CHAPTER FOUR

DATA AND ANALYSIS

4.0 Introduction

This chapter discusses in greater detail the corpus and procedure used in this study to explore the extent pairs of languages differ in terms of textual conventions fundamental to the construction of a text.

More specifically, the objective of the study is to discover the extent English and Malay differ in terms of the formal devices which are deployed and manipulated by contextual factors to bring about a flow of information through a linguistic sequence so that the resultant product is a coherent, cohesive unit of written language.

To discover the differences between any pair of languages in terms of whatever systemic linguistic feature or discoursal characteristics, would necessarily involve the examination of a corpus of material written in the two languages. Preferably they should be of one text-type. This is to reduce, hopefully, the problems of classification and the task of matching the selected materials in terms of stylistic similarities to ensure
there are not too many overt discrepancies amongst them in terms of style of presentation.

4.1 Materials

The selection of the data used for analysis in this study was done over a period of time, from October 1994 to January 1995, during four months of local sabbatical leave. It was decided that the corpus in this study should constitute passages selected at random from just one source, an undergraduate science textbook entitled Biology: A Functional Approach and their corresponding passages from the translated Malay version, Biologi: Satu Pendekatan Dari Segi Fungsi. For reasons pertaining to the choice of the book, please refer CHAPTER ONE, pp.13.

4.2 Description of the Selected Passages

As stated in CHAPTER ONE, sub-section 1.4.1, a total of 20 passages were randomly picked from the source text, Biology: A Functional Approach. These together with their corresponding translations, making up a total of 40 passages, were entered into a computer as a data base for text analyses. The passages are of more or less the same length with each of them displaying independent textual unity. In other words,
all the selections, regardless of their length, are units that independently make sense. Three of the passages are made up of a paragraph each while the rest range in length of two relatively long to six relatively short paragraphs.

The question of stylistic differences may arise since the translation is the joint effort of four different translators. And it is highly plausible, differences in style may occur especially as the selected passages were chosen at random from a larger corpus. In other words, the translations of the passages picked for this smaller corpus, might not have come, all of them, from just one translator. Rather, the corpus would include translations from all the four participating translators since they are extracted from different parts of the textbook. The integrity of the project, the mission to produce a translation of high quality and the adherence to basic canons in translation called for the selection of suitably qualified native speakers to do the translation as well as the inclusion in the project of a language editor, a reputed Malay linguist, whose role was to check and standardize the translation from the point of view of language use, thus, helping to neutralize the weight of individual stylistic differences, if any.
4.2.1 Text Typology

The passages, by virtue of their topical content, may be labelled expository scientific discourse though strictly speaking, they are more texts of a general informative nature, whose content is information on various aspects of the living world. In terms of function, the inclination is to sub-classify them as descriptive or narrative. The bulk of the passages describes primarily a scientific technique, process, phenomenon or structure. Few conclusions are drawn from the information and very little comparison with any other information is done. In fact one may be inclined to classify them all as generally informative rather than purely scientific texts, if by scientific discourse is meant the type, whose purpose is to prove a point, by arguing from accepted premises, by generalizing from particulars or by a combination of both. The primary aim of the selected texts or passages seems to be to impart some information on certain conceptual structures of science.

The structure of these texts is determined not so much by the logical and causal interrelationships among the classes involved as by the temporal sequence of events with explicit markers of time sequence. One of the problems of studying excerpts taken out of context
from a larger work that is scientific, is that, when alone, it can give the impression more of the informative type of discourse - for example, the following passages: #18S - The Possibility of Cytoplasmic Control and #19S Evolution in Evidence. The texts of which they form a part would actually be more appropriately described as hypothetical verification discourse.

The assumption we make is that this random selection will be representative of the whole corpus and that patterns which occur in this smaller corpus will be indicative of the patterns in the larger corpus.

4.3 Procedure

The procedure consists of a direct examination of the corpus, first of the passages in English and then of the passages in Malay. In the corpus examination, the 'ties' or cohesive relationships between sentences in each of the English and Malay passages are identified and comparisons between them in a number of dimensions are drawn. These are subsequently categorised according to one of Halliday and Hasan's five categories of cohesive devices - referential, conjunctive, substitutional, elliptical and lexical - and a count is taken for each category.
The analysis of cohesion, adapted from Halliday and Hasan (1976), is based on the concept of the text as a semantic unity which is dependent on the cohesion between its elements. In order to analyze a text in terms of its cohesive properties and give a systematic account of its patterns of cohesion, Halliday and Hasan (1976) use the term *tie* to refer to a single instance of a cohesive relation between intervening sentences. How cohesive elements build up a text across sentence boundaries is illustrated by *distance* or the number of intervening sentences separating the linguistic item from its referent. With regard to distance between cohesive ties, it is generally true that the greater the distance the more difficult it is to make semantic links and perceive cohesion or coherence in a text. Hence, with a long stretch of text, a writer has to choose among various types of reiteration.

Cohesion variables are analyzed by handcounts throughout the text corpus, and included only intersentential cohesion relations (following Halliday and Hasan, 1976).

### 4.4 Identification of Texts in the Corpus

In the analysis, the texts have been identified as #01S, #02S, #03S ... #20S for the passages in English
and #01T, #02T, #03t ... #20T for the translated passages in Malay. The symbols for the various types of cohesive device are as follows:

<table>
<thead>
<tr>
<th>Type</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference</td>
<td>r</td>
</tr>
<tr>
<td>Conjunction</td>
<td>c</td>
</tr>
<tr>
<td>Substitution</td>
<td>sb</td>
</tr>
<tr>
<td>Ellipsis</td>
<td>e</td>
</tr>
<tr>
<td>Lexical</td>
<td>l</td>
</tr>
</tbody>
</table>

Sub-categories like pronominalisations, whether they be straightforward or more complicated forms of pronouns such as proforms, pro-words or anaphora-nouns (Gill Francis, 1986), synonyms, antonyms, and so on are represented as follows,

- \( rp \) represents a pronoun/pro-form/pro-word with a referential value;
- \( rsy \) stands for synonym with referential value, and so on.

4.5 The Issue of Cohesion in Translation

Translation which entails comprehending a source text then rewriting it in another language is a thinking process in which the translator, in the role of the writer is always making decisions in lexical choice,
structural options and possible organizations of information and ideas. Words and sentences are carefully selected and arranged so that cohesion and coherence can be achieved through semantic, syntactic and contextual ties. Like writing, translation is a dynamic process and the construction of the text involves links at various levels, lexicon, grammar and organization.

Studies in coherence and cohesion often focus on the distinction between the two, that is, one is contrasted with the other. It would surely be of greater benefit to explore the relation between them, that is, how overt surface links contribute to the interpretation and communicative purpose of a text.

In non-literary as in literary translating, we need to consider the grammatical-combinatorial linking devices that produce coherent discourse. It is necessary to progress beyond the sentence and even beyond the text - in order to see translation as a dynamic communication process, not just as a simple item-to-item conversion. (cf. Nils Erik Enkvist, 1977)

In the early seventies, when text analysis was still in its early stages a number of important works were published that dealt with the subject of cohesion.
According to the works alluded to, a text is in part organized, in part created, by the presence in each sentence of these elements that require the reader to look to the surrounding sentences for their interpretation. Phenomena that had resisted satisfactory handling within sentence-bound grammar, such as pronominalisations, ellipsis, and sentence conjunctions were found to be not only well handled once textual factors were taken into account but capable of casting light on the nature of the text itself.

The earliest of the studies referred to, in fact, the first to be widely available was that of Quirk, Greenbaum, Leech and Svartvik (1972). Several of the later chapters of this mammoth grammar were devoted to the features that ground a sentence in its context, building on previous works by the authors (particularly Greenbaum, 1969); this was later superseded by a much expanded description in Quirk et al (1989). Another of these studies was that of Gutwinski (1969) (cf. CHAPTER TWO pp. 31).

The third and perhaps the most widely known, is Halliday and Hasan (1976). This work builds heavily upon two earlier works by Hasan, one published (1968), one unpublished (1976) which lists and classifies the devices available in English for linking sentences to
each other, and an unpublished but widely circulated report on research into scientific text by Huddleston, Hudson, Winter, and Henrici (1968) that used Halliday’s model.

For Halliday and Hasan, the organization of text, (which they term texture) is made up in a large part of relationships amongst items in the text, some semantic, some grammatical, which they refer to as cohesive ties. In the words of Ruqaiya Hasan,

"Texture is the technical term used to refer to the fact that the lexico-grammatical units representing a text hang together - that there exists linguistic cohesion within the passage. This cohesion is effected by the use of such linguistic devices as those of reference, substitution, ellipsis, conjunction and lexical organisation. The semantics of these cohesive devices ranges from absolute identity of meaning to simply certain kinds of contiguities of meaning".

(Halliday and Hasan, 1976; Hasan, 1971)

4.6 Grammatical Cohesion

The cohesive devices in English that Halliday and Hasan identified can actually be regrouped under two broad headings: grammatical and lexical. Classified under the grammatical grouping are: reference, conjunction, substitution and ellipsis. The discussion of each of these sub-categories is done with direct
reference to examples in English and Malay, extracted from the data base.

