Bridging and Relevance

by

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Thesis submitted for the degree of
Doctor of Philosophy
of the
University of London

1995

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Abstract

A bridging reference is a referring expression which has no explicitly mentioned antecedent, so that the existence of the referent has to be inferred from what has been explicitly mentioned. The phenomenon is illustrated in (1) and (2):

(1) I went into the room. The window was open.
(2) John went walking at noon. The park was beautiful.

This thesis examines and attempts to explain the mechanism of bridging, using the framework of relevance theory. It argues against various existing accounts, and defends a relevance-theoretic account.

Chapters 1 and 2 are introductory. Chapter 1 gives brief overview of past studies of bridging and introduces some of the main issues which this thesis aims to address. I also propose and defend a definition of bridging implicature. Chapter 2 summarises the central claims of relevance theory. It illustrates how reference assignment is carried out on the basis of the criterion of consistency with the principle of relevance.

Chapters 3 to 5 contain the central arguments of the thesis. Chapter 3 discusses how the accessibility of candidate referents affects the hearer's choice of the intended referent. It surveys past studies, assesses the accounts of Sidner and Erku & Gundel, and concludes that they should be supplemented by relevance theory to produce a satisfactory account. Chapter 4 examines the role of contextual assumptions in the interpretation of bridging. It assesses Sanford & Garrod's scenario-based account and concludes that scenarios have more limited roles than Sanford & Garrod suggest. Chapter 5 investigates factors affecting the acceptability of bridging.
Various accounts, including those of Clark and Hobbs, are tested against a wide range of examples on which I have conducted questionnaires. It argues that only relevance-theoretic account explains the results of the questionnaire.

Chapter 6 summarises the thesis and briefly draws some conclusions.
Table of Contents

Abstract 2

Acknowledgements 8

Chapter 1: Introduction 11
  1. Introduction 11
    1.1. The Goals of my Research 11
    1.2. The Problem 11
    1.3. The Theoretical Framework 13
  2. A Brief Survey of Past Studies 14
    2.1. Hawkins 15
    2.2. Clark 19
    2.3. Sanford & Garrod 21
    2.4 Sidner 23
  3. Main Issues 24
  4. Characterisation of Bridging Implicature 31
    4.1. Clark's Definition 31
    4.2. An Alternative Definition 32
    4.3. Bridging Reference and Other Types of Referring Expressions 34
  5. Overview of the Thesis 39

Chapter 2: Relevance Theory 42
  1. Background 42
    1.0. Introduction 42
    1.1. Relevance Theory and the Code Model 42
    1.2. Relevance Theory and Grice 48
  2. Basic Notions 53
    2.1. Communication and Relevance 53
    2.2. Optimal Relevance 54
  3. Utterance Interpretation 63
Chapter 4: Accessibility of Bridging Assumptions and Other Contextual Assumptions

1. Introduction 131
2. Background 131
   2.1. Schemas, Scripts and Frames 131
   2.2. Research on Inference Generation 132
3. The Scenario-based Account 135
   3.1. Scenario and the Domain of Reference 135
   3.2. The Content of the Scenario 138
   3.3. Selecting an Appropriate Scenario 140
   3.4. The Structure of the Scenario - Explicit and Implicit Focus 141
   3.5. The Nature of Focus 143
   3.6. Primary and Secondary Processing 146
   3.7. Pragmatic Considerations 147
4. Limitations 148
   4.1. Computation of the Scenario 149
   4.2. Representation of the Scenario 152
   4.3. Examples: Sanford & Garrod's Problem 150
5. The Principle of Relevance and Selection/Construction of Contextual Assumptions 164
   5.1. Context and Search for Relevance 164
   5.2. A Relevance-Theoretic Solution to Sanford & Garrod's Problem 169
6. Summary 181

Chapter 5: Some Evidence: Acceptability Judgements for Bridging Reference

1. Introduction 185
2. Previous Accounts 188
   2.1. Clark: the Given-New Contract 188
   2.2. Sanford & Garrod: ‘Scenario’ - a Situational Model 193
Acknowledgements

Many people contributed to the completion of this thesis, and I would like to thank them all.

I cannot describe how much I am indebted to my supervisor, Deirdre Wilson. Five years ago, Deirdre convinced me that it is possible to discover some truth about our mind - more specifically, about the way thoughts of one interact with thoughts of others. Since then, her own thoughts have never stopped stimulating mine. Her optimism, patience and sympathy kept me going whenever my confidence was weakened. Without her tolerance, some of my thoughts would have never been included in this thesis. She has been, and will continue to be, a great mentor for me.

It has been a privilege to be a research student at Department of Linguistics, UCL. I would like to thank specially to Neil Smith, who, at the very early stage of my research life, encouraged me to enter the department.

I received enormous support, both intellectually and emotionally, from other relevance theory researchers. I am specially grateful to Robyn Carston, who, despite her busy schedule, somehow found time to read my papers and gave me some precious comments. I would also like to thank Keiko Tanaka and Vlad Zegarac for constantly giving me moral support.

The three questionnaires I carried out form an important part in this thesis. This could not have been possible without encouragement and help of two people, Dan Sperber and Francesco Cara. I would also like to thank all the people who
participated in the questionnaires.

My special thanks go to Prof. Togo in Waseda University, whose influence made me decide to start my postgraduate study in London, where he himself spent some time when he was a young scholar. He was the first person to tell me that doing PhD research is well worth all the pain, which has become the belief I constantly relied upon.

I am grateful to the British Council and the Daiwa Anglo-Japanese Foundation for financially supporting this research.

I would also like to thank Tim Hampson for his assistance in the logistics of the production of this thesis.

Finally, I would like to thank my family in Japan, who have always been open-minded. I am specially grateful to my parents, Hiromi and Michio Matsui, for supporting me both financially and morally.
For my Parents

'I proceed. "Edwin and Morcar, the earls of Mercia and Northumbria, declared for him; and even Stigand, the patriotic archbishop of Canterbury, found it advisable........”

'Found what?' said the Duck.

'Found it' the Mouse replied rather crossly: 'of course you know what “it” means.'

'I know what “it” means well enough, when I find a thing', said the Duck: ‘it’s generally a frog or a worm. The question is, what did the archbishop find?’

Lewis Carroll: Alice's Adventures in Wonderland (1865)
Chapter 1  Introduction

1. Introduction
1.1. The Goals of my Research

The goal of my research is to help to fill a major gap in our current knowledge of verbal understanding. Often, in interpreting an utterance, the hearer has to choose between a range of possible interpretations. The question that interests me is how that choice is made. I find this question particularly interesting because wrong choices lead to misunderstanding. By examining the mechanisms by which choices are made, I hope to show not only how misunderstandings arise, but how they may be reduced.

The domain I propose to investigate is that of reference assignment, where the hearer of a referential expression such as ‘the man’, ‘the window’, must decide which particular object the speaker had in mind. Reference assignment has been approached from many different angles: by linguists, logicians, philosophers, psychologists and workers in the field of artificial intelligence. All are agreed that context or background assumptions play a crucial role in reference assignment, but there is little agreement about how they are selected, and, once selected, what role they play. I will argue, following recent works in relevance theory, that the role of contextual assumptions in reference assignment is identical to the role of contextual assumptions in every other aspect of utterance interpretation where the hearer has to make a choice. Thus, a detailed investigation of the problem of reference assignment should provide a key to a very wide range of further problems that arise in verbal misunderstanding and to which, at the moment, no full answer is known.

1.2. The Problem
Within the domain of reference assignment, I will focus my attention on a phenomenon known as 'bridging reference', on which there is a substantial literature in linguistics, psycholinguistics and artificial intelligence. The phenomenon is illustrated in (1) and (2):

(1) I went into the room. The window was open.

(2) John went walking at noon. The park was beautiful.

What interests me is the interpretation of the referential expressions 'the window' in (1) and 'the park' in (2). In (1), although it is not explicitly stated in the first part of the utterance that the room had a window, the natural assumption is that it did, and that the window referred to in the second part of the utterance is the one in the room. Similarly, in (2), although it is not explicitly stated in the first part of the utterance that John went walking in the park, the natural assumption is that he did, and that the park referred to in the second part of the utterance is the one where John went walking. I am interested in what makes these the natural assumptions, and in what happens in more complicated cases of the same general type.

The term 'bridging' was first used by the psycholinguist Herb Clark (1977a) to describe the process by which the existence of a referent which has not itself been explicitly mentioned in the text is inferred from something which is explicitly mentioned - in (1) from the mention of a room, and in (2) from the mention of the fact that John went walking. I want to investigate the processes by which these inferences are made. By 'inference' here, I mean a non-demonstrative inference process of hypothesis formation and evaluation. In (1), for instance, it is reasonable to suppose that, in interpreting the referential expression 'the window', the first hypothesis to come to the hearer's mind will be that the window being talked
about is in the room just mentioned. In more complex cases, there may be several possible hypotheses, and the hearer will have to choose between them. I want to investigate what determines the order in which hypotheses occur to the hearer, and how the choice between these hypotheses is made.

1.3. The Theoretical Framework

It is customary to distinguish semantics (the theory of sentence meaning) from pragmatics (the theory of how utterances are interpreted in context). Pragmatic interpretation involves not only a knowledge of sentence meanings, but also the ability to draw inferences based on contextual assumptions, or knowledge of the world. Bridging, which involves going beyond what is explicitly stated in the utterance, is clearly a pragmatic rather than a strictly semantic phenomenon.

Of the various pragmatic theories currently available, the most plausible and comprehensive seems to me to be relevance theory, originated by Dan Sperber and Deirdre Wilson (1986). Sperber and Wilson argue that human cognition and communication are relevance-oriented. Humans are looking for relevant information; every utterance creates in the hearer an expectation of relevance; where the hearer has to choose between a variety of possible interpretations, he should choose the one that best satisfies his expectation of relevance.

One of the uniquenesses of relevance theory is its treatment of the role of context and inference in verbal understanding. Since inferences are the products of individual minds, they can be generated in highly idiosyncratic ways. However, since we are often able to achieve successful communication, it seems reasonable to assume that we do not generate inferences randomly, but do so in a principled way.
Relevance theory provides a clue to the principles underlying human inference processes: they are geared to the search for relevance.

Adopting Sperber and Wilson’s overall framework, I want to apply it to the phenomenon of bridging, which has resisted full analysis in all other pragmatic frameworks currently available. Bridging is, in other words, a test case. Success or failure in this domain should have implications for our view of utterance interpretation as a whole.

2. A Brief Survey of Past Studies

2.0. There has been an enormous amount of work on reference assignment in general. Here, I have chosen only a few of the items most crucially relevant to this work: studies of the pragmatic interpretation of either bridging reference or definite noun phrases (not pronouns). They may be categorised into the following three approaches:

Studies of the general functions of the definite article
Christophersen (1939)
Faurud (1990)
Hawkins (1978, 1991)

Studies of the interpretation of bridging reference based on psychological evidence

Studies of the interpretation of definite noun
Rather than summarising all of these, I will discuss briefly the four most influential works, namely, Hawkins (1978), Clark (1977), Sanford & Garrod (1981) and Sidner (1983a).

2.1. Hawkins

Using Christophersen (1939) as a ground work, Hawkins (1976) proposes a speech-act account of definiteness which he calls 'location theory'. He says that 'the use of the definite article acts as an instruction to the hearer to locate the referent of the definite NP' and that 'the hearer locates the referent in the sense that he understands that the object referred to is a member of the appropriate, pragmatically identifiable, set' (Hawkins ibid.: 17). One of Hawkins' crucial assumptions is that a speaker and a hearer are able to organise the objects in the universe into different sets using their common knowledge and knowledge of their situation, and that the definite article is an instruction to the hearer to exploit this shared experience in working out which set and referent are intended.

Hawkins regards bridging cases as one of major usage types involving the definite article; he calls them 'associative anaphora':

..........this is undoubtedly the most frequent use that is made of the. .......... Having mentioned a book, I can immediately add: the author is unknown, the pages are uncut, the content is abysmal, using a first-mention the in each case. (Hawkins ibid.: 123)
He suggests that whereas reference resolution in all usage types involving the definite article requires identification of an appropriate shared set, bridging cases particularly require identification of an appropriate set of associated objects on the basis of general knowledge. Although Hawkins cannot offer an account of 'the parameters defining the set of possible associates', he does suggest some general defining characteristics of associations, such as the notions of 'part-of' and 'attribute of'. His examples of the first notion are 'the steering wheel' as a necessary part of 'a car' and 'the bride' as a necessary part of 'a wedding', whereas examples of the second notion are 'the length', 'the colour', and 'the weight' as attributes of 'a car'.

Hawkins suggests the following 'appropriateness conditions' as pragmatic conditions on successful reference assignment:

1. **Set existence condition**: the speaker and hearer must indeed share [knowledge of] the set of objects that the definite referent is to be located in.

2. **Set identifiability condition**: the hearer must be able to infer either from previous discourse or from the situation of utterance which shared set is actually intended by the speaker.

3. **Set membership condition**: the referent must in fact exist in the shared set which has been inferred.

4. **Set composition conditions**: (i) there must not be any other objects in the shared set satisfying the descriptive predicate in addition to those referred to by the definite description, i.e. there must not be fewer linguistic referents referred to by the definite description than there are objects in the shared set; and (ii) the number of linguistic referents referred
to by the definite description must not exceed the number of objects of the appropriate kind in the shared set; and (iii) the hearer must either know or be able to infer that the intended object has the property that is used to refer to it in the descriptive predicate.

(My insertion in square brackets.)

In general, Hawkins' work is more descriptive than explanatory and his account of bridging reference is rather intuitive and sketchy. Most importantly, it fails to offer a precise account of the pragmatic criteria used in reference assignment. Let me illustrate this point briefly here. Hawkins regards his appropriateness conditions for reference assignment as the most crucial pragmatic principles. However, in fact, all the four conditions seem to me rather problematic. Here I will just mention the two most serious problems. First, in condition 2, Hawkins suggests that the hearer must be able to infer the intended set from various contextual clues, but he does not give any idea of how the hearer can do it. If, for instance, there is more than one possible set in the previous discourse, the hearer has to decide which one was intended, and Hawkins does not offer any suggestion about how this is done. One example to illustrate the problem is the following:

(3) Nigel bought a fridge and put it in the caravan. Three weeks later the door fell off. (Blakemore 1992:76)

In this example, the phrase involving bridging reference is 'the door', for which there are two possible candidate referents, namely, 'a fridge' and 'the caravan'. The hearer of (3) has to choose one of the two and the question is: how he will do this? Hawkins offers no answer to this. For (3), in fact, most people interpret 'the door' as belonging to the fridge rather than the
caravan. A pragmatic theory of reference assignment must be able to explain why one candidate is preferred to the other in examples like (3), and on this, unfortunately, Hawkins' account fails.

Second, condition 4 above seems rather problematic. For example, clause (i) of 4 claims that there must not be fewer linguistic referents referred to by the definite description than there are objects in the shared set. The following examples of his illustrate this point:

(4) Bring the wickets in after the game of cricket.
(5) Jack is fed up with his new university, because the students are lazy.

Hawkins says that in (4), 'the wickets' should refer to all six, not four or five, and that in (5), 'the students' should refer truthfully to all the students of Jack's new university, not, for example, some of them. However, among perfectly acceptable uses of bridging reference, there are often cases which breach clause (i), such as the following:

(6) My lecture was terrible. The students were bored.
(7) Someone stole my CD player from the car. The windows were smashed.

In (6), it is unlikely that 'the students' would be intended or understood as referring to every single student in the class. In (7), although everyone knows that burglars are more likely to break the front windows, rather than all the windows of a car, and would interpret (7) in that way, the use of bridging is perfectly acceptable. Hence, Hawkins' claim in clause (i) seems too strong.

Because Hawkins does not offer a satisfactorily explanatory theory of bridging reference assignment, I will not
discuss his work further in the thesis. However, in the history of the study of bridging, Hawkins should still be appreciated for his early treatment of bridging cases as the most interesting and important use of the definite article.

