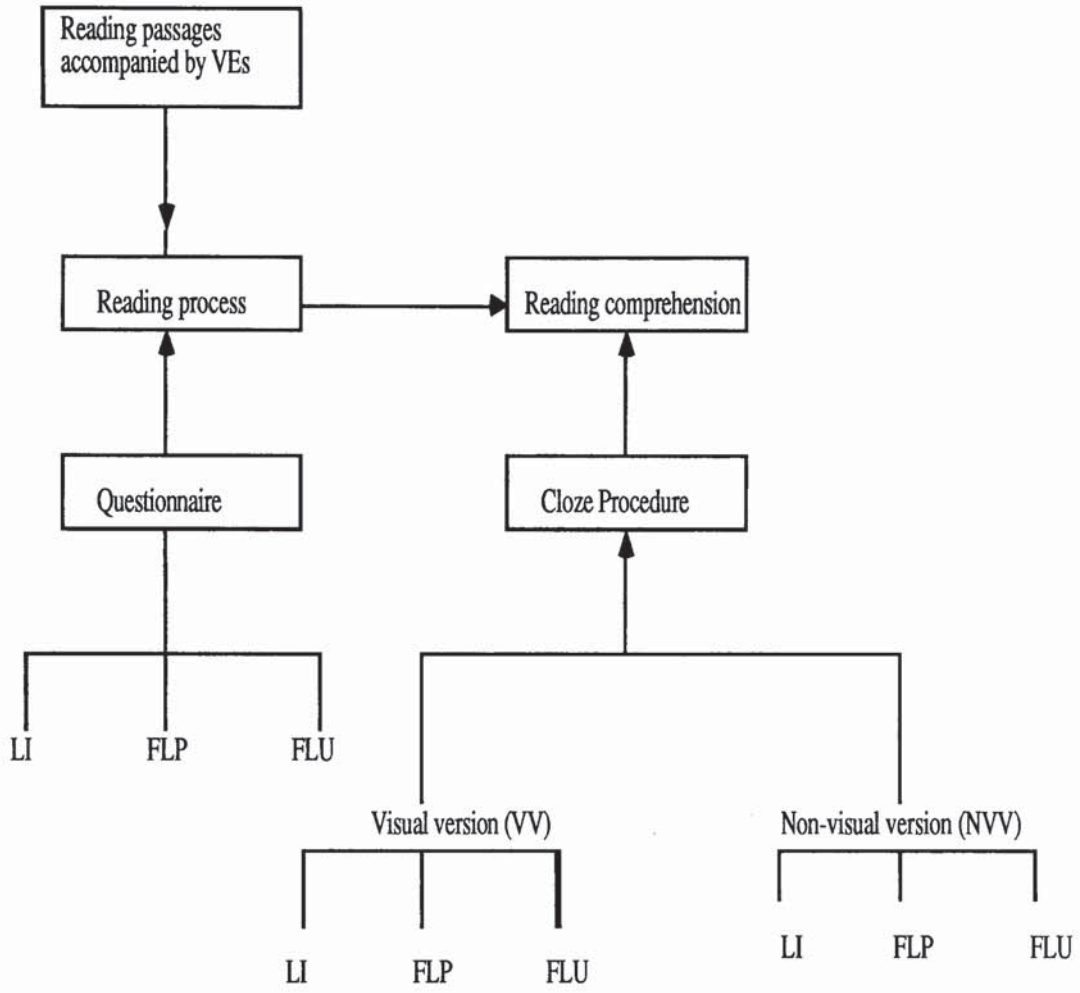
(a) Comprehension levels: These levels are frustrational, instructional, and independent (for definitions of these levels, see Chapter Three, section 3.3.4.2).

(b) General comprehension: This refers to the overall comprehension which is worked out collectively for all subjects in each group.

As well as these four aspects of reading comprehension, the results were treated from another angle and that is the impact of VEs on readability of texts. So this aspect has been treated as an indirect result because it does not particularly fall within the limits of the second part of the central hypothesis.

In both methods the subjects used were either native speakers of English (LI) or speakers of English as a foreign language (EFL). They were both selected from adult postgraduate or undergraduate students (for further detail on this see Chapter Three, sections 3.2.5 and 3.3.8). A further distinction was made among the EFL group into foreign language postgraduates (FLP) and foreign language undergraduates (FLU).

Figure 1: Research Design of Study



Apart from being postgraduate/undergaduate this distinction was made because the FLU, by virtue of being at the university during the time of experimentation, were assumed to be practising readers of the type of texts selected for this study. The FLP on the other hand, were less practising readers due to their departure from the university long before experimentation.

The total number of the subjects used in the questionnaire was 163 distributed as follows: LI=77; FLP=56; FLU=30. The total number of cloze subjects was 123 distributed as follows: LI=50; FLP=33; FLU=40.

Thus, the research design of this study, ie. hypothesis, methods and subjects can be represented diagrammatically in Figure 1 above.

1.4 The Significance of Study

This study attempts to shed light on and address a specific reading problem, namely, the reading of VEs in texts in the context of reading process (purposes and strategies) and reading comprehension. Hence its significance is derived from the following aims which it sets out to achieve:

First, to identify and quantify statistically the impact of the presence of VEs in texts on the reading process as attested in the reading behaviour of adult readers.

Second, to assess the above impact in relation to readers' differences in language background, ie. LI/EFL.

Third, to assess the impact of the presence of VEs on reading comprehension on the basis of readers' differences in language background.

Fourth, the study crucially attempts to contribute to the area of reading both in process and comprehension by raising readers' awareness, especially the EFL ones, to the potential role that VEs may play in their reading process and as far as their comprehension is concerned, the study will investigate the impact of these reading processes on the success or otherwise in adult reading comprehension.

Previous research (eg. Artley, 1944; Laffey, 1972) has shown that a relationship does exist between skill in reading and success in content area subjects, where skill in reading refers to reading connected prose. This study, on the other hand, will attempt to throw light on the relationship that exists between the skill of reading VEs and the success in reading the texts in which these VEs occur.

Although the above four aims are mainly and directly related to readers, nevertheless they could well be of great value to textbooks authors in the use of VEs in texts in relation to the target readership.

1.5 Definitions of Terms

This section will offer some of the possible definitions of some terms used in this study. There are however some other terms which are defined in the places where they

occur for the first time in the thesis.

(a) Reading process: The behaviour of the reader when he or she is engaged in silent reading. This mainly involves eye-movements and eye-fixations. The fixations are "usually quite short in duration, each one will last about one-quarter of a second on average" (Carroll, 1978: 95).

(b) Reading strategies: This is part of the reading process. Reading strategies are the conscious or unconscious processes which learners make use of in learning and using a language (Richards et al, 1985). Reading strategy is also defined by Harri-Augstein et al (1982: 6) as the "way in which the reader approaches the text". Brown (1980: 456) defines it as "any deliberate planful control of activities that give birth to comprehension". In this study reading strategies were divided into two: those concerned with reading connected prose which we call linguistic strategies; and those concerned with relating the reading of connected prose to that of reading visual elements (VEs) which accompany prose and those were termed non-linguistic strategies. This latter type of strategies is referred to by Hosenfeld (1977b) as "paralinguistic strategies".

(c) Readability: The difficulties in the language of a passage. In this study, the exact-word scores obtained from subjects in the cloze tests were considered as a reflection of the difficulty of the passage used.

(d) Visual Elements (VEs): Visual elements in general include all the non-verbal information used in written texts, eg. pictures, graphs, tables, flowcharts etc. In this study, however, VEs refer mainly to tables, graphs and general diagrams (examples of these are given in Chapter two, section one). A definition of each is given below. (These definitions

are the basic ones given in Hornby (1980) and quoted in Hormechea (1982):

(a)Table: A list, orderly arrangement, of facts, information etc, usually in columns, eg. a table of contents.

(b) Graph: A graph is a diagram consisting of a line or line (often curved) showing the variation in two quantities eg. the temperature at each hour.

(c) Diagram: A drawing design or plan drawn to explain or illustrate something.

The term visual elements (VEs), in this study, is used interchangeably with the following terms: visual devices; visuals; visual material; illustrations; non-verbal information; non-verbal elements. The term (VEs) is preferred to the term non-verbal information because some VEs do in fact contain language (Nuttall,1982).

VEs are usually accompanied by verbal labels to guide the reader to the information presented in them. These labels have been categorised and defined by Hormechea (1982: p5) in the following (examples can be seen in Chapter Two, section one and Appendix 2):

(i) Annotations and headings: These are pieces of information, notes, accompanying the information presented in VEs to make it understandable. So annotations and headings are not the actual information presented in VEs, rather they are added information to lead readers in eg. the headings of columns or rows in tables; names of horizontal and vertical axes, identification of curves in graphs. They could be one word or more.

(ii) Caption: Information in the form of a sentence about the visual to which this caption is next to. Its aim is to give an overview about the concept underlying the visual (it is usually printed in **boldtype**).

(iii) Gloss: The commentary or summary which appears after the caption (it is usually printed in a black bold face type, smaller than the caption and smaller than the main text type).

(iv) Text-reference: The piece of information within the main text which refers to the visual (it is often written in italics). Text references are intended to link between the whole or part of the information included in the main verbal texts and that in VEs.

It is worth noting that every visual element is normally accompanied by annotations and headings and text-reference(s) to it in the main text. As for the captions and glosses, they do not always accompany VEs. A typical example, are the texts used in this study where all have annotations, headings and text-references but none has a gloss or a caption. The use of captions and glosses in association with VEs in the area of social sciences and humanities in general, however, seems to be relatively infrequent compared to the area of hard sciences. Thus in order to achieve representativeness in this aspect as well , captions and glosses were excluded from the passages of the present study (see Appendix 1). So the VEs included in the texts selected for the present study neither have glosses nor captions.

The rest of the definitions are of the terms related to cloze procedure and they are for the most part adapted from Foley (1979):

(v) Cloze procedure: A method of deleting words from a prose selection and evaluating the response a reader makes as he recovers the deleted items. Both readability of the passage and reading comprehension of the subject can be assessed from the subject's score (Foley, ibid). The deletion system may be random, semi-random or selective (Anderson, 1976).

(vi) Cloze blank: The space that denotes the deletion of a word. In this study

each blank was made of standard length, ie. a 12-letter space approximately, 3cm.

(vii) Cloze tests: Application of cloze procedure to passages following the rules stated in Chapter Two, section 2.4.2. in this study.

(viii) Verbatim or Exact-word Scoring: Where the subject's response can only be judged as correct if it is identical to the item used by the author of the passage.

1.6 Contents of Thesis

Apart from this introduction, Chapter Two presents a three-section review of the literature where each section reviews the literature of one aspect of the topic of the present study. Section one (2.2) surveys the research undertaken in the area of VEs in terms of their types, characteristics and functions in the fields of discourse analysis, psychology and applied ergonomics, and rhetoric. Some of the research referred to in this section, as will be shown in Chapter Two, is not undertaken at a particularly high level and it is thus, perhaps, of little value. This is partly due to the fact that this area is a relatively new field of enquiry and partly due to the time constraints under which that research is undertaken. However, there is a considerable body of high level research referred to in one aspect or another in this particular section.

Because this topic has been developed in the area of reading particularly reading in a foreign language (RFL), section two (2.3) then reviews the relevant research in this area. It may be seen that due to the restricted nature of the topic this review is only confined to a small portion of the research done in RFL, namely, some of the features of texts which were tested experimentally in relation to reading process or reading comprehension. Section three (2.4) offers a brief review of cloze procedure which is used in this study as a testing tool of reading comprehension. This review is confined to the theoretical aspects of cloze procedure only: its rules, rationale, and general

applications. As for the methodological aspects of it they are presented in Chapter Three.

Chapter Two concludes with section four (2.5) which outlines the distinctive features of the present study in terms of its content and methodology. As well as that it outlines some similarities between the present study and previous research.

Chapter Three describes the two main methods of data collection for the two parts of the central hypothesis stated in 1.2 above, namely, the questionnaire and cloze procedure. Section one (3.2) covers the different aspects of the questionnaire used in this study, the texts used in the questionnaire etc. Section two (3.3) deals with the various aspects of cloze methodology exploited in this study: deletion system, scoring, cloze as a measure of reading comprehension. As well as that, the section describes the texts and the subjects used (3.3.7 - 3.3.8) and gives a critical evaluation of cloze procedure as a measure of reading comprehension (3.3.6). Section three (3.4) reports on the administration of both methods and section four (3.5) presents a brief description of the statistical measurements used in this study namely, the chi-square and the t-test and they are both tests of significance.

Chapter Four reports the results of the first part of the questionnaire, ie. non-linguistic reading processes (strategies, intensity and frequency). The results are presented comparatively between the three groups (LI, FLP, FLU). The similarities and differences between the groups are then compared with the findings of previous research in the LI/EFL contrastive setting. The same procedure is followed with the results of Chapter Five which presents the second part of the questionnaire results (reading purposes of VEs and evaluation of VEs).

Chapter Six presents the cloze results related to the second part of the main hypothesis. The chapter opens by giving a full description of the design of the cloze tests and the nature of the tasks associated with them. The chapter then presents and discusses the results under the five headings mentioned in 1.3 above. Also, in this chapter the relationship between these results and the questionnaire results is discussed. Finally, the chapter compares the present cloze results with those of previous research undertaken to investigate the role of illustrations in reading comprehension.

Chapter Seven winds up the whole thesis by bringing together the central hypothesis, the questions associated to it and the findings and shows to what extent the hypothesis has been confirmed. It thus offers at the beginning a summary of the main findings of the two methods in relation to the research hypothesis. Then it critically evaluates the present study and finally puts forward suggestions for future research along the lines of this topic.

CHAPTER TWO

A REVIEW OF LITERATURE

2.1 Introduction

The topic of the present study was first initiated in the area of discourse analysis as part of the research undertaken in the context of verbal/non-verbal information relationships. It was then developed in the area of reading in a foreign language (RFL) where the research hypothesis (cf.1.2) has been tested experimentally partly through the use of cloze procedure. Therefore, this chapter will include reviews of the following three areas:

(a) Survey of visual elements (VEs) non-verbal information (NVI) in written discourse

This includes the research undertaken in the areas of discourse analysis, psychology and ergonomics, and rhetorics in terms of the types, characteristics and functions of VEs/NVI (cf. 2.2)

(b) Reading in a foreign language (RFL)

This starts off with definitions of reading and also surveys the different features of text that have been researched experimentally in L2/RFL contexts (cf. 2.3).

(c) Cloze procedure

This covers the theoretical constructs and general applications of cloze procedure (cf. 2.4). However, the methodological aspects of cloze procedure as a measure of reading comprehension are presented in Chapter Three.

It is hoped that the three reviews presented in this chapter will lead to a state of the art summary that is meaningful and useful. So in an effort to identify all the existing research in the three areas outlined above, searches were made from a number of databases. Below are some examples:

(1) Alphabetical Subject Index and the Classified Catalogue.

(2) Catalogue to Journals and Periodicals.

(3) Psychological Abstracts.

(4) Dissertation Abstracts International (DAI).

(5) Index to Theses.

(6) Language Teaching and Linguistics Abstracts.

(7) Conference Proceedings.

As well as the published sources, the review includes some unpublished ones, notably the dissertations. That is perhaps because ESP in general and the area of VEs/NVI in particular seem to be fairly new fields of enquiry. However, the reviews of RFL and cloze procedure are for the most part limited to published sources due to the relatively great amount of research undertaken on them.

2.2 Section One: Visual Elements in Written Discourse

2.2.1 An Overview

It is a truth widely accepted among linguists, psychologists, discourse analysts and rhetoricians that communication through the spoken mode is not only realised by speaking, which is by definition only verbal, but employs such paralinguistic devices as gestures, facial expressions and so on, which are conveyed through the visual medium (Widdowson, 1978). Although much written discourse is purely verbal and although the paralinguistic features of spoken discourse are not directly recorded in the written mode, it is quite common to find non-verbal elements in written discourse in the shape of diagrams, (Corder, 1966). So, in Corder's view, since information can be conveyed visually through diagrams, it is no accident that all writing systems have apparently developed from drawings.

The importance of VEs/NVI has been little recognised over the years by specialists in ELT/ESP and statistics despite relevant discussion from some scholars (though often not at a particularly high level). Sections 2.2.2 to 2.2.6 deal in some detail with what

has been done in this area. Among the authors who recognised NVI as being an important mode of communication is McDonough (1984) who considers graphs, tables, charts, diagrams etc as integral parts of ESP discourse. The importance of NVI is also reflected in the work of Widdowson (1975: 6) who suggested that non-verbal devices are the universally conventionalised expression of the underlying communicative system of science and:

> Since these non-verbal modes of communicating represent some of the basic concepts and procedures of different scientific subjects they can serve as a point of reference for verbal realisations in the student's own language and in English.

Among the statisticians who have recognised the importance of this mode of communication is Selby (1976) who has contributed the lion's share to this field. The reason why he is particularly concerned with studying VEs is perhaps clearly stated in the following:

> Studying graphs and tables can be fun! For the simple reason that they are <u>interesting</u> as well as useful (ibid,pv).
>
> (underlining is the original)

The present review of the relevant literature has revealed that four groups have dealt with this area, ie. VEs/NVI in written discourse, from one perspective or another. The first group dealt with the different types of VEs, eg. Powell (1961); Corder (1966); Selby (1976); Smithies(1982).The second group was concerned with the characteristics of VEs and this group included researchers like Powell (1961) and Colinese (1972). A third group depicted the advantages and disadvantages of VEs in written discourse, eg. Selby (1976); and Widdowson (1978).

However, the recent studies undertaken in this area by a fourth group have concentrated largely on the functions performed by VEs/NVI in written texts or, in other words, the interaction between verbal and non-verbal information. This group of scholars includes for example, Levin et al, (1978); and a series of unpublished masters' dissertations undertaken at the University of Aston, by Duncan (1984); Hussein (1985);

Wallace (1986). Each of the aforementioned groups will be discussed under the relevant aspect of VEs, that each one has tackled.

2.2.2 Types of Visual Elements

This is the first aspect of VEs/NVI with which the first group of researchers has been concerned. These authors have acknowledged the fact that there is no end to the different ways of visually representing factual information. However, Smithies (1982) has identified four groups of VEs. These include:

(a) Tables

1 statistical tables

2 comparison tables

3 tabular listings

(b) Graphs and Charts

1 single line graphs

2 multi-line graphs

3 surface graphs

4 bar graphs

5 pie charts

6 frequency histograms

7 cumulative frequency histograms

(c) Diagrams

1 organisation diagrams

2 classification diagrams

3 flow diagrams

4 procedure diagrams

5 maps

(d) Pictorial Illustrations

1 photographs

2 outline drawings

3 exploded view drawings

4 cutaway drawings

Another author who has contributed to this area in the field of statistics is Selby (1976) who makes the following comment about the use of graphs and tables:

> Statistics without graphs and tables would be like a sunset without the sun. (ibid, p1).

Although the above metaphor is unfortunately not atypical of the level at which Selby is working, it illustrates the point that graphs and tables are recognised as important modes of communication in addition to the verbal texts. In this context, Selby identifies four general categories of VEs:

1 Line Graphs

These are divided into five types as shown in Figure 2 below:

(i) straight-line

(ii) curvilinear

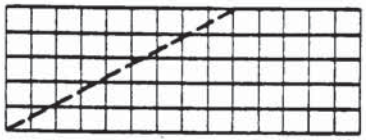
(iii) zig zag

(iv) step

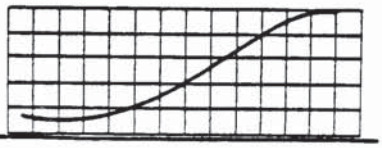
(v) special scale

Figure 2: Types of Line Graphs (Selby, 1976)

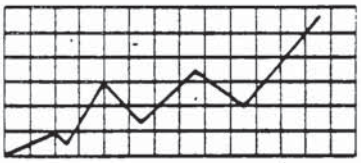
Straight-Line: Consists of one or more straight lines representing a linear relationship between two quantities.



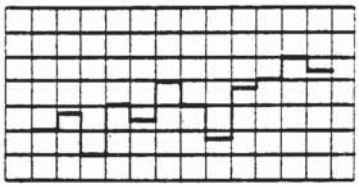
Curvilinear: Consists of a curved line representing a nonlinear relationship between two quantities.



Zigzag (connected line segment): A curve made by drawing a line directly from each plotted point to the next. Shows whether changes from point to point are gradual or abrupt.



Step: A graph made by drawing a horizontal line through each point and connecting the ends of these lines by vertical lines. Often used to show averages or other measures that apply over periods of time.



The fifth group of line graphs are known as Special Scale graphs. These differ sufficiently from one another to make it impractical to show you a typical example here; you will find these covered in the next chapter.

2 Surface Graphs

These are divided into four sub-categories, (see Figure 3):

(i) subdivided zig zag

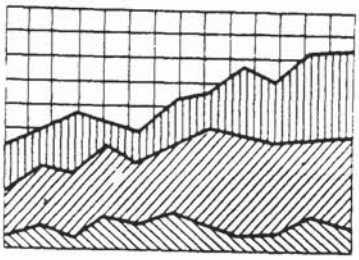
(ii) simple zig zag

(iii) simple step

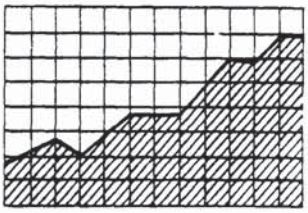
(iv) curvilinear

Figure 3: Types of Surface Graphs according to Selby (1976)

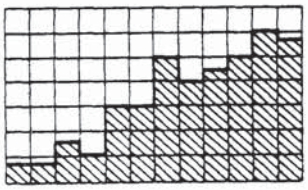
Subdivided zigzag: Also known as a layer or strata chart, this graph often is used to show how the component parts of a time series combine to make the total.



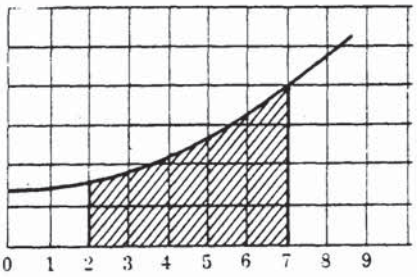
Simple zigzag: This is simply a single-curve chart with the space between the curve and the base line shaded to form a surface.



Simple step: This is essentially the same as the simple step line curve but with the area between the curve and the base line shaded to form a surface.



Curvilinear: This is basically a non-linear, simple curve with the area between the curve and the base line shaded to form a surface. Notice that (in this case) it has definite limits on the horizontal scale.



3 Bar Graphs

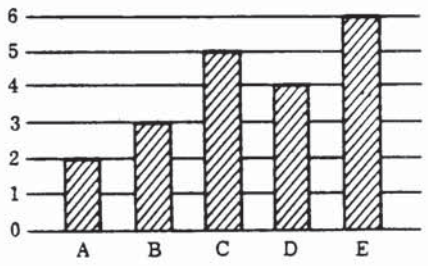
These include only two types as in Figure 4 below:

(i) vertical or columnar

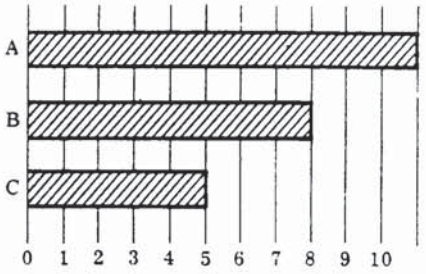
(ii) horizontal

Figure 4: Types of Bar Graphs according to Selby (1976)

Vertical (simple column): Consists of a series of vertical bars, each extending from the base line to a particular vertical height.



Horizontal (simple bar): This chart is merely a series of horizontal bars drawn to the right of a common base line.



4 Special Graphs

These include the following:

(i) Combination graphs. This may consist of a great many combinations of line, surface or bar graphs such as zig-zag and step; surface and curve; or column and step.

(ii) Other graphs. This is a "catch-all" group of graphs which do not fall under the previous headings. They include:

I the pictograph

II the histogram

III the circle graph

(see Figures 5, 5a, 5b).

Figure 5: The Pictograph (Selby, 1976)

Pictograph: The pictograph is simply a graphic representation of a statistic using small, simple pictures to represent a certain number or amount. It is essentially a variation of the bar chart in which a row of representative symbols is used to make up the bar.

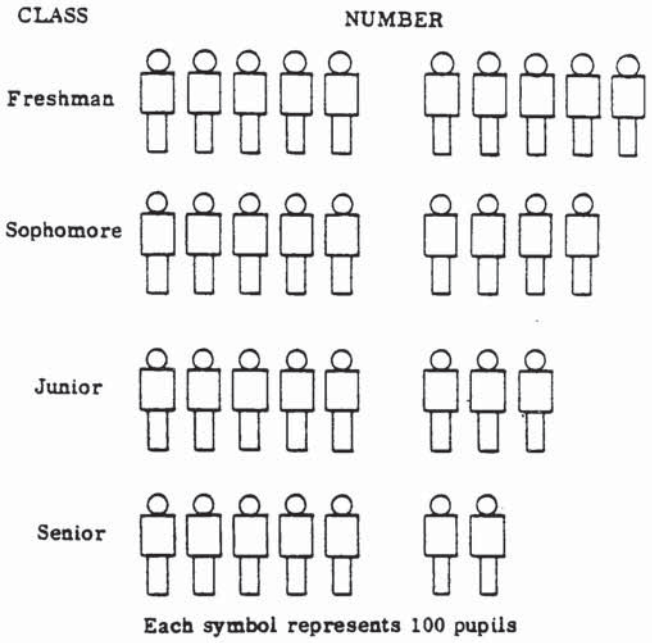
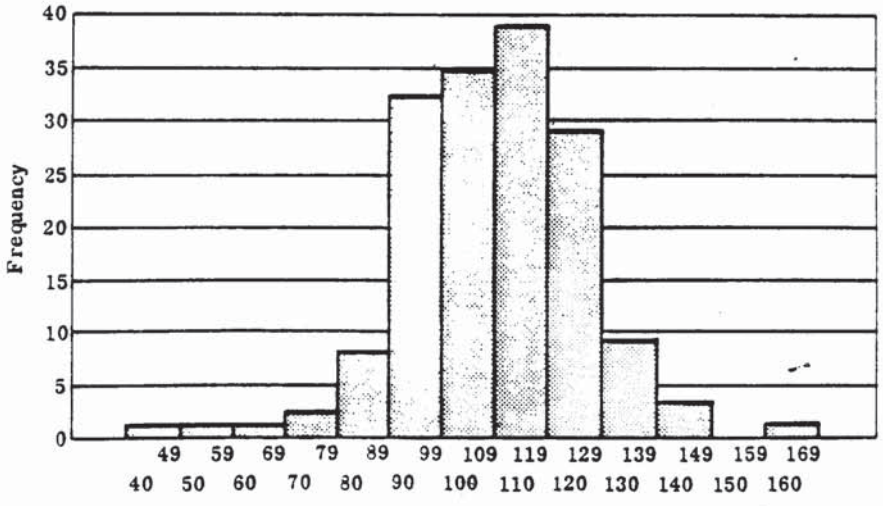


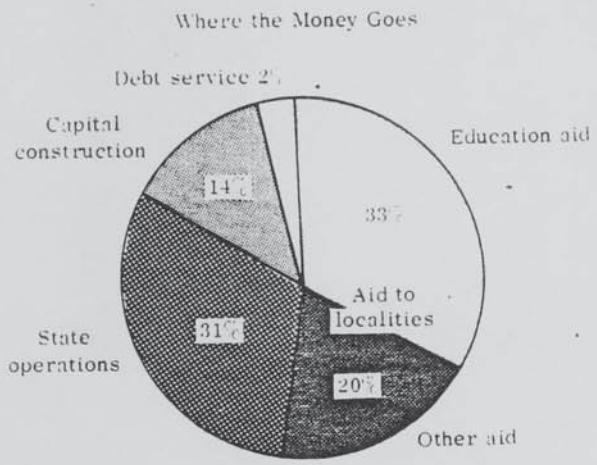
Figure 5a: The histogram according to Selby (1976)

Histogram: A vertical bar graph in block form made by plotting frequency of occurrence against the values obtained. It is the common mode of representing frequency distribution in statistics (below).



Circle graph (sectogram or pie chart): This graph is a pictorial representation of a complete circle, or "pie," that is sliced into a number of wedges.

Figure 5b: The Circle Graph according to Selby (1976)



As far as tables are concerned, Wright and Fox (1972) identify two main types of tables:

(1) Numerical Tables

In this case numbers are used more than prose, such as in time-tables. Figure 6 below shows an example of a numerical table.

Figure 6: A Numerical Table

TABLE Z. Mean ranges of samples from a normal distribution.

n	0	1	2	3	4	5	6	7	8	9
0			1.128	1.693	2.059	2.326	2.534	2.704	2.847	2.970
10	3.078	3.173	3.258	3.336	3.407	3.472	3.532	3.588	3.640	3.689
20	3.735	3.778	3.819	3.858	3.895	3.931	3.964	3.997	4.027	4.057
30	4.086	4.113	4.139	4.165	4.189	4.213	4.236	4.259	4.280	4.301
40.	4.322	4.341	4.361	4.379	4.398	4.415	4.433	4.450	4.466	4.482
50	4.498	4.514	4.529	4.543	4.559	4.572	4.586	4.599	4.613	4.625
60	4.639	4.651	4.663	4.676	4.687	4.699	4.711	4.722	4.733	4.744
70	4.755	4.765	4.776	4.786	4.796	4.806	4.816	4.825	4.835	4.844
80	4.854	4.863	4.872	4.881	4.889	4.898	4.906	4.915	4.923	4.931
90	4.939	4.947	4.955	4.963	4.971	4.978	4.986	4.993	5.001	5.008
100	5.015	5.022	5.029	5.036	5.043	5.050	5.057	5.063	5.070	5.076
110	5.083	5.089	5.096	5.102	5.108	5.114	5.120	5.126	5.132	5.138
120	5.144	5.150	5.156	5.161	5.167	5.173	5.179	5.184	5.190	5.196
130	5.200	5.205	5.211	5.216	5.221	5.226	5.231	5.236	5.241	5.246
140	5.251	5.256	5.261	5.266	5.271	5.275	5.280	5.285	5.289	5.294
150	5.298	5.303	5.308	5.312	5.316	5.321	5.325	5.330	5.334	5.338
160	5.342	5.347	5.351	5.355	5.359	5.363	5.367	5.371	5.375	5.379
170	5.383	5.387	5.391	5.395	5.399	5.403	5.407	5.411	5.414	5.418
180	5.422	5.426	5.429	5.433	5.437	5.440	5.444	5.447	5.451	5.454
190	5.458	5.461	5.465	5.468	5.472	5.475	5.479	5.482	5.485	5.489

(2) Non-Numerical Tables

In this type of tables prose only is used; or prose is used more than numbers, eg. as in store directories indicating on which floor particular merchandise is to be found.

Figure 7: A Non-Numerical Table

TABLE VI. How geographical education was represented on the junior school timetables

School	Junior 2	Junior 3	Junior 4
A	topic	geography	geography
B	geography	geography	geography
C	humanities	humanities	humanities
D	project work	topic	humanities
E	topic	geography	geography
F	geography	geography	geography 2 terms. geography 1 term. topic (all years
G*	geog., topic	geog., geog.	geog., geog.
H*	geog., topic	geog., project	geog., topic or geography

From the above survey of the types of visuals, it is perhaps clear that most of the authors who have tackled this issue especially the statisticians such as Selby, have more or less concentrated on "graphs" rather than on VEs in general. Tables, on the other hand, have received less consideration (apart from Wright, 1980; and Wright et al, 1970). On the whole, the identification of these types and the distinctions they have drawn between them seem to be of great value for writers as well as for readers of texts which include VEs.

2.2.3 Characteristics of Visual Elements

The literature surveyed under this heading reflects the fact that the researchers in this field seem to concur on the fact that VEs are important in their texts because (a) they play a significant role in the comprehension of the texts in which they occur; (b) they tend to summarise an important part of the text or present it differently; and (c) they present information quickly and the whole concept is presented in a clearly organised pattern. Therefore, VEs must have certain characteristics which make them capable of performing these functions. Hence, many studies have been developed around this issue amongst which are those of Powell (1961); Corder (1966); Colinese (1972); Selby (1976); Turk and Kirkman (1982). Some authors have discussed these characteristics in a positive way, ie. Powell (ibid); others have discussed both the positive and the negative characteristics, eg. Selby (ibid); Huckin and Olsen (1983).

No writer, however, as far as I can find, has been wholly negative. Even those who have discussed both the positive and the negative characteristics have eventually expressed their bias in favour of the positive side. Thus, there seems generally to be a consensus among the authors on the following positive characteristics of VEs:

(1) They tend to be self-explanatory.

(2) They tend to be relevant to the needs of the target group of learners.

(3) They are always related to the context in which they occur.

(4) They are clear.

(5) They are simple.

(6) They are comprehensible.

The following are some examples of individual authors who have been either positive or critical in the qualities they assigned to VEs. Powell (1961), to start with, summarises the features of VEs in a list of five qualities, namely:

(1) visibility

(2) understandability

(3) compactness

(4) brevity

(5) symmetry.

Selby (1976) assesses the characteristics of VEs critically by pointing out the positive as well as the negative sides of graphs and tables. As far as the positive characteristics of graphs are concerned, he points out the following (again, it will be seen that this list of desirable qualities hardly represents profound thought):

(1) Quick: They show the main features of data at a glance.

(2) Forceful: They carry out more emphasis than texts or tables.

(3) Convincing: They provide the point instead of merely starting it.

(4) Compact: They pack a lot of information into a small space.

(5) Interesting: They are easy to look at.

The negative characteristics include the following (for both readers and writers):

(1) Technical: Some readers are unfamiliar with the interpretation of graphs.

(2) Demanding: They require special know-how to design effective graphs (writers)

(3) Costly: They require more time to construct (writers).

(4) Not always usable: Some data are not suitable for graphic representation (writers).

(5) Not precise: They cannot be read as accurately as texts or tables (readers).

However, Selby (ibid) did not mention whether these negative aspects apply to all types of readers or to particular ones. In other words he did not mention whether or not readers who differ for example linguistically or in their background knowledge would perceive the VEs in the same way (negative-positive) as pointed out by him. These criticisms apply to Selby and of course to the other discourse analysts who identified the functions of VEs without recourse to readers.

Selby (ibid), also considered the pro's and con's of tables. The following are the advantages:

(1) Clarity: Tables present many items of data in an orderly and organised way.
(2) Comparison: They make it possible to compare many figures quickly.
(3) Explicitness: They provide actual numbers which document data presented in accompanying texts.
(4) Economy: They save space and words (in writing) and time (in reading). (This is once again questionable because some readers might find them more time-consuming to read than verbal texts).
(5) Convenience: They offer easy and rapid access to the desired items of information.

The disadvantages of tables, on the other hand, are that they will appear to be:

(1) Uninviting: They often look like difficult reading matter and so many people ignore them. At this stage, it is difficult to see how this view can be reconciled with the explicitness, clarity and economy which Selby has already mentioned.Similarly, it is not clear what he means by his reference to the "many people" who ignore the VEs, he says nothing about what type of readers tend to ignore them and why. These are the sort of questions for which the present study attempts to find answers.

(2) Undramatic: Significant relationships are hard to find and comprehend.

(3) Too specific: The tabular data, because of their formal appearance, tend to make crude estimates; and projections seem to be more precise than they really are.

From the above discussion, Selby arrives at the following conclusion:

> The choice of what graphic format to use is largely a matter of deciding what figures have the greatest significance to the intended reader and what figures he can best afford to skip.
> (ibid, p41)
>
> (Underlining is the original).

With regard to charts, Selby concluded that no charts are exactly the same. Each one is different because its purpose is different. Each focuses attention on a different aspect of data or puts a different emphasis on a given aspect. Hence the selection of what type of chart to use, as Selby puts it:

> ... is not a matter of taste; it is always a matter of judgement.
> (ibid, p42)

Wallace (1986) reviewed the literature on the characteristics of VEs and came up with the following five characteristics (I quote some of Wallace's findings):

(1) Relevance: Since we place a visual in a text to make a point, we must be sure that it makes the point.

(2) Clarity: To make a visual clear, two separate activities are involved:

(a) making the visual conceptually clear;

(b) making it technically clear.

The former means having a clearly defined and relevant point and a good form for the point. The latter involves an informative title, appropriate headings and labels and enough white space so that an audience has the best possible chance of finding the 'right' meaning from the visual. Readability is then of paramount importance.

(3) Truthfulness: This is important for two reasons:

(a) A visual which falsifies information or misleads its audience may hurt the writer's reputation since it may lead people to see him as dishonest.

(b) A false or misleading visual may hurt the argument which in turn leads the audience to discredit it.

(4) Integration: Visuals must be incorporated into the text so that they seem to belong there. They must be tied to their texts and make sense to readers. In thewords of Huckin and Olsen (1983) the easiest way to integrate a visual into the text is to explain its main points and any special implications the reader should note.

(5) Independence: Though the visual is required to be tied to its text, it also needs to be indpendent since it will sometimes be read by itself without any comment. This occurs whenever the reader leafs through a book or article just looking at graphs or tables or whenever a listener does not pay close attention to a speaker and suddenly finds only the visual left from which to find the speaker's point. It also occurs when a speaker needs to make an oral presentation, remembers a particular visual from some report and has it photocopied for the presentation. In this situation, the visual is totally independent of text and if it has not been properly titled and labelled it may be difficult to understand.

Also, in the context of discussing the characteristics of VEs Wallace (1986: 16) summarises some of Huckin and Olsen's (1983: 132-136) discussion on the advantages and the disadvantages of VEs:

	Advantage	Disadvantage
Line graphs	Show well continuity and direction as opposed to individual or discrete points, direction as opposed to volume and the importance of a nodal point if there is one.	They do not show well the importance of one particular point which falls off a node, the relation-ship of many lines, or the intersection of 3 or more lines.
Bar Graphs	Show relatively well the discreteness or separateness of points as opposed to their	They do not show well the absolute values of the items measured, though

	continuity, volume as opposed to direction, the relationship among 3 or 4 items at a time, the contrast between large and small numbers and the similarities and differences between similar numbers.	one can indicate values with labels.
Pie Diagrams	Show relatively well the relationship among 3 or 4 items which total 100%, the contrast between large and small percentages, and the similarity between relatively similar percentages.	They do not show well absolute values (unless the parts of the pie are labelled) or the relationship among more than 5 or 6 parts; with too many parts it is hard to see the relationships of part to part and part to whole.
Tables	Tables are convenient for presenting lots of data and for giving absolute values where precision is important.	They present items one at a time in columns, emphasise the discrete rather than the continuous and make it difficult to show trends in the data.Tables are not predominantly visual: the reader's mind must translate each number into a relationship with each other number. For maximum visual impact tables should probably be a last choice as a visual and used only when it is important to provide a great deal of information with precision in a very small space.
Photographs	Photographs are useful 1 When there isn't the time, the money or the expertise to produce a complicated drawing. 2 When one is trying to produce immediate visual recognition of an item. 3 When emphasising the items external appearance (as opposed to its internal structure or a cross-section). 4 When not concerned with eliminating the abundant detail.	They are not preferred when there is a need to focus on some one aspect by eliminating a lot of detail and there is time and resources to produce a good line drawing.

So, from the foregoing discussion, it seems that the positive characteristics of VEs can be summarised in the following. That they are:

1 Relevant
2 Clear
3 Truthful
4 Readable
5 Integrated
6 Illustrative
7 Informative
8 Memorable
9 Neither over complicated nor too abstract
10 Easily understood, ie. comprehensible
11 Brief
12 Visible
13 Compact
14 Symmetrical

Turk and Kirkman (1982) have also considered some of the characteristics of tables and charts. Tables (they say) usually give a systematic arrangement of information. They eliminate unnecessary repetition of words and phrases that can instead be put at the tops of columns or sides of rows. Charts, on the other hand, are used to present numerical data in a better way than tables do. They facilitate visual comparisons. However, it is preferable to present information in a sequence of "logically developed charts" rather than in one cumbersome chart which in saying everything conveys nothing.

So they conclude that VEs provide important cues that cannot be used in verbal signalling. These cues include alignment in columns and rows, grouping etc. It is clear, perhaps, that Turk and Kirkman view VEs as more advantageous than prose. Unlike the other authors, eg. Selby (1976), they did not point out any disadvantages of VEs. In other words, they have exclusively restricted their discussion on VEs to the positive side. This point is also clear from the following chart in which Turk and Kirkman (ibid) view VEs as extremely advantageous over their accompanying texts:

Visual Elements (VEs)	Texts
1 Show shapes, activities going on in parallel and movement in varying directions.	1 Restrict information to a one dimensional linear sequence.
2 Human eye can use a span of awareness much wider.	2 Human eye can use a span of awareness less wide.
3 Make much more use of reader's perceptual abilities.	3 Make less use of reader's perceptual abilities.

(Source: Adapted from Turk and Kirkman, ibid, p156)

However, these findings seem to be subjective because no empirical evidence from the side of the "readers" is available. It is also not clear what type of "readers" the authors refer to. In other words, do all readers perceive the VEs as advantageous when used in relation to verbal texts? These are the sort of queries, that the present study attempts to investigate empirically.

Trimble (1985) has also discussed types and characteristics of VEs and mentioned that they all have one characteristic in common, namely, "providing information, usually detail, that is difficult or impossible to describe accurately in words alone" (ibid, p103). Then he comes up with the following common characteristics of VEs that are found in scientific and technical discourse which include:

1 Tables and graphs

They usually give numerical detail with graphs, being less precise than tables as they are designed to show relationships quickly.

2 Schematics and flow charts

They give similar information to the reader with the flow chart also showing the stages of a process or a procedure.

3 Exploded views

They are a kind of visual physical description as they give the spatial relationship of the parts of an object or device.

4 Maps

They show physical relationships but more often of a territory than of machinery.

5 Photographs

They cover a wide range of information, from blown-up fine detail such as textures, to great sweeps of land.

6 Representative drawings

They also give visualisation of physical description and space order.

Despite the functions that the VEs might perform, Trimble (ibid, p103) concludes that:

> .. without some kind of text explanation, no type of visual provides information with the same clarity and precision that well-written scientific and technical discourse does.

So, the above conclusion seems to agree with Selby's (1976) in the sense that VEs are technical and not precise. Thus, Trimble (ibid) puts the VEs in a subsidiary status in relation to their accompanying texts. That is because (Trimble says) the text accompanying a visual should answer as a minimum four basic questions. These questions are:

1 When should readers look at the visual?

2 Where should readers look for the visual?

3 What should readers look for in the visual?

4 Why should readers look at the visual?

These questions will be discussed later in this chapter. At this stage, one would argue that even if the accompanying text provides the reader with this basic information, does the reader really behave according to the instructions of the verbal text? In other words when the reader is directed by the verbal text to consult the visual at a certain stage, eg. (see table X) or (as shown in fig Y) does the reader consult the visual accordingly or does he/she decide himself/herself when to refer to the visual? It can be argued that there is no evidence to substantiate the fact that the reader really makes use of the information provided by the verbal text in answer to the four basic questions set up by Trimble (1985). Hence one of the aims of the present study is to investigate experimentally the reading processes (strategies and purposes) that different readers (native and non-native English speaking readers) employ when approaching texts accompanied by VEs and whether or not the minimum information provided by the verbal text, in answer to the four questions, coincides with these processes. The study also sets out to find justifications for any similarities and/or differences between readers in the way they rate VEs in written discourse.

In short, the aim of this study is to relate the findings of discourse analysis regarding the visual/verbal relationships to the reading process particularly the FL reading process.

2.2.4 Functions of Visual Elements

Having reviewed the literature on the main types and essential characteristics of VEs, it is perhaps appropriate here to attempt a discussion of the functions of VEs in text.

The literature surveyed under this particular issue reflects the fact that VEs were recognised (though little) as an effective mode of written communication a long time ago. The 1960's, however, witnessed a growing concern about them. Powell (1961:7), for example, distinguished between two groups of VEs:

> ... those which amplify the effectiveness of the mechanics of transmission and reception of sensations, and those which contribute to the teaching-learning process. In the first category are microphones, projectors and so on; in the second such equipment as diagrams, models and gramophone records.

The present study will be concerned with the second group of VEs.

Though functions/characteristics of VEs seem to overlap in some instances, an attempt has been made to distinguish between them as may be seen in the following discussion. Powell (ibid), then outlines the following functions of VEs (I summarise):

1 Aid

VEs often earn ancillary dividends by invoking co-operation.

2 Attraction

The capacity of an aid for attracting attention may be two-edged, ie. positive or negative. Nevertheless, its major function is to attract attention.

3 Supplementary

The VEs can supplement verbal explanations.

4 Concentration

The VEs may be used to hold attention while a lesson is being taught.

5 Illustration

The VEs may illustrate relationships by taking the form of demonstrations, apparatus or models.

6 Challenging

A quite distinct function of a visual may be to challenge. Visual devices which

challenge learners do so, as a rule, either because they offer a reasonable opportunity of success, eg. a cross-word puzzle, or because they appear as a reasonably balanced battle of wits between the learner and the teacher.