Since this exercise is a contrastive study of Malay and English in the use of these cohesive features, the same example is quoted in both the languages, hopefully to highlight in this manner the contrast between them. The studies on references in Malay are not numerous. Most of the works available have been conducted in a traditional framework; but whether traditional or generative, they have the disadvantage of being sentence-based, for even in attempts to explain the process of pronominalizations in terms of relevant transformations, the comparison lies at the level of comparing their operation with their English equivalents.

As is evident from the data we have analyzed the pronominalization process operates analogously in both languages. However, cataphoric pronominal reference is much more restricted in Malay than in English. In Malay the cataphoric role is usually played by the pronoun nya (cf. Example 1) and the anaphoric role by the demonstratives, ini, seumpama ini (cf. Examples 2 and 3 below while distal itu is rare.
Example 1  #17T & 17S

Lamarck mencadangkan dengan sedikit bukti yang menyokongnya, bahawa apabila sesuatu organisme mewujudkan keperluan untuk sesuatu struktur tertentu, ini mempengaruhi bentuk rupanya.

Lamarck proposed, with little supporting evidence, that when an organism develops a need for a particular structure, this induces its appearance.

Example 2  #02S & 02T

Pada tumbuhan berbunga, ini bermakna mempunyai mekanisme-mekanisme yang menggalakkan pendedungan silang.

In flowering plant this means having mechanisms that encourage cross pollination and prevent self pollination.

Example 3  #07T & #07S

Enzim-enzim yang memangkinkan pemindahan atom-atom seumpama ini dari satu bahagian molekul ke bahagian lainnya disebut isomerase.

Enzymes catalysing such transfer of atoms from one part of a molecule to another are called isomerases.

The demonstrative pronoun itu in Malay is more a definiteness marker (Example 4) and functions in a way similar to the English articles.
Example 4 #02S & 02T

Sebagaimana yang telah disebut terlebih dahulu, persenyawaan sendiri mencegah kemungkinan untuk percampuran genetik, dan jika ini berlaku secara meluas dalam banyak keturunan, ia boleh menyebabkan kemerosotan spesis itu.

As was mentioned earlier, self fertilization precludes the possibility of genetic mixing, and if carried out on a large scale over many generations it may lead to the decline of the species.

But based on the corpus analysed, a one-to-one equivalent translation of pronouns in English and Malay may not exist all the time. This is especially so when the pronoun in English may be the pro-subject it as in Example 5 below, or even the demonstrative pronoun those as in Example 6.

Example 5 #07T & 07S

Dalam banyak hal, tindakbalas ini melibatkan pemindahan atom atau kumpulan-kumpulan atom dari satu molekul kepada molekul lainnya: [zero] boleh jadi atom hidrogen, kumpulan fosfat, kumpulan amino dan sebagainya.

In many cases the reaction involves the transfer of atoms, or groups of atoms, from one molecule to another: it may be a hydrogen atom, phosphate group, amino group, and so on.

Example 6 #17T & #17S

Enzim-enzim yang khusus memangkinkan penyingkiran atom hidrogen dari suatu substrat disebut dehidrogenase, dan yang memangkinkan penambahan oksigen kepada hidrogen adalah oksidase.
Enzymes that specifically catalyse the removal of hydrogen atoms from a substrate are called dehydrogenases, and those that catalyse the addition of oxygen to hydrogen are oxidases.

Consequently Malay seems to allow for the proximal/distal contrast to be grammaticalized only if the relevant demonstrative pronouns play the role of adjectives, that is nominal modifiers. However, if they occur in sentence-initial position and are not followed by a nominal, they naturally perform the function of subject, analogous to that of pro-subject it in English. This is corroborated by the fact that the Malay equivalent of this, that is, ini is simultaneously the equivalent of English it as in Example 7 below.

Example 7  #12T & #12S

Walaupun banyak peristiwa partenogenesis buatan telah dinyatakan sebagai suatu kejadian semula jadi ini adalah terbatas pada kumpulan-kumpulan invertebebrata tertentu, khasnya serangga

Although many instances of artificial partenogenesis are claimed, as a natural occurrence it is restricted to certain groups of invertebrates, notably insects.

Sometimes the pro-subject it is not even replaced in Malay by anything as in Example 8 below,
Example 8 #16T & #16S

Walau bagaimanapun, [Zero] eloklah diingati bahawa pencantuman tisu dan pemindahan organ adalah peristiwa-peristiwa bukan semula jadi yang tidak pernah berlaku dalam alam tabii.

However, it is as well to remember that tissue grafting and organ transplantation are highly unnatural events which never occur in nature.

The distinction between proximal and distal demonstratives is neutralized in Malay to the effect that ini takes over the functions of both this and that where this/that and their Malay equivalents are used as introductions. For an instance of ini serving this function please refer to Example 2 pp.93.

From the data derived in the analysis of the 20 translated Malay passages then, the following observation about this and that may be made, and that is, they have the dual role of acting as modifiers or references in a text. However, there seems also to be some sort of a tacit agreement whereby ini or inilah is preferred when a demonstrative pronoun is used in the sentence-initial position performing the function of subject as in Example 9 #12T and Example 10 #03T below.
Example 9  #12T &#12S

Walaupun banyak peristiwa partenogenesis buatan telah dinyatakan, sebagai suatu kejadian semula jadi ini adalah terbatas pada kumpulan-kumpulan invertebrata tertentu, khasnya serangga. Pada setengah-setengah spesis, ini adalah satu-satunya cara pembiakan yang berlaku.

.........................diploid normal. Inilah yang berlaku pada peringkat-peringkat tertentu dalam edaran hidup a fid.

Although many instances of artificial partenogenesis are claimed, as a natural occurrence it is restricted to certain groups of invertebrates, notable insects. In some species it is the only known method of reproduction.

.........................diploid constitution. This is what happens at certain stages in the life of aphids.

Example 10 #03T & #03S

Ini boleh dilakukan terutamanya dengan menurunkan lantai farinks. Ini dilaksanakan dengan pengecutan satu siri-siri otot-otot hipobranks ... celah-celah insang (Rajah 8.8A). Ini menjamin supaya air hanya masuk melalui mulut dan liang-liang insang.

This is achieved mainly by lowering the floor of the pharynx. This is brought about by the contraction of a series of hypobranchial muscles which ... over the gill slits (Fig. 8.8A). This ensures that water enters only via the mouth and spiracles.

Ibu seems to be the rule when it is a choice between ini or itu in such conjunctive expressions as maka dari itu (#12T) dari itu (#12T)(#17T)(#18T), dan kerana itu(#01T), iaitu (#01T)(#02T) (#08T)(#15T)(#18T),
oleh sebab itu (#05T)(014T)(#20T), sejak itu (#16T)(#20T), dan dengan itu (#16T)(#20T) dan di samping itu (#18T), dan oleh itu (#01T)(#20T).

Occasionally though, the pro-subject it may be replaced in Malay by ia, (cf. Example 4 #02T & #02S). This seems to be a function only recently attributed to the pronoun and it reduces quite significantly the constraints of interlingual borders in translation arising from linguistic differences. In fact there have been at least two instances in the corpus where ia/ianya are used to translate they in the English source texts (cf #11T & #11S and #14T & #14S).

The distinction between the use of the pronoun 'dia' to refer to human subjects and 'ia/ianya' for inanimate or non-human referents is according to Asmah Haji Omar (1991) a rather recent development because in the 16th century the difference between the two pronouns was one of grammatical function and not of referent. 'Ia' functions as topic or subject of a sentence while other functions are fulfilled by 'dia'.

English is rich with a repertoire of referentially identical but textually different variants for its writers to select from and ensure that the communicative dynamism is effectively and economically maintained in a
text. And the It-predication is but one of these optional transformations.

The neutral sense of demonstratives is directly related to what Lyons (1977:651) calls 'impure textual deixis', where they function between anaphora and deixis. Both *this* and *that* may be used deitically to refer not only to objects and persons and to linguistic entities of various kinds in the text and co-text, but also to refer to past, present and future events.

4.6.1 Reference

Reference is one of the major cohesive resources. It refers to how the writer introduces participants and then keeps track of them once they are in the text. Participants are the people, places, concepts and things that get talked about in the text. Participants in a text may be presented (introduced as 'new' to the text) or presumed (encoded in such a manner that we need to retrieve their identity from somewhere). Only presuming participants create cohesion in a text since ties of dependency are created between the presuming item and what it refers to (its referent). When the writer uses a presuming reference item, the reader needs to retrieve the identity of that item in order to follow the text.
Thus with *reference*, the meaning of a linguistic item is specified and interpreted through its referent in the text.

Language can refer - or make reference - in two ways. Reference can be exophoric, in which case reference is made to some entity in the real world. This type of reference plays a secondary role in textual organisation. But it is also possible to refer, by language, to another bit of language: this reference-in-text, is called endophoric reference or cotextual reference and are traditionally classified as *pronouns*. Pronouns, as obvious from the examples cited above, can refer to reality via full nouns in one of two ways: backwards to nouns which have already appeared in the text (anaphoric reference), or in anticipation of a full noun (cataphoric reference).