2.2. Clark

Clark (1977a) was the first to use the term 'bridging', although I will argue that his definition is too loose to be useful. Later in this chapter, I will discuss the definition of bridging in more detail. Let me first mention some points which characterise Clark's approach.

Unlike traditional studies of bridging reference, in which bridging was treated as one of the functions of the definite article, Clark's main concern is the difference between the ways in which new and old information are presented to the hearer. Believing that there is a speaker-listener agreement on how the two types of information should be presented, Clark and Haviland (1977) propose the following Given-New Contract, as a sub-part of Grice's Co-operative principle:

**Given-New Contract**

The speaker agrees to try to construct the Given and New information of each utterance in context (a) so that the listener is able to compute from memory the unique Antecedent that was intended for the Given information, and (b) so that he will not already have the New information attached to the Antecedent. (Clark & Haviland 1977: 9)

The idea behind this approach is that there are linguistic constructions which mark information as Given rather than New. One such construction is the definite article, but there are many more. The Given-New Contract then imposes pragmatic
conditions on the use of such constructions: essentially, that what is linguistically marked as Given should be information the hearer already has, and what is linguistically marked as New should not be information the hearer already has.

In this context, Clark and Haviland regard bridging as a special case of conveying Given information. Clark’s basic assumption is that reference assignment succeeds when the listener has in working memory a representation of the intended referent. Normally, when a speaker uses a referring expression, the hearer should have such a representation available by, for instance, having heard the intended referent spoken of not long before in the conversation. However, when a hearer comes across example (2) above, he may not have a suitable representation for ‘park’ readily available and hence, he has to introduce one. Roughly, Clark calls this extra introduction process in reference assignment ‘bridging implicature’.

Haviland & Clark (1974) report the results of an experiment designed to test the hypothesis that bridging cases will take more time to understand than normal anaphoric cases. One of the pairs of examples used in the experiment is the following:

(8) We got some beer out of the trunk. The beer was warm.
(9) We checked the picnic supplies. The beer was warm.

Their results show that comprehension time for (8) was shorter than (9). Haviland & Clark suggest that the delay in reading time for (9) is caused by the construction of a bridging implicature.

Clark further believes that although bridging is clearly different from other types of reference assignment, the success of bridging reference assignment is still governed by the Given-New Contract. He suggests that what enables the hearer to make a bridging implicature is indeed the Given-New Contract: in
other words, the hearer’s belief that the speaker is obeying the contract will lead him to draw the necessary implicature in a Gricean sense.

On the basis of this assumption, Clark suggests the following rule for appropriate bridging reference assignment: build the shortest possible bridge that is consistent with the Given-New Contract. In other words, he suggests that a hearer ‘takes as the intended implicature the one that requires the fewest assumptions, yet whose assumptions are all plausible given the [hearer’s] knowledge of the speaker, the situation, and facts about the world’ (Clark 1977:420).

Although his description of bridging reference is more or less correct, and his intuition about how bridging assumptions are constructed is on the right track, Clark’s account is by no means satisfactory as an explanatory theory. For example, although he suggests that the hearer should make the fewest assumptions possible, he does not explain why this should be so. Furthermore, although Clark’s notions of shortness of the bridge and plausibility of the bridge give some clues about the factors governing reference resolution, they do not yield an adequate theory on their own. I will discuss the central features of Clark’s account in more detail in Chapter 5.

2.3. Sanford & Garrod

Sanford & Garrod (1981), and other works by the same authors, propose a theory of comprehension which might be called a ‘scenario-based account’. Their approach is psychological and their basic assumption is that language understanding is a process in which linguistic input and a knowledge-base (or memory) interact; their aim is to describe how this interaction takes place, focusing on the phenomenon of reference assignment. Their main proposal is that the reader/hearer uses the previous discourse to identify an
appropriate domain of reference, loosely corresponding to what
the text is about, and that he then uses the identified domain of
reference to interpret subsequent discourse as far as this is
possible. The domain of reference is called a 'scenario', which is
 conceived of as one particular part of the knowledge-base. So
for example, in understanding the following passage, a ‘Court
case’ scenario will be retrieved from long-term memory to
short-term (working) memory:

(10) Fred was being questioned. He had been accused of
murder.

For Sanford & Garrod, bridging is a prime illustration of
how the scenario-based account works, and hence they discuss it
at length. For instance, suppose that after (10), a reader comes
across the following continuation:

(11) The lawyer was trying to prove his innocence.

They claim that in this case, with a ‘Court case’ scenario at
hand, in which there is a slot for ‘lawyer’, the reader will have
no difficulty assigning a referent to ‘the lawyer’. More generally,
Sanford & Garrod claim that as long as (a representation of) the
referent is found in the currently active scenario, the process of
reference resolution will be rapid. However, if a referent cannot
be found in the currently active scenario, then the search domain
must be extended into the entire knowledge-base, and the
resulting process will be time-consuming.

Although Sanford & Garrod’s account of reference
assignment is the most comprehensive one proposed by
psychologists, and their proposal is surely on the right lines, it
still has crucial limitations. One is that they rely too heavily on
the role of linguistic information in selecting the appropriate
domain of memory to activate. Consequently, their account
cannot deal with cases where the correct scenario is linguistically underdetermined: that is, cases where there is more than one candidate for a plausible scenario, or more than one candidate referent when the search domain is extended into the entire knowledge-base. I will discuss Sanford & Garrod’s account further in Chapter 4.

2.4. Sidner

Sidner (1983a, 1983b) proposes a theory of reference resolution within the field of artificial intelligence. In her model of language comprehension, the notion of ‘focus’ (or ‘centering’) plays a crucial role. Sidner assumes that speakers center their attention on a particular discourse element which is identifiable by the hearers. She calls this highlighted element of discourse the ‘focus’.

Sidner has worked out possible preference rules for the choice of focus, based on the grammatical relations in a sentence. The result can be summarised as follows. The focus will be:

The Expected Focus Algorithm
1. The subject of a sentence if the sentence is a ‘is-a’ or ‘there’- insertion sentence.
2. The first member of a default expected focus list, ordered as follows:
   -theme, unless the theme is a verb complement, in which case theme from the complement is used.
   -all other thematic positions with the agent last.
   -verb phrase.

Sidner’s central claim is that the expected focus is the first candidate to be tested in reference resolution, and that if the result is successful, there is no further search needed. The
algorithm defines a whole series of potential referents. If the first selected referent fails, the next possible candidate is tested, and so on until the right one is found. Thus, Sidner is also claiming that there is a certain order in which candidate referents are tested, and that this is predicted by her algorithm.

For Sidner’s system to work properly, there is one other factor crucially needed and that is a notion of plausibility. Whether a referent selected by the algorithm will be accepted or rejected depends on whether the resulting interpretation is consistent with evidence available from general knowledge. The notion of plausibility is also important when a choice has to be made between several candidate referents.

Sidner’s model seems adequate to deal with many cases of reference resolution. However, as I will show in detail in Chapter 3, there are cases which her system cannot handle properly. One such case is where there is more than one equally accessible and equally plausible candidate referent. However, overall, Sidner offers many insights into the factors affecting reference assignment, and in my later discussion, I will show that her ideas can be well integrated into relevance-theoretic account.

3. Main Issues

In developing an adequate account of bridging reference, several questions have to be answered. I have chosen the following as the five most central questions, to which I will be offering some answers in this thesis.

Q1. How can bridging reference be defined?

Although the phenomenon of bridging reference has been studied for at least two decades, surprisingly, it has never been properly defined. The term has been used rather loosely (see e.g.
Clark 1977a, Clark & Haviland 1977), and in different ways by different authors. For example, according to Clark (ibid.), the referring expressions illustrated in (12a) - (12f) are instances of different types of bridging reference:

(12) a. I met a man yesterday. The man told me a story. (= Identity bridge)
    b. I met a man yesterday. He told me a story. (= Pronominalization bridge)
    c. I met a man yesterday. The bastard stole all my money. (= Epithets bridge)
    d. I looked into the room. The ceiling was very high. (= Necessary part bridge)
    e. I walked into the room. The chandeliers sparked brightly. (= Inducible parts bridge)
    f. John was murdered yesterday. The murderer got away. (= Necessary roles bridge)

Clark says that for all types of reference resolution illustrated above, an inference of some sort is required, which he calls a bridging implicature. This definition seems to me, however, to be too broad to be of any use. I will elaborate this later. In addition, this definition is not consistent either: Clark gives another definition of bridging elsewhere which is quite different from the one discussed here. I will suggest an alternative, narrower definition of bridging reference later in this chapter, which rules out some of Clark's instances of bridging.

Sanford & Garrod (1981), on the other hand, regard the following as instances of bridging:

(13) a. A bus came trundling down the hill. The vehicle nearly flattened a pedestrian.
    b. A vehicle came trundling down the hill. The bus almost flattened a pedestrian.
c. Keith drove to London last night. The car kept breaking down.
d. Fred was being questioned. He had been accused of murder. The lawyer was trying to prove his innocence.

They seem to assume that a bridging inference is required (a) when a definite anaphoric expression does not share the same conceptual content as the antecedent NP, and (b) when there is no phonetically realised antecedent NP. In the latter case, there are at least two different situations: (a) the existence of the antecedent NP is logically implied by the verb in the previous discourse; (b) the existence of the antecedent NP is implied by the situation or event described in the previous discourse. I believe that Sanford & Garrod's definition of bridging is also too broad. I will develop a proper characterisation of bridging reference later in this chapter. I will suggest that genuine bridging cases such as (13d) should be distinguished from (a) cases in which there is no newly inferred referent but merely a redescription of an existing one, as in (13a) and (13b), and (b) cases in which the verb in the previous discourse entails the existence of the antecedent NP, as in examples along the lines of (13c) (assuming that genuine cases of this type can be found: see below, section 4.3.).

Q2. What are the factors which affect bridging reference assignment?

One of the factors involved in bridging reference assignment is the accessibility of candidate referents. Many people, such as Erku & Gundel (1987) and Sidner (1983a,b), have noticed that the 'topic' or 'focus' noun phrase, which is the most salient noun phrase in a clause, is invariably highly accessible as an indirect antecedent of a bridging reference. For example, in
(14) below, 'a Thai restaurant' is the 'topic' noun phrase in the first sentence, and is the indirect antecedent of 'the waitress' in the second sentence, in the sense that it provides the starting point from which the existence of the intended referent is inferred:

(13) We went to a Thai restaurant. The waitress was from Bangkok.

A second crucial factor is the set of contextual assumptions potentially usable in inferring the existence of the intended referent, and in evaluating the resulting interpretation. Generally, work on bridging has concentrated on the role of contextual assumptions in inferring the existence of the intended referent, where Sanford & Garrod's notion of a scenario has been seen as playing a vital part. I will argue that the role of context in establishing and evaluating the resulting overall interpretation of the utterance is equally important, and will develop a relevance-theoretic account of how this is done.

However, my hypothesis is that, although accessibility of candidate referents and accessibility of contextual assumptions are indeed important factors in reference assignment, they are not enough on their own to account for how bridging reference is achieved. For example, there are often cases in which more than one candidate referent, or more then one set of potential contextual assumptions can be found, and the notions of 'topic' or 'focus', or 'scenario' do not provide a sufficient basis for choosing between them. Most accounts of bridging more or less explicitly assume the existence of a pragmatic criterion that hearers use in evaluating alternative possible assignments of reference. I will discuss this point in chapters 3 to 5.

Q3. What is actually going on during the bridging process?
As Rickheit, Schnotz and Strohner (1985) point out, one of the greatest problems with inferences involved in discourse comprehension is to determine when they are made. The question is whether such inferences are made as soon as possible during the comprehension process, or whether they are made only if they are needed to bridge a gap in the text. Carpenter and Just (1977) call the first type of inference 'forward' inference and the second type 'backward' inference. I will discuss this question by considering Sanford & Garrod's model, which is based on the assumption that bridging implicatures are forward rather than backward inferences. I will argue that although their basic intuition is on the right lines, their model cannot handle a range of cases where the correct overall interpretation of an utterance can only be reached via judgements supported by a suitable pragmatic criterion.

Q4. What makes some cases of bridging appropriate and others inappropriate?

So far, most of my examples of bridging have been stylistically acceptable. However, it is not difficult to construct examples which are less acceptable. Consider the following pairs, where the first member of each pair is acceptable, but the second is less so:

(15) a. John and Mary went to see Macbeth last night. The three witches were excellent.
b. John and Mary went to see a play last night. The three witches were excellent.

(16) a. He moved to Ealing last year. The rent was incredibly cheap.
b. He stopped smoking suddenly. The rent was
incredibly cheap.

Here, in (15b) and (16b), the results of bridging are to varying degrees unacceptable. There have been a variety of hypothesis about why these differences in acceptability arise. Clark (Clark & Haviland 1977) mentions three factors affecting acceptability of bridging: the shortness of the bridge (i.e. how many assumptions are needed to introduce the inferred referent), the plausibility of the bridge (i.e. how likely the bridging assumptions are to be true), and the computability of the bridge (i.e. how easily identifiable the intended referent is). Sanford & Garrod (1981) would explain the differences in terms of scenarios: when the hearer's mental scenario constructed on the basis of the first sentence does not contain the intended referent, the result should be infelicitous. However, as I will try to show, these assumptions seem unsatisfactory for various reasons. My aim is to investigate the factors affecting acceptability and unacceptability of bridging reference and to offer a better explanation for these examples within the framework of relevance theory.

Q5. How are interpretations evaluated? When there is more than one candidate referent, how is the right one selected?

The ultimate goal of this thesis is to investigate the mechanism of hypothesis formation and confirmation that hearers use in the process of bridging reference assignment. Hence, one of my main tasks is to see whether various proposed pragmatic criteria can handle all possible bridging cases. In order to test the appropriateness of different accounts, I have chosen a particular type of bridging case, where there is more than one possible bridging assumption, as in the following examples:
(17) I moved from Earl’s Court to Ealing. The rent was too expensive.

(18) I stopped flying Aeroflot and tried JAL. The stewardesses were much nicer.

The possible bridging assumptions for (17) are the following:

(19a) The speaker paid rent in Earl’s Court.
(19b) The speaker paid rent in Ealing.

For (18), similarly, there are the following two highly accessible potential bridging assumptions:

(20a) There are stewardesses on Aeroflot flights.
(20b) There are stewardesses on JAL flights.

The hearer of (17) and (18) has to choose one of the two possible bridging assumptions. The question is, how is this done? In fact, there seems to be a clearly preferred interpretation for both (17) and (18), namely, (19a) and (20b) respectively. We need to explain why such preferences occur.

From a pragmatic point of view, these are very interesting questions and I believe that an adequate pragmatic criterion should help to answer them. Therefore, in this thesis, some major accounts of bridging reference assignment will be tested by use of examples similar to (17) and (18) and will be challenged to provide answers. A further reason for choosing this type of bridging reference as my main testing ground is that there have not been many studies which discuss this kind of case so far, perhaps partly due to the apparent complexity of the interpretation process. Examples similar to (17) and (18) will be found throughout my thesis and many of my arguments will be built around them.
4. Characterisation of Bridging Implicature

4.1. Clark’s Definition

In Clark & Haviland (1977) and Clark (1977a, 1977b, 1978), the terms ‘implicature’ and ‘bridging implicature’ are rather loosely used, and the difference between ‘bridging implicature’ and other types of inferences used in reference assignment in general is not clear.

According to Clark & Haviland (ibid.), it seems that a bridging implicature is generated only when the listener cannot find a direct antecedent for a reference in his memory. By ‘direct’ reference, Clark means a case where there is an antecedent explicitly mentioned in previous discourse, and by ‘indirect’ reference he means a case where the existence of an antecedent is implicit and has to be inferred. The following is a list of cases of reference from Clark (1977a). According to Clark, examples (21a) - (21c) involve ‘direct reference’ and (21d) and (21e) ‘indirect reference’:

(21) a. I met a man yesterday. The man told me a story.
    b. I met a man yesterday. The bastard stole all my money.
    c. I met two people. The woman told me a story.
    d. I looked into the room. The ceiling was very high.
    e. John was murdered yesterday. The murderer got away.