7 Consolidation

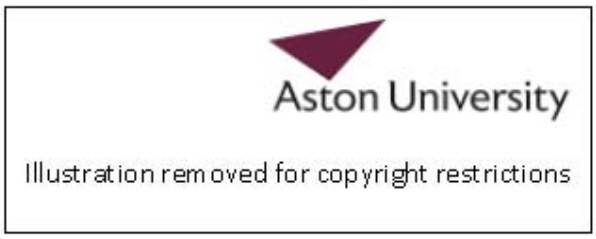
Visuals may be used to consolidate what has been learnt or to generalise. Such aids must therefore be used after the subject matter has been learnt in order to give it form and to show each learner his/her progress.

So, since the 1960's the functions of visual devices in texts have received some consideration. The development in the field of discourse analysis in general and in ESP (English for Specific Purposes) in particular, has highlighted scholars' interest in the area of VEs. This is manifest in the works of Widdowson (1978); Swales (1981); Tadros (1981); Smithies (1982); Jonassen (1982) ; Bates (1982); to name a few.

Widdowson (1978), for example, mentioned that VEs are incorporated in the discourse and they relate to the actual verbal text to form a cohesive, coherent unit of communication.

Bates (1982) identifies three functions of VEs which are:

(a) they encourage learners to go beyond the confines of the text;
(b) they relate new knowledge to the students' own stored knowledge; and
(c) they make use of related situations, topics or texts by transferring from one to the other and in some cases they form a "staging post" between the comprehension of one text and the construction of another on a related topic as shown below.



Source: Bates (1982, p4)

McDonough (1984) has considered the functions of VEs in ESP materials. She concluded that there are two main ways in which VEs are used:

First, they are used as illustrations in which case they are not integrated with textual information but tend to be simply additions to a text, eg. a photograph of a computer. The role of learners and readers in this case is only to visually register the illustration. Second, visuals are used as integral components to the accompanying texts. In non-pedagogic texts, the illustration of a process may be set out in stages parallel to a linguistic description. In the ESP materials, illustrations are used as integral parts of the learning process.

Smithies (1982) emphasises that visuals are often designed as simple representations of a more complex process and adds that it cannot be assumed that readers can explain or are capable of explaining a visual coherently. Practice is needed and with practice (he says) comes fluency.

VEs are also used in information transfer techniques where information is transferred either from a text to a diagram (in developing reading skills), or from a diagram to a text (in developing writing skills). (For further detail on this, see Widdowson, 1978).

In the field of ESP some researchers, as part of their studies, have dealt with the functional relationships between verbal and non-verbal information. Those are: Tadros

(1981); Hormechea (1982); Duncan (1984); Hussein (1985). Although this issue has not been the main focus in Tadros (1981) and the fact that the rest of the above studies have treated it at a relatively low level, it is perhaps useful to review some of their findings.

2.2.4.1 Tadros (1981)

Tadros has dealt with linguistic prediction in Economics textbooks and how this prediction is signalled by discourse markers. Hence, she comes up with six categories (for further detail see Tadros, 1981). One of those six categories is called "advance labelling". In this category the "D" member (the predicted member) is realised by three types of act. Two of them label acts which have "non-linear" realisations. By non-linear realisations what is meant is non-verbal representation. Thus, in this context, non-verbal information is considered as an instance of realising predicted actions in "advance labelling" in Economics textbooks.

2.2.4.2 Hormechea (1982)

She considered the interaction between the components of VEs, ie. annotations, captions, glosses and text references. She concentrated on the grammatical aspects of this interaction, eg. complex nominals and cohesive devices. However, she did not consider the relationship between the VEs and their accompanying texts. In other words, she restricted her study to the verbal/non-verbal information within the VEs only.

2.2.4.3 Duncan (1984)

Duncan has carried out an analysis on the techniques used by authors of three Economics books, ie. Lipsey (1983); Hanson (1972); Samuelson (1984) to make texts more accessible to readers. He showed how these authors use some "facilitating devices" to enable the readers to follow the economic argument. He then discussed the use of VEs such as tables and graphs as one of those "facilitating devices". He mentioned that the VEs are usually accompanied by concise commentaries which paraphrase the points made in the text. However, Duncan did not provide empirical evidence as to whether the VEs

facilitate readers' comprehension of those texts. Moreover, he did not show the type of readers for whom VEs facilitate comprehension.

2.2.4.4 Hussein (1985)

The present author has considered the relationship between verbal and non-verbal information in the same three books as Duncan's. His analysis concentrated on two types of VEs, namely, graphs and tables as they are widely used in Economics textbooks. He examined their functions in the texts where they occur. Then he concluded that there are five main functions performed by the VEs in Economics textbooks. These are, addition, integral to text, summary, exemplification and reiteration.

2.2.5 The Research in Psychology and Applied Ergonomics

In these two fields, VEs have been dealt with in the context of information processing theory, (eg. Harber, 1969; Gagnon, 1978; Kennedy, 1980). Other researchers have tackled them under display techniques, eg. Levin (1981); Wright and Fox (1970). However, one researcher, ie. Verhagen (1981) has carried out his research on VEs that allow greater freedom in structuring information. Generally, the research in the area of psychology is for the most part experimental. It sets out to investigate the extent to which VEs enhance, or otherwise, the comprehension and later recall of accompanying texts.

The study by Levin et al (1978), for instance, started by surveying the general functions that pictures or non-verbal information can perform. They gave as examples pictures in commercial textbooks which are of an aesthetic nature only and contribute nothing to the information whereas pictures at the research level may be used according to Ausubel (1968) as advance organisers. The study then categorised the research on pictures into two groups whereby each attempted to assemble evidence to answer one of the following two questions:

1 Are pictures effective?

2 Why are pictures effective?

The first question is on the practical aspect and the second on the theoretical. In answering the first question, Levin et al (ibid) concluded that research seems to provide support for the picture-positive position as reflected in the works of Rohwer and Harris (1975); Lesgold et al (1975); Rohwer and Matz (1975); Levin et al (1976); Guttmann et al (1977); Ruch and Levin (1977). This support, however, applies only when the use of pictures adheres to five principles (see Levin et al, 1978):

(a) if the prose passages are presented orally;
(b) the subjects are children;
(c) the passages are fictional narratives;
(d) the pictures overlap the story content;
(e) learning is demonstrated by factual recall.

Glass (1972) has similarly distinguished between "evaluative" (Question 1-type), and "elucidatory" (Question 2-type) enquiry expressing his bias towards the former.

Ehrenberg (1977) quoted in Wright (1982) depicted the presentation factors relating to tables and suggested the following three principles to be applied to the presentation of numeric information in tables:

(1) The numbers should be rounded to just two or three figures. This will help readers make comparisons easily.
(2) Averages, of rows or columns as appropriate, help readers evaluate cell values. They also help them appreciate the scatter among the cell values.
(3) Where practicable, numbers should be arranged in some meaningful order.

Wright (1982: 336) also in the context of presentation factors summarised the

findings of her research on tables and flowcharts as follows:

> Specific design decisions have to be taken in a way that is sensitive to the internal structure of the data being presented, the needs of the readers who want to use the information, and the constraints of the production system being used to print the material.

Then she concluded with some general principles which can be helpful for designers of tables and flowcharts. These are:

1 Redundancy

Eliminating redundancy can be a false economy in the sense that the removal of some information from a table might create more problems for readers.

2 Decision structure

Users of tables and flowcharts need to be provided with a decision structure which is "natural" in the alternatives it specifies and "error reducing" in the sequence through which it takes users.

3 Presentation

Designers of tables and flowcharts need to be able to use space to help readers perceive the functional groupings within the material. Failure to use space appropriately can result in legibility problems, particularly in flowcharts and in large tables. Even the physical location of the table or chart in relation to references to it in the text can critically determine how effectively the information is used.

Regarding the method of visual presentation, particularly of pictures, Levin et al (1978) reviewed different possibilities of visual location. That is, pictures may be presented simultaneously with the text (Guttmann et al, 1977) or following each sentence (Levin et al, 1976) or following each passage (Lesgold et al, 1975). Moreover, a picture may contain information related only to a specific sentence (Guttmann et al, 1977) or to

all previous sentences (Rohwer and Matz, 1975).

In fact, this notion of "location" of VEs on the page has been dealt with in the recent studies on the rhetorical organisation of text, (eg. Trimble, 1985), but as to the influence of the "location" on the readers processing strategies only little has been done.

In another paper Wright et al (1972) have discussed the types of tabulation formats whereby they come up with the following two categories:

(a) Explicit format of tables

This provides the user with the information that s/he wants directly, requiring nothing but a search process.

(b) Implicit format of tables

Although the same information is available to users it is no longer directly available and requires additional work on the part of the person making the conversion. Duchastel (1982) considered the VEs as part of "textual display techniques" when he says, "How a text is processed is thus intimately tied to its function" (p 170). He then touched upon the relationship between processing strategies, and the textual display techniques, concluding that:

> the degree to which textual display techniques can and do affect processing strategies is closely tied to the sophistication of the learner and to the primary function of the text (pp173-174).

Regarding the functions of VEs in text, Duchastel (ibid) mentioned that illustrations should probably act as summaries do, ie. represent in a concise way the main points in a section of text. In this way they can serve as summary statements presented in graphic form. However, he summed up his article by saying that much remains to be explored in the use of VEs in text as it has to fit in with other display techniques in the design of text.

To conclude the work on VEs in the area of Psychology and Ergonomics, there is an article by Levin (1982) which deals with the functions of VEs in relation to their accompanying texts. Two types of relationships have been identified:

(a) the relationship between functions of VEs and comprehension and memory; and

(b) the relationship between functions and macro and micro structure levels.

Regarding the functions, he identified four major ones:

(1) Representation function

This function is realised when the picture accompanying the prose is virtually redundant.

(2) Organisation function

This is realised when the picture enhances the relatedness of the textual elements even when the propositional connections are adequately signalled in the text.

(3) Interpretation function

The picture interprets the textual information by increasing the meaningfulness of the information that is being processed.

(4) Transformation function

This function has to do with information storage/retrieval purposes in which case the picture enhances directly the memorability of text.

So the research undertaken in the area of psychology is experimental. The experiments set out to test the effect of VEs in text comprehension and recall. Those experiments were mostly carried out on children by the use of narrative texts. Despite previous claims to the contrary, (eg. Concannon, 1975; Samuels, 1970), the vast majority of researchers in this field concluded that there is solid evidence that pictures do facilitate prose-learning. However, to the best knowledge of the present researcher, no evidence was found in the psychological literature where experiments have been done on

adults reading expository prose to test the influence of VEs on their reading comprehension. Nor was there any evidence of such experiments done on non-native English speaking subjects.

On the other hand, the research that has been carried out in the area of discourse analysis is mostly text-based. Each researcher has depicted the interaction between verbal and non-verbal information within the text and come up with different categories of functions deemed to be performed by VEs/NVI in text as we have shown before (cf. 2.2.4). However, there is perhaps no evidence as to whether those functions are perceived by the readers of those texts in the same way as the researchers have shown them as discussed in the above sections.

Thus, the research in discourse analysis on the functions of VEs in texts has largely concentrated on the interaction between the two modes of communication within the text and ignored the third party, the readers. How do readers approach VEs? What strategies do they employ in comprehending texts accompanied by VEs? What influence do VEs have on their comprehension? Do all the above questions have the same answers to both native and non-native speakers of English or do they have different answers?

These questions seem to be left unanswered following the review of the literature in the area of visual/verbal relationships. This feeling seems to coincide with that of Trimble (1985), who carried out a fairly recent study in which he attempted to consider the functions of VEs from the view point of the reader of the text. The following section will report on it.

2.2.6 The Rhetorical Organisation of Information

Trimble has contributed greatly to the field of rhetorical organisation, but before proceeding with his (1985) study, it may be helpful to give some definitions of the word "rhetoric".

This term has been widely used in the studies of discourse analysis carried out in recent years. Generally, it refers to the area of speaking or writing effectively (Longman

Family Dictionary, 1984). Nickel (1976: 237) also gives a useful definition:

> ... rhetoric, with regard to the writing of EST, is concerned with the organization of information and relating concepts such that the concepts are the most functional for the purpose of discourse and for a particular kind of reader.

A further definition has been offered by Trimble (1985:10):

> Rhetoric is the process a writer uses to produce a desired piece of text. This process is basically one of choosing and organizing information for a specific set of purposes and a specific set of readers.

From the above definitions, it seems that the term rhetoric refers to the way information (verbal or non-verbal) is organised and the way each bit of information relates to the preceding and following bits in the same text.

In the context of discourse analysis and particularly in the area of EST (English for Science and Technology), Trimble (1985) adopts a discoursal approach towards the study of the rhetoric of visual/verbal relationships. Thus, he is interested in the way VEs and their accompanying texts are organised and how this organisation yields different sets of relationships.

Therefore, his approach involves two aspects:

(1) The sequencing of the items of information in a piece of written discourse.

(2) The expression of the kind of relationships that exist between these items.

Trimble then comes up with the "EST Rhetorical Chart" which is a modified version of the original chart discussed in Lackstrom et al (1973); in Selinker et al (1976); and in Trimble (1977). (See Figure 8 for Trimble's 1985 chart; and Figure 9 for the original one). Both charts show that EST rhetoric exists at several hierarchical levels in a piece of discourse (in this case the basic unit is the conceptual paragraph). The hierarchy is made up of four levels, ie. from level A to level D. Thus, a typical analysis of these levels would be:

Level A: States purpose of total discourse, eg. topic announcement.

Level B: States function, eg. reporting previous research.

Level C: Rhetorical devices, eg. definitions and classifications.

Level D: Relational rhetorical principles that provide cohesion within the limits of Level C, eg. natural principles, time/space logical principles, comparison contrast, exemplification.

It has been reported, (Tadros, 1981) that this hierarchy has been criticised by many discourse analysts, eg. Widdowson and Urquhart (1976) who criticised it as being inadequate to handle the description of longer units of discourse. Another defect is the overlap of functions, for example, a definition could be made of a description. Despite these criticisms, Tadros (1981) concluded that the notion of a hierarchical organisation of text remains of great pedagogical value.

What concerns us, however, is that in Trimble's chart the rhetoric of visual/verbal relationships is treated as a specific rhetorical function at level C which derives its cohesion from the relational devices at level D to develop a general rhetorical function at level "B" up the hierarchy (for further detail see Trimble, 1985).

In dealing with the visual/verbal relationships in this context, Trimble starts the discussion by giving a definition to this type of relationship in the following:

> By visual-verbal we mean the relationships between visual aids such as drawings, schematics, graphs, tables, charts - any illustrative material - and a piece of text (ibid, p102).

Then he moves on to discuss the functions of VEs by saying that they add information to that given by the discourse and as a result VEs are found to be in conjunction with other features. He concludes that whatever the type of visual aid or of the rhetorical function and/or rhetorical technique used, the relationships between them (that is, the statements made by the text) should be such that they provide the reader with the following information:

(1) When the reader should look at the visual.

(2) Where the reader should look for the visual.

(3) What the reader should look for in the visual.

(4) Why the reader should look at the visual.

Figure 8: EST Rhetorical Chart (Trimble, 1985)

Level	*Description of level*
A.	*The objectives of the total discourse* EXAMPLES: 1. Detailing an experiment 2. Making a recommendation 3. Presenting new hypotheses or theory 4. Presenting other types of EST information
B.	*The general rhetorical functions that develop the objectives of Level A* EXAMPLES: 1. Stating purpose 2. Reporting past research 3. Stating the problem 4. Presenting information on apparatus used in an experiment – a) Description b) Operation 5. Presenting information on experimental procedures
C.	*The specific rhetorical functions that develop the general rhetorical functions of Level B* EXAMPLES: 1. Description: physical, function, and process 2. Definition 3. Classification 4. Instructions 5. Visual–verbal relationships
D.	*The rhetorical techniques that provide relationships within and between the rhetorical units of Level C* EXAMPLES: I. Orders 1. Time order 2. Space order 3. Causality and result II. Patterns 1. Causality and result 2. Order of importance 3. Comparison and contrast 4. Analogy 5. Exemplification 6. Illustration

Figure 9: EST Rhetorical Process Chart (Lackstrom et al, 1973)

LEVEL	DESCRIPTION OF LEVEL
A	*The Objectives of the Total Discourse.* EXAMPLES: 1. Detailing an Experiment 2. Making a Recommendation 3. Presenting new Hypotheses or Theories 4. Presenting other Types of EST Information
B	*The General Rhetorical Functions Employed to Develop the Objectives of Level A.* EXAMPLES: 1. Stating Purpose 2. Reporting Past Research 4. Stating the Problem 5. Presenting Information on Apparatus: Description 6. Presenting Information on Apparatus: Operation 7. Presenting Information on Experimental Procedures 8. Referencing an Illustration 9. Relating an Illustration to the Discussion
C	*The Specific Rhetorical Functions Employed to Develop the General Functions of Level B.* EXAMPLES: 1. Definition 2. Classification 3. Description: Physical and Function 4. Description: Process
D	*The Rhetorical Techniques that Provide Relationships Within and Between the Units of Level C.* EXAMPLES: 1. Time Order 2. Space Order 3. Causality 4. Result 5. Comparison 6. Contrast 7. Analogy 8. Exemplification

Then Trimble moves on to discuss these four questions in more detail by saying that the text accompanying a visual should answer - as a minimum - the following questions:

(1) When should the readers look at the visual?

(a) Should they look at first mention of the visual?

(b) Should they look during the reading?

(c) Should they look after the reading?

(2) Where should readers look for the visual? For this question, Trimble suggests that the accompanying text usually gives this information when the location of the visual is not apparent to the reader.

(3) What should readers look for in the visual?

(a) What are the focal points?

(b) What are the specific points?

(4) Why should readers look at the visual?

(a) What are the meaningful relationships between the visual and the accompanying text?

(b) What are the meaningful relationships between the visual, the accompanying text and the subject matter of the total discourse?

To Trimble, the major problem in visual-verbal relationships is suggested by question 2, ie. where should VEs be placed in relation to their text so that they are most <u>useful</u> to the reader? Then, in answering this question, he states that most scientific and technical writers seem to apply the following rules:

(1) If the visual is of direct importance to the discourse,

(a) put it on the page with its text, that is in case the visual is small enough to put on the page;

(b) put it on the following page - if the visual is too large (over half a page) to go on the page with its text;

(c) put visuals at the end of the text - if there are several related visuals and they cannot be put on the page with their texts or on the following page(s).

(2) If the visual is not of direct importance to the discourse, put it at the end of the total discourse or in a position that does not appear to give it more importance than it warrants.

However, it is not clear from Trimble's study how those technical and scientific authors he referred to have arrived at these principles of visual location. What is clear, however, is that the writer of the book is the one who decides on whether or not the visual element is of "direct" or "indirect" importance to the discourse and hence decides on its location on the page. Thus, the question that arises at this stage is, whether or not the reader of the textbook in question perceives the visual's importance in the same way as the author does. The point to be made is that the decision on the importance of the visual, whether direct or indirect, should be reader-oriented.

From the literature surveyed there seems to be no evidence in support of locating the visual from the viewpoint of the reader. Thus, the present study will attempt to seek reader-based information regarding the importance of VEs in the reading process. This will be discussed later in Chapters Four and Five.

Trimble has also discussed the interrelationships of texts and visuals and in this context he outlined two possibilities:

(a) When the type of visual is determined by the text information, there may be illustrations of:

(i) a device or object being described

(ii) a process by a flow chart, etc.

(b) When the text information is determined by the type of visual, there may be illustrations of:

(i) summary information by graphs, tables

(ii) locational information by maps

(iii) tangential information (often barely mentioned in the text).

Once again from the view point of the reader, does s/he perceive these interrelationships as they occur in the text? In other words, this leads to the first basic question raised by Trimble, namely, when should readers look at visuals? ie. at what stage in reading? If the type of visual is determined by textual information (type "a" above) does it follow from that readers should look at the visual during or after reading? Similarly, if the textual information is determined by the type of visual used (type "b" above) does it follow from this, that readers should look at visuals before the commencement of reading - or what?

All these questions seem to lack answers based on empirical evidence as shown in the literature. Consequently, the present study sets out to find empirical evidence regarding the strategies used by readers in processing text/visual information and to what extent those strategies conform to Trimble's (1985) findings regarding the visual/verbal interrelationships.

Regarding questions 3 and 4 above, (ie. What should readers look for in the visual? Why should readers look at the visuals?) these are closely related. They have to do with the functions of VEs in their texts as viewed by the readers, not the textbook writers or the discourse analysts. In other words when a reader consults a visual for information, s/he does so, not because the author has prescribed the visual's importance to him or her as manifested in the visual's location, nor because the discourse analyst has identified or assigned a particular function to that particular visual. Rather the reader's behaviour is

simply an outcome of his/her interaction with the text and his/her purpose as Goodman (1967), (reported in Harri-Augstein et al, 1984: 273) puts it, "that reading is an active generative process whereby meaning is attributed to the words on the page". Thus, Harri-Augstein et al (ibid) concluded that, "the sophisticated reader samples, searches, selects and relates to the items of meaning in a text, in ways which make sense to him or her depending on self-defined purposes" (ibid, p273).

Since reading is defined as a "psycholinguistic guessing game" (Goodman, 1967), therefore it is the reader, who perceives the function of the visual in the text s/he deals with.

So, the point to be made here is that it is the reader, the one who interacts with the text, who gives reliable answers to the four basic questions raised by Trimble (1985).

To sum up, it is perhaps evident from the literature that the functions of VEs in written texts have been identified within the texts. In other words, they have been identified by the discourse analysts without recourse to the readers of those particular texts (cf. 2.2.4).In the area of rhetorical organisation of discourse, the questions raised by Trimble (1985), regarding the functions of VEs in relation to their accompanying texts, are quite legitimate. However, the attempts made to provide satisfactory answers to them are still perhaps unconvincing, because the answers available are provided by the textbooks authors who seem to decide on behalf of the target readers whether the visual is of direct importance or not hence to be located on the page accordingly, as discussed earlier.

So it is now perhaps obvious that the discourse analysts and the rhetoricians tended to be prescriptive in their attitudes towards readers. Thus empirical research on the influence of VEs on readers processing strategies and comprehension seems to be lacking. In the area of psychology, however, some empirical work has been done on some VEs and their influence on text comprehension but, as mentioned before (cf. 2.2.5) the texts tended to be oral narratives and the subjects were children. Hence the influence of VEs on adult readers' strategies and comprehension seems to have received little consideration.

In the area of discourse analysis, as pointed out earlier, the treatment of visual/verbal relationships has been exclusively text-based. Thus the element of subjectivity is by no means excluded. As MacKay and Palmer (1981) put it:

> The complex problem at the very centre of any approach to analysing discourse or providing a model for the analysis of discourse is of a dual nature. First, there is the difficulty of exhaustively specifying the functions that can be realized through language, and second, there is the inevitably subjective element in assigning any stretch of text to one or another of the functional categories set up. (p80)

Consequently, the present study sets out to investigate experimentally the visual/verbal relationships from the view point of the readers and at this stage it may be useful to give a short review of the different experimental research undertaken in the area of reading in a foreign language in the following section.

2.3 Section Two: Reading in a Foreign Language

Due to the restricted nature of the topic of the present study, this review will pick up only the relevant bits of the literature in RFL.

It has been stated in Alderson and Urquhart (1984) that reading bears on many disciplines, eg. cognitive and educational psychology; sociology and sociolinguistics; information theory and discourse analysis. As such, reading as a process received quite a number of definitions where the oldest viewed reading as a complex cognitive activity. Thorndike (1917), for instance, argued that reading was similar to mathematical problem-solving. In the 1960's, reading received a psycholinguistic definition, ie. "an active generative process whereby meaning is attributed to the words on the page" (Goodman, 1967 quoted in Alderson and Urquhart, 1984: 273). The same definition was shared by Smith (1971) and Weaver (1980). A fairly recent definition is put forward by Widdowson (1979) and described by Alderson and Urquhart as "all-embracing" and that definition viewed reading as "the process of getting linguistic information via print" (ibid, p xxv)

Thus, the area of reading seems to have drawn the attention of a considerable

number of researchers particularly in recent years. The researchers have generally concentrated on the following three aspects of reading:

1 The text

2 The reader

3 The interaction between text and reader.

Much of this research, though entitled RFL, was undertaken in L1 setting and it was considered to be of particular relevance to the EFL reader (Alderson et al, 1984).

As reported in Alderson and Urquhart (ibid) in the research in the area of reading in a foreign language, researchers have concentrated on features of text that cause difficulty to readers. Urquhart (1984) investigated how certain principles of text organisation can affect readability of text. It has also been demonstrated that global organisation of a narrative text can influence how a reader recalls a text (Meyer, 1975; Thorndyke, 1977; Rumelhart, 1977; Kintsch and van Dijk; 1978). Berman (1984), has also depicted syntactic difficulties which are encountered in EFL reading and she suggested the importance of transparency as opposed to opacity of the kernel sentence (the basic SVO ordering of sentences). Cooper (1984) compared practised and unpractised FL readers and examined the linguistic features of text that might be thought to give problems. He found no differences between them in terms of syntactic features but found differences in features like cohesive devices.

In the area of applied discourse analysis, attempts have been made to go beyond the sentence, ie. to look at how readers attempt to relate new information to old one (Carpenter and Just, 1977; Kintsch and van Dijk,1978). Mountford (1975) criticised the issue of text simplification. He argues that making a text syntactically less complex may result in increasing difficulties in other aspects of text. This is perhaps clear in Alderson (1984: xxiii/xxiv), where he argued that:

> It would seem not unreasonable to suggest that in the interaction of a particular reader and a given text, predicted syntactic complexity, lexical density or infrequency and rhetorical anomaly or opacity might not prove to cause difficulty or incomprehension. This may be because of other text factors.

Even in this situation, Alderson suggests some factors related to the reader and which reduce text difficulty. These are, a high interest level in the text's content which might overcome predicted linguistic difficulty, and reader's familiarity with topic, genre etc (Bransford et al, 1984).

Alderson et al (1984) also reported experiments conducted for the purpose of assessing the cultural component in reading comprehension. Fries (1945, 1963) was the first to incorporate cultural background information into a description of meaning. Rivers (1968) identifies differences in values and attitudes (often expressed at lexical levels) as one of the main sources of problems in a foreign language and one area in which significant progress can be made in understanding a foreign culture. More recently, Rivers and Temperly (1978) emphasise providing background information, explaining high-frequency culturally-loaded terms, and supporting reading selections with illustrations as ways of adding new meaning to simple texts (Steffensen et al, 1979). In applied studies of cross-cultural reading performance, Gatbonton and Tucker (1971) found that cultural instruction could affect the improvement of reading performance. Steffensen et al (1979) also found that subjects were able to read the passage based on their own culture more rapidly than the passage based on the foreign culture (in this case the Indian subjects read the Indian passage more rapidly than the American one).

Alderson and Urquhart (1984: 60) sum up the work done on cross-cultural study of reading by saying that:

> Cross-cultural experimentation demonstrates that reading comprehension is a function of cultural background knowledge. If readers possess the schemata assumed by the writer, they understand what is stated and effortlessly make the inferences intended. If they do not, they distort meaning as they accommodate even explicitly stated propositions to their own existing knowledge structures.

Other aspects of reading which have received consideration from different scholars include the effect of readers' operations on interpreting texts (Urquhart, 1981); the intent of the reader as a factor of learning from text (Royer et al, 1984). The vast majority, however, have dealt with aspects of vocabulary and their influence on text readability, eg. Williams (1981) ; and Williams et al (1984).

From the literature surveyed in the area of RFL it appears that there is one aspect in reading which received little consideration, namely, the VEs in texts. That is in terms of their relationship with the readers processing strategies and their influence on reading comprehension, ie. the outcome; and the study of this aspect from these two perspectives constitutes the aims of the present study.

2.4 Section Three: Cloze Procedure

2.4.1 Introduction

Cloze procedure was first introduced by the American researcher, Wilson Taylor, in 1953 as a new approach to the assessment of readability. The procedure, however, attracted little notice until the 1960's. Anderson (1976) explained that might be due to the inaccessibility of the Journal where the procedure was introduced or perhaps because of the inevitable time-lag between theory and practice. Though the first applications of cloze procedure were to measure readability level of texts, many other uses, eg. Osgood and Sebeok (1965), were to assess relative proficiency of a bilingual person in two languages. Taylor (1956: 99) hinted at this possibility in a review of research results when he says:

> It also seems possible to use the cloze method for testing the progress of students learning in a foreign language.

Cloze procedure thus "measures the twin aspects of readability and reading comprehension" (Anderson, 1976:6).

2.4.2 Rules of Constructing Cloze Tests

Cloze procedure consists of a set of rules for constructing cloze tests. These are (see Ashiurakis, 1987):

(1) Selection of a text (written or oral)

(2) The language patterns of the message's language are mutilated by deleting words

(3) Blanks replace missing items

(4) The mutilated version is then given to a testee to complete the language patterns by filling in the gaps with the most suitable words

(5) The proportion of correctly-guessed words by the testee is taken as an index of how much s/he has understood the message (Lunzer and Gardner, 1979; Foley, 1979; Harrison, 1979, 1980).

2.4.3 Rationale of Cloze Procedure

2.4.3.1 Cloze and Closure

Wilson Taylor, the inventor of the cloze technique, is also responsible for coining the word "cloze" which is rather obviously a spelling corruption of the word "close" (Oller, 1979). Oller states:

> The term is mnemonic or perhaps a humorless pun intended to call to mind the process of closure celebrated by Gestalt psychologists (p341).

The Gestalt Psychologists applied the term "closure" to the tendency to complete a pattern which has a part missing. Thus, we tend to see a circle even when a small gap is left in the drawing. Taylor compared this tendency with making the mutilated text whole again. Thus, the fluent reader will often substitute a word of similar spelling and meaning to the one in the text or read correctly a word from which a letter has been omitted (Moyle, 1978).

However, the relationship between "cloze" and "closure" has been criticised as being "weak" and "misleading" (Weaver, 1965; Foley, 1979; Rye, 1982). Weaver (ibid), for example, criticised the concept of "closure" and its relationship to "cloze" where he pointed out that the Gestalt explanations of closure are primarily related to the subjects' perceptions and not to conscious thought processes as such. In other words it

is misleading to imply that when subjects complete a cloze test, they are supplying the missing word on the same basis on which they would mentally close up an incomplete geometrical shape. Ohnmacht et al (1970) reported in Rye (1982), also conducted a study on cloze and closure and concluded that there was no strong relationship between the Gestalt principle of closure and the completion of items in cloze passages. More recently, Rye (1982:3) states his criticism as follows:

> Cloze procedure is essentially a cognitive task, the reader has to reason and construct suggestions to fill the gap on the basis of the evidence derived from the context.

Thus, he suggested the term "constructive procedure" as a more accurate title for the process than "cloze procedure".

On the positive side, Anderson (1976) used the findings of Ohnmacht et al (ibid) as a positive support of the relationship. Similarly, Oller (1979) accepted Taylor's notion of cloze and closure when he says:

> The reader's guessing of missing words is a kind of gap filling task that is not terribly unlike the receiver's completion of imperfect visual patterns (p341).

It is perhaps obvious from the phrase "not terribly unlike" stated in the quotation above, that Oller accepted the notion with some reservations. These reservations as explained by him relate to the redundancy and familiarity of the cloze material to the examinee as in the following example where the examinee is asked to fill in the deleted letters of the words "two", 'three", "four", etc in the sequence:

one, t ____, t ____, f ____, ____ive, ____ x, ____ n, ... (see ibid, p341)

The above demonstrates the fact that in Oller's opinion when the material is almost completely redundant, filling in the missing words in a text that has been committed to memory would seem to be like the process of filling in the gaps in imperfect visual patterns.

2.4.3.2 Redundancy

Redundancy is a technical term that describes the features of a message which allow us to reconstruct lost or ambiguous fragments (Harrison, 1980: 86). It was also defined by Cherry (1966) as:

> A property of languages, codes, and sign systems which arises from a superfluity of rules, and which facilitates communication inspite of all the factors of uncertainty acting against it (p19).

The rules referred to by Cherry include the grammatical and semantic constraints that make a language redundant as manifested in Osgood's example reported in Taylor (1953):

> 'Man coming' means the same as 'A man is coming this way now'. The latter, which is more like ordinary English, is redundant; it indicates the singular number of the subject three times (by 'a', 'man', 'is'), the present tense twice ('coming' and 'now'), and the direction of action twice ('coming' and 'this way'). Such repetitions of meaning, such internal ties between words, make it possible to replace 'is', 'this', 'way', or 'now', should any one of them be missed (p 418).

Redundancy was the second rationale for cloze procedure proposed by Taylor and it was based on Shannon and Weaver's (1949) generalised communication model (Anderson, 1976). This model deals with signal transmission as it relates to telephone. Its influence is seen in Taylor's definition of cloze procedure as reported in Anderson (1976: 14).

> A method of intercepting a message from a 'transmitter' (writer or speaker), mutilating its language patterns by deleting parts, and so administering it to 'receivers' (readers or listeners) that their attempts to make the patterns whole again potentially yield a considerable number of cloze units.

Statistically speaking, redundancy is a measure of certainty or predictability (Ashiurakis, 1987). It has to do with interdependence of the signals in a language, ie. the occurrence of one signal influences the other, eg. (in English), it is more likely that the

letter 'q' is followed by the letter 'u'.

Research on cloze procedure shows that the concept of redundancy has become an increasingly popular construct to the extent that some studies have suggested the phrase "redundancy utilisation" instead of cloze procedure (Weaver, 1965; Foley, 1979). Thus, a reader who could use clues to good effect would be at an advantage, and it is this ability that Weaver had in mind when he used the phrase "redundancy utilisation". Also, according to Harrison (1980), the reader's success in restoring a message whose redundancy has been reduced by mutilation, depends on two factors the first of which is redundancy utilisation, ie. the reader's ability to use his awareness of linguistic conventions, vocabulary and so on; the second is the information load of the message itself which is a characteristic of the examinee.

2.4.3.3 Expectancy Grammar

This construct was proposed, among others, by Oller (1973, 1979); and Oller and Conrad (1971) to explain the cloze procedure theoretically.Lapkin et al (1976: 280) reported what Oller (ibid) refers to as ' expectancy grammar', as the ability which permits one to use clues in the text to form hypotheses about the missing words. These clues include grammatical redundancies and lexical, contextual references which reduce uncertainty so that an acceptable item can be supplied. The adult native speaker can make "educated guesses" on the basis of his ability to engage in a successive process of analysing and synthesising information presented in the text.

Expectancy grammar, thus, refers to the way the reader processes the contents of a book by partially expecting or predicting more or less linear arrangements of verbal elements (eg. words, sentences, paragraphs etc) conveying information to occur (Oller, 1979:25). Therefore, the more grammatically expected a verbal element is, the more readily it can be processed as in the cloze test. Conversely, a sentence that violates a syntactic or semantic constraint, eg. the famous Chomskyan sentence illustrating semantic nonesense "colourless green ideas sleep furiously", can be very difficult to understand. Furthermore, there is existing research evidence which shows that

scrambled passages (with unmeaningful or rearranged sentences) used in cloze tests proved to be more difficult to complete than natural sequential passages (Rye, 1984).

Expectancy grammar is similar to redundancy. The only difference between the two concepts, however, is that the former is a language user's characteristic whereas the latter is a characteristic of natural languages. Thus Oller (1973) concluded that language competence is best characterised by a grammar of expectancy and this is the competence measured by a cloze test.

2.4.3.4 Entropy

This is the fourth construct on which cloze procedure is based. According to Rapoport (1966) this construct was first used in the field of "Thermodynamics" as a measure of "the unavailability of heat energy for transformation into useful work" (ibid, p52). In other words, entropy "is the measure of the probability that the temperature in a system is distributed in a certain way" (Ashiurakis, 1987: 134). Thus, entropy "has to do with the amount of order in a system (the less order, the more entropy); and is equivalent to the amount of information required to describe a disorderly system (the less order, the more information)" (Rapoport, 1966).

This concept is related to a language situation in the sense that if a passage is more structured (ordered) then less information is needed to describe it and vice versa. The relationship between entropy and cloze was first investigated by Taylor (1954) where the relationship has to do with cloze scoring methods. Taylor found that the two concepts seem to be strongly related, ie. when all the responses given at a particular blank are right, the value of the cloze score (the ability to substitute missing items) would be 100% and the value of entropy (the amount of information needed to describe the text) would be zero. If different responses are chosen at any blank, the cloze score is zero and entropy would be maximum. It is generally found that the lower entropy, the higher the cloze scores (Taylor, 1954). As well as being related to a language situation and cloze; entropy is also related to the first construct, redundancy. The former being a measure of the uncertainty and disorder of a system and the latter a measure of the same system's

certainty or amount of order (Shannon and Weaver 1949). Thus, they are opposite to one another: the higher the entropy, the lower the redundancy.

2.4.4 The General Applications of Cloze Procedure

Though Taylor had a single and specific purpose in mind when he introduced the term, cloze procedure has been developed in four general directions (Harrison, 1980: 88). These directions are:

1 Readability measurement

2 Standardised comprehension testing

3 Diagnosis of individual readers' abilities or deficiencies

4 Reading development.

It is worth noting that Rankin (1974) found about 252 papers using cloze procedure between 1953-1974 as a research tool in one or more of the above four directions which reflects the dramatic extensive use of the procedure.

The next chapter, in addition to the questionnaire, will report on the different aspects of cloze methodology and provide extended discussions of cloze validity and reliability in measuring reading comprehension resulting from linguistic and/or non-linguistic reading skills.

2.5 Section Four: The Distinctive Features of the Study

As shown in the literature surveyed in the fields of discourse analysis, psychology and ergonomics and rhetoric there seems to be no research (with the exception of psychology perhaps), that has addressed explicitly and empirically readers' use of VEs. In the field of psychology, however, this has been done with children using pictures in narrative prose, as pointed out earlier. To the best knowledge of the researcher there is no research which tackled this issue using adult readers and other types of VEs apart from pictures, as the present study sets out to do. Even in psychology, the focus was

only on the effect of pictures on children's comprehension which means that no effort was made to quantify the reading processes of the pictures prior to their impact on comprehension. Therefore, the present study differs from previous research firstly, in the sense that it attempts to quantify the reading processes of VEs and then assess their impact on reading comprehension, ie. product.

Secondly, as pointed out before, this study's empirical work differs from that undertaken in psychology in that adult readers were used instead of children, graphs and tables instead of pictures and expository texts instead of narrative prose. Among the 'adult readers', this study focuses in the main on the EFL readers in an attempt to specify their needs for VEs to be incorporated in expository texts, ie. how and where to incorporate them.

Thirdly, this study differs from previous research in that it concentrates on a special type of texts, ie. texts accompanied by VEs. Previous research in the area of reading, on the other hand, seems to concentrate predominantly on connected prose (eg. see Alderson et al, 1984).

Fourthly, as far as methodology is concerned this study attempts to establish the post-reading questionnaire as a suitable technique in identifying readers' non-linguistic skills in terms of strategies and purposes. In fact the questionnaire proved to be sensitive to the factors that influenced readers' processing of VEs, eg. language background (see Chapter Four).

Finally, another methodological distinctive feature of this study is that the study explores the use of cloze procedure in assessing the impact of VEs on the comprehension of the texts they accompany. In previous research, cloze procedure was extensively used in measuring typical linguistic skills (cf. Chapter Three) and the non-linguistic skills were treated only incidentally. Thus, the present study attempts to establish cloze procedure as

an equally valid technique for assessing the outcomes of non-linguistic skills used by adult readers.

However, the findings of this study are expected to be comparable to those of previous research undertaken on the reading process and comprehension of the typical linguistic skills of reading connected prose, eg. Harri-Augstein et al (1984). Moreover, this study is expected to be comparable to previous research in that it will be undertaken in the LI/EFL contrastive context.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter describes the research methods used to test the central hypothesis of this study. It also describes the two main samples used, ie. native speakers of English (LI) and speakers of English as a foreign language (EFL). Moreover, it gives brief accounts of the administration, and the statistical measurements adopted in handling the data.

The central hypothesis of this study constitutes two main parts, as stated in Chapter One. The first part is concerned with the reading process of VEs. It involves readers' purposes and strategies in reading VEs. The second part is concerned with the impact of VEs on the overall
comprehension. The assumed relationship between these two parts is that, LI/EFL readers use VEs/NVI differently (with different purposes and different strategies) and that consequently results in enhancing their comprehension to different levels.

In order to identify, quantify and assess the reading process and impact of VEs in relation to their texts on reading comprehension for each type of reader, two data collection methods were used as follows:

Method	Concept
1 Questionnaire	Reading process of VEs accompanied by texts.
2 Cloze procedure	Impact of VEs on reading comprehension of texts.

The questionnaire was designed to obtain quantifiable data on the similarities and/or the differences between the two types of reader in the processes they used in dealing with VEs/NVI in the reading. The cloze, on the other hand, was intended to assess that use by each type of reader in the overall reading comprehension particularly for the EFL

subjects. Sections one and two below report on each method.

3.2 Section One: The Questionnaire

3.2.1 Objectives

Traditional approaches of research in reading emphasised product as the desired terminal behaviour whereas the new approaches are interested in ways in which readers approach a certain reading problem, eg. Hosenfeld (1977b); Augstein (1971); Harri-Augstein et al (1984).

So for this study a process-based questionnaire has been developed to gain insights into the process of reading particularly into the reading of VEs in relation to their accompanying texts. Eventually, the questionnaire aims at eliciting a taxonomy of reading purposes and strategies that both LI/EFL adult readers use when they approach texts accompanied by VEs. The emphasis, however, is on the EFL ones.

In developing the questionnaire, use has been made of Trimble (1985) who raised the four basic questions discussed earlier (cf. 2.2.6). Thus the first question, "When should readers look for the visual?" is in fact on the strategies that different readers use to approach the VEs. The second question, "Where should readers look at the visual?", is a question which also has to do with the reading strategies: that is the influence exerted by the location of the visual on the page on the reader's eye-fixation when s/he uses it. Although this question is not explicitly stated in the questionnaire, it is implicitly included in some of the questions, as will be discussed later. The third question raised by Trimble, "Why should readers look for the visual?", has to do with the readers' purposes and this is closely related to the fourth question, "What should readers look for in the visual?" The fourth question, as well as being related to readers' purposes, is mainly concerned with functions of VEs in relation to their accompanying texts. For example, readers might look for the VEs for specific information, focal points, main points etc depending again on their reading purposes.

So in making use of these four questions, the questionnaire set out to elicit process-based information on the reading of VEs. One of the questions in the

questionnaire was intended to elicit a general idea on the reading outcome, in other words the impact of the VEs on the total comprehension of text (a detailed discussion of the questionnaire will be given in Section 3.2.3 below).

Also, in developing the questionnaire, use has been made of Hosenfeld's (1984) retrospective approach, ie. to get readers to reflect upon their operations after they have completed them. This is because the questionnaire was given to the subjects immediately after they had read the passages (a step made as a result of comments received from piloting, see Section 3.2.2.3 below).

To some extent use has also been made of Harri-Augstein et al's (1984) conversational approach in that subjects were asked to "talk back" into earlier processes to arrive at personal descriptions of their reading processes. In thise way, the questionnaire was deemed to be a tool of diagnosis of one's articulatory taxonomies of reading purposes and strategies (ibid, p254). It was an investigation in a reading-for-information experience intended to elicit readers' purposes and strategies. Other sources were also consulted in designing the questionnaire, eg. Oppenheim (1966); Siegel and Hodge (1968); Bailey (1982).

3.2.2 Suitability

As well as drawing its objectivity from the shared subjectivity of respondents (Harri-Augstein et al, 1984) the questionnaire suitability was maintained by the use of the following techniques.

3.2.2.1 Relevance

The questions were constructed in such a way that they were relevant to the study and to the respondents (Bailey, 1982). That was because the respondents, whether LI or EFL, were deemed to recognise the VEs as a mode of communication in written discourse due to their practice in reading them (see Section 3.2.5.).

3.2.2.2 Multiple Choice Item Response

Questions are either "open" or "closed". A closed question is one in which the respondent is given a choice of alternative replies, ie.multiple-choice item response. Open questions are not followed by any type of choice, ie. the respondent provides the answers.

In this questionnaire, multiple-choice item responses as opposed to open-ended responses have been preferred for the following reasons:

1 Open-ended responses require superior writing skills and better abilities to express one's feelings verbally (Bailey, 1982). This is particularly important in this study because two of the experimental groups were EFL subjects.

2 The results of the open-ended questionnaire according to Heather (1981) can involve subjective judgement.

3 According to Oppenheim (1966), open-ended questions are often easy to ask but difficult to answer and the responses are still more difficult to analyse.

4 The multiple-choice item responses, on the other hand, have the advantage of requiring fewer instructions, thus can be used with a sample of lower educational and/or lower proficiency in English.

5 Multiple-choice item responses are quicker and easier and quantification is straightforward (Oppenheim, 1966).

3.2.2.3 Piloting

The pilot run was intended to detect and remove any questions without face validity and ultimately enhance the reliability of the questionnaire. It was also intended to enable the researcher to 'turn free-answer questions into multiple choice

ones'(Oppenheim,1966:29).