Where the interpretation involves identification with a referent, ties include pronouns, articles and demonstratives. The commonest presuming reference items are:

(i) the definite article, *the*
(ii) demonstrative pronouns, *that, these, those, this*
(iii) pronouns, *he, she, it, they, them, her him*
In the light of these facts it might be interesting to juxtapose some English and Malay data as to the rules governing the use of anaphora. The present analysis concentrates on demonstrative pronouns in their anaphoric functions. Intuitively the relevant pronouns should behave analogously in both languages. The adduced examples confirm these intuitions as to the overall mechanism of pronominalization. But as indicated below, the differences between English and Malay do crop up as regard the details of the actual grammatical rendition of the pronominalization process. See example below where the ties are highlighted.

**Example 11 #01S & #01T**

Though they may be widely separated from another, endocrine organs do not exist in functional isolation. They influence one another and, through their interactions, are integrated into a highly coordinated system, the endocrine system.

Sungguhpun mungkin terletak jauh terasing dari satu sama lain dari segi fungsi organ-organ endokrin tidak wujud secara berasingan. Organ-organ ini mempengaruhi satu sama lain dan, menerusi tindakan**nya** yang menyaling, diintegrasikan ke dalam sistem yang diselaraskan dengan sepenuhnya, iaitu disebut sistem endokrin.

In the case where interpretation of a linguistic item is through comparison with a referent, comparative and superlative forms of adjectives as well as other
comparative items preceding nouns (e.g. the same, a similar, another, a different) and equivalent forms in Malay, are counted as ties.

Example 12 #05S & #05T

In the case of fat and protein rather less energy is released when these are oxidised in the body than when they are burned in a bomb calorimeter, the reason being that inside the cells they are not completely broken down.


4.6.1.1 Anaphoric reference

Anaphoric or backward pointing reference is based on the assumption by the speaker that the hearer already knows something of what he is talking about. In the aforementioned passage, Example 12, the demonstrative pronoun these and the personal pronoun they in the English text are anaphoric references to fat and protein. It is to be observed, however, that this anaphoric reference is marked by a zero in the Malay translated version. In Malay the personal pronoun for the third person plural - mereka - and its related possessive adjective mereka are strictly speaking only applied to human referents and not inanimate objects,
noe even referents from the animal kingdom. Though the problem of the possessive adjective is easily resolved in translations by the end-affix *nya*, the referential *they* is generally replaced by a generic term such as *bahan-bahan* (substances) followed by the modifier *ini* or *itu*. In fact, it is common recommended practice in Malay translation to repeat the full form of the referent. However, occasionally modern Malay writers take the liberty of making an exception to the rule and so we find in Text #11T the following sentence where *they* in the English version in one instance is translated by a repeat of the full form of the word and in another instance by *mereka* in the Malay text,

**Example 13 #11S & #11T**

*They are amoeboïd, moving about in contact with the endothelium of the blood vessels where they ingest bacteria (Fig 17.4).*

*Sel-sel ini berbentuk seperti amebe dan bergerak bersentuhan dengan endotelim saluran-saluran darah di mana *mereka* bergerak memakan bakteria (Rajah 17.4).*

In other words, there is no one-to-one equivalence in reference patterns between Malay and English. In some other passages the reverse is the case, that is, *yang* bearing the meaning of 'those' is inserted where in the English passage it is a zero marking. Note **Example 14** below,
Example 14  #09S & 09T

If and when a particular antigen gets into the body it stimulates certain cells, [zero] derived from the lymphocytes, to produce a corresponding protein called an antibody.

Jika dan bila antigen tertentu memasuki badan, ianya merangsangkan sel-sel tertentu, iaitu yang terbit dari limfosit, untuk menghasilkan protein yang selaras yang disebut antibodi.

4.6.1.2 Cataphoric reference

Cataphoric systems as mentioned earlier represent a different kind of cohesion, one that alerts the hearer/reader to something that is yet to come. The pronoun they and the proform one another in the following text reveal a cataphoric relationship with endocrine organs. In the Malay version this relationship is signalled by only one referential tie, that is, satu sama lain (one another).

Example 15  #01S & #01T

Though they may be widely separated from one another spatially, endocrine organs do not exist in functional isolation ...

Sungguhpun mungkin terletak jauh terasing dari satu sama lain dari segi fungsi organ-organ endokrin tidak wujud secara berasingan ...

Cataphoric relationships also hold between sentences. In the example below, it has both anaphoric as well as cataphoric value.
Example 16  #09S & #09T

Each kind of micro-organism, it might be the diphtheria bacillus or the polio virus, contains a wide range of macromolecules which act as antigens ...

Setiap jenis mikroorganisme, [zero] baik basilus difteria mahupun virus polio, mengandungi berbagai jenis makromolekul yang bertindak sebagai antigen ...

4.6.1.3 Summative Lexeme Reference

A third way to categorize types of reference is according to the size and nature of the segment referred to. Quirk et al. (1972:701) highlight two main types: the proforms which refer to a sentence (or clause) and those which refer to a noun phrase. This in #17S below is a summative lexeme which refers to the entire preceding sentence (underlined).

Example 17  #17S & #17T

This idea was based on the observation that structures which are subjected to constant use become well developed, whereas those that are not used tend to degenerate. This in itself is not an unreasonable proposition; after all everyone knows the effect that exercise and training can have on the development of the muscles in a weight-lifter.

Gagasan ini didasarkan kepada pemerhatian bahawa struktur-struktur yang sentiasa digunakan berkembang dengan baik, manakala struktur-struktur yang tidak selalu digunakan berkecenderungan untuk merosot. Cadangan ini
secara tersendiri bukanlah tidak munasabah; malahan kita sedia maklum tentang kesan senaman dan latihan ke atas pembentukan otot-otot seorang pengangkat berat.

In the Malay translation (#17T), the reference to the preceding sentence is brought about not by a pro-word summative lexeme but by a summative noun phrase which is made up of two constituent elements, *ini* and a preceding generic term *cadangan*.

**Example 18 #12S & #12T**

There are two kinds of parthenogenesis: diploid and haploid. In diploid parthenogenesis the eggs, instead of being formed by meiosis, are formed by mitosis, with the result that they are diploid instead of haploid. The resulting adult will therefore have the normal diploid constitution. **This** is what happens at certain stages in the life of aphids.


In Example 18, #12S and #12T however, one can say that Malay coincides with English in the use of a summative lexeme pro-word to establish a referential relationship with the preceding sentence.
4.6.1.4 Proforms/Pro-words

On closer inspection we find that proforms can refer to a whole range of full forms used elsewhere in the text, not just sentences and NPs (noun phrases). Proforms, in other words, are abbreviations of the full forms and can stand for adverbs and predicates (that is, parts of sentences). Some pro-word constants are, this, these, that, those, it and they.

Pro-words are sometimes not resolvable within the sentence itself, but are resolvable in the larger context of the passage. The pro-word this in the source text and inilah in the target Malay text in Example 12 above is a case in point.

The simplest of these cases is when the pro-word refers to a noun phrase in the previous sentence. The reference, however, can be more complex. The noun phrase referred to may not be the preceding noun phrase, but may actually be a noun phrase two or more sentences away.

Almost always such cases involve some semantic considerations. In some cases the semantic information to resolve this reference is contained within the text under consideration, but in some cases the information needed to resolve the problem must come from general
knowledge about the world. The phrase referred to is not always a particular noun phrase. The reference may be to a previous whole sentence or to a set of previous sentences, or may even refer to the whole previous text.

Pronouns continue as subsequent mentions of an introducing noun phrase until there is a shift to a new discourse segment, when the full noun phrase surfaces again or is re-entered into the discourse. It is a fact that pro-words do not occur in the first sentence of a text. This fact is borne out in all the texts in our corpus, both in English and in Malay. (cf. Appendix IA and IB)

One rather distinctive contrast between Malay and English in the use of pronouns lie in the frequency of appearance of the ordinal pronoun phrases the former and the latter. Though used occasionally in English the ordinal pronoun phrase is quite restricted in terms of its occurrence. The ordinal pronoun phrase, the latter appeared four times in the data analysed but there was only one instance of the use of the ordinal pronoun phrase the former. The use of its equivalent in Malay is even more rare though it does exist. The following examples are two of the four cases we have identified in our corpus:
Example 19  #02S & #02T

Self-fertilisation may be prevented by the stamens and carpels being located in different flowers, or maturing at different times (stamens first, carpels later, or vice versa).

This latter strategy is also used by certain haemophroditic animals in which the testes develop before the ovaries.

Persenyawaan sendiri boleh dicegah dengan cara stamen dan karpel terletak pada bunga-bunga yang berasingan (stamen dahulu, karpel kemudian, atau sebaliknya). Strategi yang disebut terkemudian, juga digunakan oleh haiwan hermofrodit tertentu di mana testis berkembang sebelum ovari.

Example 20  #03S & #03T

This ensures that water enters only via the mouth and spiracles. The latter are lined with sensory epithelium which tests the incoming water. If undesirable, the water is expelled and the fish moves elsewhere.

Ini menjamin supaya air hanya masuk melalui mulut dan liang-liang insang. Liang-liang insang dilapik oleh epithelium deria yang menguji air yang masuk. Jika tidak dikehendaki, air ditolak keluar dan ikan bergerak ke tempat lain.