Thus, according to Clark & Haviland, only examples (21d) and (21e), which involve indirect antecedents, are cases of bridging.

However, in Clark (1977a), one finds a completely different view of bridging implicature. According to this paper, all the examples (21a) - (21e) generate ‘bridging implicatures’, regardless of whether the reference is ‘direct’ or ‘indirect. What
surprises me most about Clark (1977a) is his decision to treat reference assignment involving a direct antecedent as a case of bridging. He introduces the notion of 'direct reference' as follows: 'Given information often makes direct reference to an object, event or state just mentioned. These always force an implicature of some sort, even though it may be trivially simple. This class of bridging is well known (my emphasis)' (Clark ibid.: 414). This account is apparently inconsistent with Clark & Haviland's definition of bridging: 'bridging. When the listener cannot find a direct antecedent, most commonly he will be able to form an indirect antecedent by building an inferential bridge from something he already knows' (Clark & Haviland ibid.: 6).

Either this passage is not meant to provide a definition, and 'bridging' is being understood so broadly that it takes in all cases of anaphoric definite NP reference, or there really are two contradictory definitions being offered, and a choice must be made between them. While I agree with Clark's view that establishing the reference of any referring expression requires inferences, I will argue for a narrow definition of bridging, and I do not agree to treat all of (21a) - (21e) above as cases of bridging.

4.2. An Alternative Definition

As I have shown briefly in the previous section, Clark (1977a) uses the term 'bridging' either very broadly or inconsistently. In the broad sense, bridging implicatures, for Clark, are any inferences needed to identify the intended referent of any (anaphoric) referring expression, ranging from pronouns on the one hand to definite noun phrases with no direct antecedent in previous discourse on the other. This broad definition should be tightened. In this section, I will propose an alternative definition.
First, I would like to suggest that the term 'bridging implicature' should be used strictly for a contextual assumption, warranted by the explicit content of previous discourse, needed to introduce an intended referent which has not itself been explicitly mentioned. (1) and (2) above are instances of bridging reference by this definition:

(1) I went into the room. The window was open.
(2) John went walking at noon. The park was beautiful.

In (1), the antecedent of 'the window', and in (2), the antecedent of 'the park', have not been explicitly mentioned in the first part of the utterance. Instead, the existence of these antecedents must be inferred from the explicit content of previous discourse. In (1), the mention of the room enables the listener to make the assumption that the room had a window, and in (2), the mention of the fact that John went walking enables him to assume that John went walking in a park. These newly introduced entities can then be assigned as referents for 'the window' and 'the park', respectively. I regard this type of new assumption, which is indispensable for identification of the intended reference, as a bridging implicature. Thus, the bridging implicatures for (1) and (2) are (1') and (2') respectively:

(1') There was a window in the room the speaker went into.
(2') John went walking in a park.

Let me note that the notion of bridging implicature introduced here is quite different from Clark's. According to Clark, the bridging implicatures for (1) and (2) would be (1") and (2"):

(1") The room mentioned has a window; it is the
antecedent for ‘the window’.

(2") Where John went walking was in a park; it is the antecedent for ‘the park’.

Notice that according to my notion of bridging implicature, only the first part of his version of bridging implicature counts. In other words, the second part, namely, ‘X is the antecedent for Y’ is not a bridging implicature. Hence, cases such as (21a), whose implicature, according to Clark, is (21a’), should not be considered to be cases of bridging:

(21a) I met a man yesterday. The man told me a story.
(21a’) The antecedent for ‘the man’ is the entity referred to by ‘a man’.

Similarly, (21b) should not be considered to be a case of bridging, since it does not require an implicature which introduces a new entity. According to Clark, the implicature required for (21b) is (21b’), which is not a bridging implicature according to my narrower definition of the notion:

(21b) I met a man yesterday. The bastard stole all my money.
(21b’) The antecedent for ‘the bastard’ is the entity referred to by ‘a man’; that entity is also a bastard.

I will discuss the difference between genuine bridging cases and cases such as (21a) and (21b) in detail in the next section.

4.3. Bridging Reference and Other Types of Referring Expressions

Now I would like to characterise bridging reference more clearly, by comparing bridging NPs with three other types of
referring expressions: pronouns; definite noun phrases which share a noun with an antecedent noun phrase; and definite noun phrases which redescribe a previously mentioned antecedent. The three types are exemplified in (22) - (24) respectively:

(22) I met a man yesterday. He told me a story.
(23) I met a man yesterday. The man told me story.
(24) I met a man yesterday. The nasty fellow stole all my money.

Let's consider the case of the pronoun first. Sanford (1985:195) claims that pronouns are primarily geared towards retrieval of explicitly mentioned entities. This view seems plausible. Typically, in written texts at least, pronouns are used on condition that there is no need for a new assumption to introduce the antecedent, nor for the creation of a new antecedent in the hearer's mental representation. The hearer is simply required to search for some representation of the intended referent in previous discourse. Thus, anaphoric pronouns are typically not cases of bridging because their intended referent has been explicitly mentioned, whereas deictic pronouns are typically not cases of bridging because the existence of their intended referent is not inferred from anything that has been explicitly mentioned.

Second, in the case of a definite noun phrase which shares a noun with its antecedent, as in example (23), again there is no need for the introduction of a new entity to act as antecedent. The case is very similar to that of pronouns, although the search space will be narrower because of the descriptive content of the noun.

These two types of referring expressions share the characteristic that there is an explicitly mentioned antecedent and no new entity needs to be created by the listener in order to establish the intended reference. The listener still has to infer
what referent was intended, as he does in all cases of reference assignment - but he already knows that this referent exists.

Third, let's consider a definite noun phrase which redescribes its antecedent, as in the example (24), where the new assumption would be 'The man whom the speaker met was a nasty fellow'. This assumption may be called an 'implicature', in the sense that it is (a) new and (b) part of the intended context. Thus, this type of referring expression is quite different from the two mentioned above, because an implicature is needed in order to assign reference correctly. However, there is also a significant difference between this type of case and what I am calling bridging reference. While 'the nasty fellow' in (24) redescribes an existing, previously established antecedent, 'the window', in (1) and 'the park' in (2) do not redescribe an existing, previously established entity, but require the introduction of a new entity as referent. To me, the most important characteristic of bridging reference is that there is no explicitly mentioned antecedent in the previous discourse. The antecedent must be created by the listener in his mental representation using clues given by the explicit content of the discourse. Hence, the implicature required for (24) should be distinguished from genuine bridging implicature. A genuine bridging implicature is one which leads the listener to create a new entity as the antecedent, and this is how I propose to use the term.

I would now like to consider the relation between bridging implicatures and logical inferences or entailments. To illustrate, an entailment of 'he is a bachelor' is 'he is an unmarried man', where the conclusion is deducible from the premise with no extra assumptions. In the following examples, logical inferences are needed in assigning reference to the definite NPs in the second part of the utterance:

(25) Peter took a cello from the case. The instrument was
originally played by his great-grandfather.

(26) Jane was going to wear a pearl necklace. The jewel seemed to suit her silk blouse best.

In (25), ‘the instrument’ refers to the cello mentioned in the previous sentence, and in (26), ‘the jewel’ refers to the pearl necklace previously mentioned. In each case the identification of antecedents involves a logical inference: ‘a cello is an instrument’ for (25), and ‘a pearl necklace is a jewel’ for (26). By my definition, however, these are not cases of bridging reference. The reason is that there is an explicitly mentioned antecedent in previous discourse. These examples involve redescription of an existing antecedent, rather than genuine bridging mechanisms.

Entailments associated with verbs provide more complicated and interesting cases. As I noted before, Sanford & Garrod (1981:104) suggest that the verb ‘dress’ logically entails ‘put on clothes’, and therefore, there is no extra processing needed by the reader to comprehend an utterance such as (27a) as compared with (27b):

(27) a. Mary dressed the baby. The clothes were made of pink wool.
   b. Mary put clothes on the baby. The clothes were made of pink wool.

Their assumption seems to be that entailments are obligatorily drawn during comprehension, so that in (27a), the existence of the clothes will have been established before the NP ‘the clothes’ is heard, and no additional effort will be needed to identify its referent. Cases like (27a) share the characteristic with bridging reference that there is no phonetically realised antecedent in previous discourse. If we accept Sanford & Garrod’s claim that the verb ‘dress’ entails ‘put on clothes’, we
will need some argument to decide whether 'the clothes' counts as an explicitly mentioned antecedent - in which case it cannot be a case of bridging by my definition - or whether it counts as an implicit/inferred antecedent. In the latter case, my definition of bridging should be able to accommodate it. In any case, example (27a) should be distinguished from an example such as (2), where there is no logical entailment between 'walking' and 'the park'. In example (2), what is involved is not a logical entailment derived from word meaning, but general encyclopaedic knowledge which tells you that it is possible to go for a walk in a park. As for how entailments are represented and processed psychologically, and whether they are part of explicit or implicit content, I must leave it for further study. Meanwhile, I would like to emphasise that, at least theoretically, entailments and bridging implicatures should be differentiated.

Finally, let me look at the difference between the following:

(28) I went into a room. A window was open.
(29) I went into a room. The window was open.

In (28), 'window' is associated with the indefinite article whereas in (29), it is associated with the definite article. What is interesting here is that with an assumption such as 'a room has windows' very easily available from general knowledge, the overall interpretations of (28) and (29) look very similar: both communicate that there was a window in the room the speaker went into and it was open.

However, it is clear that the indefinite article plays a different role from the definite article and here I would like to analyse the difference in cognitive terms. There seem to be two crucial differences in processing (28) and (29). First, in (28), what the hearer is required to do is to introduce a new
representation of a window into his mental representation, which may be the antecedent for subsequent references. On the other hand, in (29), a particular window is being picked out and referred to by this very utterance, and the hearer is required to make a bridging implicature such as 'there was a window in the room speaker went into', in order for the reference to succeed. In other words, in (28), it is not necessary to search for an antecedent, whereas in (29), it is, and for this, the bridging implicature is vital.

However, the question of why 'a window' in (28) can be interpreted as a window in the room mentioned in the previous sentence still needs to be answered. Parallel remarks, of course, apply to (29). Thus, despite their semantic differences, (28) and (29) have some common elements in their pragmatic interpretation.

5. Overview of the Thesis

This thesis examines, and more importantly, attempts to explain the mechanism of bridging reference assignment, of which three particular aspects are chosen to be investigated: (a) how and to what extent the accessibility of candidate referents affects hearers' choices of referent; (b) how and to what extent the accessibility of contextual assumptions affects hearers' choices of referent; (c) what affects the stylistic acceptability of bridging. Various existing accounts of each of the three phenomena are tested against a range of critical examples, which results in the finding that none of the existing accounts is satisfactory on its own. As an alternative, this thesis proposes a relevance-theoretic account (Sperber & Wilson 1986). Sufficient evidence is given throughout the thesis to conclude that a relevance-theoretic account successfully explains all three aspects of the bridging mechanism.
In the first chapter, I have given a brief overview of past studies of bridging and some of the main issues to which this thesis aims to give some answers. In addition, a definition of bridging implicature has been proposed, which is itself the answer to one of the main issues introduced in this chapter.

The second chapter summarises the central claims of relevance theory. This brief outline describes how the criterion of consistency with the principle of relevance explains various phenomena in communication, which are not discussed in the rest of the thesis.

The third, fourth and fifth chapters form the main body of the thesis. The third chapter takes up the topic of accessibility of candidate referents. Past studies on the subject are surveyed, which provide extensive evidence that the accessibility of candidate referents is indeed a crucial factor affecting the hearer's choice of referent. Accounts offering such evidence, represented by Sidner and Erku & Gundel, are assessed in detail: examples introduced in the chapter suggest that such accounts cannot satisfactorily explain the overall mechanism of bridging interpretation. The final part of the chapter demonstrates that a relevance-theoretic account, which sees the accessibility of candidate referents as merely one of many factors affecting the overall interpretation of bridging cases, offers a better explanation.

The fourth chapter examines the role of contextual assumptions in the interpretation of bridging. Their role in utterance interpretation in general has been recognised for some time, but there is still no definite answer to the question of how and when the assumptions necessary for utterance interpretation are constructed. Among existing accounts, Sanford & Garrod's scenario-based approach has been the most influential. This chapter discusses their account and points out some crucial limitations. It also argues that a relevance-theoretic view of the role of contextual assumptions in
utterance interpretation, which assumes that situationally organised information is merely a part of the whole information available to the hearer, works better.

The fifth chapter investigates factors which affect the acceptability of bridging cases, and explains why some are judged acceptable and others less so. Six accounts, representing different criteria for acceptability, are chosen for assessment: two propose a truth-based criterion; one is based on accessibility of candidate referents; one invokes both truth and accessibility; one invokes truth and coherence. Each account is tested against various types of examples on which I have conducted questionnaires designed to examine what affects subjects' choices of referent and judgements of acceptability; the results of these questionnaires are used as evidence to support or disprove predictions made by the competing accounts. It is argued that none of the accounts discussed in this chapter satisfactorily explains subjects' choices of referent and judgements of acceptability, and that a relevance-theoretic account based on the criterion of consistency with the principle of relevance offers a better explanation for the results of the questionnaires.

The final chapter summarises the thesis and briefly draws some conclusions. In addition, some issues which are related to this research but are left for future investigation are briefly sketched.
Chapter 2  Relevance Theory

1.  Background
1.0.  Introduction

Relevance theory (Sperber & Wilson 1986, 1987; Blakemore 1992) is a pragmatic theory which shares a basic assumption with the Gricean approach: that verbal communication involves not only encoding and decoding, but also, more crucially, the drawing of inferences, in which contextual assumptions play an important role. However, Sperber & Wilson differ from Grice in their claim that the principles governing inferential communication have their source in some facts about human cognition: humans typically pay attention to the most relevant phenomena available, construct the most relevant possible representations of these phenomena, and process these representations in a context that maximises their relevance.

The consequence of this claim for the theory of communication is significant: a communicator, by the very act of claiming a hearer's attention, communicates that the information he is offering is relevant enough to be worth the hearer's attention. In other words, utterances automatically create expectations of relevance.

In this chapter, I will outline some of the central notions of relevance theory, which will be applied in later chapters to provide an account of bridging reference. This chapter makes little claim to originality, and merely summarises existing research.

1.1.  Relevance Theory and the Code Model

Relevance theory offers an approach to communication
which is different from those adopted by all previous theories of communication. It is radically different from the still widely popular 'code model', typically represented by the semiotic approach to communication. It is also different, though in a much more subtle way, from the Gricean approach.

Let me first illustrate how relevance theory differs from the narrowest interpretation of the code model, in which the only messages that can be communicated are those that are linguistically encoded. Consider the following examples:

(1) Mary bought his articles.
(2) That's too long.

The code model, understood in this very strict way, assumes that an addressee can only recover 'linguistically encoded meaning' from an utterance. Hence, it predicts that what an addressee can recover as a meaning of (1) might be 'Mary bought someone (male)’s articles’. Similarly, an addressee of (2) might recover a meaning such as ‘A certain object (non-animate) is too long for something’. Clearly, this is too poor a description of verbal understanding. Let me point out what is crucially missing from this picture. One characteristic of linguistic meaning is that it does not assign actual referents to referring expressions. To interpret (1), in addition to recovering its linguistic meaning, an addressee has to identify who ‘Mary’ is, and what ‘his articles’ are; in (2), she has to identify what ‘that’ is intended to refer to. Furthermore, in (1), the word ‘articles’ is ambiguous and an addressee has to decide whether it means ‘things’ or ‘papers’. In addition, the phrase ‘his articles’ is vague: it can mean ‘papers he has written’, ‘papers he is trying to sell’, ‘papers he is editing’, ‘papers about him’, and so on. Similarly, in (2), the meaning of ‘too long’ is vague and an addressee has to clarify what it is too long for.