According to Oppenheim (ibid) the respondents in the pilot studies should be as similar as possible to those in the main inquiry. Because in the present study the samples were intended to be drawn from undergraduates and postgraduates, native and non-native speakers of English, the respondents in the pilot run were carefully selected in such a way that at least a minimum similarity could be established between the pilot sample and the research sample. Therefore twelve respondents were selected from the Language Studies Unit (LSU), Aston University in the summer of 1986. Six of them were staff members in the LSU and they were all native speakers of English. The other six were advanced research students and they were all non-native speakers of English.

Because the questionnaire was based on five selected passages (cf. 3.2.4) respondents were asked to perform two tasks (a) reading the passages, and (b) completing the questionnaire. So the respondents had to do two tasks and for this reason it was suggested in this pilot run that the questionnaire should not be long. In this run the passages and the questionnaires were distributed to respondents at the same time.

One of the distinctive features of this questionnaire was that the respondents were asked about an immediate experience, ie. about information on the passages they had just read. Many ordinary questionnaires, on the other hand, often ask respondents about remote experiences where their responses depend largely on memory.

The respondents were asked to give their comments on both questionnaire items and procedure. Below are the observations advanced by them in the pilot run:

(1) The respondents unanimously suggested that the questionnaire should be given after completing the reading of the texts, and should be made shorter.

(2) Some biographical data were considered unimportant. For example, age was considered unimportant because the sample of the study would be drawn from undergraduates and postgraduates whose age-range was obvious.

(3) Scales were recommended for questions 3 and 5 instead of multiple-choice responses.

(4) Reordering of questions was suggested (see 3.2.3. below).

(5) Rewording was suggested for some phrases which were difficult to understand, eg. text-reference.

(6) Because the word "visual" was a key word in the questionnaire, it was suggested that a definition should be given to it at the beginning.

In the light of these observations received from respondents the majority of whom had experience in questionnaire design, the questionnaire was reshaped and finalised (see Appendix 1).

3.2.2.4 Consistency

Siegel and Hodge (1968: 55) state that, "in order to make any substantial progress on questions of reliability one needs, of course, repeated measurements". In other words, the questionnaire as a tool of measurement should give consistent measurements. It should not show a change when none occurs. Therefore, this questionnaire was done on a sample of 40 LI subjects and later on a sample of 37 LI subjects. It gave similar results (as will be reported in Chapter Four and Five) because the two samples shared nearly the same descriptions. But when the questionnaire was carried out on a group of 56 FL postgraduates and 30 FL undergraduates it reflected a number of significant differences between the LI and the FL groups as will be reported later. That was because a change in the variables took place, thus the questionnaire seemed to be sensitive to any change in the group descriptions.

3.2.3 The Questionnaire Final Version

3.2.3.1 Questionnaire Sequence

One of the chief results of piloting was the order of questions. To establish rapport and interest in the questionnaire the personal information was left to the last two questions (Oppenheim, 1966). The easiest questions were put first whereas the evaluative ones were placed last (see Appendix 1).

3.2.3.2 Question Types

When the questionnaire was put in its final form, it consisted of eight questions eliciting 36 items. Questions 7 and 8 elicited two types of biographical data, namely, subject's first language and specialisation. Age was not included because subjects were drawn from university undergradutes and postgraduates whose age-range was obvious as stated before (cf. 3.2.2.3). Gender was treated as an irrelevant variable in this study for two reasons. First, there was no suggestion in the literature surveyed that gender exerts any significant influence on the reading process in general and the reading process of VEs in particular. Second, some respondents in the pilot run also suggested that gender might not be an important variable in this study.

Question 1 was intended to elicit the strategy the reader employed when approaching the VEs in texts, ie. the first-time the reader looked at the visual. Five responses were then listed to the reader who was asked to choose the appropriate one, ie.

(1) Before reading (B).

(2) During reading but before text-reference to the visual (D_1).

(3) During reading but after text-reference to visual (D_2).

(4) After reading (A).

(5) Never consulted visual at all (NE).

Question 2 was intended to elicit whether the reader's strategy (in Question 1) was a product of the direction of the accompanying verbal text or whether it was influenced by the reader's own purpose. Once again, the possible answers to this question were listed in nominal values.

Question 3 on the other hand had ordinal values where subjects were asked to rank their frequency of consultation of VEs during the above mentioned reading stages on a 7-point scale. This question was closely related to the research done on the process of eye-fixation on other features of text during the reading process (Just and Carpenter,

1980). In this context, researchers have raised many questions such as: Why do eyes fixate? What information are the eyes processing when fixating? So, this question was to some extent an attempt to relate the frequencies of consultation of VEs to eye-fixation in general FL reading.

Question 4 investigated the purposes of readers. It was intended to elicit the information-type looked for in the visuals, eg. was it specific or general? This was an evaluative question of the relationship between the visual element and its accompanying text as perceived by the reader.

Question 5 was also an evaluative one, but this time of the importance of the visual to the reader and the extent to which his/her purpose had been met. Like Question 3, it had ordinal values represented on a 7-point scale.

Question 6 was evaluative of the general outcome. As mentioned earlier this question was not (and in fact could not be) intended to give an accurate measurement of the influence of VEs on the total comprehension (because this was left to be investigated at a later stage in this research by the use of another technique); but rather to give only quite a broad and general idea about some guidelines to the ways in which the VEs might influence positively or negatively the overall comprehension of the text.

3.2.4 Criteria for Texts Selection (See Appendix 2)

The questionnaire was based on five representative passages taken from five textbooks, some of which were in use at Aston University (UK) and Khartoum University (Sudan) and perhaps elsewhere. From the rhetorical point of view, the passages represented the type of text organisation on which the study focused, ie. each included a visual of one type or another accompanying the prose, ie. a table, a graph or a diagram. However, this might not truly represent reality because some passages might be accompanied by more than one visual element, but the choice was made for experimental purposes, ie. self-contained passages where each had one visual.

The choice of the texts was also confined to the area of social sciences and humanities as being more accessible to general knowledge than hard sciences and

secondly, the visual elements in this area, perhaps due to their relative infrequency compared to the area of hard sciences, received little consideration in previous research. Even that little consideration (notably in Economics) was in the area of discourse analysis rather than in the area of reading.

A further criterion was the readability level. In order to maintain a match between the level of testees and selected texts, the texts were chosen according to the Fog Index (Gunning, 1952) readability formula, ie:

$$0.4 \left(\frac{\text{No of words}}{\text{No of sentences}} + \frac{\text{No of 3-syllable words}}{\text{No of words}} \times 100 \right)$$

According to Harrison (1980:4) the Fog Index is generally regarded by researchers as a suitable measurement of text difficulty with adult reading materials, but it is often used in junior schools. This formula is referred to in the literature on readability reflecting its wide use. For instance Urquhart (1984) used it. Although this formula like the other readability formulae, eg. Chall (1958) was criticised for being inadequate in capturing extra-textual features, eg. background knowledge, it was used here as a general predictor of text difficulty.

The results of the Fog Index are interpreted as follows : (see Alderson et al, 1984, pxxii).

(a) 12- = easy. (b) 13-16 = undergraduate level. (c) 16+ = postgraduatelevel.

In chapter Two an extended review of previous research dealing with visual-verbal relationships has been given. The review has shown that a number of studies undertaken by different scholars in different subject areas have yielded, as one would expect, a wide variety of different types of visual-verbal relationships. These relationships differ with respect to a great many things and, significantly for present purposes, from one author or reader to the other.

Therefore, in order to achieve at least the minimum representativeness of the passages selected for this study in terms of visual-verbal relationships, the passages were selected

with a view of obtaining a wide variety of different types. Aiming for as wide a cross-section of passages as possible within the limits of this study, also has the advantage that one may hope to capture the main types of relationships provided by previous research. These relationships, which the present passages too may represent (and the results suggest that they did indeed do so), can be labelled as follows (whether these particular labels of relationships are indeed representative is, clearly, a subjective matter but none of them is, at all controversial) :

1) Integral to Text (Economics and Business passages).

2) Illustration (Psychology and Linguistics passages).

3) Summary (Natural Resources passage).

A brief account of these labels of relationships will be given later in this section.

The reason why these three types of visual-verbal relationships were considered representative was that they almost all seem to appear on many of the lists advanced by previous researchers in different subject areas (for a full review on this see Chapter Two, section 2.2.4.). This in effect reflects the wide recurrence of these three types of visual-verbal relationships in a wide range of text types.

Another criterion considered in achieving this representativeness in the above labels was that they may also represent the varieties of authors' purposes of using VEs in texts. This tentative conclusion is based on the commonly-used types of text-references to VEs in the main texts eg.: In summary; Fig. x illustrates.....etc.

In this study, however, the main thrust was not on the relationships themselves (though they are of course important in this study), rather it was on the impact of these relationships on readers' reading processes and comprehension when they encounter such texts. This will be judged against their language background ie. LI / EFL.

The visual-verbal relationships in these five passages were assumed to be representative of their types. There are of course differences between them and some of these differences are perhaps significant. A decision was taken, however, to treat these

differences as an irrelevant variable in this study, with the quantification of data undertaken in relation to readers' language background.

Within the scope of this study, in other words, the aim was to acheive a representative cross-sample of text types and hence of reader-text relationships. A further study could usefully build on this work and attempt similar experiments with this variable held constant, but for present purposes it was felt appropriate to look for variety in text type to elucidate different reader-text relationships. Thus all the visual-verbal relationships in the five passages were considered as one feature of text and will be examined in the context of the reading process and comprehension in the LI / EFL contrastive setting. It is for this reason that the differences between these relationships were treated as an irrelevant variable in this study. It may be helpful though to give a brief account of each visual-verbal relationship in each of the five passages.

A) The Economics Passage

In this passage a numerical table has been used and located immediately after the first paragraph ie. nearly in the middle of the passage. The use of tables (in general) in expository prose passages is preferred by authors perhaps when the material is directly available to the reader (Wright and Fox, 1973).

The table which accompanies this passage is relatively simple and perhaps quicker to use. It has a few headings and annotations to lead readers in. The possible relationship between this table and its accompanying text is that the information presented in it is integral to the verbal text. This is clear from the fact that the second paragraph starts the following discussion of the topic with the information in the table (see Appendix 1):

> We can build an example to help us here. In table 3.1 we have three columns. Column A represents the total costs of the land, labour, capital and raw materials needed to make a carpet ; it does not include the payment needed for profit.....etc.

This means that all the economic argument and discussion rest on the table.

The second paragraph provides an example of the economic concept announced in the

first paragraph ie. how the relationship between costs and revenue constitutes the most important factor in production decision. The paragraph starts by describing the contents of the table eg. the concepts that each column in the table represents. Then the author states that " the most obvious" relationship that the accompanying table displays is the one between cost and revenue. This relationship, in fact, constitutes the main concept which this passage sets out to discuss. The discussion, afterwards, becomes somewhat inferential and once again it is built on the information presented in this table.

The author then concludes the passage by the use of the following conditional sentence in the passage :

> If a price increase produces higher profits, then the relative opportunity cost of producing his chosen good must fall.

The above sentence is very much typical of the language which normally accompanies tables.

It is, then, this close relationship between the table and its accompanying text which will be examined from the viewpoint of the reader. The questionnaire of this study (see Appendix 1) is not primarily intended to elicit the types of relationships between VEs and texts; rather it is intended to examine the impact of these relationships on the reading process and comprehension of LI / EFL adult readers.

B) The Natural Resources Passage

This passage is somewhat longer than the other four. Its visual is a general diagram consisting of a number of annotations and headings. The possible relationship that exists between this diagram and its accompanying text is that of Summary. This is perhaps indicated in the verbal text by the author's use of the following text - reference :

> In summary, after the Geneva Convention, the countries of the world generally divided their waters into three or four main categories (Fig. 3.1)

Thus, it will be seen, this relationship is identified mainly from the author's point of

view. The diagram is analogous to a map in showing the different locations referred to in the main verbal text.

The diagram is directly related only to the last third of the passage. Its main function is (or at least seems to be) to show the following locations of the four zones mentioned in the verbal text :

a) Internal waters

b) Territorial seas

c) Contiguous zones

d) High seas

As well as that the diagram provides some other information related to each zone such as the measurements of width, length etc. So if a reader is presented with this passage and he first looks to the diagram, he will only know the geographical locations of these zones. On the basis of the diagram alone he probably cannot understand thoroughly the physical and geographical features of each individual zone and the relationship of each to the others; and more importantly, the rationale behind the division of these zones in the manner shown in the diagram will not be clear to him. These issues are clarified only when the reader refers to the verbal text. This diagram can also act as a summary in the situation whereby the reader had read the text before and after a period of time he could refer only to the diagram from which he could remember the contents of the whole passage.

It is worth noting that this diagram in the original source and in this thesis (see Appendix 1) is located on the second page of the passage; but in the questionnaire experiment, it was presented to subjects on the same page with its accompanying verbal text. That was done for experimental purposes, namely, to make all the VEs in relation to their verbal texts in the five passages appear on the same page with their texts, hence holding this variable constant.

Although, as mentioned before, the locations of the four zones discussed in the verbal text are indicated in the diagram, nevertheless the verbal text carries all the detailed

discussion about them. In other words, the diagram seems to be of subsidiary status to the verbal text.

C) The Business Passage

The visual in this passage is a curvilinear graph which consists of headings and annotations. It is located in the middle of the second paragraph, that is to say in nearly the middle of the whole passage. Its relationship to the accompanying verbal text seems to be similar to that of the Economics passage. In other words, the graph is used in this passage as a basis on which the argument is developed.

The overall rhetorical organisation of this passage is very similar to that of the Economics passage. The first paragraph introduces the economic problem ie. scheduling in relation to time and resources. The second paragraph develops the discussion of this concept on a curve which is " convex ". After that a number of very abstract concepts are presented in the curve eg. " normal " and " crash " times. The paragraph then goes on to show how the relationship between cost and time for each activity is demonstrated by the different slopes of the curve. Finally the last sentence draws the conclusion by showing how the procedure discussed in the curve generates what might be called " a least cost schedule ".

The reason why the Economics and Business passages are similar in terms of visual-verbal relationships is partly due to the reasons suggested in Chapter Six which have to do with producing similar/ different cloze deletions. So for further discussion on this, see Chapter Six, section 6.2.2.

D) The Psychology Passage

This passage includes a simple line graph with only two annotations for the vertical and horizontal axes. The text-reference to it, unlike the other four VEs, occurs in the first paragraph. The aim of this passage is to discuss the relationship between intensity and human stress. The relationship between the two is one of causality. The function of the graph is to enable the reader to " visualise" this very abstract relationship. Thus the

relationship between this graph and its accompanying text seems to be Illustration.

And in fact, once again and in the Natural Resources passage, the author of this passage seems to indicate the possible relationship between this graph and its accompanying text through the use of the word " illustrate " itself (I quote):

> The graph in Figure 9-5 illustrates the probable frequency of stresses of various intensities.

The possible relationship here seems, then, to be one of Illustration.

This visual might appear to be simple in terms of the verbal information it carries, nevertheless it seems to represent basic abstract concepts which make its relationship to the accompanying text of vital significance.

E) The Linguistics Passage

This passage is shorter than the other four. It includes a table which consists of a number of columns and rows. The table also has annotations and headings. Unlike the other four VEs, it is located at the end of the passage. The possible relationship between this table and its accompanying text is also,perhaps, indicated by the author'sfollowing statement: (seeAppendix1)

> This can be illustrated from a study of the dialect of the Norwegian town of Tonsberg which was carried out using one-word responses to a questionnaire.

After that the author moves on to discuss the information presented in the table to show how the study referred to is illustrated. In other words this relationship is similar to that indicated in the Psychology passage ie. Illustration.

The first two paragraphs of this passage present the topic ie. the study of linguistic change in progress. The table is directly related to the third paragraph in that, the statistics it presents is related to the discussion in this paragraph. Even though, the verbal text leads the discussion and gives the full detail of the study referred to in the passage (ie. a study of the dialect of the Norwegian town of Tonsberg).

However, the conclusion of the study that the vowel /ae/ is giving way to the vowel /a/

is better demonstrated in the table than in the verbal text according to the author's following judgement:

> Responses to the Tonsberg questionnaire tabulated word by word and informant by informant , as in Table 6.1, show that a change is taking place.

So these five selected passages are representative in the sense that they include the commonly-used types of VEs ie. graphs, tables and diagrams; and also they represent the commonest types of relationships that exist between VEs and their texts.

Thus on the basis of the above criteria, the following five passages were chosen from five disciplines in the area of social sciences and humanities (see Tables 1a and 1b below and Appendix 2).

Table 1a: Sources of Selected Passages

Passage	Discipline	Source
Passage A	Economics	Daniel (1985, p23)
Passage B	Natural Resources	Ross (1978, pp43-45)
Passage C	Business	Cook (1971, p136)
Passage D	Psychology	Woollams & Brown (1979, pp186-188)
Passage E	Linguistics	Chambers and Trudgill (1980, p80)

Table 1b: Information on Selected Passages

Text	Words (n)	Sentences (n)	3-syllable words (n)	Fog Index
A	358	17	23	11
B	424	18	26	13
C	318	17	41	12.6
D	323	15	49	14.6
E	325	11	37	16

(n) = number

3.2.5 The Sample

The population of the sample of this study constituted two main groups: native English speakers (LI) and speakers of English as a foreign language (EFL). The latter included two subgroups: foreign language undergraduates (FLU) and foreign language postgraduates (FLP). The criteria used for group identification particularly the two EFL groups, as being targets, were language background, subject area and level of education. As pointed out before, gender was excluded because to the best of my knowledge, there was no suggestion in the literature surveyed that it had any influence on the reading skills (linguistic or non-linguistic). Because the emphasis was on the overall behaviour of subjects, the individual differences like intelligence were also excluded.

All the subjects were chosen from either postgraduates (FLP) or final year university undergraduates (LI and FLU) for two reasons: firstly, these types of students were likely to have sufficient experience in reading English texts in general hence what was expected to be measured, ie. reading VEs would not be influenced greatly by other linguistic reading difficulties and secondly, these types of students were expected to be familiar with and experienced in reading VEs in expository texts (the texts used in this study). It is evident, perhaps, that both reasons concentrated on experience either in general reading or reading of VEs in texts because it is believed that an experienced reader would be more useful in this approach which set out to elicit reading processes. This is supported by the evidence provided by Harri-Augstein et al (1982: 3) that:

> An experienced reader brings a great deal to the act of reading. Such a reader has, indeed, a considerable advantage over younger, less experienced readers, and an approach to reading which starts from that fact is likely to prove particularly fruitful for present purposes.

The following sections report on each group.

3.2.5.1 The Native Speakers (LI)

The population of this sample constituted 77 subjects. They were final year undergraduates drawn from different departments at Aston University, eg. engineering and Aston Business School. 40 of them were doing a course in communication skills at

the LSU at the time of experimentation. The questionnaire experiment was carried out in two phases. The first was done on 40 in November 1986 and the second on 37 in early 1987. The repetition technique, as pointed out before, was used to check the questionnaire's consistency in giving results (Siegel and Hodge, 1968). The results as will be shown later were similar and no serious discrepancies in the results of this group were detected.

3.2.5.2 The Foreign Language Group (FL)

As mentioned before this group included two subgroups: undergraduates and postgraduates.

(a) The Foreign Language Undergraduates (FLU)

This group consisted of 30 subjects. Strictly speaking, they were not all final year undergraduates. There were in fact about 12 of them who were newly graduated from the university at the time of experimentation. It was deemed appropriate to add them to this group rather than the postgraduates because they were much more similar in their descriptions to the former than to the latter (see Table 2 below).

In this group, the graduates had their university education at Khartoum University, Sudan. Prior to that they studied EFL for six years. They were accepted in the univeristy on the basis of their "boxings", ie. the total of five best subjects (100 each) obtained in Sudan School Certificate (SSC). The students had to achieve a minimum boxing (out of 500) set by the admissions office (in the university) in five subjects (among which was English) required by each faculty. The university usually accepts the highest boxings. In the university the students had their education through the medium of English. As well as that, both the Agriculture and Economics students had a one-year ESP (English for Specific Purposes) course in their university preliminary year.

Table 2: FLU Biographical Data

N = 30

n	Subject area	Age-range	Education	Experience
6	Agriculture	27-32	University graduates	Some post-university experience at the Ministry of Agriculture and National Resources, Khartoum.
6	Economics	27-32	University graduates	Some post-university experience at the Central Bank, Khartoum.
5	Linguistics	24-27	Final year university students	
5	Psychology	24-27	Final year university students	
8	Business	24-27	Final year university students	

However, in their post-university experience the Economics subjects seemed to have had more exposure to the use of English by virtue of their profession compared to their Agriculture counterparts. The rest of this sample, ie. the undergraduates, were drawn from Khartoum University (Psychology and Linguistics) and from Omdurman Islamic University (Business) and they were 18 in number (see Table 2 above).

Regarding their pre-university EFL studies and acceptance in the university they had the same descriptions as the Agriculture and Economics graduates. The only difference was that the Business subgroup, because they belonged to another university, had slightly lower boxings when they were first accepted in their university compared with the other four subgroups. All the members of this group (FLU) spoke Arabic as their first language and their level of English could be assessed as average. All were practising or nearly practising readers of expository texts accompanied by VEs at the time of experimentation (September 1987).

(b) The Foreign Language Postgraduates (FLP)

This group constituted 56 subjects drawn from a group of students who were doing a course in English and Study Skills (ESS) at the LSU, Aston University where the researcher was based. The students were doing the ESS course to help them pursue postgraduate studies in Britain. Their average age was 30 and they had considerable post-university experience. Their level of English was slightly better than their FLU counterparts, ie. ELTS = 5.5 (The British Council's ELTS is a nine point scale where "Band 1 = non-user: either has little or no knowledge; Band 9 = Expert user: fully functional command of the language" (Mohammed et al. 1984, p209). That assessment was made by the British Council before the start of the ESS course but the experiment took place towards the end of the course (September 1986).

The majority of this group (39) was from the social sciences area and the remaining 17 were from hard sciences, notably, engineering. For this reason an independent test of significance for the impact of the specialities of subjects on the overall result was made as presented in Chapter Four.

The subjects of this group represented different language backgrounds, ie. Arabic, Indonesian, Spanish and other Indian languages. However, the first languages of these subjects were treated as irrelevant in the present study for four reasons. Firstly, like gender, there is no suggestion in the literature to the knowledge of the researcher, that the reader's first language exerts any influence on his reading skills of VEs in a foreign language. Secondly, in fact there is evidence, ie. Goodman (1973) reported in Alderson (1984:3) that "the reading process will be much the same for all languages". This presumably includes, as well as the reading process of connected prose, the reading process of VEs/NVI. Thirdly, even the types of VEs/NVI on which the study focuses (mainly tables or graphs) are cross-cultural, thus their reading process was assumed to be the same. Fourthly, the subjects were chosen from a level of education whereby they had sufficient experience in reading in a foreign language texts accompanied by VEs/NVI.

For these reasons, no effort was made to classify the subjects of this group on the

basis of their first languages. So the homogeneity of the FLU and the heterogeneity of the FLP in terms of their first languages reflect only the composition of the group who took part in the experiment. The criteria used then for FL groups identification was undergraduate or postgraduate, where the former were considered as practising readers of the selected texts at the time of experimentation whereas the latter were considered less or non-practising readers of such academic texts because they had left university a long time before the time of experimentation (for more detail on the criteria of group selection see section 3.2.5 above).

3.3 Section Two: Cloze Methodology of the Present Study

3.3.1 Introduction

In Chapter Two (section three) we have discussed some of the theoretical aspects of cloze procedure, ie. its rationale and general applications. In this section we will discuss the methodological aspects of cloze procedure: validity, reliability, the different uses in reading comprehension as used in this study.

The cloze procedure is used in this study as part of the analysis of the non-linguistic reading skills of adult LI/FL readers of expository texts. The use of cloze procedure in measuring the impact of non-verbal information in general comprehension is highlighted by Rankin and Culhane's (1970) study where they have demonstrated that cloze scores are also sensitive to extra-linguistic information provided by pictures used to illustrate textual materials. By extension, pictures can represent the other types of non-verbal information including the ones used in this study, namely, tables and graphs.

As well as the above reasons, the researcher has also had practical considerations in mind, considerations which influenced his decision to use cloze procedure as a measure for testing the outcomes of non-linguistic reading skills of the study's subjects. These considerations related to the fact that the experimental design required the testing of subjects who were to be selected from the UK and Sudan. Not only that, but they had to be chosen from different faculties in each university in each country where the faculties are often located apart from each other. In addition to that, some of the tests in some

faculties had to be supervised by some lecturers (from those faculties) who were busy most of the time and thus could not afford much time to supervise the tests should they take longer times. Furthermore, the subjects chosen for the tests were either final-year university students, ie. LI and FLU or postgraduates undertaking research (FLP). In both cases the students were very busy and would find it difficult to spare much of their time to do any work which was not directly related to their studies. Finally, the study was based on four texts chosen from different disciplines in the area of social sciences and humanities, therefore the test had to be easy to construct.

For the above reasons, the test to be chosen had to be one that would require little explanations and little time to complete and administer in addition to its ease of construction as mentioned above. The cloze procedure was then chosen because it possesses these qualities, ie. it is simple, economical and easy to prepare. A cloze test can be made in a matter of minutes and that the deletion of words helps to avoid the technical problems and bias associated with question construction (Oller and Conrad, 1971; Alderson, 1981; Rye, 1982).Lapkin et al (1977: 280) state that:

> Because cloze tests are relatively easy to construct, administer and score, they offer a practical advantage for use in summative evaluations, especially if no appropriate tests are available.

Anderson (1976: 7) also points out that:

> Cloze tests as measures of readability and of reading comprehension are quick and inexpensive to construct. No training in test construction is required. Tests may be administered on a group basis. Instructions are uncomplicated and scoring is easy. The whole procedure is objective which means that research studies may be replicated.

3.3.2 Deletion System: 7th-Word Deletion

According to Anderson (1976), investigations into "noise" or message distortion fall into the category of methodological problems. The questions most frequently asked about cloze procedure concern "frequency of word deletions, type of word deletions, number of deletions, and cutting across all of these, scoring procedures" (ibid, p23).

Regarding the frequency of deletion there are two common systems: selective, and

every nth deletion (semi-random) which deletes systematically every nth word (normally between every 5th-10th word) from a written or spoken language. The former, ie. the selective, deletes certain items depending on the purpose of the test, eg. deleting the function words only or the subject-specific items only. Most researchers have preferred to use the more simple every nth procedure. Oller (1979), for example, has recommended the every nth word deletion. He states:

> Unless the purpose of the testing involves a need to assess student performance on some particular grammatical form, type of content or the like, an every nth deletion procedure will probably work best (p 365).

Taylor (1954: 25) warns against restricting deletions to particular kinds of words because that is:

> ... to ignore the fact that those kinds may not occur equally often in different materials. That difference in frequency of occurrence may itself be a readability factor.

As well as that, and because the present study focuses on the impact of non-verbal information on reading comprehension, there was no suggestion in the literature which shows that non-verbal information is sensitive to any category of item, eg. semantic, syntactic. Thus any selection of specific deletions has been avoided in this study and semi-random or every nth word deletion has been adopted. However, Jongsma (1980: 17) pointed out that selective deletion systems may be effective only instructionally when he says:

> ... Selective deletion systems aimed at particular contextual relationships are more effective instructionally than semi-random deletion systems such as every nth word or every nth noun-verb. Of course theoretically, cloze has been built on the notion of semi-randomness and this notion has held up well, particularly in readability research. However, for instructional purposes, selective deletion systems seem to be more effective.

In this study, the semi-random deletion system, ie. every nth word has been preferred because it is simple and objective and does not require any particular skill and that any researcher or teacher is capable of deleting systematically every nth word (Rye,

1982). Moreover, it is preferred because it is used in this study for testing reading comprehension rather than instructional purposes.

Within the every nth deletion system, most studies on cloze have favoured deletion beyond the 5th word as being most suitable for non-native English speakers because it provides more context for them to work with (Oller, 1973; Douglas, 1976; Foley, 1979; Ashiurakis, 1987). There is even evidence that deletion beyond the 5th word is also suitable for native speakers. Lunzer and Gardner (1979: 89) quoting Klare et al (1972) and others, suggest that:

> depending upon the nature of the material, the deletion pattern which will produce the highest cloze scores may be every seventh, ninth or tenth word.

Harrison (1980: 102) quoting MacGinitie (1961) has also preferred this method:

> ...Once the deletion rate falls below five a cloze test becomes increasingly difficult because the amount of contextual information available is too low to allow the normal process of redundancy utilisation to occur. There is also evidence to suggest that once the rate rises above seven the reader does not gain by being shown increasingly longer stretches of running text between deletions.

Foley (1979) stresses the fact that every nth word (between every 5th and 12th) should establish a balance between function and content words. Similarly Alderson (1983) and Rye (1982) point out that when less than five words of context is provided, this seems to have some effect on the predictability of deletion.

From the above discussion, it seems that the every nth word deletion method is preferred beyond the 5th word by most studies. However, there is no conclusive evidence on a specific rate of deletion beyond the 5th which has more effect on the validity of cloze procedure. But, Harrison and MacGinitie (above)
seem to suggest a range between 5th and 7th. Klare et al (1972), quoted in Harrison (1980), have suggested:

> that seventh-word rather than fifth-word deletion is preferable if the readers are comparatively weak or the passage is likely to be found difficult (ibid, p102).

As well as the above factors, the rate of deletion (5th or 7th) is governed by the length of cloze passages. Some authors have suggested 50 blanks to be obtained in which case the length of each passage selected should be 250 words or 350 words in the case of every 5th or 7th deletion respectively (Bormuth, 1968a; Oller, 1979). More recently, Harrison (1980) suggested for a reasonably reliable cloze test 35 deletions for a 180 length on 5th word deletion and 250 for 7th word deletion. Foley (1983: 66) suggests passages of 250/350 words in length to get between 30-50 deletions. Swain et al (1976) have conducted a cloze test to measure children's language proficiency in a bilingual program where they used passages of 280/292 words in length and adopted a 7th word deletion system obtaining a total of 40 deletions.

So, like the specific deletion rate, there seems a tendency among authors to obtain a total number of deletions in a cloze test that ranges between 30-50. Thus, in this study and for the aforementioned reasons, an every 7th word deletion has been proposed, first because it is suitable for native/non-native speakers of English who are both involved in the study. Secondly, the length of each passage in each version (a version comprises four texts, see Appendix 3a and 3b) ranges between 300-358 words in which case a total of 35-46 has been obtained in each. Thirdly, the results are analysed collectively, ie. in the four texts in each version where the overall deletions are well over 150 (for fuller discussions of the experimental design see Chapter Six). Fourthly, there are some examples of cloze studies which used the 7th word deletion on native and non-native (Irvine et al, 1974; Hinofotis, 1980; Heilenman, 1983).

Having specified the deletion rate in this study, ie. 7th, it follows that every 7th word in each passage is a potential deletion.

3.3.3 Scoring by Exact-word Method

It has been reported by Oller (1979) that all of the scoring methods of the cloze results that have ever been investigated produced highly correlated measures. For instance, correlations as high as .99 have been observed between exact word scores and scores that allowed synonyms for the exact words as correct answers, eg. Miller and

Coleman (1967). Oller (ibid) concludes:

> Thus, the exact word technique, which is generally the easiest to apply, is usually (but not always) to be preferred (ibid, p367).

Taylor (1953), quoted in Oller (1979: 367) states the rationale behind the exact word scoring method that the ability of a reader to fill in the very word used by the writer would be a suitable index of the degree of correspondence between the language system employed by the writer and that employed by the reader.

Foley (1979) also reports that the cloze studies of ESL/EFL subjects correlating both scoring methods, eg. Stubbs and Tucker (1974); Hinofotis (1976) indicate that there is little difference between the exact cloze and acceptable cloze in terms of their effect on cloze scores. Finally, Harrison (1980) has clearly argued in favour of verbatim (exact-word) scoring as being faster, more reliable and more valid than synonym scoring.

Despite its objectivity and ease, the exact scoring method has not escaped criticism. Oller (1979) finds it "too stringent a requirement" because as he puts it "it would keep the creative reader from supplying an even better word in some cases" (ibid, p367).

However, the alternative methods of scoring, ie. "acceptable cloze" and "clozentropy" received even more criticism than the exact cloze method. The acceptable cloze, where the examinee provides an acceptable word to the missing original one, has been criticised because it takes longer time than the verbatim and may be less reliable (Harrison, 1980). Similarly Lesiak and Bradly-Johnson (1983) state that acceptable cloze scoring reduces reliability because of subjective judgement.

The second scoring method, ie. clozentropy, was first introduced by Darnell (1970). It is a binary method that combines both the exact-word and acceptable cloze methods. It is based on the responses of native speakers on the assumption that the responses given by such a group would be a reasonable criterion against which to judge the adequacy of responses given by non-native speakers to the same test items. Darnell reasoned that the responses given more frequently by native speakers should be assigned a heavier weighting than less frequent responses (Oller, 1979: 372).

This method, like the acceptable cloze, has been criticised as being more complex

and time-consuming: as Oller (1979: 373) puts it, "the virtue of the ease of preparing a cloze test was swallowed up in the difficulty of scoring it". More recently this scoring method has undergone two modifications the first was Reilly's (1971) where what he suggested "minimizes considerably the number of Darnell's formulae by only a single formula that requires a two step computation for obtaining the total scores of each FL examinee" (Ashiurakis, 1987: 141). The second modification was in Douglas's (1976) Botswana study where he reported a correlation of (.97 $P < .01$) between Reilly's system and his modified version. The basic idea of Douglas's is to assign one point, ie. a correct score for every answer given by a non-native examinee which coincides with that given by at least two native speakers and not just by the majority as in Reilly's system.

Despite these modifications of Darnell's clozentropy it is still time-consuming compared with exact-word system. Secondly it necessitates the availability of a group of native speakers to act as a crtierion group and this may be difficult to find in many places. Thirdly, if the texts selected for the cloze procedure were chosen from different subject areas, as the case in this study, then it would be impractical to get a reasonable number of native speakers for each text to act as criterion groups. In addition to the above reasons, the exact-word scoring method will be adopted in the present study for the following reasons:

(1) It is objective and easy as mentioned before.

(2) It correlates highly with all the other scoring methods specially the acceptable-cloze.

(3) The procedure is used for testing purposes rather than instructional purposes in which case the exact method is more preferable as Jongsma (1980: 18) puts it:

> When the cloze procedure is used for testing comprehension or assessing readability, the preferred scoring method is to count only exact replacements. However, when used for instructional purposes, teachers have been encouraged to accept synonyms as well as exact replacements.

(4) The texts were chosen from four related disciplines in the area of social sciences. So as well as the impracticality of getting sufficient numbers of native criterion

groups, as pointed before, the native speakers themselves were used as an experimental group in this study. Therefore, all the efforts were geared towards getting enough numbers for the experimental group which in itself proved to be a painstaking task let alone getting extra numbers to act as criterion groups. That is why the "clozentropy" was avoided.

(5) The acceptable cloze, on the other hand, was avoided due to the difficulty of getting sufficient numbers of subject-specialists to act as judges for the responses in four different texts.

(6) The tests constituted eight versions (two of each text) in which case the total number of deletions was over 300. Thus if either acceptable cloze or clozentropy was adopted, it would be cumbersome and time-consuming.

(7) The tests were not intended to measure any particular linguistic skills, though they might incidentally do so, rather the interest was in the difference(s) between the overall outcomes of reading in the two versions (the visual and the non-visual versions). Therefore, the exact-word scoring method was found satisfactory to fulfil this purpose

3.3.4 Cloze Procedure as a Measure of Reading Comprehension

Broadly speaking, cloze procedure has been used either as a testing tool (Taylor, 1953; Anderson, 1976) or a teaching tool (Jongsma, 1980) In this study it is used as a testing tool albeit the results may recommend it as a teaching tool.

Though the first applications of cloze procedure were to measure the readability level of texts, many other uses assess the relative proficiency of a bilingual person in two languages (Osgood and Sebeok, 1965). Taylor hinted at this possibility as early as (1956).

Research on the uses of cloze procedure in reading comprehension has concentrated on comprehension as being the offspring of linguistic reading skills. However, comprehension resulting from non-linguistic reading skills, ie. reading skills of non-verbal information, seems to have been treated only incidentally. This study identified some non-linguistic reading skills used by a specified sample of native/non-native English speakers in reading tables and graphs in expository texts. The study attempts to assess their overall impact on reading comprehension through the use of cloze procedure (for full discussion of this see the design of the cloze tests in Chapter Six).

As such it is perhaps appropriate at this stage to give a brief review of research undertaken on the use of cloze procedure as a measure of reading comprehension in general. The research tackles this issue from four broad aspects. These are:

3.3.4.1 The Use of Correlations with Traditional Comprehension Tests

The aim of the studies undertaken under this issue is to establish concurrent or predictive validity of the procedure with other comprehension tests especially the multiple choice type. The reason why cloze tests were particularly correlated with multiple choice type tests was because as Bormuth (1967) puts it, "multiple choice comprehension tests have been used for many years and have a widely-known frame of reference accepted in both readability research and in classroom practice" (p292).

Thus the correlation studies can be divided into two:

(a) Native English Speakers (LI)

These have reported consistently high correlations between cloze and other standard reading tests. Rankin (1969) reported his work with Culhane where they conducted a study on five passages for over a hundred students and they reported that the correlation averaged .68. Anderson (1976) reviews about thirteen studies on reading comprehension for different school levels of children on different tests based on different deletion rates.

He reported validity coefficients of these studies ranging between .68 to .84 and a reliability coefficients between .88 to .97. Bormuth (1968a,b) obtained the highest correlations for small-scale cloze tests, ie. .73-.84 validity coefficients.

(b) The FL Setting

Where the subjects were non-native English speakers (FL and L2), research studies have yielded similar significant correlations between cloze scores and other standardised comprehension tests. The studies that have used cloze procedure with adults and children indicate that reliability coefficients range from fairly high to very high. For example, Darnell's (1968) and Oller's (1972) studies have established the validity of cloze procedure as an integrative measure of second language proficiency. Also, Irvine et al (1974) conducted a study on 59 native speakers of Persian and found a correlation of .79 between cloze test and TOEFL. Earlier, Friedman (1964) provided limited evidence for the use of cloze procedure as a measure of reading comprehension beyond native speakers. She correlated cloze scores on twenty selections from McCall-Crabbs standard Tests Lessons in reading with the Metropolitan Achievement Test and found correlations with vocabulary items ranging between .63 and .85 and between .71 and .87 with the total reading and she concluded that cloze procedure was a valid measure of comprehension for foreign students.

Recently, Stubbs and Tucker (1974), reported in Ashiurakis (1987); used the EEE (English Entrance Exam of the American University in Beirut) on 155 Arabic-speaking subjects to correlate with cloze tests where they found a correlation of .76 ($P < .01$) between acceptable cloze and total EEE scores. Foley (1979) suggested that cloze procedure was particularly useful in the ESL situation because one of its strengths is in "identifying the reader's knowledge of the lexical items in their syntactic setting so as to get at the conceptual input of the writer" (p351).

3.3.4.2 Cloze as a Criterion-referenced Test

As pointed out above (cf. 3.3.4.1), many studies have reported the interpretations

of cloze scores, in much of the research on language testing, with reference to multiple-choice type of tests. Thus, cloze as a criterion-referenced test indicates one of three levels of difficulty in basic language skills, whether those skills be applied to reading or listening: frustration, instruction and independent (Foley, 1983: 57). These levels were based on Bett's (1954) study where 75% score on multiple choice comprehension test indicated instructional level and 90% indicated independent level. Below are brief definitions of these levels (after Rye, 1982; Foley, 1983):

(i) The Frustrational Level

The material set before the reader is not matched to his level of ability in the target language. Thus it is too difficult for the reader to cope with even when helped.

(ii) The Instructional Level

The material can be used with some information gain if used with outside assistance, eg. teacher or peer group.

(iii) Independent Level

Where the student can use the material without any outside assistance.

The comparisons between cloze test percentages and multiple-choice test percentages at different levels of comprehension were reported in Cohen's (1975: 249) as shown in the table below:

Table 3: Comparison between Percentages Scores of Cloze Tests and Multiple Choice Test (Cohen, 1975)

	Level of Comprehension					
	Multiple choice percentage scores			Corresponding cloze percentage score		
	Level 1	Level 2	Level 3	Level 1	Level 2	Level 3
Bormuth, 1967	65	75	90	31	38	50
Bormuth, 1968a		75	90		44	57
Rankin and Culhane, 1969	65	75	90	23	41	61
Rankin, 1971	65	75	90	38	44	58
Mosberg, Potter and Cornell, 1971	57	68	78	27	36	36

These levels of comprehension have been criticised by some authors. For example, Guszak (1970) suggested that these reading levels needed to be validated. Prior to that, Bormuth (1969) stated that no one has given either a "logical" or "empirical" reason as to why the standards of 90% - 75% should be accepted. However, Foley (1983) reported some studies, ie. Myers and Winkley (1973); Jones and Pilkulski (1974); and Foley (1979, 1982), which followed these indications and they all found that cloze above the 38% marked effectively identified instructional level even when multiple choice type assessment was not used.

Thus the 38% criterion will be adopted in this study because it was found that this would allow for a greater margin of error between "instructional" and "frustrational" levels than other studies which suggest 44% as minimum (Foley, 1979: 354). 57% criterion will be used to mark independent level.

3.3.4.3 Cloze as a Measure of Specific Reading Comprehension

The validity of cloze procedure as a measure of specific reading comprehension (as opposed to general comprehension) was made by correlating cloze tests with comprehension tests made by the same testers and often over the same passages and comparable results were obtained. For example, Taylor (1957) correlated two types of specific comprehension: the first was a pre-cloze test and a multiple choice test where a correlation of .70 was obtained, and the second was a post-cloze with another comprehension test where a correlation of .80 was obtained.

Recently, Cohen (1975) examined the effects of content material from 7th grade textbooks of literature, social studies and science on 63, 7th grade high school subjects. The cloze scores were then correlated with multiple choice tests and all the correlations were found to be significant at level 0.01. Similar studies include Bormuth (1967); Grundin et al (1981).

3.3.4.4 Information Gain

This refers to the distinction made between the knowledge a subject gains from reading a passage and the knowledge he has before reading that passage through the use of pre-cloze and post-cloze tests (Anderson, 1976). Anderson reported studies, namely, Taylor (1957) and Rankin (1957) which obtained information gains significant beyond the 0.001 level. In the FL setting also, Oller (1972); and Stubbs and Tucker (1974) obtained similar substantial correlation coefficients.

In this study, however, cloze will be used as a measure of general reading comprehension and as a criterion-referenced test (see Chapter Six).

3.3.5 Cloze as a Sensitive Measure to Contextual Constraints

Cloze procedure is used in this study because it is sensitive to different aspects of contextual constraints, eg. different deletion rate (one in five or one in seven), changing

sentence or paragraph order (natural vs scrambled passages). Oller (1979) reported some studies that investigated constraints within sentences. Among them was Aborn et al's (1959) where they found that the predictability of a word in a given context was generally inversely proportional to the size of the grammatical class. That is, the larger the number of words in a given grammatical class, the harder it is to predict a particular member of that class in a sentence context. MacGinitie (1961) conducted another study of contexts of prose materials up to 144 words in length and concluded that "context beyond five words did not help in the restoration of missing words" (p127). Miller and Cokeman (1967) reached a conclusion very similar to MacGinitie's, ie. contexts beyond five words did not affect cloze scores very much. Carroll et al (1959) showed that if a text was divided into ten word segments with one cloze item inserted in each segment, the items were much easier to fill in if the segments were presented in the original order of the text than if they were presented in a scrambled order.

A similar technique was used by Oller (1975), ie. "a cut and scramble procedure", in five, 100-words long passages where he found that items inserted in the five word segments were significantly more difficult than the very same items in the ten word segments and so on. Chihara et al (1977) examined the sensitivity of cloze procedure to constraints ranging across sentence boundaries on native and foreign language subjects. They used sequential vs scrambled cloze tests. They found that constraints across sentence boundaries help the performance of the language user on at least some cloze items. More recent studies, eg. Brown (1983); and Rye(1984); have also provided evidence for the sensitivity of cloze to contextual comprehension.

As well as that, there are other studies which provided evidence for the sensitivity of cloze procedure to non-linguistic extra-textual constraints. For example, Rankin and Culhane (1970) provided evidence, that cloze procedure is also sensitive to extra-textual information provided by pictures to illustrate textual materials as mentioned before (cf. 3.3.1).

3.3.6 Evaluation of Cloze Procedure as a Measure of Reading Comprehension

Traditional comprehension tests tend to use comprehension questions of one type or another, eg. multiple choice, false/true, yes/no. The setting of these questions has been criticised by many, notably Rye (1982). He criticised them as being inadequate to capture many features of the text, ie. the rhetorical organisation and he doubted whether these questions involve high-order comprehension skills, eg. inference and evaluation or they only require literal recall of the passage. By extension it may well be argued that these questions seem to be inadequate to handle the non-verbal information that often accompanies verbal texts let alone the motivation it often provides for reading the accompanying verbal texts. Secondly, there is no guarantee that comprehension questions will always be set in understandable, unambiguous and unbiased manner and that their answers would not involve subjective judgements from the assessors. Finally, traditional comprehension questions seem to examine some parts of text more closely than others.