Malay has no similar expression equivalent to 'the latter' in English, thus in the Malay text #02T in Example 19 above, the meaning of 'the latter' is conveyed by strategi yang disebut terkemudian which means 'the last mentioned stategy'. In Example 20, however, the last named nominal is taken up again thus creating a link with the clause before it.
Example 21 #07S & #07T

Enzymes can be divided into two main groups: intracellular and extracellular. the former occur inside cells where they control metabolism. The latter are produced by cells but achieve their effects outside the cell: they include the digestive enzymes that break down food in the gut.


Example 22 #15S & #15T

They are separated from each other by narrow air spaces and are densely packed with chloroplasts. The latter tend to arrange themselves in the part of the cell which receives maximum illumination, usually the upper part.

Sel-sel ini terasing satu dari yang lain oleh ruang udara yang sempit dan berisi padat dengan kloroplast. Kloroplast cenderung untuk menyusun dirinya pada bahagian sel yang menerima pencahayaan maksimum biasanya di bahagian atas.

The same remark made above for Example 20 seems to hold here as well. Repetition seems to be a more favoured device in Malay.

In conclusion, it is worth noting that, although it, this and that may only play a relatively minor role in textual organization, close examination of their
characteristic environments raises fundamental questions about the status of paragraphs and discourse segments and about how writers structure their arguments, create foci of attention in texts and signal desired interpretations.

4.6.2 Conjunctions

Conjunction is cohesive by its semantic relation between two events in a narrative, two steps in an argument, or two continuous parts of a text. Conjunctive ties are connecting words between sentences, for example, and, however, consequently, of course, thus and equivalent forms in Malay such as, dan, tetapi, sekiranya, sungguhpun, dari itu, etc.

Some languages are quite richly endowed with conjunctions while other languages seem to have a considerable dearth of them. Conjunctions are usually classifiable as temporal versus logical conjunctions though others may be essentially locative as exemplified in the texts below. Basically they may be broadly grouped into coordinating and subordinating conjunctions.
Example 23 #20S & 20T

Fleming had been working on staphylococcus and (1) it happened that some spores of a mold floated into his laboratory through an open window and (2) landed on one of his staphylococcus colonies.

Ketika Fleming sedang menjalankan penyelidikan ke atas staphylococcus, secara kebetulan ada beberapa spora kulat yang terbang masuk ke dalam makmalnya melelui tingkap yang terbuka dan (2) jatuh di salah satu dari koloni staphylococcus.

It is quite clear in the example above that the two ands in the English sample and the dan in the Malay translation are temporal conjunctions. In fact the temporal nature of and (1) is so transparent that it is translated into Malay by the word ketika meaning when while and (2) is translated with its lexical equivalent dan which literally means and.

This temporal and occurs primarily with conjoined verbs, though there are some instances in which it occurs with conjoined nouns.

Example 24 #11T & #11S

Pada peringkat-peringkat awal jangkitan tempatan, beratus-ratus neutrofil berpindah dari kapilari-kapilari ke kawasan yang terjangkit, dan di sini nitrofil-nitrofil ini menjalani fagositosis secara besar-besaran.

In the early stages of a local infection hundreds of neutrophils migrate from the capillaries to the infected area, where they undergo phagocytosis on a large scale.
In Example 24 #11T dan plus di sini act as a locative conjunction joining the last part of the sentence to that immediately preceding it.

In Example 25 (#12T and #12S) and Example 26 (#14T and #14S) the simple form of causal relation is expressed through the conjunction therefore, for which the Malay translation can take more than one form, namely Maka dari itu or Oleh sebab itu. It is to be noted that the conjunctive phrases in Malay occupy initial position at the start of the sentence unlike their counterpart in English.

Example 25 #12T & #12S

Dalam partenogenesis diploid, telur bukannya dibentuk dengan meiosis melainkan melalui mitosis; sebagai hasilnya telur-telur ini adalah diploid dan bukan haploid. Maka dari itu haiwan dewasa yang dihasilkan akan mempunyai konstitusi diploid normal.

In diploid partenogenesis the eggs, instead of being formed by meiosis, are formed by mitosis, with the result that they are diploid instead of haploid. The resulting adult will therefore have the normal diploid constitution.

Example 26 #14T & #14S

Jalinan kapilari dalam paru-paru mempunyai jumlah kawasan lebih kurang 40 meter persegi. Oleh sebab itu dalam paru-paru satu kawasan permukaan yang luas untuk pertukaran gas ditumpatkan dalam satu ruangan yang sangat kecil.
The capillary network in the lungs has a total area of about 40 square meters. In the lungs, therefore, an enormous surface area for gaseous exchange is packed into a comparatively small space.

However, the same observation cannot be said to hold for the adversative conjunctions However and Namun begitu in Example 27 below. In both the English and Malay texts, the adversative conjunctions as introducers of sentences serve to fit the sentence into paragraph context.

**Example 27 #02S & #02T**

The majority of animals have separate sexes, i.e. they are dioecious. **However** most plants (and some animals) are hermaphrodite (monocious), i.e. each individual has both male and female organs.

Kebanyakan haiwan mempunyai jantina yang berasingan yakni haiwan ialah dioesius. **Namun begitu**, kebanyakan tumbuhan (dan setengah-setengah haiwan) adalah hermofrodit (monoesius), iaitu tiap-tiap individu mempunyai organ jantan dan juga organ betina.

They also serve to fit the paragraph into discourse context as in the following instance.

**Example 28 #16S & #16T**

................. at the research level and some people believe that in time it may become common medical practice.
However, it is as well to remember that tissue grafting and organ transplanting are highly unnatural events which never occur in nature.

............. pada peringkat penyelidikan dan setengah-setengah mempercayai bahawa dalam sedikit masa lagi akan menjadi amalan perubatan yang biasa.

Walau bagaimanapun, eloklah diingati bahawa pencantuman tisu dan pemindahan organ adalah peristiwa-peristiwa bukan semula jadi yang tidak pernah berlaku dalam alam tabii.

4.6.2.1 Conjunctions as Adversative Ties

In Example 28 above the conjunctions however and walau bagaimanapun signal a change in the development of the text. It is an example of what Halliday and Hasan term adversative cohesive ties. Other adversative markers in English are: yet, although, but, nevertheless, instead, on the contrary. Their equivalents in Malay are: sungguhpun, namun begitu, sebaliknya, selain itu, tetapi ... Example 29 below is a case in point.

Example 29 #14S & #14T

Although a certain amount of gaseous exchange can take place across the walls of the smaller tubes, it is the alveoli which play the leading role in this respect.

Sungguhpun sejumlah tertentu pertukaran gas boleh berlaku menerusi dinding salur-salur yang lebih halus, alveolus-alveolus yang sebenarnya memainkan peranan utama dalam proses ini.
4.6.2.2 Conjunctions as Additive Markers

Other markers such as Furthermore, and, also, moreover, that is, alternatively in English and Tambahan pula, dan, juga, selain itu, iaitu in Malay are called additive markers or link which signal an addition to a previous element. An example of this marker is Juga in the following sample of text,

Example 30 #07S & #07T

Both of these are involved in the final steps in respiration. Also important in respiration are the phosphokinases which catalyse the addition of phosphate groups to a compound.

Kedua-dua ini terlibat dalam peringkat-peringkat akhir dalam pernafasan. Juga penting dalam pernafasan ialah fosfokinase yang memengkinkan penambahan kumpulan-kumpulan fosfat kepada sebatian.

4.6.2.3 Conjunctions as Causal Links

Thus, consequently, therefore, it follows that, for this reason and their Malay equivalents, oleh demikian, oleh itu, sebab itu, dan dengan itu constitute examples of the causal type of link which signal action taken or to be taken because of problems or factors described in earlier or immediately preceding sentence(s).
Example 31 #20S & #20T

The mold was subsequently identified as *Penicillium notatum* for which reason the active substance killing the bacteria was called penicillin. In 1940 Howard Florey and Ernst Chain succeeded in isolating and purifying the active substance, thereby enabling it to be used in injections.

Kulat ini selanjutnya dikenal sebagai *Penicillium notatum* dan oleh sebab itu bahan aktif yang memusnahkan bakteria itu dipanggil penisilin. Dalam tahun 1940 Howard Florey dan Ernst Chain berjaya mengasingkan dan memurnikan bahan-bahan aktif itu, *dan dengan itu* membolehkannya digunakan untuk menyuntik.

Example 32 #07S & 07T

Normally an enzyme is named by attaching the affix -ase to the name of the substrate on which it acts. *Thus* maltase acts on maltose, lipase on lipid, urease on urea, and so on.

Biasanya sesuatu enzim itu diberi nama nama dengan cara membubuhkan akhiran -ase kepada nama substrat yang menjadi tempat tindakannya. *Dari itu* maltase bertindak ke atas maltose, lipase ke atas lipid, urease ke atas urea, dan seterusnya.

4.6.2.4 Coordinating Conjunctions

The major coordinating conjunctions identified in the corpus were *and* and *or* and their equivalents in Malay *dan*/*serta* and *atau*. Under this type of conjunctions Halliday (1968:220) lists the "pure coordinators" (*and* and *or*) and the portmanteau items, in which a coordinator is combined with some further
meaning (*but, yet, so, then*). To him coordinating conjunctions are not constituents of the clause. By virtue of their conjoining function, they occupy an initial position, either at the beginning of the second conjoint or, when used in a discoursal sense, at the beginning of an independent clause or other unit, and their function is to signal that an inference is to be drawn or some other connection is to be made with the preceding discourse.