Now consider the following conversation:
Example (3) raises a different kind of problem from those mentioned above. Although (3b) would most naturally be interpreted as an answer to (3a), within the framework of the code model as defined above, it is impossible to explain how (3b) can be interpreted as an appropriate answer to (3a), since this goes beyond what is linguistically encoded. In reality, an exchange such as (3) is quite common, and intuitively, (3b) can be interpreted as a negative answer to (3a). It is crucial for a theory of communication to explain why exchanges such as (3) are possible, or even sometimes preferred, and on this, the code model has nothing to offer.

A natural extension of the code model would be to argue that the linguistic code described above should be supplemented by some form of pragmatic code, which should yield an appropriate interpretation for each utterance in context. The problem is that no such code has ever been shown to exist. Moreover, Sperber & Wilson (1986) have argued that no such code could exist. According to them, part of the utterance-interpretation process involves choosing an appropriate context, i.e. an appropriate set of contextual assumptions against which to interpret it. If they are right, the context is not fixed independently of the utterance-interpretation process, as the code model assumes, but has instead to be chosen as part of that process. Yet the idea that the context itself could be chosen by means of a code has never been seriously defended. In that case, the code model itself is inadequate in principle.

What, then, should a proper theory of communication be like? Sperber & Wilson believe that such a theory should explain how addressees identify those parts of the intended
interpretation that go beyond the linguistically encoded meaning. Phenomena such as reference assignment and disambiguation clearly belong to this domain, and they are considered to be 'pragmatic' phenomena. Identification of intended implications, as in (3) above, and identification of the intended context (or intended set of contextual assumptions), are further pragmatic phenomena. The question is, if the code model is wrong, how should these pragmatic phenomena be explained?

Relevance theory is part of a tradition created by philosophers such as Grice, Lewis and Strawson, in which communication has been described not as a process of encoding and decoding, but as 'a process of inferential recognition of the communicator's intentions' (Sperber & Wilson ibid.: 9). This view is fundamentally different from the code model. It claims that beyond the linguistic meaning of an utterance there is another layer of meaning which might be called 'speaker's meaning' or 'intended meaning', identification of which is the goal of the interpretation process. As Sperber & Wilson put it:

Verbal communication is a complex form of communication. Linguistic coding and decoding is involved, but the linguistic meaning of an uttered sentence falls short of encoding what the speaker means: it merely helps the audience infer what she means. The output of decoding is correctly treated by the audience as a piece of evidence about the communicator's intentions. In other words, a coding-decoding process is subservient to a Gricean inferential process (Sperber & Wilson ibid.: 27).

When we consider pragmatic phenomena, it is useful to distinguish 'sentence' from 'utterance'. According to Sperber & Wilson, a sentence has purely linguistic properties, and its meaning is linguistically encoded. On the other hand, an utterance has both linguistic and non-linguistic properties:
these last include, for example, the time and place of utterance, the identity of the speaker, the speaker's intentions, and so on. As a result, it is possible for utterances of the same sentence to be interpreted differently in different situations. Sperber & Wilson argue that an adequate theory of communication should be a theory of utterance interpretation, rather than a theory of sentence meaning, which was advocated by followers of code model, narrowly understood.

Relevance theory distinguishes three aspects of utterance meaning: 1. what is said; 2. what is implied; 3. what attitude is communicated. In each case, it is the speakers intentions that the hearer aims to identify. In this section, I will illustrate the first two of these. The first aspect of utterance meaning, 'what is said', is called the 'propositional form' in relevance theory. According to Sperber & Wilson, the propositional form of an utterance goes beyond the encoded linguistic meaning and encapsulates the truth-conditional content of the utterance. Recall our examples (1) and (2). The linguistic meaning (i.e. sentence meaning) of (1) and (2) leaves unspecified crucial pieces of information such as who is 'Mary', what are 'his articles' in (1), and what is 'that' in (2), and so on. The propositional form of an utterance of these sentences will have all the intended referents identified and ambiguous elements disambiguated. Thus, the propositional forms of particular utterances of (1) and (2) might look as follows:

(1') Mary Edwards bought papers written by Yukio Mishima at Dillons on November 7, 1982.

(2') Two weeks is too long as a holiday for a Japanese worker.

A crucial question to be answered here is how a hearer can recover a propositional form such as (1') or (2'). In other words, how does a hearer assign the right referent to a referring
expression and choose the intended disambiguation from among several possible interpretations? Sperber & Wilson argue that in addition to decoding of linguistic information, various inferences play a crucial role in recovering propositional form. I will discuss this in more detail in section 3.1.

Now let's consider the second aspect of utterance meaning, namely, 'what is implied'. Our example (3) is a case in point:

(3)  a. Do you fancy that Italian restaurant on the High Street?
    b. I have eaten pasta three times this week.

Let's suppose the propositional form of (3) is the following:

(3a') Does Jane fancy Spaghetti Junction on Teddington High Street on the evening of September 16th 1994?
(3b') Jane has eaten pasta three times in the week which includes September 16th 1994.

Intuitively, even after assigning reference, (3b) does not make sense on its own as an answer to (3a). What the hearer naturally does in cases like this is to infer what is implied. In the case of (3b), the hearer's choice of implied interpretation will most likely be the following:

(4)  a. If one has eaten pasta three times in a week, one will not choose to eat pasta again within the same week.
    b. Therefore, Jane doesn't fancy Spaghetti Junction.

In the next section, I will discuss briefly how Grice accounts for cases like (3). How relevance theory accounts for the recovery of implicatures in general will be discussed in section 3.2.
1.2. Relevance Theory and Grice

Sperber & Wilson and Grice share the basic assumption that communication is an inferential activity involving identification of the intended interpretation. However, the differences between the two are significant - they differ particularly in how the possible interpretations of an utterance are evaluated and accepted or rejected.

Grice claims that conversation is a co-operative activity governed by the Co-operative principle and maxims:

Co-operative principle
Make your conversational contribution such as is required, at the stage at which it occurs, by the accepted purpose or direction of the talk exchange in which you are engaged (Grice 1975: 45)

Maxims of quantity
1. Make your contribution as informative as is required.
2. Do not make your contribution more informative than is required.

Maxims of quality
Supermaxim: Try to make your contribution one that is true.
1. Do not say what you believe to be false.
2. Do not say that for which you lack adequate evidence.

Maxim of relation
Be relevant.

Maxims of manner
Supermaxim: Be perspicuous.
1. Avoid obscurity of expression.
2 Avoid ambiguity.
3 Be brief (avoid unnecessary prolixity).
4 Be orderly.

Grice's biggest contribution to the study of communication is his claim that utterance interpretation is a matter of hypothesis formation and evaluation. His co-operative principle and maxims are indeed the standards by which hypotheses about the intended interpretation are evaluated. In Grice's framework, the interpretation which satisfies the co-operative principle and maxims should be confirmed and accepted as the one intended. Implicatures are then the beliefs that have to be attributed to the speaker in order to preserve the assumption that the Co-operative Principle and maxims (or at least the Co-operative principle) have been obeyed.

However, although Grice's framework is a much better starting point than the code model, it also has some significant problems. Let me mention three major drawbacks of his framework. First, it is not clear where the Co-operative principle and maxims come from, and whether they should be seen as universal or culture-specific (see e.g. Keenan 1976). Second, many of the terms used in the Co-operative principle and maxims are too vague to be useful. For example, the first maxim of quantity says, 'make your contribution as informative as is required', and the second quantity maxim says that the contribution should not be more informative than is required'. The problem here is that the notion of the 'required information' is left unexplained and undefined. Similar criticisms can be applied to most of his maxims, and it is especially significant that the maxim of relation is left undefined. Finally, Grice's framework makes apparently wrong predictions about what the hearer will choose as the intended interpretation of an utterance. An adequate account of utterance interpretation should be able to explain which of the various possible
interpretations will be chosen by the hearer. Grice's framework, however, provides no method of choosing between a range of interpretations which satisfy the Co-operative Principles and maxims. I will illustrate this point by reference to example (3):

(3)  a. Do you fancy that Italian restaurant on the High Street?
     b. I have eaten pasta three times this week.

As I mentioned, this example cannot be accounted for by the code model, since it ignores or underestimates the role of inference in interpretation. Grice, on the other hand, offers an explanation for how (3) can be understood.

According to Grice, when the speaker apparently violates at least one of the maxims, the hearer will search for an interpretation which satisfies it, and attributes to the speaker any belief required to dispose of the apparent violation. Such beliefs are what Grice calls 'implicatures'. In the example above, (3b) is the result of an apparent violation of the Maxim of Relation, since it seems not to answer the question in (3a). Therefore, according to Grice, the hearer of (3b) will start searching for implicatures. As I mentioned before, the most natural interpretation of (3b) is to attribute to the speaker the beliefs in (4):

(4)  a. If one has eaten pasta three times in a week, one will not choose to eat pasta again within the same week.
     b. Jane doesn’t fancy Spaghetti Junction.

These would then be implicatures of (3b), which restore the assumption that the maxim of Relation has been obeyed.

However, there is a significant problem: Grice's maxims will apparently be satisfied by various other possible
interpretations of (3b), such as the one in (5):

(5)  a. If one eats pasta three times a week, one must love pasta.
    b. If one loves pasta, one wants to eat in restaurants which serve it.
    c. Jane fancies Spaghetti Junction.

The problem is that, although it is unlikely that the hearer of (3b) will interpret it as (5) suggests, Grice's framework does not provide an obvious way of rejecting this interpretation.

Relevance theory differs from Grice in various ways, and as a result, it does not encounter the same problems as Grice. In relevance theory, Grice's Co-operative principle and maxims are replaced by a single principle, namely, the principle of relevance:

Principle of relevance
Every act of inferential communication communicates the presumption of its own optimal relevance

According to Sperber & Wilson, the principle of relevance is not something that has to be known or followed by communicators, and communicators could not violate it even if they wanted to. The principle of relevance is simply an exceptionless generalisation about what happens when someone enters into communication. Its source, according to Sperber & Wilson, lies in an essential feature of human cognition. Human cognition is relevance-oriented: humans typically pay attention to the most relevant phenomena available; they typically construct the most relevant possible representations of these phenomena, and process these representations in a context that maximises their relevance. As a result, when a communicator requests an audience’s attention, this automatically raises an expectation
that the utterance (or other act of communication) will be relevant enough to be worth the audience's attention - or, in Sperber & Wilson's terms, 'optimally relevant'.

Furthermore, unlike what happens in Grice's maxims, the most crucial notion in relevance theory, namely, 'optimal relevance', is clearly defined:

**Optimal relevance**
An utterance, on a given interpretation, is optimally relevant iff:
(a) it has enough contextual effects to be worth the hearer's attention;
(b) it puts the hearer to no unjustifiable effort in obtaining those effects.

Notions such as 'contextual effects' and 'processing effort' are central to relevance theory, and I will discuss them later in this chapter.

Finally, relevance theory is preferable to Grice's theory in that it offers an adequate method for evaluating candidate interpretations. The following is the pragmatic criterion proposed by Sperber & Wilson:

**Criterion of consistency with the principle of relevance**
An utterance, on a given interpretation, is consistent with the principle of relevance if and only if the speaker might rationally have expected it to be optimally relevant to the hearer on that interpretation.

As Sperber & Wilson show, because of the way 'optimal relevance' is defined, there is never more than at most a single interpretation which satisfies this criterion. I will discuss how the criterion works in actual communication in section 3.
2. Basic Notions
2.1. Communication and Relevance

In order to understand how the principle of relevance actually works, it is important first to clarify the notion of 'communication'. Sperber & Wilson are interested in a notion of communication that involves 'ostensive' behavior. By ostensive behavior, they mean a behavior intended to attract an audience's attention to some phenomenon. As noted above, Sperber & Wilson claim that ostensive behavior automatically creates an expectation, or presumption, of relevance, i.e. an expectation that the ostensive behavior will be relevant enough to be worth an audience's attention. On the basis of the presumption of relevance, once she starts attending to a certain ostensive phenomenon, the audience will try to find the intended meaning of the ostensive behavior. This mode of communication is called 'ostensive-inferential' communication and is defined as follows:

**Ostensive-inferential communication**
the communicator produces a stimulus which makes it mutually manifest to communicator and audience that the communicator intends, by means of this stimulus, to make manifest or more manifest to the audience a set of assumptions \{I\}. (Sperber & Wilson ibid.: 63)

Within ostensive-inferential communication, there may be an element of coding, as in verbal communication, but it also works on its own, as in many types of non-verbal communication.

Sperber & Wilson argue that by attracting someone's attention, a communicator is asking for some effort to be spent, since paying attention requires a certain amount of effort. They also claim that humans are not willing to spend their effort for nothing - there is always an expectation of some reward. In the case of communication, as in cognition, the reward for attention...
and mental effort is measured in terms of relevance. Hence, if a communicator requests your attention, you assume that as a result of paying attention, you will get adequately relevant information as a reward. This fact, that every act of ostensive communication creates an expectation of relevance, is the basis of the principle of relevance, introduced in the last section.

However, there are usually several possible interpretations of an act of ostensive communication, and this is why misunderstanding often occurs. To succeed in communication, the communicator's task is to make sure that his intended meaning is the one selected. The audience's task is to choose the intended meaning, and nothing else. The question is: how can this be possible? To answer this question, we have to understand the notion of 'optimal relevance'. In defining the notion of optimal relevance, Sperber & Wilson introduce two factors - contextual effect and processing effort - which lie at the heart of their theories both of communication and of cognition.

2.2. Optimal Relevance

Sperber & Wilson's notion of 'optimal relevance' is repeated here for convenience:

**Optimal relevance**

An utterance, on a given interpretation, is optimally relevant iff:

(a) it has enough contextual effects to be worth the hearer's attention;

(b) it puts the hearer to no unjustifiable effort in obtaining those effects.

In this section, I will discuss the notion of optimal relevance and its role in communication.
Let me first clarify the notion of 'contextual effects'. Contextual effects result from an interaction of new and old information, and are categorised into three types by the way they interact with old, or contextual, information: 1. by combining with the context to yield contextual implications; 2. by strengthening existing assumptions; 3. by contradicting and eliminating existing assumptions. I will illustrate these three types of interaction in turn.

Suppose you like Keith Jarrett and you know that he will be giving a recital at the Royal Festival Hall tonight, but you did not book a ticket because you were not sure whether you could make it or not. Here is an example of the first type of interaction. In the morning, you make up your mind as follows:

(6a) If tickets are still available, I will go to the recital tonight.

Then you telephone the box office and discover:

(6b) Tickets are still available.

Now, from your existing assumption (6a) and the new information (6b), you can deduce a conclusion not deducible from either the existing assumption or the new information alone:

(6c) I will go to the recital tonight.

Sperber & Wilson call such conclusions 'contextual implications'. In the example above, (6b) is relevant in a context containing assumption (6a) because it enables a joint inference process involving old and new information to take place. Sperber & Wilson claim that new information is relevant in any context in which it has contextual implications, and that the more contextual implications it has, the more relevant it will be.
Here is an example of the second type of interaction which yields contextual effects. You find an advertisement for the recital in the morning paper, which does not say either ‘sold out’ or ‘returns only’, and guess that:

(7a) Tickets should still be available.

You telephone the box office and find out that:

(7b) Tickets are still available.

In this case, the new information (7b) strengthens, or confirms, your existing assumption (7a). Sperber & Wilson claim that new information is relevant in any context in which it strengthens an existing assumption: and the more assumptions it strengthens, and the more it strengthens them, the greater its relevance will be.

Now an example of the third type of interaction. In the same situation as (7a), you guess that:

(8a) Tickets should still be available.

This time, when you telephone the box office, you discover that:

(8b) All the tickets are sold out.

Here the existing assumption and the new information contradict each other. Sperber and Wilson assume that when two assumptions contradict each other, the weaker of the two is abandoned. In this case, (8b) would provide strong evidence against (8a), which would therefore be abandoned. They claim that new information is relevant in any context in which it contradicts, and leads to the elimination of, an existing assumption; and the more assumptions it eliminates, and the
stronger they were, the more relevant it will be.