These problems associated with comprehension questions are mostly overcome in cloze procedure where the attention is focused on a wide sample of passage. In addition to that cloze procedure does not concentrate on a particular group of reading skills. Rather it involves the use of a wide range of reading skills (ibid, p31). Anderson (1976: 12) also suggests that "the cloze procedure, based as it is on a regular deletion system, ensures that the items are an unbiased sample from the population of test items for a particular passage".

Despite all the evidence provided in support of cloze procedure as a measure of reading comprehension over the traditional comprehension tests, the cloze does not escape criticism. The main criticism which was raised by Carroll (1972) and confirmed by recent critics was that cloze is dependent on local redundancy, and hence capable of measuring only low order comprehension skills, eg. the ability of handling collocation, cohesive devices such as anaphora and cataphora, rather than the higher order skills such as inference and evaluation.

However, Ashiurakis (1987) reported Chavez-Oller et al's (1985) and Rye's (1985) defence against the studies that reported negative evidence on cloze as a measure of reading comprehension as being "fraught with theoretical weaknesses". Prior to that, Foley (1983) responded to the claim that cloze measured only low order skills by stating that low and high order comprehension skills do overlap considerably as manifested in the consistent significant correlations between cloze tests and multiple-choice type comprehension questions.

To conclude, as well as benefiting from the strengths of cloze procedure over traditional comprehension questions, this study attempts to establish the cloze as a measure of reading comprehension resulting from non-linguistic reading skills. This emanates from the capability of cloze in capturing the linguistic as well as non-linguistic features of the text as discussed before.

3.3.7 Selection of Cloze Passages (see also Section 3.2.4. above)

The selection of cloze passages was based, among other factors, on their readability indices and to what extent they matched the linguistic levels of the testees to ensure the reliability and validity of the task. However, in his review of this aspect of cloze methodology, Oller (1979) has shown that the level of difficulty of a cloze passage does not greatly affect the scores produced by the testees, and moreover research has shown that, "the cloze procedure is probably appropriate to just about any text" (ibid, p364). In addition to the above, Rye (1982) has also pointed out a number of criteria for cloze passages' selection: the first has to do with motivation, ie. the passage selected for a cloze test must be the one that subjects would want and reasonably be expected to read. That is because the cloze deletions will add to the difficulty of the passage, and if the passage becomes too difficult the deletions will fail to discriminate well between subjects. The second has to do with the selection of passages from different subject areas (as the case with the present study). Rye points out, this is advantageous in two ways:

(a) it is helpful as a means of assessing not only the comprehension of the testee,

but also the understanding of the subject-matter itself by the testee;

(b) it is helpful in encouraging the students to develop their understanding of a subject.

The selection of the cloze texts also conforms to MacKay and Mountford's (1979: 122) principles which are:

(a) materials should be selected from the specific area of the field upon which the students are engaged;

(b) the materials should not be more advanced than students' knowledge of the area.

It is worth pointing out that the choice of texts from different subject areas does not require the use of different reading skills (Beard, 1967). Beard examined possible differences in stylistic variables between content area texts in world history, American government, biology and chemistry and how they might affect readability. He found no significant differences between the various content area texts which indicated that the type of reading skills needed in each content area may not differ. This conclusion could reasonably be extended to non-linguistic reading skills which are also expected to be the same in each content area, especially when they are used in reading cross-cultural non-verbal information such as tables and graphs as used in this study.

The present study used four of the five texts used in the questionnaire in the first experiment. These include Economics, Business, Psychology and Linguistics. The "Natural Resources" text was excluded for two reasons:

(1) the difficulty of getting a satisfactory number of suitable examinees to do this particular text; and

(2) the text contained a diagram and it was decided in this cloze experiment to confine non-verbal information to graphs and tables only because these are cross-cultural as pointed before.

Thus the criteria for selecting these passages conform reasonably well with the guidelines given by Oller and Rye above. The passages were assessed by the Fog Index (cf. 3.2.4) where their readability indices ranged between 12-16+ which matched the level of both undergraduates and postgraduates (Alderson et al, 1984).

The Fog Index like all readability formulae is a general predictor of text difficulty and provides a crude measure of readability by estimating sentence length and syllables. These formulae have been criticised by some scholars as being inadequate in handling extra-textual aspects, eg. background knowledge of reader (Rye, 1982). The readability indices of the four texts chosen for this cloze experiment were for the original version, ie. text and visual. Thus, according to the criticisms raised by Rye above with regard to the inadequacy of readability formulae, amongst which is the Fog Index, perhaps the removal of the visual element from each text had consequently created a change in its readability index in a certain direction. In other words, did the non-visual texts become more difficult or did they become easier? However, had a change of any kind taken place, it would not influence the overall result for two reasons: first, the cloze procedure is sensitive to these changes in context and second, as pointed before (cf. 3.3.5), the scores would spread evenly because the level of difficulty of a passage does not affect the cloze scores (Oller, 1979).

3.3.8 Cloze Subjects

Three groups of subjects similar to those used in the questionnaire took part in the cloze experiments: LI, FLP and FLU. The two FL groups had the same descriptions as their correspondents in the questionnaire in terms of age, educational level, level of English and specialisations (cf. 3.2.5). The LI, on the other hand, had also similar descriptions to that of the questionnaire except the cloze LI subjects were chosen from specialisations matching the subject areas of the cloze passages as a requirement of cloze procedure as will be shown below. The total number of the three groups was 123 distributed as follows: L1 = 50; FLP = 33; FLU = 40.

The first two of the groups (LI, FLP) were UK-based at the time of

experimentation whereas the latter was based in Sudan. The experimentation took place between August 1987 to March 1988. The subjects of each group were chosen from subject areas matching those of the cloze texts as a face validity required by the cloze procedure. Prior to that, as was the case in the questionnaire, (cf. 3.2.4), the readability level of texts matched those of the groups. Because of these restrictions in the selection of the samples and because each group was split into two: one for the visual version and one for the non-visual version (for more detail see experimental design, Chapter Six) the numbers were not as large as those of the questionnaire (see Table 4 below). In particular, a difficulty was experienced in getting a satisfactory suitable number of FLP subjects to do the psychology test. In fact, only 3 subjects were found at Warwick University. However, like the questionnaire, the results of the cloze test will be analysed collectively where the interest is in the overall tendencies exhibited by the groups. Table 4 below presents information on the cloze samples, ie. their numbers, specialisations and the sources they were drawn from in each group.

Table 4: Information on Cloze Subjects

	UK-based Groups				Sudan Group	
Specialisation	LI		FLP		FLU	
	n	Source	n	Source	n	Source
Economics	10	Aston Univ	8	Aston Univ	10	Khartoum Univ
Business	16	Aston Univ	16	Aston/B'ham Univ	10	Khartoum Univ
Psychology	13	Aston Univ	3	Warwick Univ	10	Khartoum Univ
Linguistics	11	Aston Univ	6	Lancaster Univ	10	Khartoum Univ
Total	50		33		40	

All the LI, apart from the Linguistics subgroup, were final-year undergraduates at

the School of Business, Aston University at the time of experimentation. The Linguistics subgroup, however, had graduated only very shortly prior to the experimentation and they did the cloze experiment while they were doing a course leading to a TEFL certificate at the Language Studies Unit, Aston University in the summer of 1987.

The FLP subjects were drawn from the postgraduate students who came to Britain to pursue studies and as mentioned before this was the group where a difficulty was experienced in getting satisfactory numbers of them, although considerable efforts were made at four different universities.

The FLU subjects were drawn from final-year students at Khartoum University, Sudan, where the majority of them were "honours" students. They were from the faculties of Economics and Social Studies and Arts (Psychology and English Departments).

As stated before these three groups of subjects had the same descriptions as those of the groups used in the questionnaire. So for more detail about each group see sections: 3.2.5.1 (LI), 3.2.5.2 (FLU and FLP) above.

3.4 Section Three: Administration of Techniques

3.4.1 Questionnaire

Following Scheafer et al, (1971); Bailey, (1982) each group or subgroup was stratified in five non-overlapping small groups (10-12 each) according to their specialisations, ie. to match the subject-matter of each text. Then the subjects were asked to read the texts first and then complete the questionnaire. The first process lasted 8-10 minutes and the second 4-5 minutes for the LI group whereas for the two FL groups it lasted 10-12 minutes and 6-8 minutes respectively. Both the LI and the FLP groups were supervised by the researcher and their respective teachers (because the experiment had to be done at the same time). As for the FLU group (the Sudan), the questionnaire was mailed but not directly to the testees, because the nature of the experiment required the completion of two tasks in a specified sequence (cf. 3.2.2.3). For this reason it was sent to reliable colleagues who were instructed to execute the experiment according to a certain

procedure on the right subjects. This was done because the researcher was unable to return himself to the Sudan for practical and administrative considerations. So the experiment was carried out on his behalf but under his guidelines and instructions.

It is worth noting that although the LI subjects were mostly hard science students, they completed the two tasks faster than FLP. There is no time record available for the FLU group.

All respondents were given the assurance of a guarantee of anonymity. Oppenheim (1966: 37) states that anonymity is often crucial in obtaining frank and revealing responses, so:

> Where possible, therefore, respondents should not be asked for their names or requested to sign their questionnaires; instead they can be given numbers.

3.4.2 The Cloze Tests

Generally, most of the UK groups were administered by the researcher. In case the tests were given to different groups at the same time or in case some of the tests were done outside Birmingham (where the researcher is based), the following had helped the researcher in administering the tests:

(a) the students' class teachers or instructors

(b) some advanced research students.

All the tests were given to testees in their lecture rooms either prior to or after their lectures. No transfer of information was allowed during the tests.

Regarding the Sudan group (FLU), for the same reason stated in the questionnaire experiment (cf. 3.2.6), the researcher was unable to go to Sudan to supervise this particular group. The tests were then administered on his behalf by reliable colleagues at the English Language Servicing Unit (ELSU) Khartoum University, who were also assisted by the students' respective teachers. The whole process was done under the

guidelines and instructions stated by the researcher. These were satisfactorily met according to a written report (see Appendix 5) received from ELSU, Sudan.

Each test was accompanied by an instruction sheet (see Appendix 5) which included as well as the cloze instructions, two biographical types of information, namely, language background and specialisation. These were deemed to be helpful in the analyses of results and in group identification. For example, a subject in the LI group was found to be of British nationality but English was not his first language. Similarly, in the FLU group a subject, due to his stay in Britain for a number of years, spoke native-like English and consequently wrote English as his first language although, strictly speaking, it was not. This particular observation was reported by one of those who administered the tests in Sudan. Similar examples were also found in the students' specialisations where some subjects were found to be not particularly well-matched to the subject-area of the texts they had attempted. Such examples and others were considered in the analyses of results.

In the cloze literature there is a general tendency to leave the tests untimed. Foley (1979), for example, states:

> Cloze tests are usually untimed, so that, it is reasoned, slower subjects are not handicapped (p62).

Following this tendency, the cloze tests were left untimed. However, for reasons required by the analysis of results (Chapter Six), each testee was asked at the end of the test to record the time s/he spent in completing the test.

3.5 Section Four: Statistical Measurements

In addition to the percentage, two statistical measures were used in the analyses of both the questionnaire and cloze results. These are, the chi-square test of significance and the t-test. The following sections report on each.

3.5.1 The Chi-Square

As mentioned before this research involved three groups of subjects: LI and two FL

groups. Thus, the quantification of results (whether within the group, eg. FLP for measuring the impact of specialisation on subjects performance in the questionnaire (cf. 4.2.2.1); or whether between the groups, eg. LI vs FLP/FLU or FLP vs FLU) often required the use of a robust statistical test to make comparisons between the groups' responses. According to Levin (1977), the chi-square is employed to make comparisons between frequencies rather than between means, eg. in this questionnaire responses to questions 1, 2, 4 where only nominal data were obtained. The groups were categorised according to their language background and level of education the hypothesis being that these variables would affect readers' use of visual elements in the reading process. Therefore, the chi-square was chosen because it is suitable in analysing data like these as Siegel and Castellan (1988: 45) put it:

> The technique is of the goodness-of-fit type in that it may be used to test whether a significant difference exists between an observed number of objects or responses falling in each category and an expected number based upon the null hypothesis.

Other reasons, for using the chi-square are:

(a) that it is suitable for testing a single sample case (Siegel and Castellan,1988)

(b) that it is suitable for testing two or more independent samples (Levin, 1977)

(c) that it can be applied to any number of independent samples measured at the nominal level.

3.5.2 The t-test

As mentioned above, the chi-square was used to test the frequencies or the nominal data but the t-test was used to test the differences between the mean scores. According to Levin (1977), the t-test can be used to translate a sample mean difference into units of standard error of the difference and that the t-test has the advantage of being:

> ... interpreted with reference to degrees of freedom (df), which varies directly with sample size and goes to determine the shape of the sampling distribution of differences. The larger the sample size, the greater our degrees of freedom. The greater our degrees of freedom, the closer the distribution of differences comes to an approximation of the normal curve (ibid, p134)

There is another reason for using the t-test and that it is suitable for testing the mean difference between small samples. This is particularly important in the case of cloze results in this study where the samples were relatively smaller than those of the questionnaire because each group had to be split into two subgroups, ie. the visual and non-visual subgroups (for further information see Chapter Six).

A third reason for choosing the t-test is that it is suitable for testing two equal as well as unequal samples. This is particularly important in this study because in most cases either the two groups tested were unequal (the questionnaire); or the two subgroups (the cloze) were unequal.

CHAPTER FOUR

ANALYSIS AND DISCUSSION OF QUESTIONNAIRE RESULTS

PART ONE

4.1 Introduction

The processing of the non-linguistic reading skills of VEs, like other linguistic reading skills, includes:

(a) reading strategies, ie. the ways in which readers employ their non-linguistic skills to deal with texts;

(b) reading purposes, ie. the purposes that influence readers to use their non-linguistic skills in one strategy or another.

These two issues will be discussed in the light of the responses to the questionnaire given by the three groups: LI, FLP and FLU. The present chapter, however, will be concerned with the first issue (a) and the second issue (b) will be discussed in Chapter Five.

As well as discussing the non-linguistic reading strategies used by the three groups in the texts they had read, this chapter will consider two more issues based, also, on the results of the questionnaire. These are:

(1) the factors that influenced the non-linguistic reading strategies used by each group;

and

(2) the frequency with which each group consulted the VEs in the reading process.

Thus the general aim of this chapter was to quantify statistically the similarities and/or differences between the groups in their non-linguistic strategies of reading VEs.

These similarities and/or differences in the non-linguistic strategies will eventually be compared with the typical linguistic strategies of reading connected prose.

Although it would be logical to start the discussion of the non-linguistic reading processes by discussing "purposes" first, it was decided to start with the strategies in this chapter and postpone the discussion of purposes to the next chapter for reasons similar to the two reasons put forward by Harri-Augstein et al (1982: 11) namely:

(1) it is easier to begin with strategies than purposes;

and

(2) this has the advantage of emphasising at once a key point, ie.that there is no one right way of reading. Different texts require different ways of reading and the same text can be read differently if read with differing purposes.

Although it should be noted that these reasons were perhaps intended for the typical linguistic reading skills, eg. scanning, skimming etc nevertheless they seem to be also appropriate to the non-linguistic reading processes because readers normally use the non-linguistic strategies to comprehend the verbal text. So the target for both linguistic and non-linguistic skills is the comprehension of the verbal text.

For these reasons, it was deemed appropriate to identify these strategies first and then consider the purposes. These reasons might also justify the fact that the questions on strategies were put at the beginning of the questionnaire (see Appendix 1).

Thus the specific aims of this chapter are:

(1) To establish the existence of non-linguistic reading skills and the fact that these skills can be manipulated using different strategies as a result of the presence of VEs in texts.

(2) To identify and describe each strategy used by each group.

(3) To discuss the factor(s) that may have influenced each strategy for each group.

(4) To examine the frequency of consultation of VEs.

(5) To compare the above aspects of the reading process of texts accompanied by VEs with those of the reading process of connected prose.

4.2 Presentation of Results

The questionnaire data were divided into four categories with a total of eight variables. The following table shows each category with its variable(s) and the manner in which each variable (var) was measured:

Table 5: Classification of Questionnaire Data

Category	Manner
Category 1: Background variables	Manner
Var 1 - Language background	Dichotomy: Yes 1, No 2
Var 2 - Subject area	Dichotomy: Hard science 1 Social science 2
Category 2: Non-Linguistic Reading Skills	Manner
Var 3 - Non-linguistic reading strategies	Percentage
Var 4 - Factors influencing the non-linguistic reading strategies	Percentage
Var 5 - Frequency of consultation	7-point scale
Category 3: Identification of Purposes	Manner
Var 6 - Non-linguistic reading purposes	Percentage
Category 4: Evaluation of VEs	Manner
Var 7 - Importance	7-point scale
Var 8 - Role	Percentage

This chapter will deal with the questionnaire results of categories 1 and 2, ie. the background variables and the non-linguistic reading skills (see table 5 above). Categories 3 and 4 will be discussed in Chapter Five. Although the background variables will be discussed in this chapter, they will also be referred to in association with categories 3 and 4 in Chapter Five.

The purpose of the questionnaire was to find answers to five out of six questions raised in relation to the first part of the research hypothesis which was

concerned with non-linguistic reading processes (cf.1.2). These questions focused on the following five aspects of the non-linguistic reading processes of VEs:

(1) The non-linguistic reading strategies used by each group of readers(Var 3)

(2) The factor(s) that influenced the strategy of each group (Var 4)

(3) Frequency of consultation of VEs (Var 5)

(4) Readers' purposes in reading VEs (Var 6)

(5) Readers' evaluation of the importance and role of VEs in the reading process (Vars 7 and 8).

The present chapter will then deal with the first three aspects as mentioned before. Therefore, the variables of category 2 will be discussed in the perspective of the central research hypothesis which attempts to identify and quantify comparatively the LI/EFL reading processes of VEs in relation to their accompanying verbal texts. The following sections give details of the questionnaire results based on category 1 and category 2.

4.2.1 Background Variables

The biographical variables of the groups were elicited by questions 7 and 8 (see Appendix 1). Question 7 was intended to elicit the subject's specialisation, ie. whether he/she specialised in hard sciences, eg. engineering, medicine, biology etc or whether he/she specialised in social sciences and humanities, eg. languages, economics and other social studies. Question 8 was intended to distinguish between the subjects on the basis of their language background, ie. whether LI or EFL. Although an attempt was first made to stratify the subjects according to their specialisations and language background prior to giving them the questionnaires, questions 7 and 8 were still included in the questionnaire for the following reasons:

(a) to check any possible mismatch between the subject areas of the selected passages

and the specialisations of respondents;

(b) to make sure about the language background of each respondent, ie.LI or EFL;

(c) one group was administered on behalf of the researcher (FLU), so the two background variables were included to ensure that the group fulfilled both of them.

These two variables, ie. language background and specialisation, were therefore important particularly for the EFL groups. For the same reasons, they were also included in the instructions sheet of the cloze experiment (see Appendix 5).

Regarding the language background variable, in the questionnaire the question was put in such a way as to distinguish between native/non-native speakers of English whereas in the cloze the distinction was carried a bit further to discriminate between the non-native speakers, ie. whether FL or L2, in an effort to focus on the FL subjects only.

Although in the questionnaire the distinction was broader than the cloze in the language background variable, it turned out that all the non-native speaker postgraduate students who took part in the experiment in the LSU, Aston University, were EFL students. That was on the basis of their responses to the questionnaire and the countries they came from. Similarly, all the subjects in the Sudan group were EFL.

This distinction between L2/EFL subjects used in this study was based on the distinction drawn by Wilkins (1972) between second and foreign language learning situations. Wilkins (ibid, p150) defines the second language learning situation as the one in which the language being learned (L2):

> is not the mother-tongue (LI) of any group within the country, but that it does have some internal, social function.

He defines the foreign language learning situation as the one:

> in which the target language is not the mother- tongue of any group within the country where it is being learned and has no internal communication function either. The aim of teaching the language is to increase ease of contact with foreign language speakers outside the country (ibid, p153).

In the cloze experiment, however, the distinction was narrowed due to the nature of the experiment in that, unlike the questionnaire, it was executed at different times and

different places and many people took part in its administration besides the researcher. For these reasons and in order to ensure that all the subjects would be EFL speakers comparable to those who undertook the experiment associated with the questionnaire it was decided to ask testees to write down their first languages, from which the EFL subjects could easily be identified.

Thus the responses to question 8 in the questionnaire identified two main groups: native speakers of English (LI), 77 in number, and FL speakers of English, 86 in number. The latter group was further subdivided into two: FL undergraduates (FLU = 30), and FL postgraduates (FLP = 56) (for further detail, see cf. 3.2.5).

Question 7, ie. the subject's specialisation, was meant to achieve a match between, at least, the specialisations of the two FL groups and the subject areas of the texts selected. This match was totally established for the FLU group where all the subjects turned out to be from the area of social sciences and humanities. Regarding the FLP group the match was substantially established with a majority of 70%. However, for the LI group the subjects were predominantly from the area of hard sciences. For this group no particular effort was made to achieve a full match between their specialisations and the subject areas of the selected texts for the following reasons:

(1) Although the LI subjects were used as an experimental group, they were also used as the reference group, ie. to make the performances of the two FL groups comparable to it.

(2) The area of social sciences and humanities seems to be more akin to areas of general interest, thus more accessible to general knowledge compared to the area of hard sciences (perhaps with the exception of the psychology text).

(3) The texts were written in English, ie. in the first language of the group in question.

(4) The nature of the questionnaire experiment compared to the cloze experiment did not seem to be influenced by a mismatch in LI specialisation and LI reading, but in the cloze this seemed to be a prerequisite as indicated

in the cloze literature (cf. 3.3.7).

However, for the 30% FLP hard sciences subjects an independent chi-square test of significance was made to measure the impact of FL specialisation on FL non-linguistic reading strategies (cf. 4.2.2).

4.2.2 Non-Linguistic Reading Strategies

As mentioned before, the analysis of results was initially carried out within the FLP group to test the influence of the specialisations of subjects on their EFL non-linguistic reading strategies. It is worth noting that the 30% hard sciences subjects were distributed between the five subgroups, ie. 3-4 subjects in each subgroup that attempted one of the five texts. Each subgroup consisted of 10-12 subjects. Thus, it may be seen that although the influence of the hard sciences subjects in each subgroup would be negligible, the test of significance was made to ensure that the overall result would not be affected by the responses of the 30% hard science subjects.

The chi-square test of significance was applied to most of the questionnaire responses. Since there were no significant differences detected due to the presence of 30% hard science subjects in the FLP sample, the results of question 1, only, will be given as an example. In question 1 subjects were asked to identify the reading stage(s) at which they made the maximum use of VEs. Five different stages were listed for each subject to choose the one that best represented what he felt. Consequently, the responses of the 70% social sciences subjects were tested against the 30% hard sciences subjects as shown in Table 6 .

The results as shown in Table 6 above reflect no significant difference between FL-HS/FL-SS within the FLP group in their reading strategies of visual elements in the five texts ($Chi^2 = 0.47$, $P > .05$, ns). (see table 6 below)

Table 6: The Impact of Specialisation on the Non-Linguistic Reading Strategies of the FLP Group

SP	n	B	D_1	D_2	A	NE
HS	17 (30%)	8	3	5	1	0
SS	39 (70%)	19	10	7	3	1

N = 56, n = Number of subgroup

Notes
HS = Hard Sciences students
SS = Social Sciences students
SP = Specialisation
B = Before reading started (pre-reading)
D_1 = After reading started but before visual was first mentioned
D_2 = After reading started and after visual was first mentioned
NE = Never consulted visual at all
A = After reading (post-reading)

This result perhaps illustrates a point mentioned earlier about the area of social sciences and humanities in general (the area from which the five texts have been selected) as being more accessible to general knowledge compared to the area of hard sciences which may be accessible only to a specific audience. This also throws more light on the fact that if this area is accessible to FL hard sciences subjects it is by definition more accessible to LI hard sciences subjects since the texts are written in the latter's first language. So subjects' specialisations seemed to exert no influence within the FLP group: hence the analysis will hereafter be between the three groups (LI, FLU, FLP). The results of question 1 are presented below:

Table 7: Groups' Performance on Q1 (Reading Strategies)

		1		2		3		4		5	
Groups	"n"	B	%	D_1	%	D_2	%	A	%	NE	%
LI	77	20	26	18	23	26	34	12	15	1	2
FLP	56	26	47	13	23	12	21	4	7	1	1
FLU	30	7	23	1	3	15	50	7	23	0	-

Regarding the responses to question 1, key areas of agreement and key areas of

disagreement have been revealed. Answers 4 and 5, ie. consulted visual after reading (A) and never consulted visual (NE) seemed to reflect areas of agreement as there was no significant difference between the three groups in this respect $Chi^2=1.58$, $P > .05$ (not significant). The three groups were the same in such a way that they all consulted the visuals at certain stages in reading. Also they were the same in that quite a small number of each group relative to the total number of each, consulted the visuals after reading (A) (response 4). Interestingly, the LI and FLP groups behaved exactly in the same way in stage 2 (D_1), ie. 23% of each group consulted the visuals at this particular stage (after reading started but before text-reference to visual), see Table 7 above whereas only 3% of the FLU group did so at this stage of reading.

So in their responses to this question (Q1), the three groups revealed similarities as well as differences in their responses. Responses 4 and 5 (see Table 7 above) appeared to reflect areas of similarities between the groups as there was no significant difference detected whether between the two FL groups or between one of the FL groups and the LI group or between the three groups as shown in the following list:

Groups	Chi-Square	Difference
1 FLP/FLU	1.54	Not significant
2 LI/FLP	2.01	Not significant
3 LI/FLP/FLU	1.58	Not significant

Responses 1, 2 and 3 on the other hand, revealed areas of both similarities and differences as may be seen in Table 7 above. These are:

1 there are similarities between the three groups in the sense that they all made use of the VEs in the reading process irrespective of the stage at which each group used them;

2 there is a further similarity between FLU and FLP in that each used the VEs

intensively during a particular stage;

3 there is one difference between FLU group and FLP group in the stage at which each group consulted the VEs with intensity;

4 the LI group differed from both FLP/FLU groups in the intensity of consultation and from the FLP group in the stage at which the visuals were consulted intensively.

The FLP subjects seemed to use the visuals throughout the three stages but with varying degrees, ie. (B) highest (47%), whereas the FLU used them only in two stages (B) and (D_2) where the latter was the highest (50%). In this respect the two groups differed significantly: ($Chi^2 = 15.68$, df = 2, $P < .01$). Although in consulting the visuals more at the D_2 stage the FLU subjects behaved in a way similar to the LI subjects, they differed from both LI subjects and FLP subjects at the D_1 stage. The FLP subjects on the other hand, differed significantly from the LI subjects at the B and D_2 stages as shown in Table 8 below.

Table 8: Difference between LI/FLP in B/D_2 Reading Stages of Visual Elements

Groups	n	Stage B	Stage D_2	Chi^2	df
LI	46	20	26	5.24	1
FLP	38	26	12		

$P<.05$

It is worth noting that the result of this test applies also to the difference between FLP/FLU since the latter was similar to LI group in the reading stages. In other words the difference between FLU/FLP was also significant.

According to Harri-Augstein et al (1984), discussion of areas of disagreement would reveal either (a) readers have approached the texts with different purposes, or (b) if purposes are similar, it may be due to other differences. These differences alluded to by Harri-Augstein et al above could include the differences in language background as the case in this study. In the five possible responses mentioned above, the three groups agreed on the last two, ie. A, NE, and differed in the first three, ie. B, D_1, D_2. The three bar-graphs in Figure 10 demonstrate the reading behaviour of each group at each stage. In this figure, the visual comparison becomes easier and trends are clearly seen.

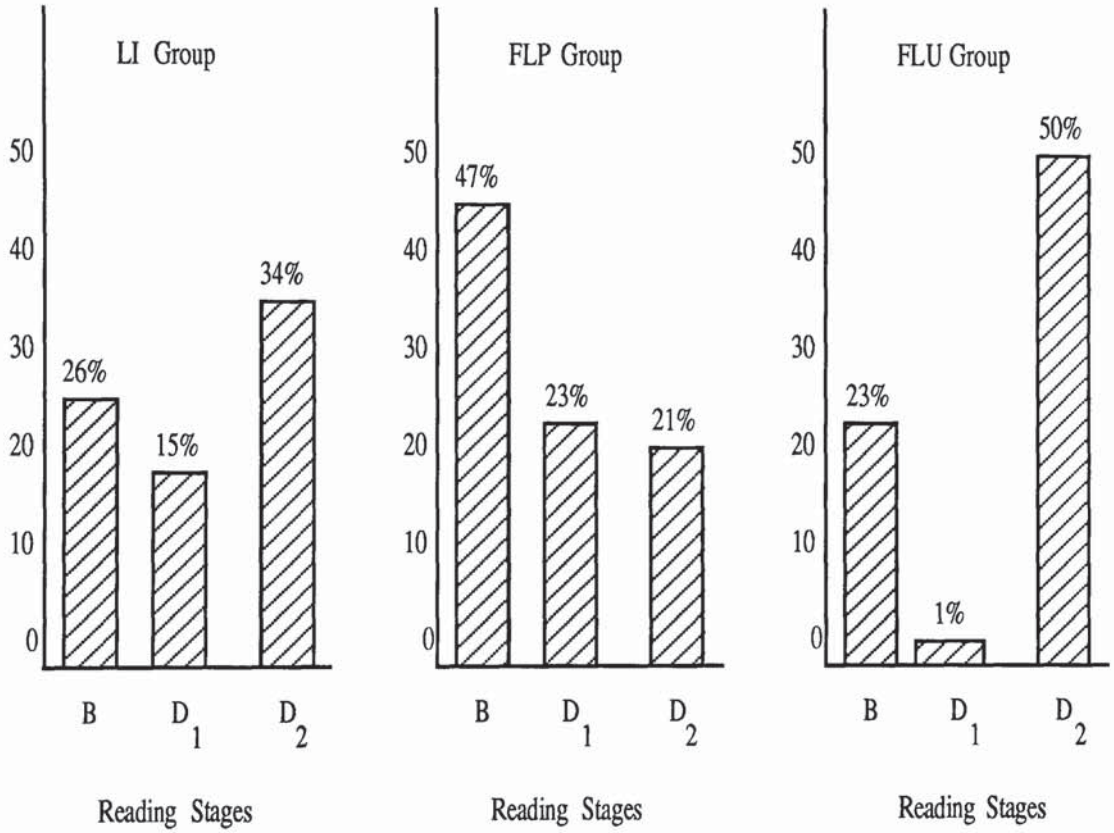
Although the FLU subjects behaved in a similar way to the LI subjects at stage D_2, nevertheless they consulted the visuals more than the LI subjects, ie. 50% the former and 34% the latter.

Figure 10 reflects the fact that all the three groups appeared to have used the VEs at the three stages: B, D_1 and D_2. Each group, however, seemed to have used the visuals more intensively at one of these stages: the FLP group at stage B, LI group and FLU group at stage D_2. The highest percentage was scored by the FLU group at stage D_2 (50%), then the FLP group at stage B (47%). The LI group even at their highest use of the visuals at stage D_2 scored only 34%. So both the foreign language groups, irrespective of the stage at which they consulted the visuals, seemed to have relied much more on the visual elements in reading than their LI counterparts (see Figure 10). The little use of the visuals by the FLU group at the B and D_1 stages was compensated for at stage D_2.

Also the figure shows that the subjects in each group varied their strategies towards the visuals: before and during reading. In terms of prose reading this behaviour is characteristic of the "effective reader" as Thomas et al (1974: 147) put it:

> The effective reader is one who can vary his methods of reading to meet his varying needs from the whole range of written material. Thus the effective reader is self-aware and self-organised, able to relax and read for enjoyment as easily as he defines a specific purpose and pursues it.

Figure 10: The Groups' Use of VEs in the Reading Process



Furthermore, Figure 10 above shows that the three groups relied more on the verbal text at stage D_1 (after commencement of reading but before the visual was first mentioned in the text) and, as mentioned before, the FLP relied more on the visuals at the B stage and both the LI and FLU at the D_2 stage. Hence the FLP group consulted the visuals, perhaps using a clue-seeking strategy, whereas the LI and FLU groups did so using a text-related strategy.

Thus the results of question 1 in the questionnaire identifies two types of non-linguistic reading strategies:

1 Spontaneous, clue-seeking consultation of VEs, ie. looking at them before the commencement of reading (FLP group)

2 Text-related consultation of VEs, ie. during reading (LI and FLU groups).

The next section will deal with the factors that might have influenced each group in adopting one strategy or another. The second strategy mentioned above, for example, might be a result of the direction of the verbal text or it might be due to the function of VEs in the texts etc. These issues and the like will be considered in the following section.

4.2.3 Factors Influencing Readers' Non-Linguistic Strategies

Question 2 in the questionnaire (Appendix 1) was intended to elicit the factors that influenced the non-linguistic reading behaviour of each group as shown in Figure 10 above. In this question, subjects were asked to point out the factor that led each to adopt the strategy he/she mentioned in response to question 1. Two possible factors were given:

1 Text-direction (T/D)

2 Subjects' decision, ie. purpose-driven (P/D)

It is worth noting that in the response given to subjects in the questionnaire for the second factor stated above, "purpose" was not explicitly stated in the response. Instead the response was "I decided to do so myself". This is again one of the changes in wording recommended in the pilot run (cf. 3.2.2.3).

Question 1 in the questionnaire was closely related to question 2 in the sense that the choice of one response or another from the former would determine the choice of the

response from the latter and not vice versa. In other words certain responses from question 1 go with certain responses from question 2 where the responses to question 1 come first as shown in Table 9 below.

Table 9: Match between Responses to Question 1 and Question 2

Multiple responses to Q1	Multiple responses to Q2
Response 1	Response 2 only
Response 2	Response 2 only
Response 3	Response 1 or 2
Response 4	Response 1 or 2
Response 5	Neither response 1 nor 2

Thus any response chosen to question 1 which did not match the one in question 2 as listed above would be considered as inconsistent. For example, if one subject chose response 1 to question 1 and at the same time chose response 1 to question 2 this answer would be considered inconsistent. This is because response 1 to question 1 means that the reader consulted the visual before the commencement of reading, and response 1 to question 2 means that the reader consulted the visual element because he had been directed by the verbal text. Since the verbal text normally directs the reader to the visual during reading and not before the start of reading, response 1 to question 1 and response 1 to question 2 were considered inconsistent. All the inconsistent responses were excluded from the analysis. In fact, a negligible number of cases were reported to have produced inconsistent answers in each group as shown in Table 10 below:

Table 10: Inconsistent Responses to Q2

Group	n	Inconsistent responses	
LI	77	6	(7.8%)
FLP	56	6	(15%)
FLU	30	3	(10%)

There were only two cases, ie. one from the LI group and one from the FLP group, who gave no responses to Q2 because they had already chosen response 5 in Q1, thus being consistent in their responses to both questions.

So the low incidence of inconsistent responses as shown in Table 10 above, secures more evidence for the reliability of the questionnaire as a suitable means for quantifying readers' non-linguistic processes (cf. 3.2.2).

Now the rest of the results, ie. those who chose either T/D (text-direction) or P/D (purpose-driven) are shown in Table 11 below.

Table 11: Factors Affecting Non-Linguistic Reading Strategies

Groups	n	T/D		P/D	
LI	70	12	(17.2%)	58	(82.8%)
FLP	49	7	(14.5%)	42	(85.5%)
FLU	27	8	(29.7%)	19	(70.3%)

N = 146
T/D = text direction
P/D = purpose-driven

So the results of this question seem to suggest that the role of the text-reference to the visual (eg. see Table X or see Figure Y) is peripheral. The authors of textbooks or articles seem to make references in the main text to the VEs because they want readers to look at the VEs at that particular stage. Although the results of this question show that readers' consultation of VEs does not necessarily coincide with that prescribed by the author via the text-reference, it is by no means excluded that readers' purposes are drived from the verbal text. In other words the verbal text may drive the readers to the VEs but not necessarily through the explicit text-reference to the visual. Perhaps this is what Trimble (1985) refers to when he mentioned that the verbal text should provide - as a minimum - the information for the reader as to when to look at the VEs in the reading process.

The readers (as far as these data are concerned) in the three groups seemed to be

influenced by their reading purposes, which could well be generated from the verbal text, and not by the explicit text-references to the VEs: the difference between the two factors was significant ($Chi^2 = 12.45$, $P < .001$).

However, this does not necessarily mean that their purposes were similar. Indeed, they turned out to be quite different as will be shown later in discussing the responses to question 4 in Chapter Five.

4.2.4 Frequency of Consultation

This is the third aspect of the non-linguistic reading strategies used by readers and identified by responses to question 3. It is not enough to know from the reader or to make him aware of the stage at which he consulted the visual elements, nor the factors that influenced that behaviour. There is yet another important aspect which can possibly bring the non-linguistic reading process more under review, as Harri-Augstein et al (1984: 273) states:

> Our studies show that the more the reader can bring the process under review the greater the probabilit that he or she can recruit an optimal strategy for effective interaction.

That may be because as they put it:

> Talking a person back into the reading-for-learning experience and encouraging reflection and review in a supportive way is an important component of the awareness-raising technique.
> (ibid, p265).

So, similar to Harri-Augstein et al's approach stated above, the different techniques employed in the questionnaire were all encouraging the reader to reflect and review his/her reading experience and also to raise his/her awareness of the nature of the interaction between him/her and the visual elements in texts. Thus question 3 set out to complete the readers' experience reflected in answering questions 1 and 2.

Whether the reader consulted the visual before, during or after reading, he was asked in question 3 to reflect on the frequency of consultation, eg. whether it was frequent or infrequent. The answers were given on a 7-point scale: from never to frequently. A t-test of significance was applied to measure the difference of means

between the two FL groups (FLP and FLU groups) as shown in Table 12 below.

Table 12: FLP/FLU Difference in Frequency of VEs Consultation

Groups	n	m	sd	dff	df	t
FLP	56	4.05	3.99	0.19	84	1.84
FLU	30	3.04	2.1			

N = 86
* P > .05 (not significant)

In the scale: 1 = Never, 7 = Frequently.

Key: m = mean, t = t-value, sd = standard deviation, dff = standard error
df = degree of freedom

The results of this question provide empirical evidence that although the FLU subjects behaved differently in reading at stage D_2 from their FLP counterparts, the frequency of their consultation of the visuals was the same as that of the FLP subjects (see Table 12 above) where the difference in their means turned out to be statistically insignificant (P > .05). The t-test of significance was applied again to measure the difference between the two FL groups on the one hand and the LI group on the other. The test was made between the LI group and FLP group only because what applies to the latter applies also to the FLU group, since there was no significant difference between them in this particular question as shown in Table 12 above. Hence LI/FLP test is shown in Table 13 below. The results of this test provide empirical evidence that although the three groups used the visuals at different reading stages, the LI subjects seemed to have used them with the least frequency where the difference between them and both the FL groups who tended to consult them more frequently was statistically significant (P<.001) as shown in Table 13 below.

Table 13: LI/FLP Difference in Frequency of VEs Consultation

Groups	n	m	sd	dff	df	t
LI	77	3.18	2.58	.35	131	6.68
FLP	56	4.05	3.99			

N = 133
** = P < .001 (significant)

In the scale: 1 = Never, 7 = Frequently

This intensive consultation of visuals by the two FL groups might explain the relatively longer time they spent in completing the reading of the texts compared with the LI subjects (cf. 3.4.1).

4.3 Discussion of Results

4.3.1 Introduction

This section will attempt to discuss and interpret the responses of subjects to category 2 of the questionnaire variables, ie. the non-linguistic reading strategies, the factors that influenced them, and the frequency of consultation of VEs. These will be discussed in relation to category 1 variables, ie. the background variables.

For the purposes of the present discussion the findings related to each variable in category 2 will be divided into similarities and differences, which could be between the three groups or between two of them. Then these similarities and differences will be discussed in the context of similarities and differences reported in previous research for the other typical linguistic strategies.

4.3.2 Similarities

4.3.2.1 Non-Linguistic Reading Strategies

All the groups (LI, FLP, FLU) irrespective of their differences (language

background, level of education etc) had attacked the visual elements in the reading process, albeit each group did so at a certain stage in reading (cf. 4.2.2).

These strategies which readers use when they encounter VEs in texts have been recognised, among others, by Hosenfeld (1977b, 1984) as the "paralinguistic" reading strategies. She defined them as the strategies that readers use to relate the verbal information to the accompanying VEs as cues of meaning even though she assigned them to successful readers only.

The evidence provided by this study, however, shows that almost all readers in the three groups used in this study whether successful or unsuccessful tended to examine illustrations (VEs). Although the subjects of this study were assumed to be "good" readers of English (cf. 3.2.5), this did not necessarily imply that they were all "successful" readers because to be a "good" reader, perhaps depends on the level of English; but to be a "successful" reader depends on the possession of "successful" reading strategies. Therefore, it could be argued that the skill of examining VEs is not only possessed by successful readers because the evidence provided in this study shows that the subjects used in the experiment indiscriminately examined VEs. So there seem to be other factors involved in this process which could distinguish successful/unsuccessful readers, eg. the stage in reading at which VEs could profitably be examined, or the intensity with which they could be examined.

Despite the fact that all subjects of this study tended to use VEs, the discrimination between them was in the reading strategies used to examine the VEs (see Figure 10 above). These differences in the strategies that each group used (which could be due to differences in language background, experience or purpose as suggested before) may indicate that successful readers tend to examine VEs using strategies different from unsuccessful readers. The point to be made, then, is that the discrimination between successful and unsuccessful readers may not be attributed only to the possession of the paralinguistic skill of examining VEs, rather the difference seems to be in manipulating that skill in successful/unsuccessful strategies as will be discussed in Chapter Six.

In their postscript on Hosenfeld's (1984) findings, however, Alderson and

Urquhart (1984) raised a number of questions as possible continuations along Hosenfeld's line of process-based reading research. Those questions were:

(a) What happens if different texts are used in the experiment?
(b) How does purposeful reading affect the strategies?
(c) Would readers from different language background reveal the same sort of strategies?

In fact the present study has made use of these questions and indeed five texts from different but related subject areas have been selected. As well as that the subjects of the present study were selected from different language backgrounds (cf. 3.2.5). It was found that these differences in language background affected the non-linguistic or "paralinguistic" strategies of these readers as will be discussed later in this chapter. Similarly, it was found that reading purposes influenced the strategies readers used in examining VEs in terms of the stage in reading at which they chose to consult the VEs; or the intensity of consultation as will be discussed in Section 4.3.2.2.

The non-linguistic reading skills were also recognised by Rauch (1972) in a study presented in Melnik and Merritt (1972: 23) and reported in Lunzer and Gardner (1979: 42). Rauch classified the reading skills into three categories: word recognition, comprehension, and work study. The latter category included, among others, four non-linguistic reading skills namely:

(a) interpret maps
(b) understand charts
(c) interpret graphs
(d) understand diagrams

These four skills recognised by Rauch as "work study" skills, were identified in the context of reading in the subject areas: language, arts, social studies, science,

mathematics and industrial art. It was suggested that these "work study" skills were relevant in all these subject areas to grade 7, 8, 9 LI readers with only two exceptions, namely that both "interpret maps" and "interpret graphs" skills were not relevant in the area of industrial art.

As well as grade 7, 8, 9 LI readers, the present study shows that some of these "work study" skills, ie. "interpret graphs" and "understand diagrams" are relevant to adult readers, both LI and EFL. In fact they turned out not only to be relevant but also to be used in the reading process.

It is worth noting that Rauch (ibid) did not include the skill of "interpret tables" in his list. Perhaps it was taken to be similar to the above four; or it might be deliberately excluded because it was assumed to be not relevant to grades 7, 8 and 9. In any case, however, the present study also secures evidence that LI/EFL adult readers used the "work study" of "interpret tables" which means that they found this skill to be relevant in reading social studies texts.

4.3.2.2 Factors Affecting the Use of VEs

This is the second similarity exhibited by the three groups. Subjects were asked about the factors that mostly influenced their non-linguistic reading strategies: Was it purpose?, or the direction of the verbal text? It is worth noting that the accompanying verbal text to VEs normally directs readers as to when to look at the visual through the text-reference to the visual. For example, the Economics text (Appendix 2) refers readers to the table by the text-reference, "In table 3 ...". Similarily the Business text refers readers to Figure 8.4 by the text-reference," as shown in Figure 8.4". According to such text-references to the visual the reader of the text is expected to consult the visual when he comes across the text-reference, or at least the author of the text believes that the right stage in reading for the reader to examine the visual element is when he comes across the text-reference to it. It was also believed in this study that readers (irrespective of their differences) would consult the VEs when they were referred to them by the main verbal text.