One function of conjunctions in some languages is to mark whether the subject of the clause which follows the conjunction is the same or different from the subject of the clause which precedes. Thus in Example 33 *and* marks a same subject sequence and in Example 34, *and* marks a different subject sequence. Dependent verbs may likewise indicate the same distinction via verb affixes.

**Example 33**  #078 & #07T

Enzymes catalysing such reactions are known as transferase *and* they play an important part in energy-production and other metabolic processes in cells.

Enzim-enzim yang memangkinkan tindakbalas-tindakbalas seumpama ini dikenal sebagai transferase *dan* memainkan peranan penting dalam penghasilan tenaga serta lain-lain proses metabolisme.
Example 34  #16S & #16T

Advances have already been made in this area at the research level and some people believe that in time it may become common medical practice.

Kemajuan-kemajuan telah dicapai dalam lapangan ini pada peringkat penyelidikan dan setengah setengah orang mempercayai bahawa dalam sedikit masa lagi akan menjadi amalan perubatan yang biasa.

Another type of coordination with and requires a temporal interpretation of the sequence of sentences which are coordinated. In the standard construction with and there is no fixed order to the conjoined terms. Changing the order of the conjoined phrase produces a paraphrase of the original sentence. In sentences where terms are conjoined by the temporal and the order of the terms is fixed. A change in the order of the conjoined terms produces a sentence which differs in meaning from the original, for example:

Example 35  #05S & #05T

The food is placed in a strong steel chamber which is filled with oxygen and tightly sealed.

Makanan itu dimasukkan ke dalam satu peti keluli yang kuat dan diisi dengan oksigen dan ditutup rapat.
4.6.2.5 Inclusive and Exclusive or

The coordinating conjunction or (atau or ataupun in Malay) can have inclusive or exclusive significance. The major ambiguity of sentences containing this conjunction is deciding whether the inclusive or exclusive meaning of or is the proper reading. For scientific texts, the distinction between the inclusive and exclusive or is crucial for a proper analysis of the semantic content of the text. By looking at the structure of the other sentences in the text the distinction between inclusive and exclusive or can often be made. And this need to determine between the inclusive or exclusive nature of or in a given sentence has serious implications for the activity of translating. In Examples 36 and 37 below or (1) is inclusive while or (2) is exclusive.

Example 36  #16S & #16T

Subsequent rejection of the transplanted organ, or (1) graft, is prevented, or (2) at least slowed down, by cobalt irradiation and immuno-suppressive drugs which inhibit the body’s normal immune response. The trouble is that in so doing they inhibit the body’s defences against micro-organisms and therefore lay the patient wide open to disease. The high failure rate in transplantation operations is due to the patient succumbing to a disease, commonly pneumonia, or to rejection of the organ.
Penolakan berikutnya terhadap organ-organ yang dipindahkan atau (1) dicantum ini dapat dielakukan ataupun (2) sekurang-kurangnya diperlambatkan dengan cara penyinaran kobalt dan dadah penindas mangli yang menyekat gerakbalas mangli normal daripada badan. Masalahnya ialah bahawa dengan berbuat demikian toleransi badan terhadap mikro-organisme tersekat dan dengan itu mendedahkan pesakit kepada penyakit. Kadar kegagalan yang tinggi dalam pembedahan-pembedahan pemindahan adalah disebabkan oleh pesakit mengalah kepada penyakit, biasanya pneumonia, atau penolakan organ-organ berkenaan.

Example 37  #20S & #20T

This is the administration of chemical substances, natural or (1) synthetic, that kill or (2) prevent the reproduction of micro-organisms.

Cara ini merupakan penggunaan bahan-bahan kimia, semula jadi atau (1) buatan, yang membunuh atau (2) menghalang pembiakan mikroorganisme.

Given only the sentences themselves, a decision about which meaning of or is intended cannot be made. However this decision can be made on the basis of the other sentences in the text. The distinction between inclusive and exclusive or in the above examples is not based purely on syntactic grounds, but rather, involved considerations of paraphrase and truth values of sentences.
4.6.2.6 Concluding Remarks on Conjunctions

The above discussion on conjunctions merely took into account the conjunctions encountered in the texts analysed. Based on the assumption that these texts are representative of expository scientific discourse we can say that these are the types of conjunctions that we are most likely to come across in scientific texts of a general informative nature. We are not staking the claim that these are the very same pronouns we will come across in the strictly speaking pure scientific texts which can themselves be categorised into:

- hypothesis verification
- controlled experiment
- technique descriptive
- structure descriptive

However one general observation can be made based on the analysis of the data and that is, conjunctive relations are realized between rather than within clauses - the text unfolds in a relatively iconic relation the activity sequence it describes.

Finally it is to be noted that in all the examples cited so far the logical relation has been expressed through a conjunction. Not all conjunctive relations are expressed explicitly. Conjunctive relations can also be
expressed implicitly, through the simple juxtaposition of sentences as in the example cited much earlier. (cf. CHAPTER TWO pp. 43). There is no conjunction linking the two sentences, we can only make sense of the occurrence of Sentence 2 in relation to 1 if we read in an enhancing relation (of consequence) between them. For a complete presentation of the various types of conjunctions encountered in the corpus of English texts and their translations in the Malay texts, refer to Appendix II.

4.6.3 Substitution and Ellipsis

As can be seen in the discussion under the sub-section reference, when proforms are used they represent fuller forms occurring elsewhere in the context. A degree of reduction is achieved by their use. Such an instance of cohesive link can be interpreted as either referential or substitutive depending on the criteria adopted. They can be semantic or grammatical.

Substitution, linguistically speaking is a relation on the lexicogrammatical level, the level of grammar and vocabulary, whereas reference is a relation on the semantic level. Diagrammatically this can be represented as:
Type of cohesive relation: Linguistic level

Reference Semantic
Substitution (including ellipsis) Grammatical

(Source: Halliday and Hasan, 1976:89)

Ellipsis by contrast brings about the total elimination of a segment of text. Its effect is 'to create cohesion by leaving out ... what can be taken over from preceding discourse.' (Halliday & Hasan, 1976: 196).

Substitution and ellipsis are, from the point of view of Halliday and Hasan, grammatical relations; substitution occurring whenever one of a small class of items 'stands in for' an earlier lexical item in the text while ellipsis, when what stands in for an earlier item is zero - nothing at all. The listener or reader has to supply the missing bit if he is to make sense of the sentence encountered.

Such textual items depend entirely on other items for their interpretation and have no definitional meaning in themselves. They are grammatical members of closed systems and not lexical items, except in so far as all grammatical items are potentially treatable as lexis (Halliday, 1966; Sinclair, 1966). Their function
is to stand in, or substitute, for lexical items. Hence, generally speaking, they have the same structural function as that for which they substitute.

Quirk et al term such textual items substitution links. Halliday and Hasan (1976) on the other hand, use the term substitution to apply to a narrower class of items, using the label reference to describe other items like pronouns and repetitions. For them, the boundary lines among these two categories and references are indistinct.

Ellipsis, according to them, is usually anaphoric in English but may also be cataphoric. The use of the linguistic item same in the stretch of language below may not be a common occurrence but it definitely is a sound example of what they mean by cataphoric ellipsis.

Example 38  #03S & #03T

In the dogfish - and the same applies to other cartilaginous fishes such as sharks and rays - five gills pouches connect the pharynx with the exterior on each side of the body.

Pada ikan yu kecil dan juga pada lain-lain ikan bertulang rawan seperti jerung dan ikan pari, lima pundi insang yang terdapat pada setiap sisi badan menyambungkan farinks dengan bahagian luar badan.

It may seem paradoxical at first sight that the elimination of part of the message should serve to
achieve textual cohesion: indeed one expects the opposite to happen, and the reader to lose the thread. But seemingly insignificant, small grammatical items like so in the text below has a meaningful role to play by contributing very largely to the cohesion within the text. So here is an example of an anaphoric elliptical item standing in for the two noun phrases removing the thymus at birth and then treating the animal with chemicals extracted from the gland in the preceding sentence. The same analysis holds for rawatan seperti ini in the text in Malay.

Example 39  #06S & #06T

This has been shown by removing the thymus at birth and then treating the animal with chemicals extracted from the gland. Animals so treated do not develop the wasting disease and the immune response develops in the normal way.

Ini telah ditunjukkan dengan mengeluarkan timus pada ketika kelahiran dan kemudian merawat haiwan itu dengan bahan-bahan kimia yang diekstrakkan dari kelenjar timus. Haiwan-haiwan yang mendapat rawatan seperti ini tidak mengalami penyakit perosotan dan gerakbalas mangli terjadi seperti sedia kala.

Some linguists are of the opinion that it may be appropriate to treat ellipsis together with substitution, as the difference between them is but one of degree of elimination and not of kind; and whichever
of the two is resorted to, reflects the writer's choice of rhetorical style.

With the exception of conjunction, substitution and ellipsis seem to share something in common with reference and that is, they are all ways of repeating.