Now let us consider the other factor which contributes to optimal relevance, namely, processing effort. Processing effort can be described as the mental effort needed to parse the utterance, decide what proposition and propositional attitude it was intended to express, access an appropriate context, and work out the contextual effects of the utterance in that context. The smaller the processing effort required - in other words, the easier it is for the hearer to recover the intended contextual effects - the greater the relevance.

The notion of processing effort, then, depends on several factors, not all of which are equally well understood. In experimental psychology, time spent on various aspects of comprehension provides a useful index of processing effort; however, other factors which affect processing effort, such as level of concentration or alertness, should also be taken into account. Moreover, while various experimental indexes of processing effort suggested by psychologist are useful guides, what is ultimately important is the way the human mind assesses its own efforts. According to Sperber & Wilson, this is done in a comparative way. For example, we can say that the more information the mind is required to process, the more effort is needed, and the more contextual assumptions it has to access, the more effort is consumed. Other factors which affect processing effort are, for example; recency of mention; frequency of mention; linguistic complexity; logical complexity; accessibility of contextual assumptions. I will discuss some of these factors with regard to bridging reference assignment in Chapters 3 and 4.

Having introduced the notions of contextual effect and processing effort, Sperber & Wilson use them to define various notions of relevance. For example, the maximally relevant interpretation of a given piece of information is the one that
yields the greatest possible contextual effects in return for the smallest possible processing effort. According to Sperber & Wilson, though, the audience of an act of ostensive-inferential communication is not entitled to expect maximally relevant information, but merely optimally, or adequately relevant information, i.e. adequate contextual effects in return for no gratuitous processing effort, and this is what the definition of optimal relevance states. By adequate effects, they mean ‘more effects than could have been obtained by processing information available elsewhere in the audience’s cognitive environment’, and by no ‘gratuitous processing effort’, they mean to rule out effort which leads to no reward in terms of contextual effects, and which the speaker could easily have spared the audience by formulating the utterance in a different way. These ideas will be illustrated in detail below.

Let me now elaborate on the way processing effort is used in accessing contextual assumptions, because this is often the most important factor in deciding which interpretation was intended by the speaker. One of the central claims of relevance theory is that contexts are not fixed independently of the comprehension process; they are retrieved or constructed during the interpretation process. This point will be repeatedly relied on in the rest of the thesis, since the construction of context is one of the most important factors in bridging reference assignment.

Sperber & Wilson suggest that there are at least three ways of accessing contextual assumptions: 1. they are accessed from the interpretation of previous utterances; 2. they are accessed from encyclopaedic knowledge; 3. they are accessed from the physical environment in which the utterance takes place. Since 1 and 3 are relatively straightforward, I will discuss the second way of accessing contextual assumptions here.

Sperber & Wilson assume that information is stored in
memory at a certain conceptual address which gives access to three types of shared information: logical, encyclopaedic and lexical. The logical entry for a concept consists of a set of deductive rules which apply to assumptions containing the concept. The encyclopaedic entry consists of a set of assumptions about the extension and/or denotation of the concept: the objects, events and/or properties which instantiate it. The lexical entry contains information about the natural-language counterpart of the concept, including syntactic and phonological information. Thus, a conceptual address is a point of access to logical, encyclopaedic and linguistic information.

Of the three entries, it is the encyclopaedic entry that plays the crucial role in accessing contextual assumptions for use during comprehension. The encyclopaedic entry for a concept consists of an organised set of propositions, each containing further concepts. So for example, the encyclopaedic entry for the concept ‘DOG’ may contain propositions such as ‘DOGS CHASE CATS’, ‘A PIT BULL IS A DANGEROUS DOG’, ‘CHOMSKY OWNS A DOG’ etc.

Now let me illustrate how the encyclopaedic entry provides contextual assumptions for use in comprehension. Consider the following example:

(9) A I have a terrible headache.
    B. Do you? Fiona has got some aspirin.

Here, the encyclopaedic entries for the concepts HEADACHE and ASPIRIN provide the assumptions crucial for comprehension: the former may provide an assumption such as ‘headaches can be cured by aspirin’; the latter, ‘aspirin can cure headaches’. Retrieving such assumptions from encyclopaedic entries for concepts may involve some sort of matching process in which the same concepts appear in the same or different assumptions accessed through different conceptual addresses.
There are cases where the encyclopaedic entry of a concept can provide more than one possible contextual assumption. To illustrate this, imagine that I am asked what my ex-boyfriend was like, and I reply:

(10) He was a typical Japanese man.

There are several contextual assumptions accessible from the encyclopaedic entry for the concept 'Japanese man', including:

(11) a. He is a male-chauvinist.
    b. He is a workaholic.
    c. He does not do any housework.
    d. He often drinks with colleagues.
    e. He likes playing golf.
    f. He likes scotch whisky.

Of these, at least some are likely to be retrievable as a 'chunk', a 'schema', or 'prototype', i.e. a set of assumptions describing typical category members, the whole chunk being stored and accessed as a unit. Let us assume, for the sake of illustration, that assumptions (11a-d) form such a chunk, and are the most easily accessible assumptions in the encyclopaedic entry for 'Japanese man'. The question then is whether the hearer of (10) will retrieve not only assumptions (11a-d), but also the less accessible (11e) and (11f). In cases like (10), relevance theory predicts that the hearer should choose (11a-d), i.e. the most easily accessible chunk, as the intended context as long as the resulting interpretation yields adequate contextual effects, which it clearly would in the case of (10). The fact that (11e-f) would not then be accessed is predicted by clause (b) of the definition of optimal relevance, as I will now show.

Having found an acceptable interpretation based on (11a-d), accessing more assumptions (in the case of (10), accessing
assumptions (11e) to (11f)) requires more processing effort. It is also true, of course, that more assumptions might provide more contextual effects. Therefore, it is reasonable to ask why the hearer should not aim at the most relevant interpretation rather than the optimally relevant one, which merely yields adequate effects. Sperber & Wilson claim that this is ruled out for two reasons: first, it is not always possible to decide which of two alternative interpretations is more relevant; second, to find the most relevant interpretation of an utterance, the hearer would have to compare all the possible interpretations, and this is not feasible since the set of possible interpretations for a given utterance is indefinitely large.

Therefore, the optimally relevant interpretation, i.e. the one which yields adequate effects for no gratuitous effort, is the one the hearer is supposed to look for. It follows from the definition of optimal relevance that the first satisfactory interpretation (here, the first optimally relevant interpretation) is the only satisfactory interpretation. Thus, if the hearer of (10) can arrive at a satisfactory interpretation on the basis of (11a-d) alone, this is the only interpretation he is justified in choosing, and all other interpretations, including those based on (11e) and (11f), are disallowed. In this way, relevance theory sheds light on how contextual assumptions are selected.

Now let us examine how the notion of optimal relevance sheds light on reference assignment. This has been discussed in a range of studies which have contributed directly or indirectly to my own research (see, for example, Ariel 1990; Gundel forthcoming; Matsui 1993a, b, 1994; Wilson 1992; Wilson & Sperber 1986). Consider the following example:

(12) I went into the room. The chandeliers sparkled brightly.

Intuitively, the most natural interpretation of (12) is:
(13) The chandeliers in the room the speaker went into sparkled brightly.

The question here is, on hearing the second part of (12), how can the hearer infer that the chandelier mentioned was the one in the room just mentioned, rather than, say, the chandelier in Buckingham Palace? The answer lies in the definition of optimal relevance. For the hearer interpreting the second part of (12), the most accessible context is drawn from the interpretation of the immediately previous utterance. Through the encyclopaedic entry for 'CHANDELIER', the hearer might be able to access the following assumption, which includes the concept 'ROOM':

(14) Chandeliers are located in rooms.

The room mentioned in the first part of (12) is then a good candidate for containing the chandeliers mentioned in the second part. Hence, the following bridging assumption might be created:

(15) There were chandeliers in the room the speaker went into.

The resulting interpretation will be (13). This interpretation - assuming it yields adequate effects - is obviously gained by the minimal processing effort. By contrast, in order to interpret 'the chandelier' in (12) as referring to the one in Buckingham Palace, the hearer would have to introduce several additional contextual assumptions, which will not be as easily accessible as (15). This interpretation obviously cannot satisfy clause (b) of the definition of optimal relevance, since there is another more easily accessible interpretation which, by hypothesis, satisfies both clauses of the definition.
Having considered the notion of optimal relevance, I would like to add one final point which is rather important. Sperber & Wilson note that the fact that an utterance communicates a presumption of optimal relevance does not mean that it will actually be optimally relevant to the hearer. The presumption of optimal relevance may be created mistakenly or dishonestly: a speaker may tell you something in the mistaken belief that you do not already know it, or in order to distract your attention from what is going on elsewhere. Hence, they propose the following ‘criterion of consistency with relevance’:

**Criterion of consistency with the principle of relevance**

An utterance, on a given interpretation, is consistent with the principle of relevance if and only if the speaker might rationally have expected it to be optimally relevant to the hearer on that interpretation.

And this is the criterion that, according to Sperber & Wilson, is used in every aspect of utterance interpretation. In next section, I will show how this criterion accounts for various aspects of verbal understanding.

3. **Utterance Interpretation**

3.1. **Propositional Form**

In section 1.1., I sketched how a hearer completes the semantic representation of an uttered sentence into a fully propositional form. In this section, I would like to look at the process in more detail.

First, let me briefly outline the role played by propositional forms in ostensive-inferential communication. In Sperber & Wilson’s model, there are two crucial hypotheses about the inferential abilities involved in comprehension. The first is that the process of inferential comprehension involves a
deductive element. The second is that propositional forms act as inputs to the deductive inference process.

From the two hypotheses above, it follows that propositional forms must have logical properties, i.e. they must be capable of implying or contradicting one another, and of undergoing deductive rules. According to Sperber & Wilson, all conceptual representations have logical properties, or 'logical form'. They say that 'a logical form is “propositional” if it is semantically complete and therefore capable of being true or false, and “non-propositional” otherwise' (Sperber & Wilson ibid.: 72). One example of a non-propositional logical form is the meaning of a sentence. For example, the following sentence is neither true or false as it stands:

(21) It is too old.

Let us suppose that the logical form of (21) looks something like (22):

(22) y is too old for z at time t.

Here, ‘y’, ‘z’ and ‘t’ are variables which need to be assigned a value if the result is to be true or false. Sperber & Wilson claim that in verbal communication, the incomplete logical form of an uttered sentence is normally completed by the hearer into the fully propositional form that the speaker intended to convey. One type of completion involves assigning values to variables. Thus, in the case of (21), a hearer might produce a propositional form such as the following:

(23) The minced beef bought on August 31, 1994 is too old to be safely eaten on September 10, 1994.

Sperber & Wilson’s most important claim about recovery of
propositional form is that it is governed by the criterion of consistency with the principle of relevance, i.e. the hearer should choose the interpretation which satisfies this criterion. This view is crucially different from that of Grice, who recognised that pragmatic principles govern the recovery of implicatures, but did not see that they also applied to the recovery of propositional form. Recent research on the role of inference in the recovery of propositional form can be found in a series of works by Robyn Carston (e.g. 1988, 1990, 1993). Here, I will illustrate briefly how various types of such inferences are performed. In relevance theory, it is suggested that there are at least three sub-processes involved in the recovery of propositional form: a. reference assignment; b. disambiguation; and c. enrichment. In the last section, I illustrated how the referent for a bridging reference can be identified by the criterion of consistency with the principle of relevance. Other types of reference assignment should be carried out along similar lines. Here I will illustrate how the other two sub-processes, namely, disambiguation and enrichment, are governed by considerations of relevance.

For each of the following examples, there are two possible interpretations:

(24) Dr. Martin left the theatre six hours later.
(25) Susan told me that John was getting married in Barbados.

(24) is lexically ambiguous: the noun 'theatre' can mean either 'a place for the performance of plays' or 'an operating theatre'. (25) is syntactically ambiguous: 'in Barbados' can modify either the verb 'told' or the verb 'was getting married'. Intuitively, the preferred interpretation of (24) is that Dr. Martin left the operating theatre, and the preferred interpretation of (25) is that Susan told me that Barbados was where John was getting
married. The question here is why these preferences exist.

Relevance theory explains this in terms of the criterion of consistency with the principle of relevance. To achieve successful communication, the speaker aims at optimal relevance: that is, adequate effects for no unjustifiable effort. The criterion of consistency with the principle of relevance predicts that the hearer should follow the path of least effort in looking for the intended interpretation. In the case of (24), the 'operating theatre' interpretation might be preferred because the mention of a doctor somehow makes it easier to access; similarly, in the case of (25), the 'getting married in Barbados' interpretation might be preferred because attaching the prepositional phrase 'in Barbados' to the lower rather than the higher VP makes the utterance easier to parse. Moreover, in both cases, it is relatively easy to find a context in which the preferred interpretation achieves adequate contextual effects: e.g. for (24), by suggesting that the operation was complicated and took a long time; and for (25), by suggesting that the speaker might make a trip to Barbados to attend the wedding. Having found such a context for no gratuitous effort, in a way that the speaker could reasonably have foreseen, the hearer should accept the resulting interpretation.

Let us move on to another sub-process involved in the recovery of propositional form, namely, enrichment, studied particularly in the works of Robyn Carston, cited above. It is widely assumed that disambiguation and reference assignment are all that is needed to obtain a fully propositional form. However, Sperber & Wilson claim that utterances often include expressions which should be regarded as 'semantically incomplete'. Consider the following:

(26) Jonathan's painting is too big.

In (26), there are two expressions which are semantically
incomplete. First, 'Jonathan’s painting’ can be interpreted in various ways: as the painting painted by Jonathan, the painting owned by Jonathan, the painting whose subject is Jonathan, the painting chosen by Jonathan, etc. Second, the expression ‘too big’ can receive several different interpretations: as too big to be carried, too big to be hung in a room, too big (important) to ignore, etc.

It is the hearer’s task to choose the right interpretation for these semantically incomplete elements as part of the process of recovering the propositional form of an utterance. In this process, Sperber & Wilson claim that pragmatic principles play a crucial role: among the various interpretations of a semantically incomplete element, the one which can be most easily processed and provides easy access to a context in which the utterance can achieve an adequate effects, should be chosen by the hearer.

Let us look at one more similar example:

(27)  a. I have had a shower.
   b. I have met the Queen.

In (27), what the hearer can recover by decoding and reference assignment is that the speaker has had a shower, or has met Queen Elizabeth II, at some point within a period of time preceding her utterance. However, while (27a) is most likely to be understood as meaning that the speaker has had a shower on the day of utterance, (27b) is likely to be understood as meaning that the speaker has met the Queen at some point in his life. According to Sperber & Wilson, these interpretations are selected by the criterion of consistency with the principle of relevance. Normally, people take for granted that others have had a shower at some point in their life; therefore, for an utterance such as (27a) to be optimally relevant, it must communicate that the speaker has had a shower recently enough for it to be
worth mentioning: for example, by suggesting that the speaker is presentable. By contrast, in (27b), the fact that the speaker has met the Queen in the course of his life itself could well be relevant enough to be worth mentioning: hence, no further enrichment is consistent with the principle of relevance. (For further discussion, see Wilson & Sperber, forthcoming, and references therein.)

3.2. Implicature

In the last section, I discussed how relevance theory explains the recovery of propositional form, i.e. 'what is said'. In the final section of this chapter, I would like to show how it explains the recovery of 'what is implied', i.e. the implicature of an utterance.

My main interest in the discussion of implicatures is to find out why a speaker might choose to communicate his intention implicitly, rather than explicitly. Since it seems obvious that the recovery of what is implicitly communicated generally requires a different amount of effort than the recovery of what is explicitly communicated, the choice between explicit and implicit means should be governed by the criterion of consistency with the principle of relevance. This aspect of communication might be called the choice of style, and will be the focus of my discussion in this section.