However, the evidence provided by this study suggests that it was purpose that influenced readers' non-linguistic strategies. In other words they concurred that it was their reading purposes that directed them to the VEs in the reading process rather than the explicit text-references to the visuals, though these purposes might have emanated from the accompanying verbal texts. The evidence was based on two observations:

(1) readers in the three groups overwhelmingly chose response 2to question 2 as shown in Table 11 above;

(2) many readers in the three groups, ie. 47% FLP, 26% LI and 23% FLU, started off the reading process by consulting the visual rather than the verbal text although neither the visual nor the reference to it (in the five texts) is located at the top of the page, (above the verbal text, see Appendix 2)

Although the evidence was based on the above two observations, the emphasis was on the former rather than the latter. That is because the readers who consulted the VEs before the start of reading may have done so due to the fact that the VEs were standing out in the text, hence drawing the attention of these readers. This is particularly likely for both the LI and FLU groups because a very small number from each looked at the visuals before reading.

Despite the fact that readers agreed that they consulted the VEs out of purpose, they disagreed in the purposes themselves, ie. each group had different purposes from the others - as will be seen later. In fact these differences in purposes of non-linguistic reading strategies could be taken as a similarity with the other typical linguistic reading strategies as the latter are also influenced by different purposes (Smith, 1967; McBride, 1975; Harri-Augstein et al, 1982).

4.3.2.3 Intensity of Consultation of VEs (FLP Group and FLU Group only)

This similarity in this aspect of non-linguistic reading behaviour, ie. the intensity of

consultation of VEs, was exhibited by the two FL groups only. This is clearly demonstrated in Figure 10 above where the two groups revealed more reliance on VEs albeit at different reading stages. 47% of the FLP group attacked the VEs at the B stage and 50% of the FLU group did so at the D_2 stage.

Although this aspect of reading behaviour exhibited by the two FL groups could be interpreted as that these intensive-consultation strategies were compensatory strategies for a low level of English, Jolly (1978) attributes this behaviour to a transfer of LI reading strategies taking place.

Coady (1979), on the other hand, points out that such a reading behaviour reflects a "FL reading problem not a language problem". So according to Jolly (ibid) and Coady (ibid) the reading behaviour exhibited by the two FL groups as manifested in the intensive consultation of VEs could not be a result of a language problem. Furthermore, according to the same authors, it may be seen that a transfer of LI reading strategies was taking place but at the same time the FL groups were experiencing a reading problem in the new situation. Consequently, the two FL groups had to resort to these "adaptive" strategies, ie. to rely more on the VEs to compensate for the reading problems they had encountered, rather than to compensate for a low level of English.

Perhaps these "adaptive" strategies constituted necessary actions to be taken by the two FL groups to deal with failures in understanding (Baker, 1979; Anderson, 1980). In terms of prose reading, Baker (ibid) states that when comprehension falters, a strategy of continuing reading takes place, seeking clarifications from subsequent sections. Similarly, Brown (1980: 454) states:

> The decision to process deeply and actively (Brown, 1979) or merely to skim the surface will determine not only the strategies necessary for the task but also the readers tolerance for intrusive feelings of failing to understand.

Brown (ibid) also asserts that while the process of reading is flowing smoothly, readers construction of meaning is very rapid. However, when a comprehension failure is detected, readers must slow down and allot extra processing capacity to the occurring

problem. Hence, she suggested that readers in such a situation resort to what she called "debugging" devices and strategies to be used in response to the detected comprehension failure and these take time and effort. She concluded that the difference in time and effort between the normal rapid processing and the "debugging" devices is the difference between the subconscious and concious level (ibid, p455).

So in situations where prose is accompanied by VEs as is the case in the texts used for this study, readers according to Baker (ibid) and Anderson (ibid) seemed to seek clarifications from VEs when they detected comprehension failure in the main verbal text. Or, perhaps, according to Brown (ibid), the consultation of VEs exhibited by the readers could be one of the "debugging" strategies she referred to. Thus if the detected comprehension failure was great the consultation of VEs would be intensive and, perhaps, would take more time and effort (Brown, ibid). This situation may be typical of the behaviour of the two FL groups in the present study. If the detected comprehension failure, on the other hand, was slight then it would follow that the consultation of VEs would be less intensive. This was probably the case of the LI group.

This behaviour is recognised by many as flexibility of reading style, eg. Lunzer (1979); Brown (1980) albeit it is mainly concerned with the styles of reading connected prose. Lunzer (ibid, p33) for example, in the context of overcoming difficulties in reading comprehension suggests:

> ... that comprehension is not transferred directly from the spoken to the written situation. Therefore, pupils require guidance which is directed towards the acquisition of reading styles, or strategies, which serve to overcome the problems posed by a written text.

He also (in this context of flexibility in reading prose) discussed the four reading strategies which he referred to as the reading "styles". These are:

(a) Receptive reading: this is the most familiar style and approximates to listener-behaviour.

(b) Reflective reading: this is the reading style that is frequently interrupted by moments of reflection.

(c) Skim reading: this is a rapid style used mainly to establish what the text is about before deciding whether and where to read.

(d) Scanning: this is a kind of skimming to see if a particular point is present in the text or to locate it.

According to Lunzer (ibid, p27) the choice of the appropriate style depends on text difficulty and on the reader's purposes.

In the reading situations where VEs accompany connected prose as is the case in this study these four styles may be used in a "shared" manner between the verbal texts and the VEs. In other words each reading style could be used in both VEs and verbal text. For example, in the receptive reading style the reader may receive information from both verbal text and VEs (no matter how much he receives from each). Similarly, the reader may scan and skim both texts and VEs to arrive at his purpose. This trend was perhaps exhibited by the three groups in the present study in that they all consulted the VEs during reading, notably, LI and FLU groups which means that the reading styles referred to by Lunzer (ibid) seemed to be practised on both verbal texts and VEs.

As well as using these styles in both texts and VEs (when they occur together), readers may use them in VEs only. For example, the reader may skim or scan VEs to get a clue to the verbal text. This was perhaps the case of the three groups used in this study, notably, the FLP group. That was because they started reading the texts by looking at the VEs (see Figure 10 above).

4.3.2.4 Summary of Similarities

The three groups despite their differences in language background exhibited two similarities, ie. in the use of VEs; and the fact that this use was influenced by purpose. Although those similarities were in non-linguistic reading processes, they seem to be supported by Goodman's (1973) reading universals hypothesis where he stated that "the

reading process will be much the same for all languages". They may be also supported by Soulé-Susbielles's (1987: 198) assumption that:

> ... reading in a foreign language does not differ in nature from reading in the mother tongue (when both share the same script, at least), so our pupils' problems probably have to be traced back to difficulties they already experience in their own language.

The third similarity, ie. the intensive use of VEs was exhibited by the two FL groups only. Like the other linguistic reading skills of EFL learners, this similarity in EFL non-linguistic reading skills is supported by Rigg's (1977) study reported in Alderson (1984: 3). Rigg (ibid) using miscue analysis, found considerable similarities in reading miscues for EFL learners from a variety of different language backgrounds. She concluded that if the reading process is the same or very similar in all languages, then one would expect the reading ability to transfer across languages.

Jolly (1978) attributes the success in EFL reading to one's LI reading ability rather than his level of English. He emphasises that reading in a foreign language requires the transference of old skills not the learning of new ones; and therefore the students who fail to read adequately in the foreign language, fail either because they do not possess the old skills or have failed to transfer them.

So the above evidence suggests that the reading process is the same in nature in all languages. Thus the mother-tongue reading skills transfer from LI to the EFL reading situation. Judging from the similarities in this study, between the three groups in that they all made use of VEs there is evidence in support of the universality of the non-linguistic reading process same as the linguistic reading process. There is also evidence in support of the transference of the reading skills from LI to RFL setting in that both the FL groups have transferred their LI reading skills albeit they came from different language backgrounds. However, whether this transfer is the same or different will be discussed in the section on differences.

To sum up this section on similarities, the study provides evidence that as well as reading universals in prose, there are also reading universals in non-prose, ie. visual

elements. Moreover, the non-linguistic reading strategies used by different readers in reading visuals could transfer from LI to FL same as the other typical linguistic strategies where the successful transfer depends on the transfer of the original successful LI non-linguistic strategies. A further similarity between the typical LI linguistic and LI non-linguistic strategies was that each could not only transfer to the FL reading situation but more importantly they could be adapted if a comprehension failure was detected as mentioned in section 4.3.2.3. However, the non-linguistic strategies may not necessarily be adapted only because there is a comprehension failure, they could also be adapted as a cautionary action against predicted comprehension failure as the case of the FLP group in this study who intensively used their non-linguistic strategy well before the commencement of reading.

4.3.3 Differences

4.3.3.1 Transfer of Non-Linguistic Reading Strategies

As mentioned in Section 4.3.2.2 above, the similarities between the three groups in that they all made use of VEs, irrespective of how and when, there is evidence that the two FL groups (FLP, FLU) transferred these strategies from their first languages. However, the differences between the two FL groups in the stage in reading at which each consulted the VEs most (the FLP in the pre-reading stage and the FLU in the during-reading stage), suggest that the FL groups did not transfer exactly the same LI reading strategies (Jolly, 1978). Instead they seemed to adapt their LI strategies to meet the demands of the new reading situation. When faced with the new FL reading situation the FLP group, being less-practised readers at the time of experimentation, transferred their LI non-linguistic reading skill but used it differently at the pre-reading stage. The FLU group, on the other hand, being practising readers used the skill in a native-like strategy. Although the FLU subjects transferred the same LI non-linguistic skill to the FL setting, still the results suggest that they did not use it exactly the same as the LI subjects because the FLU subjects increased the intensity of consultation (see Figure 10 above). It should be noted that although no experimentation was carried out in the first

languages of the FL groups, the evidence was based on the behaviour of the LI group and Goodman's (1973) reading universals hypothesis.

Jolly (ibid) suggests that as there are successful and unsuccessful LI reading strategies, success in FL reading, therefore, depends on the transfer of the original successful LI reading strategies. However, neither the reading stage at which each FL group consulted the VEs, nor the intensity of consultation secures evidence in favour of successful or unsuccessful transfer of LI reading strategies. The results, hitherto, show that a transfer of modified LI reading strategies has taken place to meet the demands of reading problems in the FL setting. Whether or not this transfer was successful will be discussed in Chapter Six.

4.3.3.2 Intensity of Consultation of VEs (LI Group and the two FL Groups)

In Section 4.3.2.3 we have discussed the similarity between the two FL groups (FLP and FLU) in consulting the visuals with more intensity. In other words they both relied on VEs more than the accompanying verbal texts. This behaviour of the two FL groups, however, differed from the LI group who exhibited more reliance on the verbal text (see Figure 10 above). The LI group at their highest reliance on the VEs at stage D_2 scored 34% which was significantly lower than either of the FL groups (the FLP was 47%, and the FLU was 50%).

This again seems to give support to Jolly's (1978) viewpoint on the transfer of LI reading skills in that the high intensity of consultation of VEs of the two FL groups compared to the low one in the case of LI group indicates a reading problem experienced by the two FL groups and to a lesser extent by the LI group. Again, even the low intensity of consultation of VEs by the LI group provides evidence that the consultation of VEs is a strategy that results from a reading problem because if it had been of a language problem, the LI group would not have consulted them at all or they would have consulted them only minimally.

4.3.3.3 Frequency of Consultation

The intensity of consultation of VEs discussed above was concerned with the actual numbers of subjects in each group who consulted the VEs at one stage or another whereas the frequency of consultation was concerned with the actual numbers of consultations of VEs each subject made use of in the reading process.

This is again an area where both the FL groups behaved significantly differently from the LI group, ie. the former groups had more consultations of VEs than the latter. The evidence was based only on the collective responses provided by the subjects on a 7-point scale (see Appendix 1). However, ideally if one had a precise record that could indicate the subjects' consultations of VEs as manifested in their eye-movements from the verbal texts to VEs and vice versa, and the time spent in each instance, and perhaps the subjects' facial expressions in each movement; clearly more sophisticated tools would have been preferred.

A typical tool of monitoring the reading process is the "Brunel Reading Recorder" developed by Thomas et al (1974) where they attempted to monitor the process of "read-for-learning". Their model relates to Bruner (1964); Chomsky (1968); and Miller (1965) and is in some ways analogous to Goodman's (1967) view of reading as a psycholinguistic guessing game. Their model is also based on the concept that:

> Meaning does not flow from the text into the reader's head. It originates in his head and is aligned, refined, and elaborated in his interaction with the words on the page (ibid, p147).

The reading recorder reveals detailed records of reading behaviour from which reader's sequence of feelings and thoughts can be inferred. In this recorder, the reader controls the movement of the continuous stationery. The reader thus performs certain tasks in the recorder (see ibid pp149-150) and the outcome is that he produces a graphical record that displays his hesitations, backtrackings, and forward skims that have occurred during the reading of the text.

Using this recorder, Thomas et al (ibid) gave a complex and unfamiliar text to two matched groups. They were able to classify parts of the records of reading behaviour

into five types. They called each type "read". These "reads" are:

> ... an observable representation of the processes involved in attributing meaning to the text, ie. comprehension. Any one complete record may be made up of a combination of such reads (ibid, p151).

The five reads they identified are (see Figure 11):

(a) The smooth read which seems to be associated with easy reading.

(b) The small item read shows short sequences of reading followed by hesitations.

(c) The large item read is similar to the small item read, but the items remembered cover longer pieces of texts.

(d) The search read seems to be associated with the active creation of meaning.

(e) The check read is a rapid skim through the text with short pauses.

Figure 11: The Five Reads

(**Source**: Thomas et al (1974) "Reading to Learn". In Merritt, J (ed), New Horizons in Reading, (p151)

Another example of the tools that monitor the reading process is the video-camera set-up used by Mohammed and Swales (1984). They used it to monitor the processes that accompany reading of "Technical Instructions" in an attempt to find out the factors that influenced the successful reading of "Technical Instructions". Their experimental task consisted of a digital alarm clock and manufacturer's instructions. The subjects were

12 students at Aston University representing four categories:

(a) Native speakers of English with a Science background.

(b) Native speakers with an Arts background.

(c) Non-native speakers with a Science background.

(d) Non-native speakers with an Arts background.

The purpose of that experiment was to describe some preliminary experimental observations of the "read and do" process and to relate these observations to three variables:

(a) the subjects' level of English proficiency;

(b) the existence or otherwise of technical and scientific background;

(c) strategies adopted.

It was found in that experiment that field-familiarity is a much stronger indicator of rapid and successful text processing than native-like competence in the language.

So the above two methods and the like may give better monitoring of eye-movement or cross-glancing than the questionnaire does. However, the questionnaire was used in this study for the following reasons (that is in addition to the reasons discussed in Chapter Three):

First, the experiment of this study involved a relatively large number of subjects constituted by three groups one of which was located outside Britain (the FLU group). Therefore the use of these techniques with such large numbers would have been time-consuming.

Second, strictly speaking, the interest in the present study was not in the eye-movements only (though this might be important), rather it was in what went on within the VEs when the subjects consulted them. In other words the information needed from the subjects was mostly of an evaluative nature and this might be difficult to elicit

through the use of the above techniques, eg. question 2.

Third, the numbers of subjects used in the questionnaire were statistically satisfactory. So their collective responses would likely give objective results.

On the whole the aspect of frequency of consultation of VEs in the non-linguistic reading processes investigated in this study seems to be comparable to the work done on eye-fixation in the reading process of connected prose undertaken by DeLeeuw (1965); McConkie (1976); Rayner (1978); Just and Carpenter (1980). In that context, the above researchers have raised a number of questions, eg. what information are the eyes processing when fixating?

It has been concluded in the studies mentioned above that little is known about the point in text where eyes fixate: do they fixate at linguistically random points or at certain points within linguistic structures? However, the research undertaken by Just and Carpenter (1980) suggests that the following items are fixated:

(1) all content words;

(2) longer fixations on infrequent words;

(3) end of sentences when inferences are being made.

Thus the work described above that has been undertaken on eye-fixation focused mainly on the processing of verbal information or connected prose. It seems, therefore, possible that this aspect of text processing, ie. eye-fixation can be investigated in the area of non-verbal information or VEs. In other words the same questions raised above could be replicated in dealing with eye-fixation on VEs, eg. what information are the eyes processing when fixating on the VEs?

In fact there was an attempt made in question 4 of the questionnaire in this study to elicit the items believed to be fixated, eg. specific or main information. This issue will be discussed in Chapter Five.

It should be noted, however, that the eye-fixation process on VEs could not be investigated in isolation from the accompanying verbal texts. This is based on the belief

that, perhaps eyes fixate on VEs for information related to the accompanying verbal text because after all readers use VEs in relation to the accompanying verbal text. Thus the items fixated within the VEs are supposed to be related to items also fixated in the verbal text.

To conclude this section on frequency of consultation, the three groups (LI, FLP, FLU) tended to consult VEs with varying degrees. Thus their process of eye-fixation seemed to be divided (though not equally) between the verbal texts and VEs. So in principle, the eyes of the three groups of readers fixated on VEs. However, the items within the VEs that were possibly fixated, will be considered in the next chapter.

4.3.3.4 Summary of Differences

In the above section, three differences between the groups in the non-linguistic reading processes were identified. One of them was between FLP group and FLU group namely, that they used their non-linguistic reading skill at different stages in reading: the former at the pre-reading stage and the latter at the during-reading stage. That might be due to the fact that a different transfer of that skill from their LI had taken place.

The second two differences, on the other hand, ie. intensity of consultation and frequency of consultation of VEs were between the LI group on the one hand and the two FL groups on the other. That was because in each of these two aspects the two FL groups behaved in the same way but at the same time different from LI group.

These findings were compared to the work done on linguistic reading processes. It was found that the flexibility in reading strategies of connected prose, eg. Lunzer (1979); Thomas et al (1974) were comparable to the findings of this study on non-linguistic strategies. Similarly, the process of frequency of consultation of VEs was found to be comparable to that undertaken on eye-movements or eye-fixation (Just and Carpenter, 1980) in the context of reading connected prose.

These similarities and/or differences in the non-linguistic behaviour in the present study, however, seem to be due to readers' differences in language background and/or practice or non-practice in the reading of the type of the texts used in this study.

4.4 Conclusion

Although one might question the accuracy of these self-reports given by respondents (to the questionnaire), nevertheless they highlighted the complexity, variety and flexibility of the strategies readers used as they attempted to comprehend (Baker, 1979). Judging from the strategies that readers used in approaching VEs, the present questionnaire seemed to have sensitised readers to the reading processes by relying on measures obtained after reading which were dependent on memory to make inferences about processes that occurred during reading (Simons, 1971; Baker and Stein, 1981).

It should be noted, however, that an attempt was made to increase the reliability of the questionnaire (cf. 3.2.2.3) by building it on an immediate experience, ie. subjects were asked in the questionnaire about texts they had just finished reading. This, in effect, reduced the burden on memory as reflected in the consistent patterns of results produced by the three groups as discussed before.

CHAPTER FIVE

ANALYSIS AND DISCUSSION OF QUESTIONNAIRE RESULTS

PART TWO

5.1 Introduction

Chapter Four dealt with the identification and discussion of readers' non-linguistic strategies. It was found that readers' purposes seemed to be the strongest factor that influenced each group's strategies. So the first part of this chapter will be concerned with the reading purposes of VEs and their relationship with the reading purposes of the accompanying verbal texts. The second part of this chapter will deal with readers' evaluation of the role of VEs in reading.

So Section 5.3 will present the results of the questionnaire to category 3, ie. the reading purposes. Section 5.4, on the other hand, will present the results of category 4, ie. readers' evaluation of the role of VEs in reading (see Table 5 above). Category 3 consisted of only one variable (var 6), ie. the reading purposes of VEs and this variable was elicited by question 4 in the questionnaire (see Appendix 1). Category 4 consisted of two variables: var 7 was on the importance of VEs and this was elicited by question 5 in the questionnaire; and var 8 was on the role of VEs on comprehension and this was elicited by question 6 in the questionnaire.

As well as that this chapter will also present a discussion of the results of these two aspects of the reading process of VEs in the LI/EFL contrastive setting and this will be in Section 5.6.2.

5.2 Reading Purposes in General

As part of investigating readers' awareness of the process of reading VEs, this section will deal with the reading purposes of VEs and their relationships with the reading purposes of the accompanying verbal texts. Therefore, it is perhaps appropriate to start this section by a brief review of previous research undertaken on reading purposes in

general and their role in reading.

The importance of purpose has been recognised by many scholars concerned with the study of reading process, eg. Smith (1967), Lunzer (1979); Brown (1980) and Harri-Augstein et al (1982).

Smith (ibid, p57) for example, states:

> It has been long proclaimed by reading specialists that the reader's purpose is an integral part of successful reading. Many statements have been made about the importance of purposeful reading, the different kinds of purposes for reading, the need for systematic instruction in reading for a variety of purposes, and the adjustment of approach and rate of reading in harmony with the purpose for reading.

On the basis of the lists of major reading purposes advanced by authorities in reading between the period 1924-1962, Smith (ibid) developed a conceptual framework of reading purposes (see Figure 12). In this framework, though her emphasis was on readers' purposes, she presents writers purposes because as she puts it, "they are related, either directly or indirectly, to the reader and his purposes for reading and because they were found in the lists prepared by experts in reading", (ibid, p59).

It may be seen from Smith's (ibid) conceptual framework of purposes that she categorised readers' purposes into two: primary and secondary. These two types of purposes will be discussed in relation to the findings of the present study on the reading purposes of VEs in section 5.6.

In that conceptual framework, she also presents some reading techniques associated with secondary reading purposes as may be seen in Figure 12.

Figure 12: Smith's (1967) Conceptual Framework of Purposes

Source: Smith (1967) pp60-61

Brown (1980: 454) recognises the relationship between reading purposes and reading comprehension in the following:

> Readers' purposes vary and, as such, criteria of comprehension also change as a function of the particular reading task at hand. In some reading situations, the participant may be quite satisfied with gleaning a cursory overview of the gist, whereas in others the reader may set more demanding criteria of comprehension.

It is perhaps evident from Smith's and Brown's quotations above that readers' purposes, among other factors, determine the reading strategies not only of verbal connected prose but also perhaps of VEs. The influence of readers' purposes on the processing of information is recognised by Harri-Augstein (1978) and reported in Harri-Augstein et al (1984: 250) in the following:

> Our studies indicate that different purposes lead to different kinds of processing of the linear strings of the words, sentences, and paragraphs on a page. These are sampled, selected and related in order to attribute a 'structure of meaning'.

Also, Harri-Augstein et al (ibid) pointed out that all the aspects of the reading process, ie. purpose, strategy and outcome should be viewed as 'co-existing'. They state:

> Although purpose partially determines strategy and this influences outcome, these must be seen as co-existing; the process is dynamic and interactive (ibid, p250)

The study of reading purposes according to Harri-Augstein et al (ibid) is thus important for two reasons:

(1) The way one reads a text varies with purpose, eg. reading for examination differs from reading for fun.

(2) The success of reading can only be checked against purpose.

As well as being important in the reading process of connected prose, purpose

is also believed to be important in reading VEs that often accompany connected prose. This is because the purposes of reading the verbal texts normally influence the purposes of reading their accompanying VEs.

Thus, while the previous studies have concentrated largely on the influence of purpose on reading connected prose, the present study attempts to investigate the relationship between those purposes and the purposes of reading VEs when they accompany connected prose. The study will then attempt to compare and contrast this type of interaction of reading purposes between the LI group and the EFL groups used in this study. So the present chapter will be concerned about eliciting the readers' purposes for using VEs and their relationship with reading purposes for accompanying texts for each group of readers.

So the questionnaire in this study attempted to provide retrospective reports on the reading purposes after readers had finished reading. This method of retrospective reports on the reading process has been used by, among others, Strang and Rogers (1965); Smith (1967); Fareed (1971); Ngandu (1977); Collins et al (1980).

The following sections report on the reading purposes that have been identified by each group in question 4 of the questionnaire.

5.3 Reading Purposes of VEs

In this study it was believed that being clear about one's purposes in reading is of considerable significance. It was also believed that being clear about one's purposes in reading VEs would throw light on their relationship with the reading purposes of the main accompanying verbal texts.

Question 2 in the questionnaire (discussed in Chapter Four) attempted to identify the factors that influenced the reading strategies adopted by each of the three groups (LI, FLP, FLU) and identified by question 1. It has been found that the three groups were overwhelmingly influenced by "purpose" in adopting one strategy or another, rather than the explicit text-references to the VEs (cf.4.2.3).

However, as stated before, the reading purposes though being the major factor

in influencing readers' non-linguistic strategies, that does not necessarily imply that the reading purposes themselves were similar. Hence question 4 in the questionnaire set out to elicit the possible reading purposes of each group for consulting the VEs at the different reading stages.

The subjects were asked about the type of information they looked for in the VEs. Nine possible nominal responses have been listed (see Appendix 1). There were four possible types of infomation both at the level of the whole text or part(s) of it. These were: main, detailed, additional, and summary. These constituted the first eight possible responses to question 4. The ninth response was given as "other" and subjects were asked to specify had they chosen this response. The results of purposes will then be discussed under two headings:

(1) The type of information looked for in the VEs, ie. main, detailed summary, additional, or other.

(2) The relationship between the type of information looked for in (1) above and the total/part message of the text.

5.3.1 Types of Information Looked for in VEs

The types of information looked for in VEs by each group indicated readers' purposes in consulting VEs which in turn reflected the relationship in reading purposes between VEs and their accompanying verbal texts. The results are presented in Table 14 below.

Table 14: Types of Information Looked for in VEs

Group/ purpose	LI n = 65	FLP n = 48	FLU n = 29
Main	16 (24.6%)	17 (35.4%)	13 (44.8%)
Detailed	13 (20%)	15 (41.3%)	8 (27.5%)
Additional	16 (24.6%)	4 (8.3%)	2 (7%)
Summary	20 (30.8%)	12 (25%)	6 (20.7%)
Other	8 (11%)	6 (11%)	1 (3%)

It is perhaps noticeable that a very small number from each group said that they consulted the VEs for "other" information, ie. information that belonged to neither of the four categories listed to them. However, many of the responses they gave as "other" could not particularly be categorised as "other information" because most of them were found to belong directly or indirectly to one of the four categories set up. There were, however, three subjects (one from each group) who identified "clarity" as a purpose as shown in the list below:

Subject	**Other information**
Subject 1 (LI)	Clarity of text
Subject 2 (FLP)	To understand clearly the subject-matter of the text
Subject 3 (FLU)	to give a clear picture of the text.

So the fact that "clarity" as a purpose was identified by only three subjects from the three groups (1.9%) and the fact that the clarity of the text could possibly be sought in one or more of the four purposes listed, "clarity" was thus not considered as an independent category.

It is worth noting that "clarity" as a purpose of consulting VEs was the only "other" information on which three subjects from the three groups agreed. The rest of "other" information was either given by one subject from any of the three groups or by two subjects who both belonged to one group or who belonged to two different groups. Thus any specified "other" information could have been accepted as a fifth category had it been produced by a reasonable consensus of subjects.

Regarding the rest of the responses, ie. the four possible categories of purposes which readers might have looked for in VEs (main, detailed, additional and summary), the results seem to suggest two hierarchies of purposes: one for LI group and the other for the two FL groups as shown in the following:

LI Group	FL Groups
1 Summary	1 Main/detailed
2 Main/additional	2 Summary
3 Detailed	3 Additional

In the list above, both FLP and FLU groups seemed to have consulted the VEs mainly in search of the main points and detailed information about the verbal text. 35.4% from the FLP group and 44.8% from the FLU group consulted the VEs for the main points of the verbal text, and 41.3% from the FLP group and 27.5% from the FLU group did so for detailed information. The two groups also exhibited a similar behaviour with regard to additional information. This was the type of information that the two groups searched for least, ie. only 8.3% from the FLP group and 7% from the FLU group.

By contrast the type of information that the LI looked for least in VEs was the detailed information (20%) whereas 24.6% looked for additional information in the VEs. The highest type of information that the LI group looked for, however, was the summary (30%). This type of information was also looked for by the two FL groups with reasonable majorities, ie. 25% FLP group and 20.7% FLU group.

So the three types of information that the two FL groups seemed to have looked

for in the VEs were: main points, detailed information and summary. The LI group, on the other hand seemed to use the VEs mainly for summary and then for either the main points or additional information.

The types of information each group searched for in the VEs might suggest some explanations for the strategies each adopted in using the VEs (These strategies were discussed in Chapter Four). A closer look at the three main types of information sought by the two FL groups in the VEs, would reveal the fact that two of them (main points and detailed information) probably required the two groups to consult the VEs with more intensity as discussed before. Similarly, two of the three types of information looked for in the VEs by the LI group seemed to require less intensity of consultation, ie. the summary and the additional information.

To sum up this section, it can be seen that although the three groups in their responses to question 2 were similar in that they all consulted the VEs out of purpose, their purposes as reflected in their responses to question 4 turned out to be different. However, the difference was between the LI group on the one hand and the two FL groups on the other because the latter behaved the same. The LI group differed from the two FL groups in three out of the four categories of the type of information set up namely, main, detailed and additional. As far as summary is concerned, the three groups nearly exhibited the same behaviour as shown in Table 14 above.

Thus, these differences in reading purposes may give support to the long-standing belief held by many, eg. Harri-Augstein et al (1982), in that reading purposes influence the reading strategies. In the present study the different non-linguistic strategies exhibited by the groups were probably the product of these different purposes which were in turn the product of the purposes for reading the accompanying verbal texts.

5.3.2 The Relationship between Purposes and Local/Global Message of Text

The aim of this section is to investigate the level of discourse at which readers consulted VEs. In other words whether their purposes in consulting VEs were related to

local level of message of each text they had read, or else they were related to the total message. This is of course irrespective of the purposes themselves, ie. whether main points, additional/detailed information or summary (see Table 15 below).

Table 15: The Relationship between Message of Text and Purpose of Reading VEs

Group	n	W/T info	%	P/T info	%
LI	73	17	23	48	66
FLP	54	28	52	20	37
FLU	30	17	56	12	40

N = 157
W/T info = whole text information
P/T info = part of text information.

The results in Table 15 above, show that the majority of the LI group (66%) made use of VEs for purposes related to parts of the texts they had read. The majorities of the two FL groups, on the other hand, (52% from the FLP group and 56% from the FLU) made use of VEs for purposes related to the whole texts. In this respect the LI group seemed to be consistent in their responses to this question and question 1. In other words, in question 1 they said that they consulted VEs more at the D_2 stage and in this question they said they consulted VEs for purposes related to part(s) of the text. Similarly, the FLP group remained to some extent consistent in that they used the VEs at the pre-reading stage because as they said in this question their purposes of consulting VEs related to the whole text. The FLU group, on the other hand, remained partly consistent with their responses to question 1, ie. used VEs at a local level (40%) and partly they behaved like the FLP group by a majority of 56%.

Although the FLU group used VEs at a local level in question 1, the majority in this question (56%) perceived the relationship between texts and VEs as global in terms of reading purposes.

To sum up this section, as far as the relationship between the reading purposes of VEs and their accompanying texts is concerned, it seemed that it was purpose that

influenced readers' non-linguistic strategies discussed before. This finding supports the conclusion arrived at in discussing the responses to question 2. However, in the present question the reading purposes themselves turned out to be different. The LI group used VEs mainly for summary, main and additional information. The two FL groups, on the other hand, used VEs in the main for main and detailed information. Thus as far as the purposes of using VEs were concerned the two FL groups exhibited another similarity. They were then, to some extent, different from the LI group.

Another similarity exhibited by the two FL groups was in the relationship between the reading purposes and the message of the text. The two majorities of the FL groups (52% FLP and 56% FLU) were found to use VEs for purposes related to the total message of each text. The LI group, on the other hand, used VEs for purposes related to parts of the message of text and in this respect they differed from both the FL groups.

5.4 Evaluation of VEs

5.4.1 Rating the Importance of VEs

Subjects were asked in question 5 to assess the importance of VEs in the texts they had read on a 7-point scale (from very unimportant to very important). Like the other questions, the results of this question reflect areas of both similarities and differences between the two FL groups on the one hand and the LI group on the other. Both the FL groups rated VEs as being quite important to them in the reading process (mean=5.6) whereas the LI group assigned less importance to them (mean=3.6). A t-test was then applied to measure the difference between these two means and it was found that the difference was statistically significant ($t=9.09$, $P < .001$).

Like the relationship between the responses to question 1 and the responses to question 4 discussed in the previous section, there seems to be a relationship between the responses to question 3 and the responses to this question (5). In other words, the tendencies exhibited in question 3 seemed to be in line with those exhibited in response to question 5. Both the FL groups used VEs more frequently (question 3) and in question 5 they rated them as important. The LI group, on the other hand, used VEs less frequently

(question 3), and consequently they rated them as less important in question 5.

5.4.2 The Role of VEs in Reading

Question 6 attempted to elicit a tentative evaluation of the role of VEs in reading, ie. whether or not they seemed to play a facilitative role. On the basis of the responses given to the previous five questions, responses to question 6 were investigated to test the following two hypotheses:

(1) The LI subjects would assign a local facilitative role to VEs whereas the FL subjects would assign a global facilitative role to them.

(2) The facilitative role of VEs (whether global or local) would be higher for the FL groups than the LI group.

The first hypothesis was concerned with investigating the level of the text at which the facilitative role of VEs exists, ie. local or global. The second hypothesis was concerned with the overall evaluation of the facilitative role of VEs (if any) for each group of readers.

Subjects in question 6 were asked about the influence that VEs had on their overall comprehension of texts. Five nominal responses were given. The three groups agreed almost entirely on two of them, namely 3 and 4. In other words subjects seemed to concur on the fact VEs neither distracted their attention from understanding the whole texts nor parts of them as may be seen in Table 17 below.

Moreover, the two FL groups were in almost complete agreement on response 5 that the presence of VEs in the texts they had read did make a difference in their comprehension. However, 17 LI subjects (23.6%), 3 FLP subjects (5.4%), and 5 FLU subjects (16.7%) said that VEs made no difference in the comprehension of the texts they had read. Consequently a chi-square test of significance was applied to test whether or not the 17 LI subjects constituted a significant portion of the LI group compared with their counterparts in the two FL groups as shown in Table 16 below:

Table 16: The Difference between the Groups to Response 5

Group	n	x^2	df
LI	17		
FLP	3	4.175	2
FLU	5		

P > .05 N = 25

The difference is statistically insignificant. Thus response 5 could be considered an area of agreement between the three groups same as responses 3 and 4. The high percentages of each of the three groups, however, in their responses to this question assembled round either response 1 or 2. Looking closely at the scores of these two responses for the three groups, it could be seen that the first hypothesis could reasonably be accepted. In other words the LI group were consistently perceiving the visual/verbal

Table 17: The Impact of VEs on General Comprehension of Texts

Groups	n	1 n	%	2 n	%	3 n	%	4 n	%	5 n	%
LI	72	14	(19)	36	(50)	2	3	3	4	17	23.6
FLP	54	25	(45.2)	24	(44.4)	2	4	2	4	1	2
FLU	29	13	(44.8)	9	(31)	2	7	1	3	4	13

N = 155

Responses:

1 = helped me understand the whole text.
2 = helped me understand part(s) of the text.
3 = distracted my attention from understanding the whole text.
4 = distracted my attention from understanding part(s) of the text
5 = made no difference.

relationships at a "local" level starting from their responses to question 1 across questions

4 and 5 and ending up in question 6 by assigning the facilitative role to VEs at a local level by a majority of 50% as opposed to only 19%. The two FL groups were also consistent in the same pattern described for LI group above where the majorities of them (45.2% FLP, 44.8% FLU) assigned a facilitative role to VEs at a global level although the percentage of each was lower than that of the LI. The FLP subjects assigned the global facilitation with a slightly higher percentage. They were almost equally divided between local/global facilitation as may be seen in the table above. The FLU group assigned a global facilitative role to the VEs with a higher majority (44.8% vs 31%) compared to the FLP subjects who were equally divided between global/local facilitation.

Although the hypothesis was accepted with a narrow majority for the FL groups particularly the FLP one, the three groups seemed to agree on the fact that VEs did really have a facilitative role in reading whether at a "local" level (LI) or at a "global" level (FLP and FLU). What is important, however, is the impact of this facilitation in the overall comprehension and this will be investigated in Chapter Six.

Now turning to the second hypothesis, ie. on the basis of subjects' responses to question 6, VEs facilitative role (global/local) was expected to be higher for the two FL groups. The results were worked out as follows:

(1) Adding up the number of subjects in the LI group who assigned a global facilitation to the VEs to those who assigned a local facilitation and the total was worked out as a percentage of the total number of the subjects who answered this question (see Table 17 above).

(2) Adding up the total numbers of the two FL groups who assigned global or local facilitation to VEs and the total was worked out as a percentage of the total number of the two FL groups who answered the question as may be seen in Table 17 above.

Thus (69%) LI subjects assigned a facilitative role to VEs and 85% of the two FL groups did so. Although the two percentages are high, the two FL groups seemed to have found VEs more facilitative than the LI hence giving reason to accept hypothesis 2 above. So hypothesis 1 was accepted in that all the groups found VEs to be facilitative at either a global or local level in relation to their accompanying verbal texts whereas hypothesis 2 was accepted in such a way that the two FL groups found the VEs to have a facilitative role higher than that of the LI group by a difference of 19%.

5.5 Summary of Results

Like the non-linguistic reading strategies discussed in the previous chapter, the results of this chapter will be divided into similarities and differences. A summary of each will be presented in this section and a discussion of both will be attempted in the next section.

5.5.1 Similarities

5.5.1.1 Similarities in Purposes

The chief similarity in reading purposes between the LI/EFL groups was that readers made use of VEs out of purpose and not due to the explicit text-references to VEs (cf. 4.2.3). As far as the reading purposes themselves are concerned, there were three main similarities: one of them was between the three groups and the other two were between the two FL groups only (see Table 14). As for the first similarity, the three groups overwhelmingly said that they did not use VEs for "other" information. In other words they used them only for the four categories given to them in question 4. All the four categories represented purposes related to the verbal texts. Even those who identified other possible purposes for which they might have used VEs, those purposes also turned out to be related to the verbal texts. This relationship between verbal texts and consultation of VEs in reading purposes gives more support to the result of question 2 in that the reading purposes of VEs emanated mainly from the verbal texts.

The second similarity which was exhibited by the two FL groups only, was that

among the four categories of possible purposes set up, both FL groups seemed to use VEs for main points or detailed information about the verbal texts they read (see Table 14). Next to these two purposes, was the summary. The two groups also agreed that the least important purpose for which they used VEs was "additional" information to that presented in the verbal text.

The third similarity which was also between the two FL groups, was in the relationship between the reading purposes of VEs and their accompanying texts. The majorities of both groups tended to use VEs for purposes related to the total message of each text they read. In other words both the FL groups tended to perceive the relationship between VEs and their accompanying verbal texts as global. This similarity in the reading purposes of VEs in relation to their texts suggests that both the FL groups seemed to be in more contact with VEs throughout the reading process.

5.5.1.2 Similarities in the Evaluation of the Importance and Role of VEs in the Reading Process

As far as evaluating the importance of VEs in the reading process is concerned, again the two FL groups exhibited a similarity. They both found VEs quite important (m = 5.6) in the reading process. In the case of the role of VEs in reading, the three groups (LI and the two FL groups) revealed the same evaluation. They almost agreed that VEs had a facilitative role on the texts they had read.

The similarity in assigning a more important role to VEs by the two FL groups gives another support to Rigg's (1977) study referred to in the previous chapter. Although authors of textbooks may have incorporated VEs in texts for LI readership on the assumption that, perhaps, VEs might be important to them, it turned out in this study that VEs were more important to FL readership than LI readership.

The similarity between the three groups in assigning a facilitative role to VEs, on the other hand, could be taken at this stage as only indicative. This is because, as pointed out before, question 6 in the questionnaire was in fact intended to give only a crude evaluation about the role of VEs on adult readers. Therefore, the assessment of the role

of VEs on the comprehension of readers used in this study will be considered more closely in Chapter Six.

5.5.2 Differences

5.5.2.1 Differences in Purposes

The main difference in reading purposes of VEs was between the LI group on the one hand and the two FL groups on the other. As pointed out earlier, the two FL groups seemed to refer to VEs mainly for main and detailed information related to the verbal texts. The LI subjects on the other hand seemed to use VEs mainly for summary of the verbal text. Next to this purpose, they seemed to focus on the main points (same as the two FL groups) and additional information. The categorical difference between the LI and the two FL groups, however, was manifested in "detailed" and "additional" information. By the time "detailed" information was one of the main purposes of using VEs by the two FL groups, this purpose was the least important one for the LI group (20% only). Similarly, "additional" information which was one of the main purposes exhibited by the LI group in the use of VEs, turned out to be the least important purpose for both FLP (8.3%) and FLU (7%) groups.

5.5.2.2 Differences in Evaluation of the Importance and Role of VEs

There were two main differences in these two aspects of the reading process between the LI group and the two FL groups. The first was: by the time the two FL groups rated VEs as quite important for them in reading, the LI group assigned only little importance to them. The second difference was that, although the three groups found VEs to be facilitative the LI group related that facilitative role only to a local level. That is, VEs seemed to facilitate the reading of only certain parts of the texts. The two FL groups on the other hand related the facilitative role of VEs to both local and global levels of the texts they read.

5.6 Discussion of Results

5.6.1 Discussion of Reading Purposes

As mentioned in Section 5.1, Smith (1967) categorises reading purposes (see Figure 12 above) into two major kinds of purposes for reading:

(1) The broad, general purposes, or life purposes or motives for which a reader chooses and reads particular selections or books are considered as "primary" purposes for reading, eg. problem-solving, intellectual demands, personal needs or demands, enjoyment etc.

(2) The different kinds of comprehension or the desired behaviour or objectives to be attained in the educational process and these are termed the "secondary" reading purposes,eg. the general impression, details, comparison,description, generalisations, anticipation of ideas etc.

These two types of purposes are concerned with reading textual materials in general and by extension they may apply to reading VEs.

In this study, the main concern is on the latter type of purposes. Smith (ibid) reviewed the literature on the relationship between purpose and reading strategy. For example, Judd and Buswell (1922) conducted an experiment on twenty subjects who were asked first to read a passage rapidly to find out what it was about and then to read it carefully to answer questions about it. On the basis of the results, they concluded that the change in purpose of reading resulted in a difference in the mental processes involved in reading.

Smith's (1967) study was conducted on twelfth-grade students to investigate their success and the processes in reading for different purposes, details and general impressions, through structured interviews. One of her conclusions was that the good readers made more adjustments in their approach to the two purposes for reading than the poor readers did and also good readers were more successful than poor readers in

holding their purpose for reading in mind. The difference between Smith's approach and the approach of the present study is that the former specified the purposes right from the beginning in such a way that the readers had the purposes in mind when they approached the texts whereas in the latter case the readers were asked to specify their purposes from a list given to them after the reading process was over. It was found in this study that the LI subjects seemed to be less definite about three purposes whereas a reasonable majority were in favour of "summary". The FL groups, on the other hand, were less vague because they specified two purposes with reasonable majorities (cf. 5.3.1). On the whole, the adult readers whether LI or FL seemed to have approached the VEs for different purposes because the nature of reading the VEs is different from that of reading the texts in the sense that reading the VEs is dependent on reading their accompanying verbal texts.

Thus at each stage in reading the accompanying text, the readers may need to refer to the VEs for a purpose necessitated by the reading stage of the accompanying text. For example, a reader may look at the visual before reading because his purpose is to get a clue for the verbal text (FLP), or he may look at the visual during reading because his purpose is to get detailed information related to the verbal text (FLU). Similarly a reader may consult the visual late in the reading process because his purpose is summary (LI) etc.

This reading behaviour is reminiscent of McBride's (1975: 83) taxonomy of purposes which characterises adults reading of prose: eg. the adult reads a novel out of interest. The adult reads the manual on car maintenance because he wishes to equip himself to do something or to improve his skill in some practical activity. The adult reads the newspaper because he is interested in political, educational or economic issues being currently discussed in society etc.

The role of purpose in the reading process is also recognised by Farnes (1973) where he states:

> The reader's purpose for reading provides a basis against which he can judge the relevance of material, and as a guide to how he should handle this material (p10).

In this respect, he criticised the existing lists of different purposes (among which was Smith's discussed above) as being unsatisfactory in that they do not offer any systematisation or any way in which these seemingly different purposes could be understood or applied in the classroom. However, he concluded that Smith's distinction between primary and secondary purposes provides the beginning of a classification system.

Farnes (ibid, p13) then reclassified Smith's (ibid) primary and secondary purposes into four categories of purposes on the basis of their contexts as follows:

A Summary of Smith's Primary/Secondary Purposes

Purpose	Context	Example
1 Life purposes	The person as an individual	To enrich my experience
2 Role purposes	The person in a particular role	To do well at school
3 Task purposes	The person in a role and a task situation	To write a project evaluating the increase in world population
4 Specific purposes	A particular resource within a task	To obtain information on population statistics of the UK from the Registrar General's Report

Source: Farnes, NC (1973): Reading Purposes, Comprehension and the Use of Context, (p13)

The relevance of Farnes' above reclassification of Smith's purposes to the present study is perhaps the influence of context on a readers' purposes. The context in the present study was that readers were given a special type of texts (texts accompanied by VEs) and were asked to specify their reading purposes in using VEs. The purposes they specified were, however, interrelated to their purposes of reading the main verbal texts. They also seemed to be much related to the category of "task purposes".