Following the classification of Halliday and Hasan, five items commonly substitute for nouns (and noun phrases), verbs (and verb phrases) and clauses and they are:

Nominal : one(s); the same,
Verbal : do/did
Clausal : so, not

As we can see from the samples which follow, these functional grammatical items in the English language seem to have their counterparts in Malay. It is to be remembered however, that not every instance of the use of any of the items above necessarily indicates cohesive ellipsis or substitution. An attestation of this is to be found in Examples 40 - 41 in which the lexical One functions not as a cohesion generating element but as a determiner.
Example 40  #01S & #01T

Hormones are organic compounds produced in one part of the body, from which they are transported to other parts where they produce a response.

Hormon adalah sebatian organan yang dihasilkan dalam satu bahagian badan dan dihantar ke bahagian-bahagian badan lainnya di mana sebatian ini mengakibatkan gerakbalas.

Example 41  #02S & 02T

The different devices that have evolved include the possession of brightly coloured petals and/or petals, the secretion of nectar, and the emission of a potent scent for attracting insects which convey the pollen from one flower to another.

Di antara berbagai mekanisme yang telah dikembangkan termasuklah mempunyai kelopak-kelopak dan/atau sepal berwarna cerah, perembesan nektar, serta pengeluaran suatu bau kuat untuk menarik perhatian serangga-serangga yang membawa debung dari satu bunga kepada bunga yang lain.

The same can be said of the item the same in Example 42 below. Unlike an earlier occurrence of this item (cf. Example 38, pp. 125), where it was cited as a good instance of the rare cataphoric ellipsis, the same in this context is neither substitutive nor elliptical. Its function in this instance is more that of a demonstrative modifier.
Example 42 #16S & #16T

If such drugs can be developed there is no reason why organs should not be transplanted freely between different individuals of the same species (homografs) or indeed between individuals of different species (heterografs) with reasonable success.

Sekiranya dadah-dadah seperti ini boleh dimajukan tidak ada sebab mengapa organ-organ tidak boleh dipindahkan secara bebas antara individu-individu yang berlainan tetapi spesie yang sama (homografit) ataupun individu-individu dari spesie yang berlainan (heterografit) dengan kejayaan yang sewajarnya.

Example 43 #08S & #08T

This is a protein extracted from cells which has been found to prevent multiplication of viruses. Unlike antibodies it is non-specific, i.e. it is effective against a wide range of viruses, not just one.

Interferon adalah protein yang diekstrakkan dari sel-sel yang didapati menghalang pembiakan virus. Berlainan dengan antibodi, interferon tidak spesifik, iaitu ianya berkesan dengan banyak virus, bukan hanya satu sahaja.

One in Example 43 above may be regarded as marking the presence of ellipsis. It is anaphoric and replaces kind of virus.

However it is to be noted also, as evidenced in Example 44, that a one-to-one equivalent may not always be possible. Whereas in the English text one is a substitute for the preceding noun phrase the relationship between the alveoli and the capillaries, no
such substitutive grammatical item was necessary in the Malay translation. Hence the zero marking. One here is the substitutive and not numeral one for it is preceded by the numeral an and epithet extremely intimate. Both on the other hand functions elliptically referring back to the nominal group the walls of the capillaries and alveoli, having the sense of two, that is, the walls of the capillaries and the walls of the alveolus. In this instance too, the Malay translated text shows zero marking, though for each other there is a perfect equivalent. Each other stands in for the single layer of flattened epithelial cells (in both the walls) while satu sama lain replaces lapisan tunggal sel-sel epithe-lium leper (dinding-dinding kapilari darah dan alveolus).

Example 44  #14S & #14T

The relationship between the alveoli and the capillaries is an extremely intimate one. The walls of the capillaries and alveoli both consist of a single layer of flattened epithelial cells firmly applied to each other.

Example 45  #048 & #04T

Air is drawn into the lungs via the trachea and bronchi. The expansion of the thoracic cavity is brought about by the upward and outward movement of the ribs, accompanied by flattening of the diaphragm (Fig. 8.2B and C). The rib movements are achieved by contraction of its radial and circular muscles. All this constitutes inspiration.


The words all and both very frequently function elliptically. They may refer back to a single nominal group, in which case it will be plural, having the sense of two if presupposed by both as in Example 43; and more than two, if presupposed by all as in Example 44, where all this presupposes the four preceding actions that constitute an act of inspiration. In this instance, the Malay text seems to have an exact equivalent in semuanya ini.

Based on the foregoing analysis one inevitable observation is, each language is sufficient unto itself as far as the grammatical and lexical elements for encoding a message are concerned. Differences exist only as a result of differences in style.
Example 46  #14S & 14T

As such, it offers minimum resistance to the diffuson of gases from one side to the other.

Oleh yang demikian, keadaan yang serupa itu memberi rintangan minimum terhadap resapan gas-gas dari satu bahagian ke bahagian lain.

In Example 46 we see the substitutive effect of the word other. This is so by virtue of the presence of the preceding demonstrative determiner the. In the Malay translation however, the full form is given, so the question of determining whether it is substitution or ellipsis that is at work here does not arise. However, one remark perhaps may be pertinent and that is, this reminds us of what has been said in another instance earlier on, the absence, in certain aspects, of a one-to-one equivalent between the two languages concerned.

Example 47  #17S & #17T

This idea was based on the observation that structures which are subjected to constant use become well developed, whereas those that are not used tend to degenerate.

Gagasan ini didasarkan kepada pemerhatian bahawa struktur-struktur yang sentiasa digunakan berkembang dengan baik, manakala struktur-struktur yang tidak selalu digunakan berkecenderungan untuk merosot.

In Example 47 a little ambiguity enshrouds the grammatical item not used which can be said to be
functioning elliptically if it is taken to be the replacement for the interpreted meaning of not subjected to constant use. This is in fact the interpretation given to it in the Malay translation where the full form stated in the preceding part is repeated almost in toto.

For a more complete list of the substitutive and elliptical cohesive items occurring in the texts in the corpus please refer to Appendix III. N.B. Only clearcut cases are included.

4.7 Lexical Cohesion

A text can be well-formed also from the lexical point of view. This is what is called lexical cohesion, that is, the cohesive effect achieved by the selection of vocabulary. Such lexical relations as synonymy, antonymy and items of the same semantic domain are well-known. They serve many functions in giving cohesion to discourse. For example, the verbs which lie on the backbone of a discourse are not a haphazard ensemble. On the contrary, they characteristically come from adjoining semantic domains.

Synonymy, antonymy, repetitions of predicates, the addition of further accompanying noun phrases, and
vocabulary items related in a hierarchy from generic to specific, all make possible varieties of paraphrase. Paraphrase relations give very close ties between sentences in a discourse and characteristically indicate embedded paragraphs.

The choice of vocabulary in a text is largely a function of the subject matter. It could be argued that lexical meaning does not inhere as if by magic, in particular, words, but is called into existence by the texts. lexis constitutes a major device for organising experience.

4.7.1 Research on Cohesion

Relatively little exists in the way of a lexical theory which considers lexis in its text forming role. A few scattered hints may be found, such as are provided in the concept of register. In this context, Firth, for instance argues that collocational patterning varies with genre. Sinclair, Jones and Daley have also looked into the field of lexical collocation. (Sinclair et al, 1970). A major concern of the Sinclair study was to give precision to the category of span upon which the whole notion of the lexical patterning of text rests.
Most writers on cohesion have seen part of their function as being the provision of a detailed classification of cohesive devices.

Winter (1974, 1979), however, has little interest in such classifications. Instead his interest centers on how the grammar of sentences contributes to their interpretation in context. For him the function of cohesive ties is to repeat. What he had in mind here was lexical repetition which is broadly equivalent to Halliday and Hasan's reiteration.

Another linguist who has done relevant work in the area of lexis is Martin Phillips (1983, 1985, 1989). Phillips's concern was with the nature of collocation and its power to organize book-length texts. He took as his data scientific textbooks and as his unit of analysis the orthographically defined chapter and showed that it is possible to identify the collocates of any given word by statistical means.

His study was significant in the sense that he discovered that the words often intercollocated. In other words, if a word collocated with one of the words in a group, there is reasonable chance that that word might also collocate with the rest of the words in the
group. Thus it was possible to set up a network of connections to represent the intercollocations.

What Phillips was actually trying to prove is that collocation is text-sensitive and that clusters of repetitions occur irregularly (and therefore significantly) at long distance. Since networks vary from chapter to chapter, the presence in any two chapters of networks closely resembling each other can be used as a measure of the closeness of relationship of those chapters.

In the final analysis, Phillips' findings were meant to show that chapters are connected by lexical cohesion and that the connection has organisational significance and constitute a vital element in the reader's understanding of text. Understood rightly this means to say that lexical cohesion is of the greatest importance in text organisation.

Hoey, in his investigation of the patterning effects of lexis gives priority to lexical links over grammatical links. Lexical cohesion, he believes, is the only type of cohesion that regularly forms multiple relationships (though occasionally reference does so too) (Hoey, 1991:11). That being so, lexical cohesion becomes the dominant mode of creating texture.
In the case of Roe (Roe, 1977a), his principal concern is to investigate how scientific subject matter can be said to be embodied in text. Roe focuses on the conceptual structure of text and argues pertinently that it is a global textual phenomenon, seeking his evidence by means of a distributional analysis of the lexis of the texts in his corpus. To him the most obvious way in which text creates cognitive meaning is through lexis. Roe put forward the concept of 'systemic lexis', which argues that lexis displays a systematic relationship to textual content.