Sperber & Wilson claim that a speaker's choice of style is governed by considerations of relevance: in other words, a speaker manipulates his style in order to achieve optimal relevance. Whether he communicates his intention explicitly or implicitly is determined by his judgement of how he can best achieve optimal relevance.

To illustrate, consider again our example (3):

(3) A. Do you fancy that Italian restaurant on the High
Street?
B. I have eaten pasta three times this week.

I have shown that B’s answer in (3) will most likely be interpreted as implicitly communicating assumptions something like the following:

(4) a. If one has eaten pasta three times in a week, one will not choose to eat pasta again within the same week.

b. Therefore, B doesn’t fancy the Italian restaurant.

What interests me about this example is why speaker B did not choose to say simply ‘no’ instead. Sperber & Wilson’s view on this is roughly the following: the speaker B, by saying that she has already eaten pasta three times that week, provides not only a negative answer, but also an explanation for that negative answer. In relevance-theoretic terms, one can say that in this way the speaker has tried to achieve extra contextual effects, which could not have been achieved by giving a direct answer such as ‘no’. The hearer has to use more processing effort to recover the speaker’s intentions, but this is justified by the extra effects he is intended to obtain in return.

However, this does not mean that an indirect answer such as B’s utterance in (3) can always be justified. Suppose that the two people engaged in conversation (3) are a couple, and they want to keep a good relationship. Suppose also that it is known between them that B likes Italian food. In such a context, if B answers by saying simply ‘no’, this might allow A to make various assumptions about why she is refusing: e.g. B does not feel well, B is in a bad mood for some reason, B has some reason to upset A, etc. Therefore, if B wants to avoid such unnecessary speculation occurring in A’s mind, and wants to explain why she does not fancy Italian food on this particular occasion, an
answer such as the one in (3) should be chosen. For A, as a hearer, this answer is much better than the direct ‘no’ answer, since A was expecting to hear ‘yes’, and if the answer is ‘no’, he will naturally require some sort of explanation for it.

Now imagine a slightly different context. A and B are a couple and it is known between them that B likes Italian food. This time, B actually wants A to know that she is angry about him being late but does not want to say so explicitly. In that situation, B might choose to say only ‘no’, wishing various negative assumptions to grow in A’s mind. If that is B’s intention, a simple answer such as ‘no’ would be optimally relevant and hence preferred to a lengthy answer such as the one in (3).

The discussion above also illustrates Sperber & Wilson’s distinction between strong and weak communication. Recall our example (3) again:

(3)  A. Do you fancy that Italian restaurant on the High Street?
    B. I have eaten pasta three times this week.

In this case, B wants to make sure that A will recover the following assumptions:

(4)  a. If one has eaten pasta three times in a week, one will not choose to eat pasta again within the same week.
    b. Therefore, B doesn’t fancy the Italian restaurant.

When a given implicature has to be recovered if the utterance is to achieve optimal relevance, Sperber & Wilson say that it is strongly communicated, or strongly implicated. Thus (3B) strongly implicates assumptions (4a) and (4b): (4a) is an implicated premise, and (4b) is an implicated conclusion. Now
recall the situation where B is angry at A's being late, and
wants him to notice it but does not want to say so explicitly: B has chosen to say 'no' abruptly. In this case, by speaking
abruptly, apart from an assumption that she is not interested in
continuing the conversation, B allows several assumptions to
occur to A; in other words, B is encouraging A to explore a wide
array of further assumptions, e.g. 'B is angry at A's late arrival',
'B is not in her usual state', 'B does not want to talk much', 'B is
not hungry', 'B is not interested in him any more', etc. Sperber &
Wilson say that in such a case all these assumptions may be
weakly communicated, or weakly implicated. When several
assumptions are weakly implicated, the hearer is encouraged to
adopt some subset of them, and to regard some subset of them
as part of the speaker's beliefs. The greater the range of
assumptions involved, the greater the range of choices open to
the hearer, and the weaker the implicatures will be. Whether a
speaker chooses to communicate certain assumptions strongly
or weakly is, of course, a matter of style, with explicit
communication being strongest form of communication.

In relevance theory, the term 'poetic effect' is used to
refer to the 'effect of an utterance which achieves most of its
relevance through a wide array of weak implicatures' (Sperber &
Wilson ibid.:222; see also Pilkington 1992). Figurative
expressions such as creative metaphor and irony typically have
poetic effects. The aspect of figurative expressions which I am
interested in is how the use of this indirect means of
communication, which requires more processing effort than a
plain literal summary, can be justified. Consider the following
example:

(28) Debbie is a cat.

Standardly, this metaphorical utterance is taken to communicate
the following assumptions:
These can be regarded as implicated conclusions, obtained by processing (28) in a context containing typical cultural assumptions about cats: for example, that cats are selfish, spiteful, and so on. The question that interests me here is why the speaker has chosen a metaphorical expression such as (28), which conceivably requires the hearer to expend more processing effort than might have been needed if (29a) and (29b) had been explicitly expressed. To find an answer, we have to consider the notion of weak implicature again. According to Sperber & Wilson, in fact, (28) must communicate more than (29) if it is to achieve optimal relevance. And of course the cultural stereotype for cats would provide access to a much greater range of possible conclusions, as in (30):

(30) a. Debbie is selfish and spiteful.
    b. Debbie takes care of her looks.
    c. Debbie thinks that she is more important than other people.
    d. Debbie likes other people to do things for her.
    e. Debbie gives the impression that she deserves other people's favor.
    f. Debbie is independent, etc.

On hearing (28), the hearer is encouraged to draw at least some of these conclusions - enough, in fact, to justify the speaker's choice of an indirect means of communication. Notice that these contextual effects are not achievable by simply saying (29). According to relevance theory, the speaker who has chosen to say (28) rather than (29) must have intended to achieve extra effects which are analysable in terms of a range of weak
implicatures such as (30a)-(30f).

Another type of utterance which can yield a poetic effect is irony. Here I will just give one example. Imagine that you have been with friends to see a film which was reviewed in Time Out; the review said that it was the most entertaining film of the year: Having seen the film, you found it rather disappointing and say the following, sarcastically:

(31) This is the most entertaining film of the year, indeed.

Traditionally, it is assumed that irony communicates the opposite of what it literally says. Therefore, according to the traditional view, (31) is interpreted as communicating (32):

(32) This is not the most entertaining film of the year.

However, Sperber & Wilson (1981, 1986, ) have argued that this approach creates several problems. I will not discuss the details of their argument here, but just mention one of the most crucial problems. If, as the traditional view claims, irony simply communicates the opposite of what it literally says, why shouldn’t a speaker directly say what he means, rather than saying the opposite? In terms of processing effort, clearly the indirectness of irony costs the hearer more. The problem with the traditional view is that it cannot adequately explain how this effort-consuming type of utterance can be justified.

Sperber & Wilson provide an answer to this question as well as a better characterisation of irony. They suggest that the nature of irony can be captured by a notion of echoic interpretive use. In relevance theory, the use of an utterance is categorised into two types: a. descriptive use; b. interpretive use. Roughly, an utterance is regarded as descriptively used when its propositional form is used to describe a certain state of affairs. On the other hand, when an utterance is used to
represent an opinion of someone other than the speaker, as in free indirect speech, it is regarded as interpretively used. An utterance is an echoic interpretation when it is used to indicate the current speaker's attitude to the opinion being echoed.

Consider example (31) again. According to Sperber & Wilson, (31) is an echoic interpretation of the critic's view of the film. In other words, the current speaker is echoing what the critic said in Time Out, and simultaneously communicating his attitude towards it: in this case, an attitude of disapproval or ridicule, which is characteristic of irony.

Sperber & Wilson's view of irony explains how ironical utterances can be justified. If an ironical utterance communicates an attitude toward echoed ideas, this will give access to a wide range of contextual effects which are not achieved by the literal counterpart, and which justify the extra processing effort. Such effects, i.e. a type of poetic effect, cannot be achieved by simply saying (32). Thus, irony, like metaphor, can achieve relevance via a wide array of weak implicatures which justify the indirect form of utterance.

4. Summary

In this chapter, an outline of some central notions of relevance theory was given. The theory distinguishes three aspects of meaning, 1. what is said (propositional form,) 2. what is implied (implicatures); and 3. what attitude is communicated (propositional attitude), of which this thesis will focus on the first two.

Sperber & Wilson (1986) claim that recovery of propositional form is governed by the criterion of consistency with the principle of relevance (i.e. the hearer should choose the interpretation which satisfies this criterion). It was illustrated how reference assignment, which is one of three sub-processes involved in the recovery of propositional form, is carried out on
the basis of the criterion of consistency with the principle of relevance.

Furthermore, it was illustrated how the recovery of implicatures is governed by the same criterion. When a given implicature needs to be recovered if the utterance is to achieve optimal relevance, it is regarded as being implicated. Such an implicature can be either an implicated premise or an implicated conclusion. There are, on the other hand, implicatures which are weakly implicated, and encourage the hearer to explore a wide range of assumptions.

In relevance-theoretic terms, a bridging implicature is an implicated premise which the hearer is required to supply in order to assign the intended referent to a bridging reference. Thus, it contributes to the recovery of the propositional form of the utterance. In the most straightforward cases, the bridging implicature itself does not yield contextual effects, but contributes to relevance by providing access to the intended propositional form, which does yield contextual effects. As I will argue in the next three chapters, according to relevance theory, the bridging implicature which should be chosen by the hearer is the one that yields an overall interpretation which is consistent with the principle of relevance, that is, one which the speaker could reasonably have expected to yield adequate contextual effects for no unjustifiable processing effort.
Chapter 3 Bridging Reference Assignment and Accessibility of Discourse Entities

1. Introduction

In this chapter, I will discuss approaches to bridging reference assignment in which the degree of accessibility of discourse entities plays a central role. In general, these studies aim to answer the question of how candidate referents are selected and checked: for example, whether they are checked serially or in parallel, and if it is a serial search, how the order of the search is decided. First, I will give a brief survey of past studies designed to isolate the various factors influencing degree of accessibility of discourse entities. Although most of these studies deal with pronoun resolution, I simply assume here that the results can be applied to bridging reference assignment. The survey includes Asher and Wada (1991), Clark & Sengul (1979), Ehrlich (1980), Garvey et al. (1976), Gernsbacher and Hargreaves (1988), Gordon, Grosz and Gilliom (1993), McKoon, Ratcliff, Ward and Sproat (1993), and Sanford & Garrod (1988), among others.

Second, I will examine the accounts of reference assignment proposed by some of the studies discussed in the survey. It has often been suggested that the major factor affecting accessibility, in terms of which most other factors can be explained, is the ‘topic’ or ‘focus’ of a sentence/discourse, which roughly means ‘the element which is talked about’ (Sidner 1983a) (the term ‘discourse center’ has also been used to refer to a similar phenomenon). Therefore, it seems appropriate to take up the ‘focus’-based approach proposed by Sidner (1979, 1983a, b) and related work by Erku & Gundel (1987), among others, in my discussion. There are other
reasons why I have particularly chosen Sidner’s works: she deals with the widest range of examples, including rather complicated cases (such as those in which there is more than one candidate referent) in which I am most interested, and more importantly, offers a pragmatic criterion, namely, a criterion of truth, or truthfulness, as a necessary factor in dealing with such cases. Furthermore, it has been pointed out (e.g. by Brennan et al. 1987) that the concept of ‘forward-looking center’ in the centering approach (e.g. Grosz et al. 1986, Grosz & Sidner 1986) is basically similar to Sidner’s ‘potential foci’, and therefore, by discussing the problems with Sidner’s approach, we can also consider potential problems with the notion of ‘forward looking center’ in the centering approach, which is considered to be currently the most influential theory in the field. I will argue that although these approaches seem to be on the right track, they cannot give an adequate explanation of how bridging reference is achieved, because of either a total failure to supply a pragmatic criterion or the inadequacy of the ones suggested. Moreover, I will point out that approaches based on the accessibility of discourse entities alone cannot offer a satisfactory explanation of why some cases of reference assignment lead to stylistic infelicity, and others do not.

Finally, I will propose an alternative approach, a relevance-theoretic approach, where all the accessibility factors can be integrated into one higher level factor, namely, processing effort. In relevance theory, processing effort is a crucial factor in deciding whether an utterance is optimally relevant for a hearer or not. I will propose the following two hypotheses:

(a) reference assignment is a part of the overall interpretation of an utterance;

(b) therefore, an adequate pragmatic criterion for reference assignment is the same criterion as that
for overall interpretation, namely, one of consistency with the principle of optimal relevance.

In addition, the problem of stylistic infelicity will be touched on although more detailed discussion of stylistic acceptability will be postponed till chapter 5.

2. Past Studies of Accessibility Factors

In this section, I will review some of the central studies of factors affecting accessibility of candidate referents. They can be roughly classified into the following categories, according to the type of factor with which each study is mainly concerned:

Order of mention
- Brennan, Friedman & Pollard 1987
- Gernsbacher 1990
- Gernsbacher & Hargreaves 1988
- Gordon, Grosz & Gilliom 1993
- McWhinney 1977

Syntactic position
- Matthews & Chodorow 1988
- McKoon, Ratcliff, Ward & Sproat 1993

Recency of mention
- Caplan 1972
- Chang 1980
- Clark & Sengul 1979
- Gernsbacher, Hargreaves & Beeman 1989

1 Intonation is also often mentioned as one of the factors which increase accessibility of certain entities in a sentence (e.g. Cutler & Foss 1977; Hirschberg & Pierrehumbert 1988).
2.1. Order of Mention

In the field of artificial intelligence, the importance of surface order as a factor affecting accessibility is suggested by Grosz et al. (1983, 1986, 1995), Gordon et al. (1993) and developed by Brennan et al. (1987), within the framework of 'centering theory', originated by Joshi & Weinstein (1981). The claim is that the words appearing early in a sentence are more accessible than words appearing later in the sentence. On the other hand, in experimental psychology, Gernsbacher &
Hargreaves (1988) suggest that the first-mentioned participants are more accessible than others not for grammatical but for cognitive reasons (for more theoretical discussion, see Gernsbacher 1990). In this section, I will review these two approaches in turn.

First, a brief outline of centering theory. One of its goals is to sort out the various mechanisms used to maintain discourse coherence, and the use of various referring expressions is regarded as one such mechanism. Grosz et al. (1983, 1986, 1995) distinguish two levels of discourse coherence: global and local. The former 'refers to the way in which the larger segments of discourse relate to one another' and 'depends on such things as the function of a discourse, its subject matter, and rhetorical schema'. By contrast, the latter 'refers to the ways in which individual sentences bind together to form larger discourse segments' and 'depends on such things as the syntactic structure of an utterance, ellipsis, and the use of pronominal referring expressions' (Grosz et al. 1983: 44). These two levels of discourse coherence are conceived of as having distinct levels of focusing: global focusing and centering (i.e. immediate focusing). Global focusing refers to the way participants focus on a set of entities relevant to the overall discourse. Centering, on the other hand, 'refers to a more local focusing process, one relates to identifying the single entity that an individual utterance most centrally concerns' (Grosz et al. ibid.).

Among the various hypotheses put forward by centering theory, what I am most interested is the following: that 'each utterance [except the initial utterance] in a coherent discourse segment contains a single semantic entity - the backward-looking center - that provides a link to the previous utterance, and an ordered set of entities - the forward-looking centers - that offer potential links to the next utterance' (Gordon et al. 1993: 311, my italicisation and addition in parenthesis ). One of
the rules of centering is that the most highly ranked element of the forward-looking center (Cf, hereafter) of a previous utterance is the backward-looking center (Cb, hereafter) of the current utterance, and must be realised by a pronoun if any element of the Cf of the previous utterance is realised by a pronoun in current utterance. The following example from Gordon et al. (1993: 313) illustrates this rule:

(1) [1] Susan gave Betsy a pet hamster.
   Cf={Susan, Betsy, hamster 1}
[2] She reminded her such hamsters were quite shy.
   Cb=Susan; Cf={Susan, Betsy, hamsters}
[3] She asked Betsy whether she liked the gift.
   Cb=Susan; Cf={Susan, Betsy, gift=hamster 1}
[3'] Susan asked her whether she liked the gift.