A third purpose-related study was carried out by Harri-Augstein et al (1982) where they attempted to specify purposes in terms of comprehension. That study was undertaken as part of the process of reading to learn. Its aim was to start the reader thinking more sharply about his/her reading purposes. The idea was to give learners a list of specific purposes, eg. to find a description of an event, to identify examples of a concept; and then to ask readers to classify them in terms of the kind of comprehension skills involved (for a detailed description of this activity see ibid, pp38-41). The result of this activity was the establishment of purpose/comprehension hierarchy of relationships.

Like Smith (1967) Harri-Augstein et al (ibid) in establishing their purpose/comprehension skills relationships, specified the purposes beforehand and then asked readers to clarify them in relation to the comprehension skill involved. In this respect the approach of the present study was similar to theirs in that readers were given categories of purposes to classify them in relation to the purposes of reading the accompanying verbal texts albeit this was done after they had finished reading.

It may be seen from the purpose-oriented studies reviewed above that purpose influences the reading strategies and comprehension of texts. The findings of the present study, as well as giving support to the findings of previous research on the role of purpose on the reading process, may permit the following conclusions with regard to reading purposes of texts accompanied by VEs:

(1) The reading purposes of VEs act as sub-purposes to thmain purpose of reading the verbal text.

(2) The EFL readers seemed to use VEs for compensatory purposes. In other words the purposes they failed to achieve in the verbal text were sought in VEs. This conclusion was based on the type of information they looked for in VEs namely, main and detailed.

(3) The LI subjects, on the other hand, seemed to use VEs for

reinforcement purposes. That was because the main information they sought in VEs was additional and summary.

5.6.2 Discussion of Readers' Evaluation of Importance and Role of VEs in the Reading Process

As shown in the results (cf. 5.3 and 5.4), readers evaluation of the role of VEs in reading was in line with their previous responses discussed in Chapter Four. The two FL groups who used VEs intensively (question 1) and frequently (question 3) rated them as important (question 5) and facilitative (question 6). Similarly, the LI group who used VEs less intensively and less frequently rated them in question 5 as less important, and although they assigned a facilitative role to them in question 6, that facilitation was related only to parts of the texts. These results suggest that the language background of readers seemed to have influenced their reading behaviour of texts accompanied by VEs. The LI group exhibited less reliance on VEs than the two FL groups. Whether or not the more reliance of the FL groups on VEs was beneficial to them in comprehending the texts satisfactorily will be discussed in Chapter Six.

As far as the similarity between the three groups in assigning a facilitative role to VEs in reading is concerned, there is some existing research undertaken on the role of illustrations (VEs) in reading comprehension, (eg. Schallert, 1980; Donald, 1983; Moore and Skinner, 1985).

Schallert (ibid) reviewed some research done on the role of illustrations (VEs) in reading comprehension and found that reserachers have come up with "seemingly contradictory conclusions". In other words:

> Some have found that pictures facilitate the comprehension and retention of text whereas others have found that pictures either make no difference or actually interfere with reading.
> (ibid,p503).

She then discussed the studies that provide evidence in favour of the facilitative effect of VEs on comprehension. These include, for example, Lesgold, DeGood and Levin (1977) who found that pictures facilitated the retention of information only when

they correctly and specifically represented the information. Peeck (1974) also provides evidence that pictures facilitate the learning of some specifiable information in a text. Rohwer and Harris (1975) conducted a study on the facilitative effect of pictures for information that was not presented in the text. They concluded that at least for some types of information, pictures alone were not sufficient but they might become adequate vehicles for non-redundant information. Finally, Rigney and Lutz (1976) also provide some evidence not only for the overall facilitative effect of print and picture combinations but also for the superiority of pictures over words in representing certain information.

Schallert (ibid) then summed up the evidence in support of the facilitative role of illustrations (despite the heterogeneity of experimental conditions) by saying that:

> Pictures help the reader learn and comprehend a text when they illustrate information central to the text, when they represent new content that is important to the overall message, and when they depict structural relationships mentioned in the text. (p 514)

She also added that pictures may have a specific effect which is localised mainly to illustrated information. This perhaps agrees with the results of the LI subjects in the present study because they perceived the facilitative role of VEs at a local level.

With regard to the evidence against the facilitative role of illustrations (VEs), Schallert (ibid) reported the works of Samuels (1967, 1970). Samuels (ibid) reviewed the works of Miller (1938); Vernon (1953, 1954); Weintraub (1960); and Koenke (1968). On the whole these studies reported either a negative effect or no effect at all of illustrations on reading comprehension. Samuels (ibid) then concluded that pictures have no demonstrated positive effect. The same conclusion was later reported by Concannon (1975).

Donald (1983), in the context of reading development, presented two opposing views on the role of illustrations on children in the process of learning to read. The first, was that of those who support Samuels' focal attention hypothesis (1967, 1970). This hypothesis according to Donald (ibid) claims that illustrations interfere with the process of learning to read. This claim is based on the assumption that:

> .... illustrations are seen as constituting attentional competition to orthographic stimuli, therefore, they are regarded as distractors in the learning process (ibid, p175)

The second view was represented by those who can be identified with a psycholinguistic hypothesis. This hypothesis, according to Donald (ibid, p175), argues that:

> .... reading development involves more than learning to recognise the orthographic structure of isolated words.

Therefore according to this hypothesis, illustrations (VEs) "constitute a source of contextual information that facilitates the process of message identification through increasing the reader's access to semantic information and reducing his reliance on orthographic information", (ibid, p176).

In testing these two hypotheses Donald (ibid) conducted a study on 120 children (including good and poor readers) at reading ages of 7 and 9. They read narrative extracts with and without illustrations. His results in general confirmed the contextual hypothesis. In other words, illustrations seemed to constitute, among others, contextual information that was "adaptively used in terms of textual message identification", (ibid, p 175).

Moore and Skinner (1985) also reviewed the literature on the influence of illustrations on learning from reading and they came up with four distinctive features which characterised those studies.

(1) Those studies tended to employ children as subjects and present the texts orally rather than have the children silently read at their own rate. (Hughes, Langdon and Kim, 1981; Levin, 1981).

(2) Many studies tended to stress on literal, factual recall (Levin and Lesgold, 1978) which means that limited attention has been given to the influence of illustrations in inferential comprehension.

(3) The studies used more concrete texts (Rohwer and Harris,1975; Ruch and Levin, 1977; Lesgold, Levin, Shimron and Guttmann, 1975).

(4) Learners may fail to make effective use of illustrations.

In the light of these features of previous research, they then conducted a study on 11-year-olds' comprehension of abstract and concrete texts and they found that illustrations facilitated prose learning at the inferential level for the abstract passages but not for the concrete ones.

5.7 Conclusion

In this chapter two aspects of the reading process of texts accompanied by VEs were discussed. The first was the reading purposes of VEs (category 3) which were elicited by question 4 in the questionnaire and the second was the role of VEs in reading the texts (category 4) and this was elicited by question 6.

Regarding the first aspect, the results could be summarised in the following:

Firstly, it was found that the presence of VEs in texts influenced readers' purposes for reading the main accompanying verbal texts. In other words, the readers sought in VEs the purposes which they could not get from the accompanying verbal texts; or the verbal texts themselves could not provide them with. The two FL groups sought in the VEs the main and detailed information about the verbal texts because they could not possibly extract that information from the verbal texts. The LI group, on the other hand, sought in the VEs mainly summary and additional information about the verbal texts and perhaps that type of information was not available for them in the verbal texts and hence they had to find access to it elsewhere.

Secondly, the purposes for which VEs were used seemed to be influenced primarily by readers' language background. In other words, the FL groups who obviously, perhaps, less proficient in English than the LI group sought in the VEs purposes which

were on the whole seemed to be compensatory to purposes which were not met in the verbal texts. Thus the purposes sought in VEs were essential to them in reading the whole texts. The LI group, on the other hand, due to their "greater experience of and ease with the bones of language" (Alderson, 1981: 73) sought in the VEs purposes which could be described as reinforcement purposes. Therefore, this result suggests that the reading purposes looked for in VEs were not desparately needed by the LI subjects.

Thirdly, the nature of the purposes looked for in the VEs by each group of readers may explain the fact that both the FL groups perceived the visual/verbal relationships in terms of purposes as global whereas the LI group perceived them as local. In other words the former looked in VEs for purposes related to the whole texts they read whereas the latter did so for purposes related to only parts of the texts.

Fourthly, the influence of reading purposes on the reading strategies of VEs was compared to the influence of reading purposes on the reading strategies of connected prose as investigated in previous research (eg. Smith, 1967; McBride, 1975). It was found that the presence of VEs in texts exerted influence on readers strategies of reading VEs in relation to their reading strategies of accompanying verbal texts. Because the FL readers looked for compensatory purposes in VEs their reading strategies would perhaps be typical of those described in Figure 10 above. The same applies to the LI group who used VEs for reinforcement purposes. Thus while previous research suggests that reading purposes vary with the type of texts, the findings of the present study suggest that the presence of VEs in texts offers readers the opportunity to generate some reading subpurposes. The relationship between these subpurposes of reading VEs and the main purposes of reading the verbal texts depends largely on readers' language background.

With regard to the second aspect of the reading process of VEs discussed in this chapter namely, the role of VEs in reading texts, the findings could be summarised in the following:

Firstly, both the FL groups exhibited a similarity in rating VEs as important thus producing an evaluation consistent with their responses discussed in Chapter Four and the present one. The LI subjects were also consistent with their previous responses

because they evaluated the presence of VEs in the texts they read as less important.

Secondly, all the groups assigned a facilitative role to VEs in the comprehension of the texts. While both the FL groups perceived this facilitation at a global level, the LI subjects perceived it only at a local level. These results were also consistent with their reading strategies and purposes.

The results were then compared to previous research evidence on the role of VEs in reading comprehension. The evidence of previous research reports positive as well as negative facilitative role of VEs, eg. Schallert (1980). In this respect, also, Donald's (1983) two opposing hypotheses on the role of illustrations (Samuels' focal attention hypothesis 1967, 1970; and the psycholinguistic hypothesis) have been discussed. In testing these hypotheses Donald (ibid) used children and narrative prose where his results seemed to support the psycholinguistic hypothesis. In the present study adult readers instead of children and expository instead of narrative texts were used in assessing the role of VEs in reading comprehension. Which hypothesis the results would probably confirm/disconfirm, will be considered in Chapter Six.

It may be seen that the question on evaluating the role of VEs in comprehension was put last in the series of the questions on the different aspects of the reading process of VEs for two reasons:

(a) It was one of the results of the questionnaire pilot run discussed in Chapter Three.

(b) It was deemed appropriate because this question would act as a suitable transition between the reading process of VEs and their impact on reading comprehension which will be discussed in Chapter Six.

In fact the results of this question have helped, among others, in the formulation of the hypotheses on the role of VEs in the reading comprehension of LI/EFL adult readers as will be seen in the next chapter.

CHAPTER SIX

CLOZE RESULTS AND THEIR RELATIONSHIP WITH QUESTIONNAIRE RESULTS

6.1 Introduction

The questionnaire results discussed in both Chapters Four and Five revealed similarities and differences between the LI/EFL groups in the reading process of texts accompanied by VEs. These similarities and differences were found to be comparable to the findings of previous research undertaken on the reading process of connected prose.

The questionnaire included two questions of evaluative nature, namely questions 4 and 6, where readers were asked to assess the importance and role of VEs in their comprehension of the texts they read. Those questions, as repeatedly stated, though intended to evaluate the role of VEs in reading from the viewpoint of the readers, could not in fact offer a reliable measurement of the impact of VEs in reading comprehension.

For this reason, and to link the reading process to the reading comprehension of texts accompanied by VEs a cloze experiment has been designed to assess readers' non-linguistic reading processes (discussed in Chapters Four and Five) in reading comprehension using the same texts as the questionnaire. Put differently the cloze experiment was intended to assess the role of VEs in reading comprehension. The use of cloze procedure in measuring the impact of VEs on reading comprehension is supported by, as stated before (cf. 3.3.1), Rankin and Culhane's (1970) study where they provide evidence for cloze sensitivity to extra-textual information provided by illustrations.

6.2 The Design of the Cloze Tests of this Study

In Chapter Three, we have discussed the different aspects of cloze methodology used in this study. This chapter will start off by describing the design of the cloze tests. It is deemed appropriate to discuss the cloze tests and the results in the same chapter because this will make the discussion of results easier than it would have been had the cloze tests been discussed in Chapter Three with the cloze methodology.

As mentioned earlier (cf. 3.3.7), four passages have been used for the tests from

the areas of Economics, Business, Psychology and Linguistics. The purpose of having four passages rather than one was to randomise any effect that might be generated from the relationship of illustration (visual) to text in any one passage (Donald, 1983). Each passage was then presented to testees in two versions:

(a) the original version, ie. the visual version (VV); and
(b) the one whose visual (non-verbal element) had been removed, ie. the non-visual version (NVV).

6.2.1 Removal of Text-References to VEs

The removal of the visual element from each passage included, as well as the visual itself, the removal of accompanying captions and glosses, and also the removal of any references to it in the main text. Each text-reference to the visual element in each passage underwent one of the following processes:

(a) deletion; or
(b) deletion and replacement by a word.

Table 18 below demonstrates the changes undergone by each text-reference to each visual in each of the four passages. It is worth noting that in some passages, eg. Economics, there is more than one text-reference to the visual element.

It is worth noting that each NVV passage has undergone two changes prior to the deletions of cloze procedure, namely, the removal of the visual together with its components, and the changes made to the text-reference(s) to it. The spaces resulting from the removal of VEs or their text-references were filled by the remaining text so that each NVV passage looked as if it had not been tampered with (see Appendices 3a and 3b).

Table 18: Changes Undergone by Text-References

Passage	Line No	Text-Reference	Change Undergone
Eco	9	"In table 3 ..."	deleted and replaced by "Imagine"
	16	"table"	deleted and replaced by "Columns"
Bus	13	"as shown in figure 8.4"	deleted
Psycho	9-10	"The graph ... intensities"	deleted
Ling		"... as shown in table 6.1"	deleted together with the two commas

Notes

Eco = Economics
Bus = Business
Psycho = Psychology
Ling = Linguistics

NB: In the Linguistics text there was a reference to a previous chapter in the textbook and that was deleted from both versions.

6.2.2 Similar and Different Deletions

In order to give sufficient context (Foley, 1979) and to make subjects feel less insecure with a difficult text (Harrison, 1980) one or two sentences at the beginning and end of each passage were left intact as a lead-in and lead-out. Starting from the first sentence after the lead-in every seventh word was deleted in each passage of each version (Appendices 3a and 3b). It is noticeable that the total number of deletions in three passages of the visual version (VV) is slightly more than in their counterparts in the non-visual version (NVV). These include Economics, Business and Psychology. The reason for the difference was that each of these three NVV passages has undergone the deletion of all the text-references to the VEs and that sometimes amounted to whole sentences as in the case of the psychology text (see Table 18). In the cases where the text-references were replaced, that was done only by one word, as in the Economics

passage. Another observation is that the actual words deleted were the same in the VVpassages and their NVV counterparts until the first reference to the visual element in each passage. With the removal of this and subsequent text-references, obviously, the words deleted thereafter were either different for the rest of the passage (Economics) or part of it (Business and Psychology). In the Linguistics passage, however, the deletions in the two versions were almost the same due to the fact that the text-reference is located right at the end of the passage. In fact the difference was only in one item.

The reason for the fact that similar as well as different deletions have been produced was that each passage in the NVV, as pointed out before, had undergone the deletion and/or replacement of all text-references to the visual element prior to the deletions required by the cloze procedure. Thus, for this reason, among others, more than one passage was used to produce more similar deletions than different ones so that the testees' scores could be assessed as far as possible on the similar deletions in the two versions. So in the four passages, 63% similar deletions have been produced as opposed to only 37% different ones. Out of these 37% different deletions, 22% were from only one passage, ie. Economics, because this particular passage had undergone the deletion of two text-references before the cloze deletions. To minimise any possible influence of the high percentage of the different deletions in this particular passage on the overall result, one of the other three passages was chosen from the "Business" area which is closely related to "Economics". Thus the expected influence of the "Economics" passage was likely to be compensated for in the "Business" passage.

So the influence of the removal of VEs and their text-references in the main texts in creating similar as well as different deletions was inevitable if the procedure of 7th-word deletion had to be applied in both VV and NVV. However, the attempts described above were intended first, to increase the number of similar deleted items and second, to minimise the impact of the different deleted items as discussed above. Moreover, the interest was not in specific cloze items rather it was in the overall results.

6.2.3 Function/Content Deleted Items

Any deleted item in each VV passage or NVV passage was obviously either a function or content item. The function items include prepositions, pronouns, conjunctions, and auxiliary verbs; and the content items include verbs, nouns, adjectives, and adverbs (Sim and Bensoussan, 1979).

It may be seen that (Tables 19a and 19b) by counting the total of function/content deleted items in each version, a balance was nearly established between the two types of word.

A further statistical study was undertaken by counting the number of similar/different items for each function and content items in both VV and NVV as shown in Tables 19a and 19b. It could be noticed that the number of similar content words within each version is higher than similar function words; but the number of different content words is smaller than that of different function words also within each version.

Table 19a: Information on Deleted Items in the VV

Text	No of words	No of deletions	Similar F	Similar C	Different F	Different C
Eco	358	46 (13%)	5	6	18	17
Bus	318	41 (12.9%)	13	23	3	2
Psycho	315	41 (13%)	8	14	14	5
Ling	320	36 (11.3%)	16	18	-	2
Total	1311	164 (12.5%)	42 (25%)	61 (37.2%)	35(21%)	26 (16.5%)

Table 19b: Information on Deleted Items in the NVV

Text	No of words	No of deletions	Similar F	Similar C	Different F	Different C
Eco	358	46	5	6	24	11
Bus	304	39	13	21	3	2
Psycho	308	41	8	14	13	6
Ling	313	35	16	18	1	-
Total	1283	161 (12.5%)	42 (26.3%)	59 (36.9%)	41(25%)	19 (11.9%)

Notes on Tables 19a and 19b

1 F = Function words. C = Content words

2 The percentage of the total number of deletions is worked out from the total number of words in the four passages.

3 The percentages of content and function words are worked out from the total number of deletions only.

However, by comparing similar/different function/content items between the two versions (VV and NVV), it is perhaps clear from the above two tables that a balance seems to have been established between content words and function words in the two versions. The biggest difference, however, is found between the different deleted content words which in itself is a small difference, ie. only (4.6%). Apart from that the

differences are very slight. All the deleted items whether function or content in all the versions were made in such a way that they could be answered by items potentially recoverable from the context. This excluded items which could not possibly be recovered from the context such as (a) numerals, (b) abbreviations when mentioned for the first time, (c) bracketted terms, (d) some proper nouns. A 12-letter space approximately (3 cm) was left in place of each deleted word and a line was drawn instead giving blanks which are all equal in length. But if the blanks had been made in such a way that was proportional in length to the omitted items this would have given the testees access to additional information that would allow them to exclude a number of alternative possibilities. This in effect (according to Harrison, 1980) makes comparisons with the 44%-57% criteria (or other criteria suggested by other scholars) difficult because these were derived from tests which used standard length blanks.

6.3 Results and Discussion

6.3.1 Introduction

As stated before, the exact-word scoring method was used in the analysis of results (see section 3.3.3. and Appendices 4a and 4b).

These results, as those of the questionnaire, will be presented, discussed and interpreted comparatively between the three groups, LI, FLP and FLU, under the following five aspects of reading:

(1) speed
(2) completion rate of tests
(3) item replacement (function and content words)
(4) general comprehension
(5) the impact of VEs on readability.

However, the emphasis will be in the main on completion rate, item replacement and general comprehension. The fifth issue, ie. the impact of VEs on readability of texts

does not particularly fall within the scope of this study because cloze procedure was used in this study as a measure of reading comprehension (cf. 3.3.4) but it will be treated as an indirect result. The first issue, ie. speed, on the other hand, will not be emphasised due to insufficiency of data especially from the two FL groups. So in this section the results obtained from the three groups will be presented and discussed under the above five headings. The discussion will be in relation to the second part of the main research hypothesis which the cloze experiment has been designed to investigate, namely, that VEs enhance readers' comprehension to different levels depending on their language backgrounds. In this respect the cloze experiment was intended to complement the questionnaire where the latter attempted to investigate the first part of the research main hypothesis, ie. the different aspects of the reading process of VEs when they occur in texts as discussed in Chapters Four and Five. Therefore, the present chapter as well as discussing the cloze results in relation to previous research, will also discuss the relationship between questionnaire results and cloze results. In other words to link the reading process of VEs when they occur in texts to their impact on reading comprehension. On the whole the results exhibit similarities as well as differences in the five aspects of reading mentioned above. Most of the similarities and differences are consistent with the questionnaire results as will be seen later.

6.3.2 Speed

It has been mentioned before (cf. 3.4.2) that cloze tests are usually left untimed.In this study they were also left untimed but testees were instructed to record approximately the time that each spent in completing the test. 37 LI subjects responded to that instruction, 13 subjects from the FLP group and none from the FLU. Therefore, the comments on this aspect of tests would be concerned mainly with the LI group and to some extent with the FLP group for the purpose of getting a tentative idea about the impact of VEs on the speed of completing the VV and the NVV tests.

Table 20 below demonstrates the overall mean time spent in completing all the tests attempted by the LI group and the FLP group both in the VV and the NVV tests.

It should be noted, however, that there was no time record obtained from neither the LI Linguistics subgroup or the FLP Economics subgroup both in VV and NVV tests.

Table 20: LI/FLP Difference in Mean Time between VV and NVV

Group	VV n	VV m	VV sd	VV t-value	VV p	NVV n	NVV m	NVV sd	NVV t-value	NVV p
LI	18	16.7	3.2	0.6	>.05	19	15.8	5.4	0.6	>.05
FLP	6	13.2	5.5	1.3	>.05	7	19	8.4	1.3	>.05

Notes

The time was recorded in minutes.

Although the number of FLP subjects who recorded the time spent in completing tests in both VV and NVV was very small as shown in the table above, the results reflect a tendency among the VV subgroup to spend less time in completing the tests, ie. mean = 13.2 as opposed to mean = 19 for the NVV subgroup. However, the difference between these two means turned out to be statistically insignificant (P >.05) as shown in Table 20 above. This tentative result may suggest that if the same experiment is replicated on larger FLP sample significant differences in speed could emerge in the same or opposite direction. The LI group, on the other hand, seemed to behave differently from the FLP group in this respect. The LI subjects completed the NVV tests faster than the VV ones but the difference was also insignificant. Once again the replication of this experiment on larger LI samples may reveal significant differences in the same or perhaps the opposite direction.

The unexpected result, however, was that the FLP group completed the VV tests much faster than the LI group. This result may be ascribed to two reasons:

Firstly, the FLP-VV subgroup was much smaller than its LI counterpart, ie. only 6 compared to 18.

Secondly, the FLP subjects tended to leave more unattempted blanks than the LI subjects (see section 6.4.3 below). This in effect reduced the amount of time they spent in completing the tests.

So the result of the FLP group may be deceptive in the sense that the fast completion of tests did not necessarily imply that their speed was accompanied by a satisfactory level of comprehension, since their completion of tests was accompanied by a number of unattempted blanks.

Another point to be made is that even if one of the groups completed the tests faster than the other and all the blanks were attempted, still there is no guarantee that the speed would be positive. Therefore speed or slowness can only be judged as positive or negative in relation to its impact on comprehension. Although this result neither indicates a positive nor a negative impact of speed on comprehension, yet it suggests that the presence of VEs in texts seems to affect readers' speed in completing the tests. Whether or not this is true for the speed of normal reading of texts with and without VEs needs further investigation. It is, however, possible that VEs may have an impact on the speed of ordinary reading which could be different from the speed of completing a test because the atmosphere in which a reader does a test is perhaps different from that of undertaking normal reading.

The difficulty of obtaining reliable measurements on reading speed and perhaps speed in completing tests is recognised by some scholars. Lunzer (1979: 26) for example, states:

> While there is general agreement that flexibility in reading pace is essential to profitable reading for learning, it is by no means easy to construct any adequate and reliable measures of this characteristic.

He elaborates on this issue by stressing the fact that all the measures are nearly always based on the difference between a reader's performance in an easy and a difficult text.

Also in relation to this issue Lunzer (ibid) referred to Rankin's (1974) study where he showed by correlation that students who had undertaken a special course of instruction

were able to vary their reading rate to suit the difficulty of the text.

Similarly Dolan et al (1979) suggest some reading improvement techniques through group discussion activities. Their approach is intended to achieve flexibility in reading texts in different subject areas. The approach as they put it:

> involves small groups of children in a range of activities which call for members of the groups to read in order to solve problems and to reflect not only on the results of their reading but also on the thinking and strategies used in arriving at decisions (ibid, p228).

On the whole Lunzer (1979: 26) described their techniques as positive because:

> they provide a real incentive to "use" the text in the fullest sense, instead of merely reading it at a standard speed, regardless of content or purpose.

So this point made by Lunzer illustrates a point mentioned earlier in this section that increasing or decreasing speed in reading or in completing tests should be associated with comprehension.

In previous research also, some factors that could influence reading speed have been touched upon. For instance, length and frequency of pauses between reads are believed to cause differences in rate of reading (Smith, 1973; Lunzer, 1979). Although the pauses referred to above are those which occur between reads of connected prose, it could be argued in this study that the presence of VEs in texts (investigated in this study) could provide another source of potential pauses. These pauses could occur before reading as the case of the FLP group or between reads as the case of the FLU and LI groups. Their length and frequency, however, require further research. The evidence provided by previous research (Rankin and Culhane, 1970) seems to suggest that the pauses made on VEs may reduce the amount of pauses that could be made on their accompanying verbal texts. Rankin and Culhane (ibid) seem to suggest that a picture can stand for a thousand words. This suggests that VEs help in assimilating the content of texts and thus readers do not have to pause after each individual phrase in the verbal texts. A typical example is that of a text accompanied by a map.

However, there is some evidence reported in Donald (1983) that the presence of VEs or illustrations is seen as "constituting attentional competition to orthographic stimuli". In this respect, VEs may be seen as requiring additional attention to that required by the verbal text hence they may influence the speed of reading or completing a test.

To conclude this section on speed, it was pointed out that the data collected to examine the influence of VEs on the speed of completing tests were limited to a small number of subjects especially in the case of the FLP group. Thus the observations drawn from that limited amount of data should be taken within these limits. The results seem to suggest that VEs exert influence on the speed of completing tests where the FLP subjects completed the VV tests faster than the NVV ones. The LI subjects behaved in an opposite manner though with a very slight difference. However, there is no evidence as to whether the slowness or speed resulting from the presence of VEs would or would not affect readers' comprehension positively or negatively.

The findings were also compared with those provided by previous research regarding the factors that could influence reading speed. In this respect, the present study suggests that the presence of VEs influences reading speed as well as the speed of completing tests. This influence could work either way, ie. could increase speed or slow it down depending, among other factors, on readers' language background and perhaps their experience in using VEs.

6.3.3 Completion Rate

The completion rate of each test was worked out through the following procedure:

(a) calculating the number of non-attempts, ie. unattempted blanks in each passage;

(b) the non-attempts were then subtracted from the maximum number of deletions in each passage for each testee;

(c) then the result was worked out as a percentage of the maximum possible score.

The above procedure was first applied at the level of each individual passage and then at the level of all the passages in both VV and NVV. So from the above, it is clear that the completion rate excludes only the non-attempts. In other words it includes correct as well as incorrect responses (see Table 21 below).

It is perhaps noticeable in Table 21 below that the completion rate of the tests for each group was higher in the VV tests than in the NVV tests particularly for the two FL groups. For the LI group, however, the difference was slight, ie. 0.8% only.

In both VV and NVV tests the completion rate of LI group was higher than that of both the FLP and the FLU groups. The lowest completion rates both in the VV and NVV tests came from the two FLU subgroups. Interestingly, the completion rate of the FLP group in the VV was closer to that of the LI group than to the FLU group whereas that of the NVV was closer to the FLU than to the LI.

Another observation in Table 21below is that the three groups tended to leave more unattempted blanks in the NVV. However, the increase of non-attempts in the NVV was far more in the case of the FLP and the FLU groups than the LI group. The FLP group produced the highest increase in non-attempts, ie. 67 and then the FLU group, ie. 37. The LI group, on the other hand, produced an increase of only 9 non-attempts in the NVV. However, the completion rate could not in any way give an indication of the comprehension level of any group or subgroup because it included the correct as well as the incorrect responses.

Table 21: Completion Rate of Tests in the VV and NVV

	VV				NVV			
Group	n	max	N/A	C/R %	n	max	N/A	C/R %
LI	24	984	7	99.3	26	1066	16	98.5
FLP	15	625	17	97.7	18	722	84	88
FLU	20	820	98	88	20	820	135	83.5

Notes

1 Max = maximum number of deletions. This is worked out by multiplying the number of subjects by the number of items in the attempted passage then adding up the results for all the passages attempted by each of the three main groups.

2 n = number of subjects

3 N/A = non- attempts

4 C/R = completion rate of tests (%)

In a cloze study on native and non-native English speakers MacKay et al (1975) found that the non-native subjects tended to leave progressively more unattempted blanks than their native counterparts. They attributed that to two reasons: fall in morale and drop in interest among the non-native testees. Although these two factors could well affect the native speakers, yet more often their impact seems to be more noticeable on the performance of the non-native speakers probably because these two factors occurred on top of other factors already affecting the performance of the non-native speakers notably the language difficulty. In fact the language difficulty often reduces interest and motivation and hence results in leaving more unattempted blanks in the cloze test.

In the present study there is also evidence that the two FL groups tended to leave more unattempted blanks than the LI group particularly in the NNV tests. However, the difference between this finding and MacKay et al's (ibid) is that the interest here was in all the unattempted blanks no matter whether they were left progressively or not. So the findings of this study may be similar to those of MacKay et al's (ibid) in that they revealed the same tendency among the FL groups in that their non-attempts were far more

than those of the LI group. As well as that this result may add to the findings of MacKay et al's (ibid) the possibility that the non-attempts of the non-native speakers in the cloze tests increase with the removal of VEs from texts. In other words the removal of VEs seemed to affect the drop in interest for the FL groups.

There were, therefore, three possible factors believed to have influenced the completion rate of the cloze tests for the FL groups in this study which were:

(1) The language difficulty experienced by the FL groups

(2) The cloze deletions

(3) The removal of VEs

The FL groups experienced the first two factors only in the VV tests whereas they experienced all the three factors in the NVV tests. Thus the drop in completion rate could possibly be attributed to the third factor namely, the removal of VEs. This factor, however, seems to have influenced the FLP group more than the FLU. The LI group on the other hand seemed to be unaffected by this factor because their drop in the NVV completion rate was negligible.

The reason why the FLP group was affected most by the removal of VEs was perhaps due to their reading strategies of VEs discussed in Chapter Four or to their reading purposes of VEs discussed in Chapter Five. The FLP group, who tended to start with VEs in the reading process (cf. 4.2.2) and perceive the relationship between VEs and their accompanying texts as global, missed the VEs greatly as manifested in the increase of their non-attempts in the NVV tests. The FLU group who exhibited a considerable number of similarities with the FLP group in the reading process also missed the VEs when they were removed albeit to a lesser extent.

So the more reliance on VEs exhibited by the two FL groups in the reading process seemed to show up in the dramatic increase of unattempted blanks when the VEs were removed. However, it should be stressed that the completion rate of tests whether in the VV or NVV could not give any indication whatsoever of the comprehension level simply

because it included both correct and incorrect responses. Rather the completion rate indicated only the total number of attempts which were manifested in the filled-in blanks.

6.3.4 Item Replacement

The aim of this section is to throw some light on the problems associated with the impact of VEs/NVI on comprehension as manifested in the correct recovery of function (F) and content (C) items in the cloze tests for the three groups. As mentioned before, function words include prepositions, pronouns, conjunctions, and auxiliary verbs and the content words include nouns, verbs, adjectives and adverbs. The former connect the ideas cohesively in a larger context and the latter contain the message or idea (Sim and Bensoussan, 1979).

Table 22 below shows the function/content cloze scores of subjects worked out as a percentage from the maximum scores of each type of words, irrespective of whether they were similar or different.

Table 22: Content/Function Cloze Scores

	VV				NVV			
Versions/ Groups	max scores F	C	cloze scores F	C	max scores F	C	cloze scores F	C
LI	448	531	320 (71%)	273 (52%)	498	499	320 (64%)	231(46%)
FLU	385	435	153(39.7%)	191(44%)	394	367	119(30%)	140(38%)
FLP	274	351	115(41.9%)	144(41%)	354	364	147(41.5%)	143(39%)

Notes

Numbers of subjects in each version:

1 The visual version (VV): LI=24; FLU=20; FLP=15
2 The non-visual version (NVV): LI=26; FLU=20; FLP=18

In both cases (function/content), the LI subjects scored higher in the VV than in the NVV (see Table 22 above). In both VV and NVV tests, they scored higher in the case of function words than in the case of content words, ie. 71% F vs 52% C and 64% F vs

46% C respectively. Interestingly, the difference between the two was nearly the same in both versions; 19% for the former and 18% for the latter. Similarly, the increase in scores in each type of word was nearly the same in the VV tests: 7% function words and 6% content words.

Like the LI group the FLU group scored higher in both content/function words in the VV than in the NVV as shown in Table 22 above. However, unlike the LI group they scored higher in both VV and NVV in the case of content words, ie. 44% content vs 39.7% function and 38% content vs 30% function respectively. The FLP group also scored higher in the VV in both content and function words (though the increase was very little in both types of word).

Thus the results presented in Table 22 above seem to suggest the following:

(1) The LI subjects seemed to benefit from the VEs in the correct recovery of both content and function deleted items, ie. an increase of 7% for the former and 6% for the latter in the VV compared to the NVV. The same applies to the FLU group who achieved a 9% increase in function words and 6% in content words in the VV tests.

(2) In both VV and NVV tests, the LI group scored higher in function words whereas the FLU group scored higher in the content words in both VV and NVV tests.

(3) The FLP group seemed to benefit least from the VEs where they achieved only a 2% increase in content words and a 0.4% increase in function words in the VV tests.

(4) All the highest mean scores in each group were achieved in the VV, ie. the LI group 71% function, the FLU; 44% content, and the FLP 41.9% function. All the lowest mean scores, on the other hand, were achieved in

the NVV, ie. LI group 46% content; FLU group 30% function; and FLP 39% content.

(5) The differences in scores between FLP/FLU in the function/content words in both VV/NVV were, with the exception of NVV function words (11.5%), very small, ie. not more than 2%. However, the differences between the LI group on the one hand and the two FL groups on the other were significant only in the case of function words in both VV and NVV (see Table 23 below).

Table 23: Differences in Scores between LI and the Two FL Groups

	VV				NVV			
	F%	diff	C%	diff	F%	diff	C%	diff
LI	71	-	52	-	64	-	46	-
FLU	39.7	31.3	44	8	30	34	38	8
FLP	41.9	29.1	41	9	41.5	22.5	39	7

Notes

1 diff = difference
2 The numbers of subjects were the same as those presented in Table 22

What is noticeable in these differences is perhaps that the differences between the LI and the FLP group increased in the VV both in content words (by 2%) and in function words (by nearly 7%) whereas in the case of FLU the differences in the VV either decreased, ie. by nearly 3% in function words; or remained unchanged in the case of content words. This point once again illustrates the fact that the FLU group seemed to benefit from the VEs more than the FLP as manifested in their decreasing differences with the LI group in the VV compared to the FLP increasing differences.

In previous research the interaction between function and content words is believed to be "necessary for effective comprehension of the context in which they operate" (Sim

and Bensoussan, 1979: 36). Sim and Bensoussan (ibid) in this connection report two notions. The first is that function words in particular are not handled with facility by students when reading expository texts. This notion according to Sim and Bensoussan is supported by "oral questioning, written exercises and a body of teacher opinion" (ibid, p36). As well as that this notion is supported by preliminary research evidence (Sim, 1973).

The second notion seems to contradict the first namely, that function words are easier to replace than content words. This notion is supported by research based on cloze procedure (Aborn et al , 1959; Louthan, 1965).

In the light of these two seemingly opposing views Sim and Bensoussan (ibid) conducted a non-cloze study using multiple choice questions to determine whether students score higher on questions testing function words than on questions testing content words. Their findings seem to support the first notion, ie. function words cause reading difficulty. Therefore, they suggest that function words need to be taught and tested to the same extent as content words.

In the present study the interaction between function and content words has been considered from another angle, namely to investigate the impact of the presence of VEs in expository prose texts on the ease or difficulty of replacing one type of words or another in cloze tests. The findings (presented in Table 22 above) can be compared to those reported in Sim and Bensoussan (ibid) in the following:

Firstly, the results of the LI group both in VV and NVV tests seem to support the second notion reported in Sim and Bensoussan namely, that function words are easier to replace than content words. Similarly, the results of the FLP group seem to support the same notion albeit their differences in scores between function and content words were not as significant as those of the LI group. Although both the LI and the FLP groups did better in replacing function words than content words in both VV and NVV tests, their mean scores were higher in the VV than in the NVV tests. The LI mean score in the VV tests was 71% as opposed to 64% in the NVV tests, and the FLP mean score was 41.9% in the VV and 41.5% in the NVV (See Figures 13a and 13b).

Secondly, the results of the FLU group on the other hand seem to support the first notion, reported in Sim and Bensoussan (ibid) above namely, that function words are not handled with facility in reading expository prose texts. That notion as mentioned before was also supported by Sim (1973) and Sim and Bensoussan (1979). In this study the FLU group did better in replacing content words in both VV and NVV tests where they scored higher in the VV tests (see Figures 13a and 13b).

As well as being comparable to the findings of previous research, the results of this study on the interaction between content and function words in relation to the presence of VEs in expository prose may permit the following suggestions: The LI subjects tended to replace the function words much better than either of the FL groups when the texts are accompanied by VEs. This ability of LI subjects also exists even without VEs. A possible explanation for that is advanced by Alderson (1981) that possibly the native speakers' experience of and ease with the "bones" of the language enable them to see distant relationships among ideas in text more easily than non-native speakers. In other words, the native speakers seem to be better than non-native speakers in recognising the relationships between function words and the cohesive properties of text (Halliday and Hasan, 1976). What the present study's findings suggest, however, is that this ability seem to be enhanced by the presence of VEs in expository texts as manifested in the LI subjects' better replacement of function words in the VV tests.

The FLP subjects, though, exhibited the same tendency as the LI subjects, the presence of VEs in texts seemed to enhance only slightly their ability in seeing distant relationships performed by function words.

The FLU subjects, on the other hand, seemed to handle the content words with more facility probably due to the presence of VEs in texts.

Figure 13a

VV/NVV Scores in Function Words

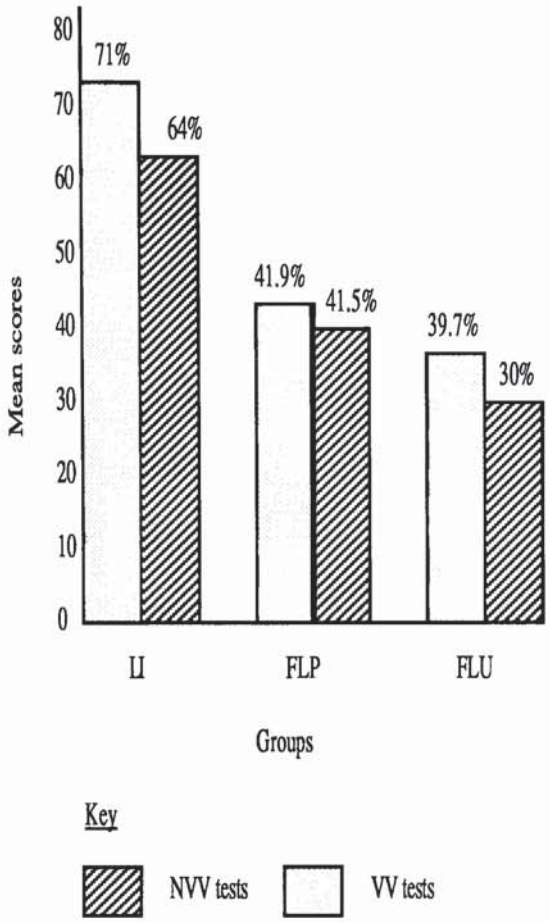
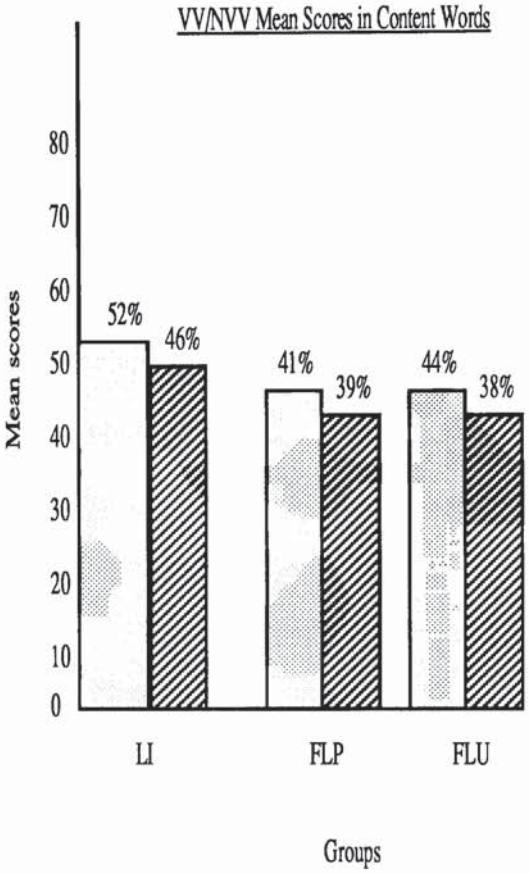


Figure 13b

VV/NVV Mean Scores in Content Words



Key

NVV tests

VV tests

Furthermore, the positive impact of VEs is not only limited to the enhancement of the correct replacement of function words for the LI and the FLP groups, rather it exceeds that to the content words though to a lesser extent. The LI group benefitted from VEs in obtaining 6% increase in the content words in the VV. Similarly, the FLP group scored 2% higher in the content words in the VV tests. By the same token, VEs seemed to assist the FLU group in the correct replacement of function words where they scored nearly 2% higher in the VV tests. On the whole the positive impact of VEs in the replacement of content words to the LI and the FLP groups and in the replacement of function words to the FLU group seemed to be very limited compared to their impact in the replacement of function words to the LI group and content words to the FLU group as discussed before.

It could be concluded that VEs helped both LI/EFL groups in the replacement of both types of words with varying degrees. The LI group seemed to benefit best from VEs in the replacement of function words whereas the FLU benefitted best in the replacement of content words. The FLP group on the other hand benefitted very slightly from VEs in both content and function words as may be seen in Figures 13a and 13b. The LI group, however, even in the content words scored higher than the FLU group in the VV. In other words the LI group benefitted from VEs in the replacement of both content and function words significantly better than either of the FL groups. The differences between the two FL groups in content and function words in the VV tests were small thus exhibiting an overall similarity in this respect.

However, there seems to be no evidence as to whether doing better in one type of words or another could be taken as an indicator of better comprehension.

6.3.5 Comprehension

6.3.5.1 Introduction

This section is concerned with the overall outcome of readers' performance in VV and NVV tests in an attempt to assess the impact of VEs on general comprehension. This will be treated at two levels: the language levels and the general comprehension.

6.3.5.2 The Language Levels

As pointed out before (cf. 3.3.4.2) cloze as a criterion-referenced test indicates one of three levels of difficulty in basic language skills whether these skills be applied to reading or listening: frustrational, instructional and independent (Foley, 1983: 57). However, these levels are no more than approximations based on different studies where researchers have attempted to correlate cloze with multiple choice test scores where 75% on multiple choice test indicates instructional level and 90% indicates independent level. Table 24 below presents a summary of these correlations (see also Cohen's summary in section 3.3.4.2 above).

Table 24: Comparison between Multiple Choice and Cloze Scores

Multiple Choice Criteria	Cloze Scores Bormuth (1967)	Bormuth (1968)	Rankin and Culhane (1969)	Anderson and Hunt (1972)	Almeida (1975)
75%	38%	44%	41%	44%	40%
90%	50%	57%	63%	53%	-

Source: Foley, (1983, p63)

As pointed out earlier (cf. 3.3.4.2) the instructional level was determined at the lowest possible point, ie. 38%. This criterion was used because it was found to be suitable for both LI and EFL subjects. The results of the three groups in terms of language levels are presented in Table 25 below.

It can be seen in Table 25 below that none of the LI subjects scored in the frustrational level in both VV and NVV tests whereas 63% FLU and 28% FLP were in this frustrational zone in the NVV. However, this percentage has significantly gone down, ie. by 28% in the case of the FLU group in the VV; but in the case of the FLP group the drop was very slight, ie. only 1%. These effects were more likely to be due to the impact of VEs. The impact of VEs on LI subjects, however, is perhaps evident in the independent level where 46% scored in the independent level in the NVV but this percentage has significantly gone up in the VV, ie. to 65%.