The investigators who have come closest to tackling the problem in their observations on the cohesive role of lexis in texts are Halliday and Hasan, who first introduced the notion of the cohesive chain in 1976. Cohesive ties apparently form chains which interact with each other thus bringing about cohesive harmony within a text.

The idea was further refined by Hasan in 1984 and later with Halliday 1985. Briefly a cohesive chain is what is formed when a cohesive element refers back to an element that is itself cohesive with a still earlier element, and so forth. Two general classes of chain namely the identity chain and the similarity chain were identified. In their explorations Halliday and Hasan
recognised the cohesive role played by lexis through the devices of reiteration, lexical relatives and collocation. Clustered under these broad sub-classes of reiteration and collocation are a variety of kinds of semantic relationship that can exist between lexical items.

4.7.2 Reiteration

Reiteration is concerned with repetition. It is either the repetition of the same item or the use of a synonym or near-synonym in the context of reference. In fact, foremost among the lexical cohesive devices are the relations of synonymy and hyponymy while hyperonymy or superordinate terms also help a passage to achieve a continuity of lexical meaning.

Reiteration covers a range of ways in which one lexical item may be understood to conjure up the sense of an earlier item.

4.7.2.1 Reiteration Through Simple Repetition

Most obviously (and perhaps most importantly too), a lexical item may exactly repeat an earlier item, producing a pattern of information that may be described as theme iteration, as in Example 49 below,
Example 49  #07S & 07T

**Enzymes** ... divided ... two main groups:

intracellular and extracellular. The former occur inside cells ... The latter are produced by cells but ... outside the cell: they include the digestive **enzymes** ... in the gut.

Normally an **enzyme** is named by attaching the affix -ase to the name of the substrate on which it acts ... attack proteins and are hence known as proteases.

**Enzymes** are grouped ... phosphate group, and so on. **Enzymes** ... as transferases and ... in cells.

**Enzim** ... dibahagikan kepada ... dua kumpulan utama: intrasel dan luar sel. **Enzim** intrasel ... di dalam sel dan ... **enzim** itu ... **Enzim** luar sel dihasilkan ... ini meliputi **enzim-enzim** penghasil yang ... dalam usus.

Biasanya sesuatu **enzim** itu diberi nama dengan cara membubuhkan akhiran -ase kepada nama substrat yang menjadi tindakannya ... dan dinamakan protease.

**Enzim-enzim** digolongkan ... dan sebagainya. **Enzim-enzim** yang ... metabolisme di dalam sel.

The term **enzyme** is repeated five times in the source text in English while in the Malay translation, the same lexical item **enzim** is repeated eight times. The count for the text as a whole was nine repetitions in the English text and twelve in the Malay translation. The only variation between all of them is entirely explicable in terms of the singular or plural paradigm.
Example 50 #04S & #04T

The structure of the human respiratory system ... Fig 8.2a. The lungs are located in the toraks ... diaphragm. The lungs are surrounded ... fluid.

Air is drawn into the lungs via the trachea and bronchi. The expansion ... flattening of the diaphragm (Fig 8.2B and C) ... inspiration. The process then ... air being expelled from the lungs in the act of expiration. Expiration is a mainly passive process stretched during inspiration. However, in forced breathing ... blocked, expiration is aided by contraction ... diaphragm upwards.

Struktur sistem pernafasan manusia ditunjukkan dalam Rajah 8.2A. Paru-paru terdapat dalam toresk ... diafragma. Paru-paru dikelilingi oleh rongga paru-paru yang dilapik oleh selaput rongga paru-paru. Rongga paru-paru lapisan ... yang nipis.

Udara disedut masuk ke dalam paru-paru melalui trakea dan bronkus. Pengembangan rongga toraks berlaku di sebabkan oleh penggerakkan tulang-tulang rusuk ke atas dan ke luar disertai oleh pendataran diafragma (Rajah 8.2B dan C). Penggerakan-penggerakan ... dan pendataran diafragma oleh ... dan bulat. Semuanya ini ... tarikan nafas. Proses itu ... di situalah udara dihembus keluar dari paru-paru bila proses hembusan nafas ... berlaku. Hembusan nafas ... proses pasif ... sewaktu tarikan nafas berlaku. Walau ... atau ... tersekat hembusan nafas dibantu oleh ... dengan menolak diafragma ke atas.

In Example 50 above, repeated use of the same lexical items occurs in both the English source text and the Malay text, for example, lungs, diaphragm inspiration, expiration, air and paru-paru, diafragma, tarikan nafas, hembusan nafas, udara and so on, thus
producing in each a sense of unity of topic and hence a certain cohesive effect. Repetition is said to have taken place even if the repeated items are not of exactly the same form. *Chemotherapy, chemical, chemotherapeutic* in Text #20S entitled *Chemotherapy and Antibiotics*; and their Malay counterparts *Kemotherapi, kimia, kemoterapeutik* in Text #20T (cf. Appendix I) may quite justly be considered repetitions of one another.

This sort of complex lexical repetition is closely related to simple repetition. The two lexical items share a lexical morpheme but are not formally identical.

A further example of such kinds of repetition is *transplantation* in Sentence 1, *transplant* in Sentence 3, *transplanted* in Sentence 6 in Text #16S and *pemindahan* in Sentence 1, *dipindahkan* in Sentence 6 in Text #16T. However, even when formally identical, they may have different grammatical functions as in the following example from the same Text. *Transplantation* in Sentence 1 and *transplantation* in Sentence 10. The same applies to *pemindahan* in Sentence 1 and its reiteration in Sentence 3 in Text #16T. In Sentence 1 the function of the lexical item is that of a nominal modifier or adjective while its function in Sentence 3 is that of a head nominal. In the first instance the lexical *transplantation* occupies the position of a qualifier
and precedes the nominal it modifies whereas the reverse is the case with *pemindahan*. In the second instance the same lexical occupies the position of the head nominal and is itself *preceded* by a nominal modifier - *organ* while *pemindahan* is *followed* by a nominal modifier - *organ*.

4.7.2.2 Reiteration Through Synonyms

Alternatively an item may be in a relation of synonymy or near-synonymy with an earlier item, as *breathing* with *respiratory* or even *process* in the aforementioned text. Thus the word *process* can be said to have a relationship on the same plane with its exact replica elsewhere in the text but a specific - generic relationship with the other items cited above.

Another illustration of this type of relation is that which holds among the following near-synonyms, *tenet, argument, idea, theory, proposition, suggest* in the English text, and their counterparts in the Malay text, namely, *prinsip, per bahasan, gagasan, mencadangkan, teori, cadangan, menyarankan* in the example below.
Example 51 #17S & #17T

A central tenet of Darwin's argument is that variations which form the 'raw material' for natural selection, arise spontaneously. They are in no way dictated by the environment or purposefully geared towards making the possessor better adapted to it. This idea is in direct contrast to an alternative theory put forward in 1809 (the year of Darwin's birth) by the French naturalist Jean-Baptiste de Lamarck. Lamarck proposed, with little supporting evidence, that when an organism develops a need for a particular structure, this induces its appearance. This idea was based on the observation that structures which are subjected to constant use become well developed, whereas those that are not used tend to degenerate. This in itself is not an unreasonable proposition; after all everyone knows the effect that exercise can have on the development of muscles in a weight-lifter. But Lamarck went on to suggest that these beneficial characteristics... could be handed on to the progeny... muscles.

Prinsip asas perbahanan Darwin ialah bahawa kelainan yang menjadi 'bahan mentah' pemilihan semula jadi timbul secara spontan. Kelainan-kelainan ini sama sekali tidak diarah oleh sekitaran atau secara sengaja diarahkan untuk menjadikan pemiliknya lebih tersesuai kepadanya. Gagasan ini adalah bertentangan secara langsung dengan satu teori lain yang ditemukan dalam tahun 1809 (tahun lahirnya Darwin) oleh pakar alam semula jadi Perancis, Jean-Baptiste de Lamarck. Lamarck mencadangkan dengan sedikit bukti yang menyokongnya, bahawa apabila sesuatu organisme mewujudkan keperluan untuk sesuatu struktur tertentu, ini mempengaruhi bentuk rupanya. Gagasan ini didasarkan kepada pemerhatian bahawa struktur-struktur yang sentiasa digunakan berkembang dengan baik, manakala struktur-struktur yang tidak selalu digunakan berkecenderungan untuk merosot. Cadangan ini secara tersendiri bukanlah tidak munasabah; malahan kita sedia maklum tentang kesan senaman dan latihan ke
atas pembentukan otot-otot seorang pengangkat berat. Tetapi Lamarck seterusnya menyarankan bahawa ciri-ciri yang berfaedah ini, yang diperolehi ... progeninya.

4.7.2.3 Reiteration Through Superordinates

A third possibility is for the writer or speaker to refer back to an earlier item in more general terms. An example is the word process in Example 50, which is a general noun referring to the sum total of the various movements that go to bring about respiration.