Here, the first utterance has no Cb because it is the initial sentence of a discourse. Its Cf includes the referents of ‘Susan’ and ‘Betsy’ and the semantic interpretation of ‘a hamster’, ranked in that order. The second utterance has Susan as the Cb and a Cf with Susan as its most highly ranked element. The third utterance preserves the Cb and prominent Cf from the previous utterance, therefore it pronominalises the Cb successfully. By contrast, utterance [3'], in which Susan is realised by a name and Betsy is realised by a pronoun, leads to stylistic infelicity. According to Gordon et al., this is due to violation of the rule mentioned above.

Although, so far, studies using the framework of centering theory have concentrated on examining the way pronouns are used appropriately in a discourse, it is worth mentioning that bridging reference is also considered to be a candidate for a Cb. The following is the example from Joshi & Weinstein (1981):

(2) [1] John walked up to the house.
Cf={John, house}

[2] The door was locked.
Cb={door}

According to Joshi & Weinstein (ibid.), although ‘door’ is not mentioned in the first utterance, it can be referred to in the second utterance because ‘it is functionally dependent on house’ (Joshi & Weinstein ibid.: 386) mentioned in the first utterance.

Now let us go back to our main issue, namely, accessibility of discourse entities and its role in reference assignment. The main contribution of centering theory to this issue is the assumption that elements of the Cf are ranked for prominence. It is suggested that surface order is a key factor conferring prominence in the Cf: that is, words appearing early in a sentence are more accessible than words appearing later in the sentence (Gordon et al. 1993).

On the other hand, Brennan et al. (1987) suggest that ranking of the elements of the Cf can be determined by the grammatical relations of the subcategorised functions of the main verb: that is, first the subject, followed by object 1, object 2, and others with adjuncts final. However, since they are aware that this ranking coincides with surface constituent order in English, their suggestion may not be very far from what Gordon et al. assume.

Now let us turn to another major study which supports the idea that the first-mentioned item is the most accessible candidate referent. Gernsbacher & Hargreaves (1988) carried out several experiments which further develop the idea advanced by MacWhinney (1977): ‘The speaker uses the first element in the English sentence as a starting point for the organisation of the sentence as a whole. Similarly, the listener uses the first element in a sentence as a starting point in comprehension’ (152). The results of Gernsbacher & Hargreaves not only confirm
their hypothesis about the advantage of first mention, but also clearly show that this advantage does not appear to be attributable to linguistic factors.

Let me briefly describe their main findings. Against a widely held assumption that the item with the thematic role ‘agent’ is the most accessible in a sentence, their first two experiments show that a first-mentioned patient is more accessible than a second-mentioned agent. The following are some of the sentences used in the experiments:

(3) a. Tina beat Lisa in the state tennis match.
   b. Lisa was beaten by Tina in the state tennis match.
   c. Tina was beaten by Lisa in the state tennis match.
   d. Lisa beat Tina in the state tennis match.

I will describe only the most important details of their first experiment, since the rest of their experiments share the same method and procedure. In their experiments, a probe-word recognition task was used. Gernsbacher and Hargreaves constructed 32 sentence sets such as (3) as well as 32 lure sentences which had similar syntactic structure to (3). The main elements of the procedure were as follows: each word of the sentence appeared on the screen for 300 ms plus 16.667ms per character. The interval between words was 150 ms. The probe names appeared in capital letters at the top of the screen and remained on the screen until the subjects responded by pressing one of two response keys, one labeled ‘yes’, the other ‘no’. After 750 ms, a comprehension question appeared with two answer choices of which subjects chose one by pressing the appropriate key. Times taken to respond to probe names were measured.

The result of the first experiment was that: first-mentioned participants were responded to 54 ms faster than second-mentioned participants. A second experiment, which was a replication of the first, showed that first-mentioned
participants were responded to 76 ms faster. From these results, Gernsbacher & Hargreaves concluded that 'comprehenders' mental representations must be constructed in such a way that first-mentioned participants are reliably more accessible than second-mentioned participants' and that 'semantic role does not appear to be the factor underlying the advantage' (Gernsbacher & Hargreaves ibid.:704).

These ideas were developed in later experiments. For example, their experiment six shows that a non-subject first-mentioned item is more accessible than a second-mentioned subject. The following are some of the sentences used:

(4) a. Because of Tina, Lisa was evicted from the apartment.
b. According to Tina, Lisa was an inspiring teacher.
c. Compared to Tina, Lisa was a tidy housekeeper.
d. Except for Tina, Lisa was the oldest member of the club.

The result showed that first-mentioned non-subjects were responded to 51 ms faster than second-mentioned subjects. They conclude that higher accessibility of the first-mentioned item is not attributable to their subjecthood.

2.2. Syntactic Position

In this section, I will outline two approaches in which the syntactic structure of a sentence is regarded as a key determinant of the accessibility of entities in the sentence. There is a clear contrast between such approaches and those mentioned in the previous section. The two approaches discussed in this section are in fact quite distinct from each other: while Matthews and Chodorow (1988) are interested in the effect of syntactic structure on the order of search for an appropriate
antecedent and deal only with reference assignment within a sentence, McKoon et al. (1993a,b) assume that different syntactic structures have different discourse functions and discuss the effect of such functions on reference assignment.

Matthews and Chodorow (1988) examine the effects of ambiguity, linear position, and level of embedding of antecedents on the speed of pronoun resolution within a sentence. Their basic claim is that grammatical structure determines the order in which NPs will be evaluated, although the evaluation itself is based on meaning and general knowledge. It is suggested that the shallowest, left-most antecedent will be found and evaluated for appropriateness first, and the deepest, right-most antecedent will be found and evaluated last.

Matthews and Chodorow constructed various types of sentences to test their claim. Among the material used in the experiments, I found the following most straightforward:

(5) After the bartender served the patron's drink,
   a. he got a big tip.
   b. he left a big tip.

The figure 1 shows the structural diagram of (5) from Matthew and Chodorow (ibid.: 248), which shows the left-to-right breadth-first path. In the first clause in (5), the words 'bartender' and 'patron' are located at different levels in the structure of the sentence: 'the bartender' is located one node below S2 and 'the patron' is three nodes below S2. According to their prediction, 'the bartender', which is shallower and left-most, will be accessed before 'the patron', which is deeper and right-most. Hence, pronoun resolution in the second clause a. will be faster than that in b.
The result of their experiment confirmed the prediction: the left-most item as a referent was comprehended faster (1074 msd) than the right-most item as a referent (1453 msd); the shallowest item as a referent was comprehended faster (1161 msd) than the deepest item as a referent (1369 msd). Matthews and Chodorow conclude that 'in the absence of unambiguous gender cues, there is a left-to-right top-down breadth-first search of the prior clause for an appropriate antecedent' (256).

McKoon et al. (1993a) take the view that syntactic
information influences the relative salience of different pieces of text information during reading. They propose that concepts placed in syntactically prominent positions are more accessible in short-term memory during reading, as well as later in long-term memory. Their basic claims are: (a) that different syntactic constructions have different discourse functions; and (b) that the knowledge of which constructions are appropriate in a given context constitutes part of a speaker’s general linguistic competence.

McKoon et al. offer the following as their main hypothesis: that ‘the more affected a discourse entity is by the action of the verb, as indicated by its syntactic position relative to the verb, the more prominent or salient will be its position in a discourse’ (595). The following are the examples which McKoon et al. (ibid) use to illustrate the hypothesis:

(6) a. John smeared paint on the wall.
   b. John smeared the wall with paint.
(7) a. I have invited Bergstrom, who I admire, to give the opening address.
   b. I admire Bergstrom, and I have invited him to give the opening address.
(8) a. This book is boring, and it is expensive.
   b. This boring book is expensive.

[(7) and (8) are originally from Wilson and Sperber 1979: 305]

McKoon et al. suggest that in (6), ‘the entity ‘wall’ is more affected as a direct object than as an indirect object, i.e. it is more likely that the whole wall is covered with paint in sentence [6b] than in sentence [6a]’ (595). Therefore, according to their hypothesis, ‘paint’ in (6a) and ‘the wall’ in (6b) are more prominent than ‘the wall’ in (6a) and ‘paint’ in (6b). Furthermore, they share the following view with Wilson and Sperber (1979):
that the syntactic structures of propositions order them in terms of pragmatic importance. For instance, in example (7), the proposition (admire, I, Bergstrom) is seen to have more pragmatic importance in (7b) than in (7a). Similarly, it is pointed out that the importance associated with a proposition will be reduced when it is expressed in a modifying phrase instead of a main clause, as in (8).

On the basis of their first hypothesis, McKoon et al. make some further psychological hypotheses: (a) that a reader might use the syntactic information to guide comprehension; (b) that an argument occupying more affected position relative to its verb would be perceived as more salient by the reader than an argument occupying a less affected position; (c) that an argument in a proposition expressed in a more important syntactic position would be more salient than an argument in a proposition expressed in a less important syntactic position; (d) that more salient entities would be more likely to remain in short-term memory longer during comprehension, and hence be available for more processing than other entities; (e) that more salient entities would also be more accessible in the long-term memory.

To test these hypotheses, McKoon et al. (ibid.) carried out several psychological experiments involving word recognition tasks. Here, I will cite only one of the experiments, which involves materials such as the following:

(9) a. The librarian was furious when she got to work today. Somebody had inserted some magazines inside some newspapers late last night.
   b. The librarian was furious when she got to work today. Somebody had inserted some newspapers inside some magazines late last night.

In each text above, the proposition with the verb 'insert' has
three arguments: 'somebody', 'magazines', and 'newspapers'. In (9a), 'magazines' is in the direct object position, and in (9b), in the indirect object position. The prediction was that the entity in the direct object position would be more accessible than that in the indirect object position. The subjects were first asked to read texts with two objects and then to judge whether given test words were in the texts or not. The time taken to respond to the test words was measured. The result confirmed their prediction: responses for test words were faster when the entity had been presented in the direct object position than when it had been in the prepositional phrase.

In addition, McKoon et al. (1993b) tested their hypotheses by measuring reading time for a sentence which contains a pronoun referring to an entity either in a verb phrase (‘deer’ in ‘hunting deer’) or in a compound (‘deer’ in ‘deer hunting’). The results confirmed their hypotheses: reading times for a sentence containing a pronoun were faster when the entity referred to by the pronoun had appeared in a verb phrase rather than in compound.

2.3. Recency of Mention

It has been suggested and widely supported that a clause is a unit for comprehension and that entities mentioned in the most recent clause are more accessible than those mentioned in earlier clauses (e.g. Caplan 1972; Chang 1983; von Eckardt & Potter 1985). For example, Caplan (ibid.) uses a word-recognition task to examine the accessibility of a certain noun in two-clause sentences such as the following:

(10) a. Now that artists are working in oil / prints are rare.
    b. Now that artists are working fewer hours / oil prints are rare.
In these examples, the probe word is 'oil'. Subjects were asked to listen two-clause sentences followed by a spoken or written probe word. They had to decide whether the probe word occurred in the sentence. The time taken to respond to the probe words was measured. The results were that reaction time to the probe word was longer in sentences like (10a) than in sentences like (10b). This result can be seen as evidence that clauses are processed as units.

One of the more recent studies of this issue is Gernsbacher et al. (1989). They use a word-recognition task to examine the accessibility of entities in two-clause sentences such as the following:

(11) a. Tina gathered the kindling as Lisa set up the tent.
    b. As Lisa set up the tent, Tina gathered the kindling.
    c. Tina gathered the kindling, and Lisa set up the tent.

The probe words for these examples are either 'Tina' or 'Lisa'. A significant development is that Gernsbacher et al. showed a probe word at four different timings: coincident with the last word; 150 ms after a sentence; 1400 ms after a sentence; 2000 ms after a sentence. The results of their experiment show that: (a) when the probe words were presented coincident with the last word of a sentence, the most recently read clause was most accessible; (b) after 150 ms, the two clauses were equally accessible; (c) after both 1400 ms and 2000 ms, the first clause was more accessible. They concluded that the advantage of first-mention is relatively long-lived while the advantage of being in the most recent clause is relatively short-lived. Their explanation for the latter fact is that 'comprehenders build a substructure to represent each clause of a two-clause sentence, and they have greatest access to information represented in the
substructure that they are currently developing' (753).

The effect of reference assignment over longer distances than two clauses is discussed in Clark & Sengul (1979). Their experiments show that subjects take less time to understand a sentence including a referring expression when the referent is found in the previous sentence than in sentences further back. They used context paragraphs which contain three sentences plus target sentences, such as the following:

(12) a. A broadloom rug in rose and purple colors covered the floor.
    b. Dim light from a small brass lamp cast shadows on the walls.
    c. In one corner of the room was an upholstered chair.

Target: The chair appeared to be an antique.

In order to capture the distance effect, subjects were given three different versions of the above example each of which has the same sentences but in different orders, so that the referent can be found in either the first, the second or the third sentence in the context paragraph. The results show that the target sentence was comprehended quickly when the referent was mentioned in the third sentence of the context paragraph, but equally slowly when it was mentioned in the first or the second sentence.

2.4. Manner of Mention

Sanford, Moar & Garrod (1988) propose that a character in a discourse would be more salient when described by a proper name (e.g. John) than when described by a role (e.g. the teacher). They carried out some experiments to test their proposal; one of
which is a reading time experiment, using materials such as the following:

(13) Mr. Bloggs/The manager was dictating a letter.  
Clare/The secretary was taking shorthand. 
It was getting to be late in the afternoon.  
He/She was beginning to feel hungry. (Target sentence)

Question: Was Clare/The secretary carrying out filing?

In the first sentence, the first character was introduced in the subject position, either by a proper name or by a noun phrase depicting a role. The second sentence introduced the second character, again either by a proper name or by a role. Four versions of each text were produced: (a) character 1 (name)-character 2 (role) with a question containing a name; (b) character 1 (name)-character 2 (role) with a question containing a role; (c) character 1 (role)-character 2 (name) with a question containing a name; (d) character 1 (role) and character 2 (name) with a question containing a role. Times taken to read the target sentence was measured, as well as times taken to answer the question. The prediction was that reading times for sentences containing pronouns referring to named characters should be shorter than the time to read sentences containing pronouns referring to role-described characters.

The results confirmed their prediction. Reading time for targets referring to individuals introduced with proper names are 289 msec shorter than for targets referring to individuals introduced by a role description. Sanford, Moar & Garrod concluded that proper names seem to enhance the salience of a character.

Garrod & Sanford (1988) further investigate the status of
proper names in discourse and suggest that proper names become more salient when they are regarded as 'thematic subjects'. Unfortunately, their definition of 'thematic subjects' is rather vague. They say that the notion of 'thematic subject' is in many ways analogous to that of a 'sentence topic', except that its domain is a segment of discourse rather than an isolated sentence, and that 'thematic subjects' can be described as 'who the discourse is about' (520).

However, their main interest is not to sharpen the definition of 'thematic subject', but to examine what linguistic cues are available for recognition of a 'thematic subject'. Thus, they argue that the means by which an entity is introduced (by a proper name, early in a story) is at least a major cue for thematic subjecthood. One of the experiments cited in support of this is the following. Garrod & Sanford suggest that thematic subjects attract certain types of inference in a way that subsidiary characters do not, and to test this, they used materials such as the following:

(14) At the restaurant
    Juliet entered the restaurant.
    There was a table in the corner.
    The waiter took the order.
    Things seemed to go well that night.

The key sentence is the final one, which they call a 'psychological atmosphere statement'. This sentence is apparently a neutral remark about the atmosphere, but it can only be verified by some character in the discourse who finds that 'things seem to go well'. Garrod & Sanford predict that experimental subjects will assume that it is the thematic subject, Juliet, rather than the waiter, who thought that 'things seemed to go well that night'. Subjects were therefore presented with one of the following types of questions after
reading each passage:

(15) a. Did things go well for Juliet that night?
   b. Did things go well for the waiter that night?