Table 25: Distribution of Subjects in the Comprehension Levels on the Basis of their Cloze Scores in VV and NVV Tests

		VV				NVV		
Groups/ Levels	n	Frus	Inst	Ind	n	Frus	Inst	Ind
LI	24	0	19%	65%	26	0	50%	46%
FLU	20	25%	50%	15%	20	63%	37%	0
FLP	15	27%	67%	6%	18	28%	72%	0

Notes

1 The results of the LI group were based on 22 subjects in the VV and 25 subjects in the NVV from the total number of subjects who attempted each version.

2 n = number of subgroup
Frust = Frustrational level (-38%)
Inst = Instructional level (38%+)
Ind = Independent level (57%+)

Another important observation in Table 25 above, is that 15% from the FLU group and 6% from the FLP group managed to score in the independent level in the VV whereas none managed to do so in the NVV. Thus the FLU group seemed to benefit from the VEs in the instructional as well as the independent level whereas the FLP seemed to do so only at the independent level.

6.3.5.3 General Comprehension

This section will present the results on the impact of VEs on reading comprehension within each of the three groups as well as between the three groups. The comparison whether within or between the groups will compare the overall performance in the VV tests to that in the NVV tests.

For each VV subgroup and NVV subgroup the mean score has been worked out and then a t-test of signifiance has been applied to measure the differences (see Table 26 below).

Generally, the results will test the following hypotheses. (These are subhypotheses

to the second part of the main hypothesis on the impact of VEs on reading comprehension, see cf. 1.2 above).

(a) That there is significant difference between the FLU visual subgroup and the FLU non-visual subgroups; also there is significant difference between the FLP visual subgroup and the FLP non-visual subgroup.

(b) That there is no significant difference between the LI visual subgroup and LI non-visual subgroup.

(c) The difference between both FL visual subgroups and the LI non-visual subgroup would be significant.

Table 26: Differences between VV/NVV Subgroups' Comprehension

	VV			NVV					
Groups	n	m	sd	n	m	sd	df	t	p
LI	24	62.3	15.1	26	52.7	16	4.5	2.1	.05(s)
FLU	20	40.5	9.7	20	32.5	12.2	3.6	2.2	.05(s)
FLP	15	41.6	9.4	18	41.1	9.9	4.1	0.12	(ns)

Notes

(s) = Significant (ns) = Not significant

In the above table the intragroup differences between VV/NVV comprehension turned out to be significant for the LI and FLU subgroups. Although there was a difference between VV/NVV FLP subgroups, it was not statistically significant for reasons which will be discussed later in this chapter. As well as that, Table 26 shows intergroup differences and how these differences were affected by the absence/presence of VEs. In the NVV the difference between the means of LI/FLU subgroups was 20.2

and this difference increased by 2% in the VV although both subgroups did better in the VV. Similarly, the difference between LI/FLP subgroups increased this time by 9%. The reason for that, obviously, by the time LI group did significantly better in the VV than in the NVV with an increase of 9%, the FLP achieved a very slight progress in the VV, ie. an increase of only 0.5%.

Thus hypothesis (a) seems to be accepted only for the FLU subgroups where the visual subgroup did significantly better than the non-visual one. Although the FLP visual subgroup did slightly better than the non-visual one yet their difference turned out to be statistically insignificant as may be seen in Table 26 above. Hypothesis (b) on the other hand, which was based on the LI subjects' evaluation of the role of VEs in the previous chapter, was disconfirmed in the cloze results. In other words the LI-VV subgroup did significantly better than the LI-NVV subgroup thus giving reason to reject hypothesis (b). One possible explanation for this discrepancy between the cloze results of the two LI subgroups in relation to their responses to the questionnaire where they rated VEs as less important and had only local facilitative role (cf. 5.4 above), lies perhaps in the fact that the LI subjects seemed to realise that even without the presence of VEs they could cope reasonably well. In the NVV tests they were well in the independent level (m=52.7) according to Bormuth (1967) or at least bordering it (Bormuth, 1968a; Anderson and Hunt, 1972). So what VEs did for the LI subjects was that they enhanced their comprehension within the independent level although this was an enhancement which they could reasonably manage without (Hussein, forthcoming).

Regarding the FLP group to whom VEs did not seem to cause a significant enhancement in their comprehension this perhaps could be ascribed to the size of the sample which was relatively smaller than either LI or FLU groups. So if this experiment is replicated on a larger sample from this particular group the difference may show up more clearly. However, it is by no means inconceivable that the difference between the two FLP subgroups may remain insignificant despite the increase in sample size. This is probably due to the age factor as Goldstein and Underwood (1981) research evidence (reported in Donald, 1983: 176) suggests that "the younger and less competent the reader

the greater will the influence of illustrations be". However, Donald (ibid) did not attribute readers' independence of illustrations to age only rather he suggests other factors:

> it might be predicted that readers would become progressively more independent of illustrations as they develop their ability to utilise the linguistic constraints in the text itself as a more reliable basis for contextual prediction and information.

So the insignificant impact of VEs on the comprehension of the FLP group, though possibly due to one or more of these factors, ie. sample size, age (Goldstein and Underwood, ibid) or developing reading ability (Donald, ibid), is most likely due to the sample size. That is because in the questionnaire this group (whose size was then satisfactory) rated VEs as important and assigned a greater facilitative role to them, therefore their impact on their reading comprehension was expected to be greater same as the LI and FLU groups. For these reasons, the sample size may be the stronger factor in yielding no significant difference between the comprehension of the two FLP subgroups.

Turning to hypothesis (c) which is concerned with the difference between each of the FL-VV subgroups and the LI-NVV subgroup, a t-test was again applied where both differences turned out to be statistically significant at level $P<.01$ as may be seen in Table 27 below.

Table 27: Differences in Mean Scores between FL-VV Subgroups and LI-NVV Subgroup

Groups	n	m	sd	df	t	p
LI-NVV	26	52.7	16	-	-	-
FLP-VV	15	41.6	9.4	3.49	3.1	.01
FLU-VV	20	40.5	9.7	4.14	2.9	.01

Note

The LI-NVV subgroup shares df, t, and p values with either of the FL-VV subgroups.

Thus, these results provide evidence for the acceptance of hypothesis (c). In other words the two FL groups even at their best comprehension, ie. when the texts were

accompanied by VEs, still lagged behind the LI group even at their lowest performance in the NVV tests. This perhaps illustrates a point mentioned earlier in this section that the LI group though seemed to benefit from the presence of VEs in enhancing their comprehension, that enhancement did not seem to be desparately needed by them. In other words, even without VEs, the LI group managed to cope with texts at a satisfactory comprehension level.

On the whole, the results of this cloze experiment suggest a positive facilitative role of VEs in reading expository texts for the EFL adult readers as well as the LI readers. The brief review of the literature on the role of illustrations in reading comprehension given in the previous chapter, however, suggests both positive and negative role of illustrations on children reading narrative prose. Schallert (1980), for example, presents two opposing viewpoints on the role of illustrations. The first is in favour of a positive facilitative role of illustrations (eg. Lesgold et al, 1977), and the second suggests a negative role of illustrations in comprehension (Samuels, 1967). As pointed out earlier, these viewpoints were the result of experiments undertaken mainly on children using narrative prose texts. In this study where adults and expository prose texts were used, the findings seemed to be entirely in favour of a positive facilitative role of illustrations though it was very little for one of the three groups, ie. the FLP. Thus, as far as the present study is concerned, there seems to be no indication of a non-facilitative role of VEs (namely graphs and tables) in the comprehension of expository texts for adult readers.

Also Donald's (1983) study referred to in the last chapter investigated the controversy which surrounds the role of illustrations in the context of reading development. This controversy is manifested in two opposing hypotheses. The first is the focal attention hypothesis which claims that illustrations act as distractors in learning the cues to individual word recognition (Samuels, 1967; 1970). The second is the psycholinguistic hypothesis which claims that in learning to read continuous text, illustrations may constitute a legitimate source of semantic information. In testing these two hypotheses on 120 good and poor readers at reading ages of 7 and 9, the results in

general confirm the effects of illustrations under the contextual hypothesis. Donald (ibid) found that there were strategy differences between good and poor readers in the way in which textual information is processed and these differences have been noted in many studies (eg. Willows, 1974; Burke, 1977; Potter, 1980). Donald (ibid) then concluded:

> good readers develop better integrative strategies and are more able to optimise their use of the available contextual information than are poor readers. (p 176)

Although in the present study no distinction was made between good and poor readers (rather it was between LI/EFL readers) the results were similar to those of Donald's in the sense that they give support to the psycholinguistic contextual hypothesis in that adults, like children, seemed to benefit from the presence of VEs in enhancing their comprehension. Also like the good readers used in Donald's study, in the present study both the LI group and the FL groups seemed to develop better integrative strategies in making use of the available contextual information manifested in VEs. This tendency, however, appears to be somewhat weaker in the case of the FLP group probably as suggested by Donald (ibid) that illustrations tend to have more influence on younger readers than older ones.

Dean and Enemoh (1983) in the context of pictorial organisation in prose learning reported many studies which have shown that the learning and retention of unfamiliar prose is facilitated when learners are provided an organisational scheme prior to study. Those studies include, among others, Ausubel (1963); Royer and Cable (1975, 1976); Bransford and Johnson (1972). For example, Bransford and Johnson (ibid) reported that people who were shown a picture which integrated text information, understood an ambiguous passage while the subjects who did not see the organiser comprehended little. This study, according to Dean and Enemoh (ibid, p20):

> demonstrated that when a subject is alerted to the existing or potential interrelations, the recall of information contained in unfamiliar prose is facilitated.

The findings of Bransford and Johnson (ibid) may perhaps apply to younger

readers (although Dean and Enemoh (1983) did not mention the age group on which Bransford and Johnson carried out their experimentation) because in this study the FLP group who used VEs before reading did not seem to benefit from that very much. Although the FLP subjects were not actually presented with VEs before prose rather they were presented with both and they chose to start with VEs, the resulting comprehension from that reading behaviour suggests that the use of graphs and tables as advance organisers in prose learning seems to result in little enhancement of comprehension to older EFL readers. Whether or not the situation is the same for younger EFL readers clearly requires further research.

However, Dean and Enemoh's (1983) own experiment was undertaken on 90 LI undergraduate students. They found that providing a map-like organisational device prior to study facilitates the comprehension and remembering of prose materials. Thus they provides evidence in favour of the facilitative role of advance organisers to LI adult readers. So Dean and Enemoh's (1983) findings were consistent with those of Bransford and Johnson (1972) in that they suggest that the contextual knowledge is necessary for prose comprehension and that subjects who were presented the contextual knowledge (eg. illustrations) before they read an unfamiliar passage benefit from it.

Although the investigation in the use of VEs as advance organisers does not particularly fall within the scope of this study, yet the behaviour of the FLP group in using VEs before reading (as reported in Chapter 4) may suggest further interesting research in the use of VEs as advance organisers for EFL readers at different ages.

More recently Moore and Skinner (1985) investigated the role of illustrations on 11-year-olds' comprehension of abstract and concrete passages and they found that the facilitative effect was only for the abstract passages for inferential and total comprehension. Their results were consistent with Royer and Cable's (1976) adult study where illustrations were reported to facilitate learning of an abstract text. On the basis of their findings Moore and Skinner (ibid) argued that illustrations accompanying the abstract passages were more easily assimilated into the children's schema. On the other hand, they found no significant difference attributable to illustrations for the concrete

passages. In this respect their findings were consistent with Dean and Enemoh's (1983) conclusions in that little improvement in comprehension can be attributed to illustrations in highly concrete texts.

Although in the present study the distinction was made between the type of readers rather than the type of passages as the case in Moore and Skinner's study referred to above, the findings of both studies on the whole point to a facilitative role of VEs in reading comprehension irrespective of whether their role is tested from the viewpoint of reader or text type.

So there seems to be a number of studies which investigated the role of illustrations in reading comprehension from different angles, eg. their role in facilitating semantic information (Donald, 1983); their organisational role in prose learning (Dean and Enemoh, 1983); their role in the comprehension of abstract/concrete passages (Moore and Skinner, 1985); and their role in the comprehension of native/non-native readers (Hussein, forthcoming). On the whole these studies seem to arrive at similar conclusions namely, that illustrations play positive facilitative role in prose learning with varying degrees in various aspects of reading comprehension. There are some other examples of studies which set out to investigate the same issue. They, however, came up with more or less similar conclusions (eg. Peeck, 1974; Rusted and Coltheart, 1979a, 1979b; Rasco et al, 1975).

To conclude this section on the impact of VEs on comprehension, the results in general indicate that the three groups (LI, FLP and FLU) seemed to have enhanced their comprehension levels through the use of VEs. The impact, however, was significant on both LI and FLU group whereas in the case of FLP it was only slight. These findings were found to be most consistent with those of the questionnaire discussed in Chapters Four and Five in that both the FLU and the FLP groups rated VEs as important and facilitative in the questionnaire and in the cloze tests that rating showed up in comprehension enhancement particularly for the FLU group. According to Coady (1979), some ESL/EFL readers were handicapped when reading pure expository prose because either their English is insufficient to pick up the necessary linguistic cues or

because they seem to lack adequate processing strategies rather than knowledge of English. Thus the impact of VEs on comprehension elicited by cloze procedure in this study seems to suggest that the presence of VEs in expository prose tend to lessen the amount of comprehension loss due to the above two factors mentioned by Coady. That is, these two weaknesses experienced by EFL readers in this study in the typical linguistic reading skills in the NVV tests were to some extent compensated for by the non-linguistic reading skills of VEs and hence resulting in comprehension gain in the VV tests.

6.3.6 The Impact of VEs on Readability of Passages

Another way of regarding subjects' cloze scores is to see how the scores indicate the reading difficulty or ease of the passages themselves because according to Anderson (1976: 19) cloze procedure "provides a measure of contextual difficulty". It is also reported (ibid) that Taylor (1953: 432) summed up the importance of the technique in readability in the following:

> Potentially important, it seems, is the fact that a cloze score appears to be a measure of the aggregate influences of all factors which interact to affect the degree of correspondence between the language patterns of transmitter and receiver.

In the present study it is believed that VEs could be one of the factors referred to in Taylor's quotation above. In other words the cloze results discussed earlier seem to suggest that VEs do have influence (often significant) on the readability levels of the passages as manifested in subjects scores. The three groups, LI, FLU, FLP, on the whole performed better in the VV than in the NVV tests in the four issues discussed above where the evidence was drawn from the collective scores of each group in the four passages. Even at the level of each passage, there is evidence that most of the higher maximum mean scores for each of the three groups in each passage came from the VV tests and most of the lower minimum mean scores came from the NVV tests as shown in Table 28 below.

Table 28: Maximum/Minimum Mean Score for Each Passage in VV/NVV

Groups		LI	VV FLU		FLP		LI	NVV FLU			FLP	
Texts	max	min	max	min	max	min	max	min	max	min	max	min
Eco	67.4	58.9	45.6	37	47.8	26.1	63	54	47.8	32.6	43.5	17.4
Bus	75.6	48.8	58.5	43.9	56.1	29.3	66.6	41	43.6	38.5	56.4	30.8
Psycho	63.4	48.8	43.6	30.8	-	-	6.5	45	30.8	10.1	-	-
Ling	69	52.8	44.4	25	58.3	44.4	63.9	45.7	48.6	28.6	54.3	42.9

Notes

1 Figures for the FLP psychology passages were excluded due to the small number of subjects who did those passages.

2 The higher maximum mean scores for each passage are underlined by double line and the lower mean scores are underlined by a single line.

Table 28 above presents 11 pairs of maximum mean scores and 11 pairs of minimum mean scores produced by the three groups in the passages in VV and NVV. Thus by comparing the maximum mean scores in VV and NVV, it was found that 7 out of the 11 higher maximum mean scores (63.6%) were in the VV tests whereas only 4 (36.4%) were in the NVV tests. By the same token, in VV/NVV, it was found that nearly all the lower minimum scores were in the NVV, ie. 9 out of 11 (81.8%).

The results also show that 43% of the higher maximum mean scores were produced by LI group in the VV. None of the lower minimum mean scores was produced by the LI group in the VV whereas, two were produced by the two FL groups (one each) in the VV.

A closer look to the minimum scores in VV/NVV in the table above would reveal the impact of VEs on readability level of each passage to each group. For the LI group all the readability levels of passages have become more difficult with the removal of VEs. Their minimum mean score in each of the Business and Linguistics passages has gone down by a little over 7% and that of the Economics and Psychology passages has gone down by nearly 4% with the removal of VEs.

In the case of the FLU group, the minimum mean score has gone down also, albeit in three passages (Economics, Business, Psychology) with the removal of VEs indicating a change in the readability indices of these passages. In each of the Economics and Business the drop in mean scores was over 5%; but the drop in the mean score of the Psychology passage was dramatic, ie. 20%. Although the removal of the visual element from the Psychology passage had perhaps played the major role in creating this discrepancy in the passage's readability level, some other factors were by no means ruled out such as the sub-group size.

The FLP group, on the other hand, has also produced the same pattern. Out of the three passages they attempted, their minimum mean scores have gone down in two of them with the removal of VEs. In the Economics passage they scored 9% lesser in the NVV than in the VV. Similarly, in the Linguistics passage the minimum mean score has gone down by 2.5% in the NVV.

However, two out of the eleven passages attempted by the three groups were found to be slightly easier with the removal of VEs. One of those was the Business passage for the FLP group where the subjects' minimum mean score has risen by 1.5% in the NVV. The other was the NVV Linguistics passage for the FLU group where they found it easier by 3.6% than its VV counterpart.

On the whole, these results seem to suggest that the VEs could possibly exert influence on the readability levels of the passages in which they occur. This influence seems to work either way, ie. the removal of VEs from passages make them more difficult or easier. However, the evidence provided by this study seems to indicate that removal of VEs makes passages more difficult, ie. nine out of eleven passages became more difficult to read with the removal of VEs (see Table 28).

So as stated before this cloze experiment has indirectly thrown some light on the impact of VEs on the readability indices of texts by comparing the mean scores of subjects in the VV and NVV tests. In this respect the mean scores were treated as a function of the subject-matter of texts. A similar study was conducted by Cohen (1975) to measure the effect of content area materials on cloze test performance (see section

3.3.4.3). He found that differences in content area materials do have an effect on cloze test performance in that some content area passages are easier to read than others regardless of comparable Dale-Chall ratings. In the present study, however, all the passages were selected from one content area, namely, social sciences but from different disciplines within that area as pointed out earlier. Thus, the selection of the cloze passages in this study from one content area may minimise the possible impact of differences in content area on the readability indices of passages because the present study focuses in the main on the impact of VEs on readability rather than that of the content area. Despite this attempt to control the content area variable, there seems to be an impact even of differences in discipline within the same content area as may be seen in Table 28 above. For each group there were differences in maximum and minimum scores for each passage in each version (VV and NVV). This may probably give support to Cohen's (1975) study in that not only the broad differences in content areas that create differences in readability of passages but even different genres in the same content area could possibly affect readability of passages.

What is important in this study, however, is not in fact the impact of content area on readability nor the impact of different genres on readability; rather it is the impact of presence/absence of VEs in passages on readability. As far as the results of this study are concerned (Table 28), VEs could be a factor that affects readability the same as content area. In other words, and judging from the results presented in Table 28 above, there was no single minimum or maximum score in the NVV tests which was the same as that in the VV tests in any passage for any of the three groups. For the most part the minimum and the maximum mean scores tended to be higher in the VV tests than in the NVV tests. Thus the impact of VEs on the readability of passages was that they generally tended to make the passages somewhat easier to read. However, there were some few cases in which VEs tended to make passages difficult to read, eg. the Linguistics passage for the FLU subjects where both their higher maximum score and higher minimum score were obtained in the NVV tests.

Clearly these results on the effect of VEs on the readability of passages were based

on the overall scores of the three groups in the four passages. The analysis, therefore, did not consider the factors related to VEs themselves that may or may not contribute to their impact on readability of passages. Some of these factors relate to the nature of VEs such as their types, eg. tables, graphs, pictures etc; others relate to their location on the page. Trimble (1985) for example, suggests that the visual should be located on the page according to its importance to the textual material. There are other factors which relate to the information contained in VEs and what relationship it has to the accompanying verbal texts. So these factors and others should be taken into consideration in any attempt towards a precise assessment of the role of VEs on the readability of passages.

The findings of the present study within its limits, however, indicate that the presence of VEs in passages could affect their readability indices positively or negatively. This, being the result of cloze procedure used in this study demonstrates the sensitivity of cloze procedure to extra textual information a phenomenon which most traditional comprehension questions lack (cf. 3.3.6).

6.4 Summary

This cloze experiment was conducted as a complement to the findings of the questionnaire results discussed in Chapters Four and Five. It was intended to test the second part of the main hypothesis, namely, the impact of VEs on LI/EFL adults' reading comprehension. On the whole, the similarities and differences between the groups elicited by the questionnaire seemed to show up in the cloze results. These similarities and differences were discussed in this chapter in relation to aspects of reading comprehension, ie. speed, completion rate, item replacement and general comprehension. The fifth aspect related to the readability of passages, ie. the impact that VEs had on the passages read by the groups.

As far as the speed of completing tests is concerned, it was found that, in the limits of this experiment, VEs could increase the speed of completing tests; or reduce it. In any case however, differences in readers' language background was probably one of the factors that contribute to the impact of VEs on speed of completing tests.

Regarding the completion rate of tests, the results were mostly consistent with those of speed. In other words the completion rate of the two EFL groups was higher in the VV than in the NVV. Although in the case of LI group the completion rate was higher in the VV, unlike speed, the difference was very slight (see Table 21). As stated before although the completion rate did not take into account the level of comprehension because it included acceptable as well as unacceptable responses, nevertheless it threw some light on the impact of VEs in encouraging subjects to fill in blanks even with guesses.

The presence of VEs also influenced the subjects in another aspect of reading comprehension, namely, item replacement. The LI subjects tended to benefit from VEs in increasing their original ability of the replacement of function words and the two FL groups seemed to handle content words with facility when VEs were present. On the whole, the results within the limits of this study suggest that VEs facilitate the replacement of either type of words for both LI/EFL readers with varying degrees.

The overall comprehension has been treated under two subheadings: comprehension levels and general comprehension. Regarding the first, the three groups LI, FLP and FLU benefitted from the presence of VEs in raising their comprehension level which was experienced in the NVV to a higher one in the VV. The LI group benefitted from VEs at the independent level while both FL groups benefitted from them mainly at the instructional level. Small percentages from both the FLP and the FLU groups scored in the independent level in the VV while none did so in the NVV. As for the general comprehension, the findings of this study in general support the facilitative role of VEs in reading comprehension investigated in previous research (eg. Schallert, 1980; Donald, 1983). So while the present study shares with previous research the same conclusions, the procedures and methods used were by no means the same. Previous research has concentrated largely on children and narrative prose and perhaps traditional comprehension questions while the present study used adults, expository prose and cloze procedure to investigate the role of VEs in reading comprehension.

Finally, the cloze results were interpreted from the point of view of the subject-matter of the passages. In other words, the role of VEs was examined from the

perspective of the readability of passages. It was found that, the presence of VEs exerted an impact on the readability indices of passages which could work either way: make passages easier or more difficult. In this study, however, VEs seemed to make passages easier to read because most of the higher maximum mean scores and most of the higher minimum mean scores produced by the groups were in the VV tests rather than in the NVV ones suggesting a strong impact of VEs on the readability of passages. However, this particular issue, ie. the impact of VEs on the readability indices of passages was treated as an indirect result of this study as mentioned before. Therefore the findings discussed under it were only tentative. Further research on this issue may clearly wish to address the factors that contribute, or otherwise, to the impact of VEs on readability of passages.

CHAPTER SEVEN

CONCLUSIONS

7.1 Introduction

The work of discourse analysis in the area of visual/verbal relationships reported in Chapter Two has come up with a number of relationships in different subject areas. In an attempt to relate the findings of discourse analysis to the area of reading, this study aimed at investigating the impact of these relationships between texts and VEs on the reading process and reading comprehension of LI/EFL adult readers (postgraduates and final-year undergraduates).

For this purpose a central hypothesis was formulated (cf. 1.2) and a number of questions were raised in association with it. So this chapter first presents the main findings of this study and examines to what extent the hypothesis has been proved. Secondly, the chapter offers some implications of this study for the teaching of EFL reading. Finally, this chapter also evaluates the study as a whole and advances some suggestions for future research.

7.2 Summary of the Main Findings

7.2.1 The Reading Process

The similar and different findings of the groups (LI, FLP, FLU) which relate to the first part of the main research hypothesis and the first four questions associated with it (see Chapter One, section 1.2) on the different aspects of the reading process of texts accompanied by VEs can be summarised in the following:

(A) Similarities

There were three sets of similarities: the first was between the three groups used in the present study (LI, FLP, FLU), the second was between the two EFL groups only (FLP, FLU) and the third was between LI and one of the EFL groups.

(1) Similarities between the three groups

(i) They all made use of VEs in the reading process in one way or another.

(ii) The above use was influenced by readers' purposes rather than by the explicit text-references in the main texts to VEs.

(iii) The three groups assigned a facilitative role to VEs in reading (no matter how different that role was).

(2) Similarities between FLP and FLU

(i) Both groups transferred their LI non-linguistic reading strategies to the EFL reading situation.

(ii) They both consulted VEs with the same intensity (see Figure 10).

(iii) They both consulted VEs with nearly the same frequency.

(iv) They both tended to consult VEs for main or detailed information about the verbal text.

(v) The two groups assigned greater importance to VEs in the reading process.

(vi) Judging from their evaluation of the role of visual/verbal relationships in the reading process, the two groups viewed the impact of the relationships on comprehension as potentially facilitative at a global level.

(3) Similarities between LI and FLU groups

There was only one similarity exhibited between the LI group and one of the EFL groups (FLU), namely, each used VEs most at the D_2 stage, ie. during reading and after the first text-reference to each of the VEs.

(B) Differences

There were two sets of differences emerged from the results:

The first was between the two EFL groups only (FLP, FLU) and the second was between the twoEFL groups together on the one hand and the LI group on the other.

(1) Differences between FLP and FLU

These two groups differed in the stage of reading at which each used VEs with intensity. The FLP group used VEs most at the pre-reading stage (B) and the FLU used them at the during-reading stage (D_2) (see Figure 10).

(2) Differences between EFL groups and LI group

(i) Both EFL groups used VEs intensively compared to the LI group and the difference was significant.

(ii) Both EFL groups consulted VEs in the reading process with more frequency than the LI group and the difference between both was significant.

(iii) There were also significant differences between EFL groups and the LI group in their evaluation of the role of VEs. The former evaluated them as more important and facilitative in reading the main text whereas the latter group assigned less importance and less facilitation to them.

(iv) Both EFL groups consulted VEs mainly for main or detailed information about the accompanying verbal text whereas the LI group did so mainly for summary or additional information to the verbal text.

7.2.2 Conclusions on the Reading Process

The above findings reveal the fact that the two EFL groups, though differing in their level of education and practice in reading texts accompanied by VEs, showed considerable similarities in their reading process of texts accompanied by VEs. These

similarities were on the whole manifested in their reading strategies, purposes and perception of the role of VEs in texts. In this respect, these findings are in line with Rigg's (1977) findings referred to in Chapter Four, section 4.3.2.

These similarities which characterised the reading behaviour of the two EFL groups turned out to be differences (mostly significant) with the LI group.

Thus the differences between the LI group and both the EFL groups in the way they used VEs in relation to their texts in the reading process are grounds for accepting the first part of the research hypothesis (cf. 1.2). Also the findings provide answers to the first four questions raised in association with this part of the hypothesis.

So the main possible conclusions to be drawn from these findings, hitherto, and which may be generalised in similar situations are:

(1) There is a significant relationship between readers' language background and the way they use VEs embedded in texts in the reading process.

(2) The way readers process texts accompanied by VEs differs significantly from the way they process whole prose texts. That is, the presence of VEs generates a number of non-linguistic strategies and subpurposes which operate hand in hand with readers' other linguistic strategies and purposes used for the accompanying verbal texts.

(3) Generally, readers on the basis of their purpose and language background tend to use two types of strategies in attacking VEs: the first is at the pre-reading stage, ie. they are used as a clue-seeking strategy, and the second is during-reading, ie. as a text-related strategy.

7.2.3 Reading Comprehension

The findings on the impact of visual/verbal relationships on the different aspects of reading comprehension can be summarised as follows:

(1) The presence of VEs in texts raised the completion rate of the cloze tests for the two EFL groups only.

(2) The LI subjects benefitted significantly from the presence of VEs in enhancing their ability in perceiving distant relationships between the units of the verbal texts. That was manifested in their higher scores of replacing function words in the VV compared to the NVV tests. Also the FLU subjects benefitted significantly from VEs in replacing content words. The FLP group on the other hand benefitted little in replacing either type of words.

(3) Regarding the overall comprehension, the findings were in favour of a facilitative role of VEs in comprehending the main accompanying verbal texts thus supporting the findings of previous research (eg. Donald, 1983).

(4) The subjects' cloze scores also suggest that VEs had a positive impact on the readability levels of passages.

7.2.4 Conclusions on Reading Comprehension

The above findings, on the whole, especially for the LI and FLU groups, reasonably confirm the second part of the hypothesis on reading comprehension and also give answers to question 5 raised in association with this part of the research hypothesis (see chapter One, section 1.2). Regarding the FLP group, VEs did enhance their comprehension but that enhancement was too little to warrant either the acceptance or the rejection of this part of the hypothesis. However, in discussing the FLP cloze results in Chapter Six an attempt was made to identify the reasons which might have affected those results (cf. 6.3) and some suggestions were given for accumilating satisfactory evidence from similar groups.

The conclusions that could be drawn from these results and which are potentially generalisable in similar situations are:

(1) The presence of VEs in cloze passages seems to encourage the EFL readers in particular to fill in as many cloze blanks as they can even with guesses (which could be correct or incorrect).

(2) Adult readers of expository texts whether LI or EFL make use of VEs in enhancing their overall comprehension. In this respect this conclusion is in line with previous research which suggests that VEs "may constitute a legitimate source of semantic information when reading continuous text" (Donald, 1983).

(3) VEs could have an impact on the readability of passages. Although this impact could work either way (make passages more difficult or easier to read) the conclusion drawn from this study suggests that VEs make expository passages easier to read.

7.3 Evaluation of Study

As discussed in Chapter Two, previous research in the area of visual/verbal relationships can be categorised into two:

(a) Text-based research:

This concentrates largely on texts selected from a variety of subject-area materials. The aim is to work out the different types of relationships that exist between texts and VEs.

(b) Empirical research:

This is undertaken predominantly in the area of psychology. Its main concern is to work out the impact of VEs (notably pictures) on the comprehension and recall of narrative texts read by children.

Thus the first type of research lacks empirical evidence from the side of readers and the second concentrates on the end-product (comprehension) to the exclusion of process. Also, it concentrates on children and pictures to the exclusion of adults and other types of VEs, eg. tables and graphs. To this end, this study stands different from previous research in attempting to investigate the impact of VEs on the reading process of texts in

which they occur. The informants being adult experienced readers from both native speakers of English and speakers of English as a foreign language, contributed more to the investigation than it would have been if the informants were less mature.

Another strength of the study is derived from the fact that the use of tables and graphs in this study rather than other types of VEs makes the study free from cultural bias which is often associated with the use of pictures, and secondly graphs and tables, as suggested in the literature (Chapter Two) are the commonest types of VEs used in written languages and subject areas.

A further strength of this study lies in its methodology. It explores the use of post-reading questionnaire as a technique of getting readers to reflect on their operations in interacting with texts and VEs in the reading process and secondly the study extends research along the line of Rankin and Culhane's (1970) study in exploring the use of cloze procedure to measure the impact of extra textual information (VEs) on the overall reading comprehension.

Although this study is essentially exploratory in nature, as to the knowledge of the researcher no investigation has hitherto addressed the potential impact of VEs on adults' reading processes (strategies and purposes); and the fact that little research has investigated the use of cloze procedure in assessing the impact of extra textual information on comprehension, the study can advance the following contributions to the area of reading:

(1) The study has indicated that the presence of VEs in passages can give both LI and EFL adult readers the opportunity of adopting new reading strategies and styles to deal with the verbal text, because VEs constitute an extra source of contextual information.

(2) The presence of VEs also contributes to readers' ability in generating a number of subpurposes to the main purposes of reading the accompanying verbal texts.

(3) In both the reading process and reading comprehension the incorporation of

VEs in texts is not particularly important if the target readership are native speakers of the language in which the texts are written (English in our case). This, however, becomes increasingly important if the target readership are EFL.

The above contributions of this study and the conclusions drawn in 7.2.2 and 7.2.4 above, however, should be read with the following limitations in mind:

Firstly, the findings were drawn from specified samples of LI/EFL subjects and special type of texts and restricted to only three types of VEs: graphs,table and general diagrams.

Secondly, from the rhetorical point of view, the five passages for this study were selected in such a way that they were intended to be representative in as many aspects as possible in order to give quantifiable data both for the questionnaire and the cloze tests. Among other criteria (stated in Chapter Three) these texts were representative in that their accompanying visuals are the most commonly and widely used in the area of social sciences' written discourse. As a consequence of this, the relationships that exist between these VEs and their texts in the five passages represent (or at least may be assumed to represent since none of the choices is controversial as mentioned before) the main types of visual-verbal relationships identified by previous research discussed in Chapter Two.

Despite the fact that the five selected passages represented the main types of visual-verbal relationships in the area of social sciences and humanities; and despite the fact that they served well in obtaining quantifiable data collected for the reading process and reading comprehension as discussed before; it may appear that the differences between these relationships in the five passages may have some effect on the overall results. However, previous research evidence

(Donald,1983), as stated before (cf.3.2.4.), suggests that using passages with different visual-verbal relationships rather than using passages with only one single relationship is advantageous in the sense that this procedure randomises any effect that might be generated from the relationship of any particular visual to the text in any one passage.

This concept of randomisation may help in minimising any potential effect resulting from the differences between visual-verbal relationships in the five passages. Therefore the passages in this study were treated as one unit regarding these relationships, since the main focus of this study was on the readers' language background variable. In other words, our concern here was on the relationship between readers' language background (LI/EFL) and their perception, processing, and comprehension of passages accompanied by VEs.

Even at the level of each individual passage the results in general reflect the same pattern as the overall results. The following couple of examples may demonstrate this: In the overall results, and in response to question 5 in the questionnaire, the LI subjects rated VEs as less important to them in the reading process (mean=3.6, in a 7-point scale) ; whereas the EFL subjects rated them as quite important (mean=5.6). This pattern held very well even at the level of individual passages as may be seen in the following chart:

Passage	**LI**	**EFL**
	MEAN	MEAN
Economics	3.9	5.5
Natural Resources	4	5.3
Business	4.2	6
Psychology	3.4	5.3
Linguistics	2.5	5.9

In the above chart it may be seen that while all the means of the EFL subjects were over 5, those of the LI subjects were well below 4.5. Almost the same pattern was nearly exhibited in response to question 6 in the questionnaire: In four passages out of five, the EFL groups perceived the role of VEs at the

individual level as more facilitative compared to the LI group. The only exception was that in the Natural Resources passage where the LI group slightly assigned more facilitation to its visual compared to the EFL groups. The effect of this slight discrepancy in one passage out of four, however, was minimised considerably in the overall results by the process of randomisation referred to above.

However, future research wishing to focus on the impact of the differences between these relationships may build on this study by confining the language background to only one variable (either LI or EFL). Or perhaps by confining the visual-verbal relationships to only one type, with the language background remaining the same (LI/EFL).

The results of this study, hitherto, establish a significant relationship between language background and visual-verbal relationships (regardless of their differences). This relationship manifests itself quite clearly in the different aspects of the reading process investigated in this study eg. non-linguistic reading strategies, frequency of consultation, and intensity of consultation of VEs (see Chapter Four); and reading purposes (see Chapter Five). This relationship is also reflected in the the differences (often significant) in the different aspects of reading comprehension between the VV and NVV tests ie. speed, completion rate, general comprehension etc. (see Chapter Six).

Thirdly, of course if the focus of this study had been exclusively on the reading process, clearly the questionnaire used in this study would not have been the only tool. Other lines of investigation could have been adopted (or perhaps preferred) such as interviews or protocol analysis. Because the investigation of the reading process constituted only the first part of this research, the questionnaire proved to be satisfactory within the limits of the study, given that the results it gave were investigated in the second part of the research through the use of cloze methodology.

Fourthly, although the questionnaire used in this study to investigate the reading process of VEs in relation to their accompanying texts succeeded in throwing light on a number of aspects which characterised this type of reading process, nevertheless it could not give precise measurements of some other aspects of the reading process, namely the eye-movements and eye-fixations. Not only the eye-movements and fixations which took place from texts to VEs and vice versa, but also within the VEs themselves.

Fifthly, because the nature of the cloze experiment necessitated the split of each of the three groups (LI, FLP, FLU) into two subgroups, ie. visual-subgroup and non-visual subgroup, the resulting numbers of the two FLP subgroups were very small. In this case the conclusions which concern this particular group in the cloze results should be treated with a degree of caution.

Finally, there were some factors related to the experimental design of the research which led to the choice of cloze subjects who had similar descriptions to those of the questionnaire's rather than having exactly the same subjects in both experiments. The first factor resulted from the fact that both the questionnaire and the cloze were based on the same texts, therefore the same subjects could not be experimented twice on the same texts. The second was that because the cloze experiment was designed to complement the questionnaire and thus depended on the results of the questionnaire, there had to be a time lapse between the two experiments in which case it would be extremely difficult to get the same subjects again. For these two reasons the questionnaire and cloze subjects were not exactly the same, but they shared all the common descriptions required by the study.

7.4 Applied Implications for EFL Adult Readers

This section will attempt to give some possible applications of the findings of this study to the teaching of EFL reading. In the area of teaching EFL reading skills, Nuttall (1982) has considered the use of non-verbal information (VEs) in the context of the teaching of reading. In that she categorised the relationships between VEs and their accompanying texts into two:

(a) Integral: where the text cannot be understood without VEs, eg.descriptions of biological structures.

(b) Less integral: in this case, though the text can be understood without VEs, nevertheless they are often of vital assistance.

Thus Nuttall concludes:

> Used together, verbal and non-verbal information support each other: an obscure section of the text may be clarified by studying a diagram, or the significance of a diagram may become clear from the text (ibid, p52)

While Nuttall's (ibid) implications are based on the relationship of VEs/texts (integral - less integral), the implications of this study are based on the perception of the EFL readers to this relationship. However, the following three types of exercises suggested by Nuttall (ibid, p53) can be illuminating to the implications of the present study:

(a) Matching texts and diagrams

(b) Giving practice in 'reading' (ie. interpreting) diagrams etc

(c) Discovering how valuable diagrams, etc can be.

There are some other authors, however, who applied the use of VEs to writing rather than reading, notably, Widdowson (1978). That is basically in "information transfer" exercises but because the chief concern of the present study is in the use of VEs in reading the implications will be for the teaching of reading. So making

use of Nuttall's (ibid) above suggestions the following possible implications can be given . (These applications are confined to the types of VEs and texts used in this study):

(1) Exploiting Group-work in Teaching Non-linguistic Strategies and Purposes

(a) The FL Postgraduates:

Because the FLP subjects in this study tended to use VEs at the pre-reading stage, so in the teaching of the use of VEs in reading the teacher may apply the following steps:

(i) Get students into smaller groups.

(ii) Supply each group with a number of tables and graphs xeroxed from their texts.

(iii) Ask each subgroup to predict the content of the texts.

(iv) Supply the corresponding verbal texts (on an OHP perhaps) and ask each subgroup to match its table or graph with the texts shown.

(v) Finally ask each subgroup for what purposes they used the table or the graph.

(b) The FL Undergraduates

In this study this group tended to make use of VEs at the during-reading stage. So in the teaching of the use of VEs in reading, the teacher may follow these steps:

(i) Divide students into smaller subgroups.

(ii) Cut a text into a number of units where the visual element is one of them.

(iii) Give these units in a jumbled order to each subgroup.

(iv) Ask students to reorder the units of the text (verbal and non-verbal).

(v) Ask each subgroup as to why they decide to locate the visual element (graph or table) in one place or another.

(2) Exploiting VEs in Promoting Speed in Gap-Filling Exercises for EFL Postgraduates and Undergraduates

(i) Divide students into subgroups and supply each with a text without a visual. The text should include some missing words.

(ii) Students attempt to fill in the gaps.

(iii) Supply the same text including its visual and missing words to the same students.

(iv) Students once again attempt to fill in the blanks.

(v) Notice the difference between the two runs both in speed and comprehension.

The above exercise can also be exploited in making use of VEs in developing EFL readers' abilities in replacing content and function words.

(3) Recognition of the Relationships between VEs and Texts

(i) Remove the visual element from its text.

(ii) Supply the text to each subgroup or individual.

(iii) Ask each subgroup or individual to construct a table or a graph that matches the text.

(iv) Using the OHP, show students the original visual.

(v) Students check their visuals with the original and assess to what extent their visuals are similar/dissimilar to it.

It is worth noting that this type of exercise could work when readers' purposes in

using VEs are, summary or main points only, but if their purposes in using VEs are for additional or detailed information about the verbal text, this exercise may not work.

7.5 Suggestions for Future Research

Undoubtedly, this attempt could not claim that it has resolved the different issues related to the impact of visual/verbal relationships on reading process and comprehension. However, it has succeeded, I hope, in bringing these issues out into the open where they can be debated.

The findings of this study on the whole provide empirical evidence which suggests that visual/verbal relationships do have impact on adults' reading process and comprehension. Moreover, this impact relates significantly to readers' language background (LI/EFL).

In spite of this contribution to the area of reading (process, comprehension, teaching), there are a number of issues risen from this study which lend themselves for further investigations. Thus, this study advances these suggestions for future research in the following directions:

(1) This study can be replicated on EFL readers only by using the same texts and translated versions of them into the readers' first languages. This procedure can offer the opportunity in comparing the impact of VEs on reading in both readers' first languages and the EFL setting. Moreover, this replication can be of great value in investigating the transfer of non-linguistic reading strategies across languages.

(2) Similarly the study can be replicated by changing one or more of the variables, eg. using different texts, using different subjects at different educational level; or using other types of VEs apart from graphs and tables.

(3) Future research may wish to investigate the use of VEs as advance organisers (Ausubel, 1968) for EFL postgraduates in reading.

(4) It would be of immense value if future research applies some sophisticated methods in monitoring and measuring the eye-movements and eye-fixations of readers (LI or EFL) when they interact between texts and VEs in the reading process. Elsewhere in this thesis it has been suggested that the tools used for monitoring the reading process of connected prose can also be exploited in investigating this reading process. An example of these tools is the Brunel Reading Recorder (Thomas et al, 1974).

(5) The reading purposes of VEs in relation to their accompanying texts have been examined from the readers' standpoint in this study. Future research may examine the purposes from the viewpoint of authors and it would be interesting if authors' purposes were compared with readers'. In this respect, Smith's (1967) conceptual framework of purposes presented in this study, in Chapter Five , may be of assistance.

(6) In reading comprehension, the impact of VEs in completing reading tests has been considered. In future it would be interesting if research investigated the impact of VEs on the speed of normal reading.

(7) In this study cloze procedure has been used as a testing tool for assessing the visual/verbal relationships on adults' reading comprehension, so it may be interesting if future research, particularly in ELT, addresses the use of cloze procedure as a teaching tool of VEs in the EFL setting.

(8) Finally although the impact of VEs on the readability level of passages has been treated as an indirect result of this study, future research into this particular issue may possibly contribute to the currently existing readability formulae.