A general noun in cohesive function is almost always accompanied by the reference item the. This the is anaphoric and the effect is that the whole complex 'the + general noun' functions like an anaphoric reference item. From a lexical view point, general nouns are the superordinate members of major lexical sets, and therefore their cohesive use is an instance of the general principle whereby a superordinate item operates anaphorically as a kind of synonym.

Grammatically speaking, the combination of a general noun plus a specific determiner is very similar to a reference item.
4.7.2.4 Reiteration by General Word

A fourth kind of reiteration is by general word. In Text #05S and #05T (cf. Appendix I) carbohydrates, fat and protein and alcohol can be referred to by the superordinate or general term food which has an implied or indexical relationship established by inference with diet and so the link is set up. The lexical item food itself is repeated six times.

Herein lies the disadvantage (and perhaps weakness) in Halliday and Hasan's model - the boundary between reiteration by superordinate and reiteration by general word is not exactly transparent; there is a cline between the two types of lexical relation.

However, one crucial point remains. While conjunction, reference, substitution, and ellipsis are markers of textual relation, the various types of lexical reiteration are in the first place types of lexical relation and not markers of textual relation. The latter is only their secondary function. This is still more true of the other sub-class of lexical cohesion - collocation.
4.7.3 Collocation

Much can be and has been said about Halliday and Hasan's rather unwieldy list of lexical relations which they labelled as collocations. The heterogeneity of the items aside, the label 'collocations' seems rather loosely applied. This weakness of the collocation category was in fact acknowledged by Hasan (1984),

"While I firmly believe that behind the notion of collocation is an intuitive reality, I have come to accept the fact that unless we can unpack the details of the relations involved in collocation ..., it is best to avoid the category. The problems of inter-subjective reliability cannot be ignored".

(Hasan, 1984:195)

Collocation has long been the name given to the relationship a lexical item has with items that appear with greater than random probability in its textual context. One important undeniable fact, however, remains. Their discussion acknowledges the existence of the important text-forming properties of lexis even though their analysis lacked the apparatus for the precise classification of the kinds of lexical relation that perform this role.

Collocation, as interpreted by Halliday and Hasan is the association of a word with another word in the preceding text, that is, the kind of reference between
sentences that is based on referential relations other than identity. This lexical cross-reference signals semantic relations such as hyponymy (carbohydrates - food [#05S]; karbohidrat - makanan [#05T]), paronymy (fat and carbohydrates, both hyponyms of food [#05S]; lemak dan karbohidrat [#05T]), inalienable possession or 'have relation' (body - organs [#01S], theory - supporting evidence [#17S]; badan - organ-organ [#01T], teori - bukti yang menyokongnya [#17T]) and implication or indexical relationship established by inference (respiration - lungs, breathing - atmospheric air, [#04S]; pernafasan - paru-paru, pernafasan - udara atmosfera [#04T]). Such cross-references presuppose a knowledge of the world organized into such wholes as permit inference by association.

There is cohesion between any pair of lexical items that stand to each other in some recognizable lexico-semantic relation. This does not only include synonyms and near-synonyms such as organs and glands in Text #01S or organ-organ and kelanjar in Text #01T (cf. Appendix I) and superordinates such as structures or struktur-struktur from the same stated texts but also pairs of opposites of various kinds, complementaries such as male ... female, testes ... ovaries, and antonyms such as productive ... sterile. The latter
examples are all taken from Text #02S entitled *Self Versus Cross Fertilization*. The same principle applies even in Malay and from the Malay translation of the text we have *jantan ... betina, testis ... ovari, dan subur ... mandul*.

There is always the possibility of cohesion between any pair of lexical items which are in some way associated with each other. The occurrence in proximity with each other of pairs of words whose meaning relation may not be easy to classify in systematic semantic terms can produce very marked cohesive effect. The cohesive effect of such pairs arise not so much out of any systematic semantic relationship as their tendency to share the same lexical environment, that is, to occur in collocation with one another. In general, any two lexical items having similar patterns of collocation - that is, tending to appear in similar contexts - will generate a cohesive force if they occur in adjacent sentences.

This effect is not limited to a pair of words. It is very common for long cohesive chains to be built up out of lexical relations of this kind, with word patterns like *surgery ... medical ... transplanted ... kidneys ... heart ... graft ... liver ... donor ... recipient ... tissue-typing ... rejection ...*
patient ... organ ... homograft ... heterograft ... transplantation (cf. Text #16S). The same pattern in Malay pemindahan ... ginjal ... jantung ... hati ... penjenisan tisu penolakan ... pesakit ... organ-organ ... homograft ... heterograft ... pemindahan organ (cf. Text #16T).

In such a chain of collocational cohesion as above we can see that the effect of lexical, especially collocational, cohesion, on a text is subtle and difficult to estimate.

When cohesive elements are broken down into syntactic ties (reference and conjunction) and semantic ties (reiteration and collocation), similarities are found for the density of ties. Semantic ties make a good percentage of the total cohesive ties. When types of semantic ties are considered, reiteration through repetition of words or the use of synonyms is far greater than collocation through the association of words. The use of syntactic cohesive ties of conjunction and reference seems to be linked to expository writing.

Scientific texts are not so much concerned with niceties of style as with accuracy and precision in the presentation of information. As such to avoid any chance of ambiguity, they tend positively to use lexical
repetition where appropriate. The often repeated claim for the precision of scientific language rests on this notion.

It is claimed that unique senses are attached to scientific terms and consequently the identical term will be used whenever the same sense needs to be evoked. As a result it becomes feasible to detect large scale patternings based on lexical repetition.

An extended form of simplex-to-complex lexical correspondence serving cohesion can occur: there are, for example lexical items which summarise complete propositions expressed elsewhere in the text. For example, words like bias and precautions. The summative lexeme bias performs an extra function besides summarising an antecedent sentence, it evaluates the content of a sentence, that is, it expresses a judgement. Such summative, evaluative words figure prominently also in dialogues. A second speaker can use them to signal lexically, that he sees the implication of the first speaker's remarks, or to express a reaction which was not expected by the first speaker.

An example of such a lexical item in our corpus comes from Text #16S & #16T.
Example 51  #16S & #16T

One can hardly expect the body to distinguish between pathogenic micro-organisms and useful tissue introduced by a benevolent surgeon.

Sukarlah bagi kita untuk mengharapkan badan membezakan mikroorganisme patogenik dari tisu-tisu berguna yang diperkenalkan oleh pakar bedah yang baik hati itu.

The lexical items hardly and benevolent express the writer’s thoughts about organ transplantation and his attitude towards the phenomenon of failures in such types of surgery mainly due to the body’s rejection of a graft. Benevolent expresses a judgement on surgeons and their task in trying to save lives through transplantation surgery. The exact relation between these two lexical items and the rest of the passage is difficult to define and pinpoint but all the same we can tell quite intuitively that some form of relatedness exists.

4.7.4 Concluding Remarks on Lexical Cohesion

As Halliday and Hasan put it,

"In lexical cohesion it is not a case of there being particular lexical items which always have a cohesive function. Every lexical item may enter into a cohesive relation, but by itself it carries no indication whether it is functioning cohesively or not. That can be established only by reference to the text".

(Halliday and Hasan, 1976:288)
Besides, other factors too play a part in determining or influencing the cohesive force between a pair of lexical items in a text.

Relatedness between lexical elements can be a function of relatedness in the linguistic system or relatedness in the text. Relatedness in the linguistic system refers to the degree of proximity in the lexical system, that is, the relative probability with which one word tends to co-occur with another. In the text, relatedness refers to the physical relative proximity between two lexical items within a text, in other words, the distance separating one item from the other, the number of words or clauses in between.

The cohesive force between a pair of lexical items within a text may also be influenced by their overall frequency in the system of the language. Generally speaking, the higher the frequency of a lexical item in a language system, the smaller the part it plays in lexical cohesion in texts (Ibid:290).

All being said, lexical cohesion may be diagrammatically summarised as follows:
Type of lexical cohesion Referential relation:

1. Reiteration
   (a) same word (repetition) (i) same referent
   (b) synonym (or near-synonym) (ii) inclusive
   (c) superordinate (iii) exclusive
   (d) general word (vi) unrelated

2. Collocation

Reiteration and collocation are lexical relations, not in the first instance textual ones. In so far as they contribute to the creation and organisation of text, the organization is lexical. Of course the relationship between lexical and textual relations is not unidirectional. The text provides the context for the creation and interpretation of lexical relations, just as the lexical relations help create the texture of the text. What a text is all about affects the options a writer has for choice of cohesive items.

Analysing a text in terms of the repetition links within it allow us to say interesting things about the relationships holding among the sentences of which it is composed.

4.8 Conclusion

Classifications of the different types of cohesive devices encountered vary depending on whose work we have
recourse to as reference material. Not all linguists concur on how they name the different cohesive devices. Halliday and Hasan term *reiteration* what is 'lexical repetition' to Winter while Quirk *et al* labelled as *substitution* what Halliday and Hasan term as *reference*. Winter also prefers to refer to as *deletion* what Halliday and Hasan call 'ellipsis'. Whatever the nomenclature, it is far more important to recognize the common function of the variety of cohesive ties than to distinguish them and that is, to repeat and to refer, thus bringing about cohesion and continuity of topic in discourse.