LIST OF REFERENCES

Aborn, M., Rubenstein, H., and Sterling, T.D. (1959) "Sources of Contextual Constraint upon Words in Sentences" Journal of Experimental Psychology, 57: 171-180

Alderson, J.C. (1981) "Native and Non-native Speaker Performance on ClozeTests" Language Learning, 30 (1): 59-76

———— (1983) "The Cloze Procedure and Proficiency in English as a Foreign Language" In Oller, W.J. (ed), Issues in Language Testing Research. Rowley, Mass:Newbury House

———— (1984)"Reading in a Foreign Language: a Reading Problem or Language Problem?" In Alderson, J.C. and Urquhart, A.H. (eds)

Alderson, J.C. and Urquhart, A.H. (eds) (1984) Reading in a Foreign Language London: Longman

Almeida, P.M. (1975) Practical Implications of the Cloze Test for Placement in Instructional Materials. PhD thesis, Harvard University

Anderson, J. (1976) Psycholinguistic Experiments in Foreign Language Testing. St Lucia, Queensland: University of Queensland Press

Anderson, T.H. (1980) "Study Strategies and Adjunct Aids" In Spiro, R.J., Bruce,B.C. and Brewer, W.F. (eds)

Anderson, A. and Hunt, A.H. (1972) "A Frame of Reference for Cloze Tests of Readability of English Learned as a Foreign Language" New Guinea Journal of Education, 8: 184-188

Artley, A.S. (1944) "A Study of Certain Relationships Existing between General Reading Comprehension and Reading Comprehension in a Specific Subject-Matter Area" Journal of Educational Research,37:464--473

Ashiurakis, M.A. (1987) The Influence of the Socio-Educational Reading Environment in an Arab University upon English Reading Performance. Unpublished PhD thesis. University of Aston in Birmingham

Augstein, E.S. (1971) Reading Strategies and Learning Outcomes. PhD thesis, Brunel University, London

Ausubel, D.P. (1963)The Psychology of Meaningful Verbal Learning. New York: Grune and Straton

———————— (1968) Educational Psychology: A Cognitive View. New York: Holt, Rinehart and Winston

Bailey, K.D. (1982) Methods of Social Research. London: Macmillan

Baker, L. (1979) "Do I Understand or Do I not Understand? That is the Question" Reading Education Report 10. Champaign: Center for the Study of Reading, University of Illinois

Baker, L. and Stein, N. (1981) "The Development of Prose Comprehension Skills" In Santa C. and Hayes, B. (eds), Children's Prose Comprehension: Research and Practice. Newark, Delaware: International Reading Association

Bates, M. (1982) "Some Uses of Transfer and Inference in 'Nucleus' Exercises" ESPMENA, 16: 1-13

Beard, J.G. (1967) "Comprehensibility of High School Textbooks: Association with Content Area" Journal of Reading, 11: 229-234

Berman, R.A. (1984) "Syntactic Components of the Foreign Language Reading Process" In Alderson, J.C. and Urquhart,A.H. (eds)

Betts, E.A. (1954) Foundations of Reading Instruction. New York: American Book Company

Bormuth, J.R. (1967) "Comparable Cloze and Multiple-Choice Comprehension Test Scores" Journal of Reading, 10: 291-299

———— (1968a) "Cloze Test Readability: Criterion Reference Scores" Journal of Educational Measurement, 5: 189-196

———— (1968b) "The Cloze Readability Procedure" Elementary English,45: 429-436

———— (1969) "Factor Validity of Cloze Tests as Measures of Reading Comprehension Ability" Reading Research Quarterly, 4: 358-365

Bransford, J.D. and Johnson, M.K. (1972) "Contextual Prerequisites for Understanding: Some Investigations of Comprehension and Recall" Journal of Verbal Learning and Verbal Behaviour, 11: 717-726

Bransford, J.D., Stein, B.S. and Shelton, T. (1984) "Learning from the Perspective of the Comprehender" In Alderson, J.C. and Urquhart, A.H. (eds)

Brown, A.L. (1979) "Theories of Memory and the Problem Development: Activity, Growth and Knowledge" In Cermak, L. and Craik, F.I.M. (eds), Levels of Processing in Memory. Hillsdale, N.J.: Lawrence Erlbaum Associates

———— (1980) "Metacognitive Development and Reading" In Spiro, R.J., Bruce, B.C. and Brewer, W.F. (eds)

Brown, J.D. (1983) "A Closer Look at Cloze: Validity and Reliability" In Oller, J.W. Jr. (ed), Issues in Language Testing Research. Rowley Mass: Newbury House

Bruner, J.S. (1964) "The Course of Cognitive Growth" The American Psychologist, 19: 1-15

Burke, E. (1977) "The Probing of Children's Reading Strategies" Educational Studies, 3: 137-143

Carpenter, P.A. and Just, M.A. (1977) "Reading Comprehension as the Eyes See it" In Just, M.A. and Carpenter, P.A. (eds), Cognitive Processes in Comprehension, Hillsdale, N.J.: Erlbaum

Carroll, J.B. (1972) "Defining Language Comprehension: Some Speculations"In Freedle, R.O. and Carroll, J.B. (eds), Language Comprehension and the Acquisition of Knowledge. Washington, D.C.: V.H. Winston, and New York: Wiley

———— (1978) "The Nature of the Reading Process" In Chapman, L.J. and Czerniewska, P. (eds), Reading: From Process to Practice. London: Routledge and Kegan Paul

Carroll, J.B., Carton, A.S., Wilds, C.P. (1959) "An Investigation of Cloze Items in the Measurement of Achievement in Foreign Languages" College Entrance Examination Board Research and Development Report. Laboratory for Research in Instruction, Harvard University

Chall, J.S. (1958) Readability: An Appraisal of Research and Application. Columbus: Ohio State University Press

Chambers, J.K. and Trudgill, P. (1980) Dialectology. Cambridge: Cambridge University Press

Chavez-Oller, M.A., Chihara, T., Weaver, K.A., and Oller, J.W. (1985) "When Are Cloze Items Sensitive to Constraints Across Sentences" Language Learning, 35 (2): 181-206

Cherry, C. (1966) On Human Communication: A Review, a Survey and a Criticism. London: M.I.T.P.

Chihara, T., Oller, J.W. Jr., Weaver, K. and Chavez, M.A. (1977) "Are Cloze Items Sensitive to Constraints Across Sentences?" Language Learning, 27: 63-73

Chomsky, N. (1968) Language and Mind. New York: Harcourt, Brace

Coady, J. (1979) "A Psycholinguistic Model of the ESL Reader" In Mackay, R., Barkman, B. and Jordan, R.R. (eds)

Cohen, J.H. (1975) "The Effect of Content Area Material on Cloze Test Performance" Journal of Reading, 19: 247-250

Colinese, P.E. (1972) Technical Report Writing. Education and Training: Central Electricity Generating Board, Personnel Department, Sudbury House

Collins, A., Brown, J.S. and Larkin, K.M. (1980) "Inference in Text Understanding" In Spiro, J.R., Bruce, B.C. and Brewer, W.F. (eds)

Concannon, S.J. (1975) "Illustrations in Books for Children: Review of Research" The Reading Teacher, 29: 254-256

Cook, D. (1971) Educational Project Management. Columbus (Ohio): Charles E.Merril

Cooper, M. (1984) "Linguistic Competence of Practised and Unpractised Non-Native Readers of English" In Alderson, J.C. and Urquhart, A.H. (eds)

Cooper, C.R. and Petrosky, A.R. (1976) "A Psycholinguistic View on the Fluent Reading Process" Journal of Reading, 20 (3): 184-207

Corder, S.P. (1966) The Visual Element in Language Teaching. London: Longman

Daniel, J. (1985) Economics and the Economy. Harlow, Longman

Darnell, D.K. (1968) The Development of an English Language Proficiency Test of Foreign Students Using a Clozentropy Procedure. Final Report, University of Colorado. Eric ED024039

———— (1970) "Clozentropy: A Procedure for Testing English Language Proficiency of Foreign Students" Speech Monographs, 37(1): 36-46

Dean, R.S. and Enemoh, P.A.C. (1983) "Pictorial Organization in Prose Learning" Contemporary Educational Psychology, 8: 20-27

De Leeuw, M. and E. (1965) Read Better, Read Faster. Harmondsworth: Penguin

Dolan, T., Harrison, C. and Gardner, K. (1979) "The Incidence and Context of Reading in the Classroom" In Lunzer, E. and Gardner, K. (eds)

Donald, D.R. (1983) "The Use and Value of Illustrations as Contextual Information for Readers at Different Progress and Developmental Levels" British Journal of Educational Psychology, 53: 175-185

Dooling, D.J. and Lachman, R. (1971) "Effects of Comprehension on Retention of Prose" Journal of Experimental Psychology, 88: 216-222

Douglas, D. (1976) A Study of Reading Among Secondary School Pupils in a Developing Nation. Unpublished PhD thesis, University of Edinburgh

Duchastel, P.C. (1982) "Textual Display Techniques" In Jonassen, D.H. (ed)

Duncan, J. (1984) Close Encounters: Three Economics Textbooks in Search of the Reader. Unpublished MSc dissertation, LSU, Aston University

Ehrenberg, A.S.C. (1975 Data Reduction: Analysing and Interpreting Statistical Data. London: Wiley

———— (1977) "Rudiments of Numeracy" Journal of the Royal Statistical Society, 140: 277-297

Estes, T.H. (1972) "Reading in the Sciences: Classroom Implications" In Laffey, J.L. (ed)

Fareed, A.A. (1971) "Interpretive Responses in Reading History or Biology: An Exploratory Study" Reading Research Quarterly, 6: 498-532

Farnes, N.C. (1973) Reading Purposes, Comprehension and the Use of Context. The Open University Press

Flood, J. (ed) (1984) Understanding Reading Comprehension: Cognition, Language, and the Structure of Prose. International Reading Association

Foley, J.A. (1979) Problems of Understanding Science and Technology Textbooks in English for First Year Students at the University of Petroleum and Minerals in Saudi Arabia. Unpublished PhD thesis, Institute of Education, University of London

Foley, J.A. (1982) "Reading Skills in Science and Technology for the L2 Student" Paper given at the International Symposium on Language for Specific Purposes. Eindhoven

———— (1983) "More Questions on Assumptions about Cloze Testing"RELC Journal, 14(1): 57-69

Friedman, M.M. (1964) The Use of the Cloze Procedure for Improving the Reading Comprehension of Foreign Students at the University of Florida. Doctoral dissertation, University of Florida

Fries, C.C. (1945) Teaching and Learning English as a Foreign Language. Ann Arbor: University of Michigan Press

———— (1963) Linguistics and Reading. New York: Holt, Rinehart and Winston

Gagnon, G.W. (1978) Images, Learning and Teaching. PhD thesis,University of North Dakota

Gatbonton, E.C. and Tucker, G.R. (1971) "Cultural Orientation and the Study of Foreign Literature" TESOL Quarterly, 5: 137-143

Glass, G.V. (1972) "The Wisdom of Scientific Inquiry on Education" Journal of Research in Science Teaching, 9: 3-18

Goldstein, R. and Underwood, G. (1981) "The Influence of Pictures on the Derivation of Meaning from Children's Reading Materials" Journal of research in Reading, 4: 6-16

Goodman, K.S. (1967) "Reading: a Psycholinguistic Guessing Game" Journal of the Reading Specialist, 6: 126-135

Goodman, K.S. (1973) "Psycholinguistic Universals of the Reading Process" In Smith, F. (ed)

Gray, W.S. (1937) The Nature and Types of Reading: Thirty-six Yearbook of the National Society for the Study of Education. Bloomington, Illinois: Public School Publishing

Grundin, H.U., Courtney, L., Langer, J., Pehrsson, R., Robinson, H.A. and Sakamoto, T. (1981) "Cloze Procedure and Comprehension: An Exploratory Study Across Three Languages" Journal of Research in Reading, 4 (2): 104-122

Gunning, R. (1952) The Technique of Clear Writing. New York: McGraw Hill

Guszak, F.J. (1970) "Dilemma in Informal Reading Assessments" Elementary English, 7 (5): 666-670

Guttmann, J., Levin, J.R. and Pressley, M. (1977) "Pictures, Partial Pictures, and Young Children's Oral Prose Learning" Journal of Educational Psychology, 69: 473-480

Halliday, M.A.K. and Hasan, R. (1976) Cohesion in English. London: Longman

Hanson, J.L. (1972) A Textbook of Economics. Macdonald and Evans Ltd

Harber, R.N. (1969) Information-Processing: Approaches to Visual Perception. Holt, Rinehart and Winston Inc

Harri-Augstein, E.S. (1978) "Reflecting on Structure of Meaning: Process of Learning-to-Learn" In Fransella, F. (ed), Personal Construct Psychology. London: Academic Press

Harri-Augstein, S., Smith, M. and Thomas, L. (1982) Reading to Learn.London: Methuen

Harri-Augstein, S. and Thomas, L. (1984) "Conversational Investigations of Reading: the Self-Organized Learner and the Text" In Alderson, J.C., and Urquhart, A.H. (eds)

Harrison, C. (1979) "Assessing the Readability of School Texts" In Lunzer, E. and Gardner, K. (eds)

Harrison, C. (1980) Readability in the Classroom. Cambridge: Cambridge University Press

Heather, P. (1981) Young People's Reading: A Study of the Leisure Reading of 13-15 Year Olds. Centre for Research on User Studies, Sheffield University

Heilenman, L.K. (1983) "The Use of Cloze Procedure in Foreign Language Placement" The Modern Language Journal, 67 (2): 121-126

Hinofotis, F.B. (1976) An Investigation of the Concurrent Validity of Cloze Testing as a Measure of Overall Proficiency in English as a Second Language. Unpublished PhD thesis, Southern Illinois University

———— (1980) "Cloze as an Alternative Method of ESL Placement and Proficiency Testing" In Oller, J. and Perkins, K. (eds),Research in Language Testing. Rowley Mass: Newbury House

Hormechea, Z.C. (1982) The Interaction between Verbal and Non-Verbal Information in Economics Textbooks and its Pedagogical Implications. Unpublished MSc dissertation, LSU, Aston University

Hornby, A.S. (1980) Oxford Advanced Learner's Dictionary of Current English. Cambridge: Cambridge University Press

Hosenfeld, C. (1977a) A Learning-Teaching View of Second-Language Instruction: The Learning Strategies of Second-Language Learners with Reading Grammar Tasks. PhD thesis, Ohio State University

———— (1977b) "A Preliminary Investigation of the Reading Strategies of Successful and Non-Successful Second Language Learners" System, 5:110-123

Hosenfeld, C.(1984) "Case Studies of Ninth Grade Readers" In Alderson, J.C. and Urquhart, A.H. (eds)

Huckin, T.N. and Olsen, L.A. (1983) English for Science and Technology: A Handbook for Non-native Speakers. McGraw-Hill

Hughes, L.H., Langdon, C.A. and Kim, Y.S. (1981) "Comprehension of Discourse at High Rates with Redundant Pictures". Paper presented at the Annual Meeting of the Psychonomic Society. Philadelphia

Hussein, A.A. (1985) An Analysis of the Relationship between Verbal and Non-Verbal Information in Economics Textbooks. Unpublished MSc dissertation, LSU, Aston University

———————— (forthcoming) "The Use of Cloze Procedure in Assessing the Impact of Non-Verbal Information on Native/Non-native English Speakers' Comprehension" ESPMENA

Irvine, P., Atai, P. and Oller, J.W. Jr., (1974) "Cloze, Dictation, and the Test of English as a Foreign Language". Language Learning, 24: 245-252

Jolly, D. (1978) "The Establishment of a Self-Access Scheme for Intensive Reading". Paper presented at the Goethe Institute, British Council Colloquium on Reading, Paris

Jonassen, D.H. (ed) (1982) The Technology of Text. Educational Technology Publications.

Jones, M.B. and Pilkulski, E.C. (1974) "Cloze for the Classroom" Journal of Reading, 17 (6): 423-438

Jongsma, E.A. (1980) Cloze Instruction Research: A Second Look. International Reading Association, Newark, Delaware: USA

Judd, C. and Buswell, G. (1922) Silent Reading: A Study of Various Types. Chicago: University of Chicago Press.

Just, M.A. and Carpenter, P.A. (1980) "A Theory of Reading: From Eye-Fixations to Comprehension" Psychological Review, 87: 329-354

Kennedy, J.M. (1974) A Psychology of Picture Perception: Images and Information. Jossey-Bass, Inc. Publishers

Kintsch, W. and van Dijk, T.A. (1978) "Towards a Model of Text Comprehension and Production" Psychological Review, 85: 363-394

Klare, G.R., Simaiko, H.W. and Stolurow, L.M. (1972) "The Cloze Procedure: A Convenient Readability Test for Training Materials and Translations" International Review for Applied Psychology, 21 (2): 77-106

Koenke, K.R. (1968) "The Roles of Pictures and Readability in Comprehension of the Main Idea of a Paragraph" Paper presented at the Annual Meeting of the American Educational Research Association. Chicago

Krantz, L.I. (1957) "The Relationship of Reading Abilities and Basic Skills of the Elementary School to Success in Interpretation of the Content Materials in High School" Journal of Experimental Education, 26: 97-114

Lackstrom, J., Selinker, L. and Trimble, L. (1973) "Technical Rhetorical Principles and Grammatical Choice" TESOL Quarterly, 7(2): 127-136

Laffey, J.L.(ed) (1972) Reading in the Content Areas. International Reading Association, Newark, Delaware

Lapkin, S. and Swain,M. (1977) "The Use of English and French Cloze Tests in a Bilingual Education Program Evaluation: Validity and Error Analysis" Language Learning, 27(2): 279-313

Lesgold, A.M., Levin, J.R., Shirmon, J. and Guttmann, J. (1975) "Pictures and Young Children's Learning from Oral Prose" Journal of Educational Psychology, 67: 636-642

Lesgold, A.M., DeGood, H. and Levin, J.R. (1977) "Pictures and Young Children's Prose Learning: A Supplementary Report" Journal of Reading Behaviour, 9: 353-360

Lesiak, J. and Bradly-Johnson, S. (1983) Reading Assessment for Placement and Programming. Springfield, Illinois: Charles, G. Thomas Publisher

Levin, J.R. (1981) "On Functions of Pictures in Prose" In Pirozzolo, F.J. and Wittrock, M.C. (eds), Neuropsychological and Cognitive Processes in Reading. New York: Academic Press

Levin, J.R. (1982) "Pictures as Prose-Learning Devices" In Flammer, A. and Kintsch, W. (eds), Discourse Processing.North-Holland Publishing Co,Amsterdam, New York, Oxford

Levin, J. (1977) Elementary Statistics in Social Research. Harper and Row Publishers

Levin, J.R. and Lesgold, A.M. (1978) "On Pictures in Prose" Educational Communication and Technology, 26: 233-243

Levin, J.R., Bender, B.G. and Lesgold, A.M. (1976) "Pictures, Repetition and Young Children's Oral Prose Learning" AV Communications Reviews, 24: 367-380

Lipsey, R.G. (1983) An Introduction to Positive Economics. Macdonald Evans Ltd

Louthan, V. (1965) "Some Systematic Grammatical Deletions and their Effects on Reading Comprehension" English Journal, 54: 295-299

Lunzer, E. (1979) "From Learning to Read to Reading to Learn" In Lunzer, E. and Gardner, K. (eds)

Lunzer, E. and Gardner, K. (eds) (1979) The Effective Use of Reading. London: Heinemann Educational Books for the Schools Council

MacGinitie, W.H. (1961) "Contextual Constraint in English Prose Paragraphs" Journal of Psychology, 51: 121-130

MacKay R., Barkman, B. and Jordan, R.R. (eds) (1979) Reading in a Second Language: Hypotheses, Organization and Practice. Rowley, Mass: Newbury House

MacKay, R. and Mountford, A. (1979) "Reading for Information" In MacKay, R., Barkman, B. and Jordan, R.R. (eds)

MacKay, R. and Palmer, J.D. (eds) (1981) Languages for Specific Purposes: Program, Design and Evaluation. Rowley Mass, London: Newbury House

MacKay, R. and Williamson, M. (1975) "A Trial Use of Cloze Test Procedure in the Assessment of Reading Comprehension" Research and Development Unit, Report No 4, Universidad Nacional Autonoma de Mexico

McBride, F. (1975) "The Analysis and Assessment of Reading Comprehension" In Latham, W. (ed), The Road to Effective Reading. UK: Reading Association

McConkie, G.W. (1976) "The Use of Eye-Movement Data in Determining the Perceptual Span in Reading" In Monty, R.A. and Senders, J.W. (eds), Eye-Movements and Psychological Processes. Hillsdale: Lawrence Erlbaum Associates

McDonough, J. (1984) ESP in Perspective: A Practical Guide. Collins, ELT

Melnik, A. and Merritt, J. (eds) (1972) The Reading Curriculum. London: University of London Press in association with The Open University

Meyer, B.J.F. (1975) The Organisation of Prose and its Effects on Memory.Amsterdam: North-Holland Publishing Company

Miller, G.A. (1965) "Some Preliminaries to Psycholinguistics" American Psychologist, 20: 15-20

Miller, W. (1938) "Reading With and Without Pictures" Elementary School Journal, 38: 676-682

Miller, G.R. and Coleman, E.B. (1967) "A Set of Thirty-Six Prose Passages Calibrated for Complexity" Journal of Verbal Learning and Verbal Behaviour, 6: 851-854

Mitchell, J. (1974) How to Write Reports. London: Chapman & Hall

Mohammed, M.A.H and Swales, J.M. (1984) "Factors Affecting the Successful Reading of Technical Instructions" Reading in a Foreign Language, 2: 206-217

Moore, P.J. and Skinner, M.J. (1985) "The Effects of Illustrations on Children's Comprehension of Abstract and Concrete Passages" Journal of Research in Reading, 8(1): 45-56

Mosberg, L., Potter, T. and Cornell, R. (1971) The Relation between Cloze and Multiple Choice Test Scores as a Function of Relative Paragraph Difficulty and Grade Level. Inglewood, California: Southwest Regional Laboratory for Educational Research Development (Quoted in Cohen, 1975)

Mountford, A. (1975) Discourse Analysis and the Simplification of Reading Material for ESP. M.Litt. thesis, Edinburgh University

Moyle, D. (1978) "Readability: The Use of Cloze Procedure" In Chapman, L.J. and Czerniewska, P. (eds), Reading: From Process to Practice. London: Routledge and Kegan Paul

Myers, P. and Winkley, C. (1973) A Comparison of the McCraken Standard Reading Inventory and the Cloze Procedure for Finding the Instructional Level. Unpublished study, Northern Illinois Univeristy (Quoted in Foley, 1983)

Nesi, H. and Skelton, J. (1987) "The Structure of Oral Presentations" ESPMENA, 24: 6-13

Ngandu, K. (1977) "What Do Remedial High School Students Do When They Read" Journal of Reading, 21: 231-234 (Quoted in Flood, J.,ed)

Nickel, G. (ed) (1976) Proceedings of the Fourth International Congress of Applied Linguistics. Stuttgart: AILA and Hochschul Verlag

Nuttal, C. (1982) Teaching Reading Skills in a Foreign Language. London: Heinemann Educational Books

Ohnmacht, F.W., Weaver, W.W. and Kohler, G.T. (1970) "Cloze and Closure: A Factorial Study" The Journal of Pscyhology, 74: 205-217

Oller, J.W. Jr. (1972) "Scoring Methods and Difficulty Levels for Cloze Tests of Proficiency in ESL" Modern Language Journal, 56: 151-158

Oller, J.W. Jr.(1973) "Cloze Tests of Second Language Proficiency and What They Measure" Language Learning, 23: 105-118

———— (1975) "Cloze, Discourse and Approximations to English" In Marina, K., Dulay, B. and H. (eds), New Directions in Second Language Teaching and Bilingual Education: On TESOL '75 Washington, D.C.

Oller,J. W. Jr. (1979) Language Tests at School: A Pragmatic Approach.London: Longman

Oller, J.W. Jr. and Conrad, C. (1971) "The Cloze Procedure and ESL Proficiency" Language Learning, 21: 183-196

Oppenheim, A.N. (1966) Questionnaire Design and Attitude Measurement.London: Heinemann

Osgood, C.E. and Sebeok, T.A. (1965) Psycholinguistics: A Survey of Theory and Research Problems. Bloomington, Indiana: Indiana University Press

Peeck, J. (1974) "Retention of Pictorial and Verbal Content of a Text with Illustrations" Journal of Educational Psychology, 66: 880-888

Potter, F. (1980) "Miscue Analysis: A Cautionary Note" Journal of Research in Reading, 3: 116-128

Powell, L.S. (1961) A Guide to the Use of Visual Aids. British Association for Commercial and Industrial Education

Rankin, E.F. (1957) An Evaluation of the Cloze Procedure as a Technique for Measuring Reading Comprehension. Doctoral dissertation, University of Michigan

———— (1971) "Grade Level Interpretation of Cloze Readability Scores" In Greene, F. (ed), Reading: The Right to Participate. Milwaukee: National Reading Conference

Rankin, E.F.(1974) The Measurement of Reading Flexibility. Newark, Delaware: International Reading Association

Rankin, E.F. and Culhane, J.W. (1969) "Comparable Cloze and Multiple-Choice Comprehension Test Scores" Journal of Reading, 13(3): 193-199

Rankin,E. F. and Culhane, J. W. (1970) "One Picture Equals 1000 Words?" Journal of Reading Improvement, 7: 37-40

Rapoport, A. (1966) "What Information?" In Smith, A.G. (ed), Communication and Culture. New York: Holt, Rinehart and Winston

Rasco, R.W., Tennyson, R.D. and Boutwell, R.C. (1975) "Imagery Instructions and Drawings in Learning Prose" Journal of Educational Psychology, 67: 188-192

Rauch, S.J. (1972) "What is the Place of Reading in the Curriculum" In Melnik A. and Merritt, J. (eds)

Rayner, K. (1978) "Eye-Movements in Reading and Information Processing" Psychological Bulletin, 85: 618-660

Reilly, R.R. (1971) "A Note on Clozentropy" Speech Monographs 38 (4): 350-353

Richards, J., Platt, J. and Weber, H. (1985) Longman Dictionary of Applied Linguistics. London: Longman

Rigg, P. (1977) "The Miscue ESL Project" In Brown, H.D., Yorio, C.A.and Crymes, R.H. (eds), Teaching and Learning ESL: Trends in Research and Practice (on TESOL '77) Washington D.C., TESOL, 106-118

Rigney, J.W. and Lutz, K.A. (1976) "Effect of Graphic Analogies of Concepts in Chemistry on Learning and Attitude" Journal of Educational Psychology, 68: 305-311

Rivers, W.M. (1968) Teaching Foreign Language Skills. Chicago: University of Chicago Press

Rivers, W.M. and Temperly, M.S. (1978) A Practical Guide to the Teaching of English as a Second or Foreign Language. New York: Oxford University Press

Rohwer, W.D.Jr. and Harris, W.J. (1975) "Media Effects on Prose Learning in two Populations of Children" Journal of Educational Psychology, 67: 651-657

Rohwer, W.D.Jr and Matz, R.D. (1975) "Improving Aural Comprehension in White and Black Children: Pictures Versus Print" Journal of Experimental Child Psychology, 19: 23-36

Ross, D.A. (1978) Opportunities and uses of the Ocean New York: Springer-Verlag

Royer, J.M. and Cable, G.W. (1975) "Facilitated Learning in Connected Discourse" Journal of Educational Psychology, 67: 116-123

———— (1976) "Illustrations, Analogies, and Facilitative Transfer in Prose Learning" Journal of Educational Psychology, 68: 205-209

Royer, J.M., Bates, J.A. and Konold, C.E. (1984) "Learning From Text: Methods of Affecting Reader Intent" In Alderson,J.C. and Urquhart, A.H. (eds)

Ruch, M.D., Levin, J.R. (1977) "Pictorial Organization Versus Verbal Repetition of Children's Prose: Evidence for Processing Differences" AV Communication Review, 25: 269-280

Rumelhart, D.E. (1977) Introduction to Human Information Processing. New York: Wiley (quoted in Alderson and Urquhart, eds)

Rusted, J. and Coltheart, V. (1979a) "The Effect of Pictures on the Retention of Novel Words and Prose Passages" Journal of Experimental Child Psychology, 28: 516-524

———— (1979b) "Facilitation of Children's Prose Recall by the Presence of Pictures" Memory and Cognition, 7: 354-359

Rye, J. (1982) Cloze Procedure and the Teaching of Reading. London: Heinemann Educational Books.

———— (1984) "Cloze and Intersentential Constraint" Journal of Research in Reading, 7(2): 113-122

———— (1985) "Are Cloze Items Sensitive to Constraints Across Sentences?" - A Review" Journal of Research in Reading, 8(2): 94-105

Samuels, S.J. (1967) "Attentional Process in Reading: The Effect of Pictures on the Aquisition of Reading Responses" Journal of Educational Psychology, 58: 337-342

———— (1970) "Effects of Pictures on Learning to Read: Comprehension and Attitudes" Review of Educational Research, 40: 397-407

Samuelson, P.A. (1984) Economics. McGraw Hill

Schallert, D.L. (1980) "The Role of Illustrations in Reading Comprehension" In Spiro, R.J., Bruce, B.C. and Brewer, W.F. (eds)

Scheaffer, R.L., William, M. and Layman, O. (1971) Elementary Survey Sampling. Belmont: Wadsworth

Selby, P.H. (1976) Interpreting Graphs and Tables. New York, London: Wiley

Selinker, L. and Trimble, L. (1976) "Formal Written Communication and ESL" Journal of Technical Writing and Communication, IV (2): 81-91

Shannon, C.E. and Weaver, W. (1949) The Mathematical Theory of Communication. Urbana, III: University of Illinois Press

Siegel, P.M. and Hodge, R.W. (1968) "A Causal Approach to the Study of Measurement Error" In Blalock, H.M. Jr (ed), Methodology in Social Research. London: McGraw-Hill

Siegel, S. and Castellan, N.Jr. (1988) Nonparametric Statistics for the Behavioural Sciences. McGraw-Hill

Sim, D.D. (1973) Grammatical Cohesion in English and Advanced Reading Comprehension for Overseas Students. MA thesis, University of Manchester

Sim, D. and Bensoussan, M. (1979) "Control of Contextualized Function and Content Words as It Affects English as a Foreign Language Reading Comprehension Test Scores" In MacKay, R., Barkman, B. and Jordan, R.R. (eds)

Simons, H.D. (1971) "Reading Comprehension: The Need for a New Perspective" Reading Research Quarterly, 6: 340-363

Smith, F. (1971) Understanding Reading. New York: Holt, Rinehart and Winston

———— (ed) (1973) Psycholinguistics and Reading. New York, London:Holt, Rinehart and Winston

Smith, H.K. (1967) "The Responses of Good and Poor Readers When Asked to Read for Different Purposes" Reading Research Quarterly, 3(1): 53-83

Smith, M.S. (1986) "Comprehension versus Aquisition: Two Ways of Processing Input" Journal of Applied Linguistics, 7(3): 239-256

Smithies, M. (1982) "From Graphics to Connected Prose" Guidelines, 4(1): 42-50

Soulé-Susbielles, N. (1987) "Improving Students' Competence in Foreign Language Reading" ELT Journal, 41(3): 198-203

Spiro, R.J., Bruce, B.C. and Brewer, W.F. (eds) (1980) Theoretical Issues in Reading Comprehension: Perspectives from Cognitive Psychology, Linguistics, Artificial Intelligence and Education. Hillsdale, New Jersey: Erlbaum.

Steffensen, M.S., Joag-Dev, C. and Anderson, R.C. (1979) "A Cross-Cultural Perspective on Reading Comprehension" Reading Research Quarterly, 15: 10-29

Strang, R. and Rogers, C. (1965) "How Do Students Read a Short Story?" English Journal, 54: 819-823

Stubbs, J. B. and Tucker, G.R. (1974) "The Cloze Test as a Measure of English Proficiency" Modern Language Journal, 58: 239-241

Swain, M., Lapkin, S. and Barik, H.C. (1976) "The Cloze Test as a Measure of Second Language Proficiency for Young Children" Working Papers on Bilingualism, 11: 32-43

Swales, J. (1981) "The Function of One Type of particle in a Chemistry Textbook" In Selinker, L., Tarone, E. and Hanzeli, V. (eds), English for Academic and Technical Purposes. Rowley, Mass: Newbury House

Tadros, A.A. (1981) Linguistic Prediction in Economics Texts. PhD thesis, Birmingham University

Taylor, W.L. (1953) "Cloze Procedure: A New Tool for Measuring Readability" Journalism Quarterly, 30: 415-433

———— (1954) Application of Cloze and Entropy Measures to the Study of Contextual Constraint in Samples of Continuous Prose. Doctoral dissertation, University of Illinois.

———— (1956) "Recent Developments in the Use of Cloze Procedure" Journalism Quarterly, 33: 42-48

———— (1957) "Cloze Readability Scores as Indices of Individual Differences in Comprehension and Aptitude" Journal of Applied Psychology, 41: 19-26

Thomas, L.F. and Harri-Augstein, E.S. (1974) "Reading to Learn" In Merritt, J. (ed), New Horizons in Reading: Proceedings of the 5th World International Reading Association Congress. Delaware: International Reading Association

Thorndike, E.L. (1917) "Reading as Reasoning: A Study of Mistakes in Paragraph Reading" Journal of Educational Psychology, 8: 323-332

Thorndyke, P.W. (1977) "Cognitive Structures in Comprehension and Memory of Narrative Discourse" Cognitive Psychology, 9: 77-110

Trimble, L. (1977) "An Approach to Reading Scientific and Technical English" Language for Specific Purposes, 4: 1-15

———— (1985) English for Science and Technology: A Discourse Approach. Cambridge: Cambridge University Press

Turk, C. and Kirkman, J. (1982) Effective Writing. London: Spon

Urquhart, A.H. (1981) "Operating on Learning Texts" In Selinker, L., Tarone, E. and Hanzeli, V. (eds), English for Academic and Technical Purposes. Rowley, Mass. Newbury House

Urquhart, A.H. (1984) "The Effect of Rhetorical Ordering on Readability" In Alderson, J.C. and Urquhart, A.H. (eds)

Van Dijk, T.A. (1977) Text and Context: Explorations in the Semantics and Pragmatics of Discourse. London: Longman

Verhagen, H.J. (1981) "Experiments with Bar Graph Process Supervision Displays on Visual Display Units" Applied Ergonomics, 12(1): 39-45

Vernon, M.D. (1953) "The Value of Pictorial Illustration" British Journal of Educational Psychology, 23: 180-187

———— (1954) "The Instruction of Children by Pictorial Illustration" British Journal of Educational Psychology, 24: 171-179

Wallace, D. (1986) Types and Functions of Non-Verbal Elements in Biological Text: Implications for Language Teaching. Unpublished MSc dissertation, LSU, Aston University

Weaver, C. (1980) Psycholinguistics and Reading: From Process to Practice. Cambridge, Mass: Winthrop

Weaver, P.A. (1977) Improving Reading Comprehension: Effects of Sentence Organization Instruction. Unpublished manuscript, Harvard University (quoted in Spiro, R., Bruce, B. and Brewer, W., eds)

Weaver, W.W. (1965) "Theoretical Aspects of the Cloze Procedure" Fourteenth Yearbook of the National Reading Conference, 115-132

Weintraub, S. (1960) The Effect of Pictures on the Comprehension of a Second Grade Basal Reader. Doctoral dissertation, University of Illinois

Widdowson, H.G. (1975) "EST in Theory and Practice: English for Academic Study with Special Reference to Science and Technology" ETIC Occasional Paper. The British Council

Widdowson, H.G. (1978) Teaching Language as Communication. Oxford: Oxford University Press

———— (1979) Explorations in Applied Linguistics. Oxford: Oxford University Press

Widdowson, H.G. and Urquhart, A.H. (1976) "K.A.A.U. English for Academic Purposes Project: 1st Yearly Report" Mimeo, University of Edinburgh, K.A.A.U. Reading Research Project

Wilkins, D.A. (1972) Linguistics and Language Teaching. London: Edward Arnold

Williams, R.C. (1981) "Lexical Familiarisation in Content Area Textbooks" In Chapman, L.J. (ed), The Reader and the Text: Proceedings of the 1980 UKRA Conference. London: Heinemann

Williams, R.C. and Dallas, D. (1984) "Aspects of Vocabulary in the Readability of Content Area L_2 Educational Textbooks: A Case Study" In Alderson, J.C. and Urquhart, A.H. (eds)

Willows, D.M. (1974) Reading between the Lines: A Study of Selective Attention in Good and Poor Readers" Child Development, 45: 408-415

Woollams, S. and Brown, M. (1979) The Total Handbook of Transactional Analysis. Prentice-Hall, Inc., Englewood Cliffs

Wright, P. (1968) "Using Tabulated Information" Ergonomics, 11: 331-343

———— (1980) "The Comprehension of Tabulated Information: Some Similarities between Reading Prose and Reading Tables" Journal of National Society for Performance and Instruction, 19: 25-29

Wright, P. (1982) "A User-Oriented Approach to the Design of Tables and Flow Charts" In Jonassen, D.H. (ed)

Wright, P. and Fox, K. (1970) "Presenting Information in Tables" Applied Ergonomics, 1 (4): 234-242

———— (1972) "Explicit and Implicit Tabulation Formats" Ergonomics, 15: 175-187

Wright, P. and Reid, F. (1973) "Written Information: Some Alternatives to Prose for Expressing the Outcomes of Complex Contingencies" Applied Psychology, 57(2): 160-166

APPENDIX 1

THE QUESTIONNAIRE

Please answer the following questions on the text you have read. In answering these questions, please tick the point that represents most closely what you feel.

Whenever you come across the word "visual", it means any non-verbal representation like a graph, a table, a map, a diagram ... etc.

1. When did you first look at the visual for information?

a.	Before I started reading the text.	1
b.	After I started reading the text but before the visual was first mentioned in the text.	2
c.	After the visual was first mentioned but before I finished reading the text.	3
d.	After I have finished reading the whole text.	4
e.	I didn't look at the visual at all.	5

2. When you looked for information in the visual, did you do that because the verbal text directed you to do so, or did you do that on your own?

a.	The verbal text directed me.	1
b.	I decided to do so myself.	2

3. While reading the text, how often did you look at the visual?

Never 1 2 3 4 5 6 7 Frequently

4. What did you look for in the visual?
(please choose one answer)

a.	The main points of the whole text.	1
b.	The main points of part(s) of the text.	2
c.	Detailed information on the whole text.	3
d.	Detailed information on part(s) of the text.	4
e.	Additional information to that in the whole text.	5
f.	Additional information to that in part(s) of the text.	6
g.	A summary of the whole text.	7
h.	A summary of part(s) of the text.	8
i.	Other (please specify)	9

.....

.....

5. How important do you consider the information provided by the visual in understanding the text as a whole?

Very unimportant 1 2 3 4 5 6 7 Very important

6. What influence did the visual have on your reading of the text? (Please choose only one answer.)

a. Helped me understand the text as a whole.	☐	1
b. Helped me understand part(s) of the text.	☐	2
c. Distracted my attention from understanding the text as a whole.	☐	3
d. Distracted my attention from understanding part(s) of the text.	☐	4
e. Made no difference.	☐	5

7. What is your subject?

.....

8. Is English your first language?

a. Yes ☐ 1 b. No ☐ 2

APPENDIX 2

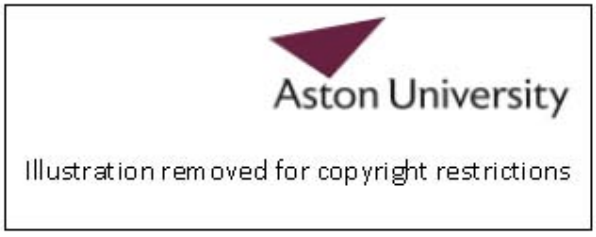
QUESTIONNAIRE PASSAGES

PASSAGE "A"

ECONOMICS

Source: Daniel (1985, p 23)

PASSAGE "B"
NATURAL RESOURCES



Source: Ross (1978, p 43-45)

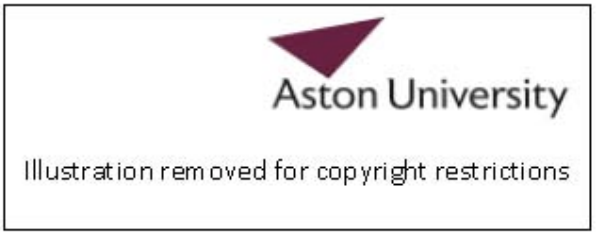
PASSAGE "C"

BUSINESS

Source: Cook (1971, p 136)

PASSAGE "D"

PSYCHOLOGY



Source: Woollams and Brown (1979, p 187)

PASSAGE "E"

LINGUISTICS

Source: Chambers and Trudgill (1980, p 88)

APPENDIX 3a

CLOZE PASSAGES: THE VISUAL VERSION

APPENDIX 3b

CLOZE PASSAGES: THE NON-VISUAL VERSION

APPENDIX 4a

EXACT-WORD RESPONSES: THE VISUAL VERSION

NB: The words in **bold type** in both visual and non-visual versions are similar and the rest are different.

Economics (VV)
Exact Deleted Items

1	**costs**	24	will
2	**factor**	25	the
3	**of**	26	factor
4	**given**	27	value
5	**markets**	28	unit
6	**relationship**	29	have
7	**it**	30	costs
8	**and**	31	costs
9	**good**	32	each
10	**to**	33	conclude
11	we	34	any
12	the	35	cost
13	capital	36	value
14	a	37	profits
15	payment	38	column
16	some	39	that
17	the	40	increase
18	may	41	once
19	prepared	42	we
20	of	43	be
21	relationship	44	could
22	one	45	effect
23	have	46	that

Business (VV)

Exact Deleted Items

1	**such**	21	are
2	**take**	22	illustrated
3	**are**	23	**can**
4	**if**	24	**approximation**
5	**resources**	25	**developed**
6	**time**	26	**could**
7	**limited**	27	**cost**
8	**situations**	28	**plan**
9	**in**	29	**would**
10	**where**	30	**in**
11	**the**	31	**accompanied**
12	**particular**	32	**reduction**
13	**any**	33	**be**
14	**time**	34	**cost**
15	**curve**	35	**is**
16	**that**	36	**result**
17	in	37	**the**
18	not	38	**analyse**
19	but	39	**the**
20	time	40	**input**
		41	**schedule**

Psychology (VV)
Exact Deleted Items

1	**the**	23	**in**
2	**to**	24	**be**
3	**individual**	25	**discounting**
4	**responds**	26	**script**
5	**person**	27	**stroke**
6	**stress**	28	**severity**
7	**visualise**	29	**distort**
8	**range**	30	**experienced**
9	**a**	31	**original**
10	**of**	32	alert
11	**less**	33	a
12	the	34	him
13	intensities	35	his
14	were	36	on
15	to	37	takes
16	two	38	level
17	a	39	responses
18	so	40	he
19	to	41	it
20	the	42	this
21	**the**		
22	**to**		

Linguistics (VV)
Exact Deleted Items

1	**of**
2	**is**
3	**have**
4	**want**
5	**on**
6	**more**
7	**linguistic**
8	**means**
9	**we**
10	**with**
11	**that**
12	**linguistic**
13	**possible**
14	**earlier**
15	**that**
16	**grading**
17	**repeated**
18	**made**
19	**is**
20	**studies**
21	**dialectology**
22	**study**
23	**town**
24	**using**
25	**but**
26	**elderly**
27	**in**
28	**of**
29	**words**
30	**and**
31	**in**
32	**status**
33	**to**
34	**word**
35	table
36	taking

APPENDIX 4b

EXACT-WORD RESPONSES: THE NON-VISUAL VERSION

NB: The words in **bold type** in both visual and non-visual versions are similar and the rest are different.

Economics (NVV)
Exact Deleted Items

1	**costs**	24	at
2	**factor**	25	of
3	**of**	26	column
4	**given**	27	which
5	**markets**	28	rise
6	**relationship**	29	that
7	**it**	30	we
8	**and**	31	of
9	**good**	32	produced
10	**to**	33	unit
11	three	34	carpet
12	costs	35	that
13	raw	36	constant
14	it	37	with
15	for	38	into
16	that	39	supplied
17	market	40	can
18	a	41	the
19	supply	42	seen
20	and	43	of
21	in	44	these
22	costs	45	the
23	the	46	could

Business (NVV)
Exact Deleted Items

1	**such**	21	**can**
2	**take**	22	**approximation**
3	**are**	23	**developed**
4	**if**	24	**could**
5	**resources**	25	**cost**
6	**time**	26	**plan**
7	**limited**	27	**would**
8	**situations**	28	**in**
9	**in**	29	**accompanied**
10	**where**	30	**reduction**
11	**the**	31	**be**
12	**particular**	32	**cost**
13	**any**	33	**is**
14	**time**	34	**result**
15	**curve**	35	**the**
16	**that**	36	**analyse**
17	we	37	**the**
18	cost	38	**input**
19	a	39	**schedule**
20	two		

Psychology (NVV)
Exact Deleted Items

1	**the**	23	**discounting**
2	**to**	24	**script**
3	**individual**	25	**stroke**
4	**responds**	26	**severity**
5	**person**	27	**distort**
6	**stress**	28	**experienced**
7	**visualise**	29	**original**
8	**range**	30	the
9	**a**	31	ever
10	**of**	32	authorities
11	**less**	33	get
12	or	34	with
13	equivalent	35	a
14	example	36	it
15	to	37	to
16	and	38	when
17	is	39	does
18	of	40	is
19	**the**	41	information
20	**to**		
21	**in**		
22	**be**		

Linguistics (NVV)
Exact Deleted Items

1	**of**
2	**is**
3	**have**
4	**want**
5	**on**
6	**more**
7	**linguistic**
8	**means**
9	**we**
10	**with**
11	**that**
12	**linguistic**
13	**possible**
14	**earlier**
15	**that**
16	**grading**
17	**repeated**
18	**made**
19	**is**
20	**studies**
21	**dialectology**
22	**study**
23	**town**
24	**using**
25	**but**
26	**elderly**
27	**in**
28	**of**
29	**words**
30	**and**
31	**in**
32	**status**
33	**to**
34	**word**
35	a

APPENDIX 5

ADMINISTRATION OF EXPERIMENTS

CLOZE INSTRUCTIONS

First:

Please complete the following information:

(a) Your First Language

.....

(b) Your Subject

.....

Second:

In the passage given to you there are many words which have been left out. Please write only ONE word, the one you think best, in each blank space. (Read the whole passage first before you start writing).

Thank you very much for your co-operation.

ADMINISTRATION CERTIFICATE