The results show that nearly 90% of responses to these questions were affirmative when the question referred to the thematic subject, while only 50% were affirmative when the question referred to the other character in the discourse. Garrod & Sanford conclude that readers draw the inference only about the thematic subject of the discourse.

Finally, Garrod & Sanford explain the privileged status of thematic subjects within the framework developed by Sanford & Garrod (1981). I will not discuss the details of this framework, since the next chapter deals exclusively with Sanford & Garrod's theory. However, let me just mention here the central points made by Garrod & Sanford (ibid.): that thematic subjects are in the reader's current focus of attention and therefore, (a) they are more accessible as default referents than other entities in the discourse, and (b) provide better access to background information.

2.5. Thematic Role

In the field of Artificial Intelligence, Sidner (1983a) proposes an account of reference assignment in which the notion of 'focus' plays the central role. Her basic claim is that referring expressions are most likely to be interpreted as referring to the focused item in the sentence, i.e. 'the element which is talked about'. She uses the term 'focus' to refer to that element and calls the process of centering attention 'focusing'. Sidner proposes 'a process model' of speaker's focusing and hearer's tracking focus which falls into three parts: first, the hearer selects a focus based on the initial utterance; he then
uses this focus to interpret the referring expressions in the
following discourse; finally, the hearer updates the focus using
the interpretations of referring expressions which result from
step 2.

The criterion for selecting focus suggested by Sidner
(1983b) is based on grammatical and thematic relations in a
sentence, and is set out as follows:

The Expected Focus Algorithm
1. The subject of a sentence if the sentence is a ‘is-a’
or ‘there’ insertion sentence.
2. The first member of the default expected focus list,
computed from the thematic relations of the verb, as
follows: Order the set of phrases in the sentence
using the following preference schema:
   - theme, unless the theme is a verb complement in
     which case theme from the complement is used.
   - all other thematic position with the agent last.
   - the verb phrase.

Let me illustrate briefly how this algorithm works. When an
expected focus is chosen on the basis of thematic relations, the
most reliable default is the verb theme itself, i.e. the direct
object of the verb. Thus, in the following example, Sidner
explains that this is why the antecedent for the pronoun ‘he’ is
the direct object NP ‘her dog’, which is the theme in the first
sentence, rather than the NP ‘a bull’ in the prepositional phrase:

(16) Sandy walked her dog near a bull one day. He walked
quietly along.

Sidner claims that in cases like this, the NP in a prepositional
phrase following the theme cannot be the focus of the discourse
unless the expected focus is explicitly overridden, as in the
following example:

(17) Sandy walked her dog near a bull one day. She saw how he threw back his great menacing horns.

In this case, the expected focus is overridden, because the following statement about horns enables us to interpret ‘he’ as referring to ‘a bull’ rather than ‘her dog’. Sidner calls this phenomenon ‘rejecting the expected focus’.

I should mention, however, that in addition to the algorithm above, Sidner suggests that the agent of the sentence is always a possible candidate for focus. So it is possible to have two foci in one sentence: one is the agent (this is called ‘actor focus’) and another is the theme (this is called ‘discourse focus’).

Erku & Gundel (1987) adopt Sidner’s approach and discuss bridging cases such as the following:

(18) We went to a Thai restaurant. The waitress was from Bangkok.

(19) We stopped for drinks at the New York Hilton before going to the Thai restaurant. The waitress was from Bangkok.

In each case, the definite noun phrase, ‘the waitress’ in the second sentence is an instance of bridging reference. Example (18) is a straightforward case: the mention of 'Thai restaurant' enables the hearer to construct a new assumption that there was a waitress in the Thai restaurant which the speaker has mentioned. But we must consider example (19) more carefully: in this case, there are two possible candidates for the place ‘the waitress’ comes from, namely, the New York Hilton and the Thai restaurant. Erku & Gundel say that in (19), the waitress is
intuitively interpreted as the waitress at the Hilton.

Their explanation for this preference in interpretation is rather sketchy. Following Sidner, Erku & Gundel suggest that: (a) an anaphoric expression will be interpreted as referring to the topic of the sentence (i.e. the item that is currently 'in focus'); and (b) the topic for the following discourse is typically introduced in the verb phrase of the main clause (in direct object position, if there is one); (c) therefore, after hearing the first sentence in (19), the hearer expects that the next sentence will be about the New York Hilton. Any other interpretation would then be stylistically infelicitous.

To illustrate this stylistic infelicity, they give the following example:

(20)?We stopped for drinks at the Hilton before going to the zoo. The baby orangutan was really cute.

Here they claim that the discourse is judged to be somewhat odd, even though a zoo is most certainly a good candidate for a place where ‘the baby orangutan’ might come from. This utterance is odd, they claim, because, after hearing the first sentence, the hearer is expecting to hear something about drinking at the Hilton, not about the zoo.

2.6. Semantics of the Main Verb

Caramazza et al. (1977) propose that implicit causality is an important determinant of pronoun assignment. They are interested in the mechanisms that govern reference assignment in ambiguous sentences such as the following:

(21) a. Jane hit Mary because she had stolen a tennis racket.
    b. Jane angered Mary because she had stolen a tennis
They say that the referent of the pronoun 'she' in both examples can be either Jane or Mary. However, the preferred interpretation for (21a) is that it is Mary who had stolen a tennis racket while in (21b) it is Jane. Caramazza et al. suggest that these facts are due to a semantic property of the verb, which they call 'implicit causality'. Their definition of 'implicit causality' is rather vague, but they say that 'it is to select one noun or the other as the probable instigator or causal source for a series of events' (601). Thus, in (21a), the implicit causality of the verb 'hit' imputes the cause of the event described in the first clause, namely, Jane's hitting Mary, to some factor associated primarily with Mary. Similarly, in (21b), the verb 'anger' will impute the event described to 'Jane'.

The idea of implicit causality was originally proposed in Garvey & Caramazza (1974), and further developed in Garvey et al. (1976). In their experiments, subjects were given sentence fragments consisting of an active clause followed by 'because' and a pronoun such as the following:

(22) John telephoned Bill because he ......

They were then asked to complete the sentence by giving a reason or motive for the action. The results show that verbs produced consistent biases in pronoun assignment: e.g. the verbs such as 'call', 'join' and 'sell' biased assignment toward the first noun phrase in a sentence, whereas the verbs such as 'fear', 'blame' and 'kill' biased assignment toward the second noun phrase. This supports the view that the semantics of verbs (i.e. implicit causality) influences the selection of antecedents for ambiguous pronouns.

Caramazza et al. (1977) further undertake reading time experiments to examine whether implicit causality facilitates
the choice of an appropriate referent. Their prediction is that sentence (23a) will be comprehended faster than sentence (23b) because the main verb in (23a) gives a strong bias towards subjects' choice of referent:

(23) a. John telephoned Bill because he wanted some information.
    b. John telephoned Bill because he withheld some information.

They used the following 14 verbs: 'won', 'confessed to', 'approached', 'questioned', 'sold', 'read', 'follow', 'confided in', 'praised', 'loaned', 'envied', 'punished' and 'scolded'. Their predictions were confirmed by the results of the majority of experimental sentences.

2.7. Parallel Function and Choice of Conjunction

In her study of the acquisition of relative clause, Sheldon (1974) suggests that one of her hypotheses to explain children's comprehension, the Parallel Function Hypothesis, might have certain implications for adult English:

Parallel Function Hypothesis:
In a complex sentence, if coreferential NPs have the same grammatical function in their respective clauses, then that sentence will be easier to process than one in which the coreferential NPs have different grammatical functions.

She points out that one area where parallel function seems to play a role is pronominalization. For example, in the following sentence, parallel function appears as a constraint on the interpretation of pronouns:
(24) John hit Bill and he kicked Sarah.

Here, 'he' is interpreted to refer to 'John' rather than 'Bill'. Sheldon suggests that this is because the pronoun in the second conjunct is interpreted as being coreferential with the NP that has the parallel grammatical function in the first conjunct. However, it is also pointed out that the presence or absence of stress on the pronoun affects the choice of referent, as in the following example:

(25) John hit Bill and then HE kicked Sarah.

This time, the stressed pronoun 'he' is interpreted to refer to 'Bill' rather than 'John'.

Grober et al. (1978) tested how parallel function interacts with the semantics of the verb. In previous studies of how semantics of verbs affects reference assignment, including Garvey et al. (1976), 'because' was exclusively used as a conjunction in a sentence. Grober et al. (ibid.) construct sentences with 'but' as a conjunction as well as sentences with 'because'. Their predictions are that (a) for sentences which contain 'but', the semantics of the verb may have little effect on pronoun assignment; (b) thus, the pronoun would be interpreted as coreferential with the subject NP regardless of the direction of implicit causality of the verb. The experiment result confirmed their prediction.

Ehrlich (1980) develops the study of Grober et al. (ibid.). She proposes that (a) implicit causality alone cannot wholly explain the way readers choose referents for pronouns; (b) readers' choices of referent are guided by their knowledge of the events described in a sentence and the relation that holds between them; (c) therefore, changing the conjunction in a
sentence might alter reader's choice of referent.

In her experiment, she uses three conjunctions: 'because', 'and' and 'but', and six verbs: 'phone', 'confess', 'confide', which are expected to exert a bias towards the first noun phrase in the sentence (NP1 type); and 'blame', 'criticise', and 'praise', which are expected to exert a bias towards the second noun phrase (NP2 type). Sentences such as the following were used in the experiment:

(26) a. Steve blamed Frank because he spilt the coffee.
    b. Steve blamed Frank and he spilt the coffee.
    c. Steve blamed Frank but he spilt the coffee.

In reporting her results, Ehrlich uses the phrase 'correct' choice to refer to choice of the referent as a function of the verb in the main clause. Thus, for example, the 'correct' choice for (26a) and (26b) above should be 'Frank' because the verb 'blame' is of NP2 type. However, since the conjunction 'but' was expected to reverse the bias of the verb, the 'correct' choice for sentences such as (26c) was opposite to the other sentences. She measured the percentage of 'correct' responses for each type of verb and conjunction. The result was that a significant number of responses were 'correct' for 'because' and 'but', but not for 'and'. Subjects performed more accurately with 'but' when the sentence contained an NP2 verb, whereas for sentences with 'because' they were more accurate when the sentence contained an NP1 verb. For sentences with 'but', NP1 type verbs achieved 47% correct responses, while NP2 type verbs achieved 81%. For sentence with 'because' NP1 type verbs achieved 94% correct responses, while NP2 type achieved 62.5%. To explain these facts, Ehrlich suggests that (a) 'but' leads a reader to choose the referent that is opposite to the bias of the verb (e.g. the first noun phrase for NP2 verbs); (b) subjects choose the 'correct' referent more often when it coincides with the surface subject
of the sentence for both conjunctions. For sentences with 'and', the choice of referent did not seem to be affected by 'implicit causality' and no preference for the surface subject of the sentence was found.

Ehrlich concludes that the claims made for 'implicit causality' are supported for 'because', but not for other conjunctions. Moreover, she suggests that readers may use linguistic knowledge (e.g. of the semantics of verbs) in combination with knowledge of the event relations described in the sentence (by the conjunction) to select referents.

2.8. Overall Salience

Asher & Wada (1991) propose a computational processing model of pronoun resolution. Although their model is predominantly syntactically and semantically based, Asher & Wada suggest that pragmatic or discourse constraints are also important. They mention two such constraints, a salience ranking on discourse referents and world knowledge. Here I will discuss only their salience constraints.

Asher & Wada's salience constraints narrow down the set of potential referents, and their most salient discourse referent is equivalent to the 'entity in focus' in the topic/focus approach, which will be discussed later in the chapter. However, Asher & Wada elaborate their notion of a salience ranking, because they prefer a notion of 'degree of focus' or 'degree of salience' of one discourse referent in among a range of potential referents, to the more standard notion of 'focus' which suggests that there is only one focus in a clause. They are aware that there can be several referents in a sentence which are more or less equally salient, and suggest that in such cases, the salience ranking does not clearly distinguish among them. Their main claims are that: (a) salience is a matter of degree; (b) when salience and world knowledge share a preference for a referent,
the discourse is coherent; (c) when the strongly preferred referent in terms of salience is ruled out because of world knowledge, the discourse is infelicitous or awkward; (d) the overall salience of an item is the result of adding up the various preferences dictated by the factors relevant to determining salience.

2.9. Summary

I would now like to summarise what appears to be the current state of affairs in the studies of accessibility factors described so far in this chapter. First, it seems clear that earlier mention of an entity in a sentence should be regarded as one of the key factors which lead to higher accessibility of that entity in both short-term and long-term memory (e.g. Gernsbacher & Hargreaves 1988; Gordon, Grosz & Gilliom 1993; Matthews & Chodorow 1988; Sidner 1983b). I am inclined to support the view that this is due to cognitive factors, and in particular to attention, although I do not commit myself to any cognitive theory at this stage. Second, there seems to be a strong tendency for comprehension of a sentence to be geared to various properties of main verbs, which may cause different degrees of accessibility among entities mentioned in the sentence (e.g. Garvey et al 1976; McKoon et al. 1993; Sidner 1983a,b). It might be fruitful to investigate further what has been suggested so far in terms of lexical semantics, a field which has been rapidly developing in the 90s (e.g. Fillmore & Atkins 1992; Levin (eds) 1985). Third, there seem to be two kinds of discourse entities: one which has a rather privileged status in the comprehender's memory across sentence boundaries (e.g. Garrod & Sanford 1988); and another which does not have such status (e.g. Clark & Sengul 1979; Gernsbacher et al. 1989). Finally, conjunctions seem to affect the choice of referent dramatically (e.g. Ehrlich 1980; Grober et al 1978;
Sheldon 1974). I have also tested this in a simple questionnaire, and will give the results later. In summary, there seems ample evidence for existence of several different factors which affect the degree of accessibility of discourse entities. However, at this stage, no fully comprehensive account is available of how these different factors interact with each other. Perhaps the following generalisation offered by Asher & Wada (1991) might be the best guess: ‘salience is the result of adding up the various preferences of the factors’ and ‘each adds something to the overall salience ranking, but none alone is decisive’ (333).

On the other hand, there have been some interesting accounts of how the different degrees of accessibility among entities in a sentence/discourse affect reference resolution. Among those already mentioned, the ‘centering theory’ proposed by Grosz et al. (1986, 1995), the ‘topic/focus’-based approach proposed by Sidner (1979, 1983a,b) and the ‘scenario’-based account proposed by Sanford & Garrod (1981) appear to be the most promising.

However, as I will try to show, there are some crucial problems in these accounts. In the first half of the rest of the chapter, I will concentrate on the ‘topic/focus’-based approach as an account of bridging reference assignment. The ‘scenario’-based account will be discussed in detail in the next chapter.

3. Topic/Focus-based Accounts and Bridging Reference

In what follows, I will consider two topic/focus-based accounts of bridging reference. First, I will look at Erku & Gundel’s approach. This can be seen as a rather crude form of the topic/focus approach, since it is based on the assumption that there is only one topic/focus in a sentence. I will argue that this assumption is wrong. Then I will move on to Sidner’s account,
which allows a set of potential foci in a sentence and also provides a criterion for selecting an appropriate one. As I will try to show, there are some crucial problems in her criterion, and that is the central issue in the final part of the chapter.

3.1. Erku & Gundel

Let us return to Erku & Gundel's examples, which I repeat for convenience here:

(18) We went to a Thai restaurant. The waitress was from Bangkok.
(19) We stopped for drinks at the New York Hilton before going to the Thai restaurant. The waitress was from Bangkok.

According to Erku & Gundel, the most likely interpretation for (18) is one in which the waitress is linked to the Thai restaurant introduced in the first sentence. In (19), on the other hand, the waitress is intuitively interpreted as the waitress at the Hilton. In this example, there are two possible candidates for the place 'the waitress' comes from, namely, the New York Hilton and the Thai restaurant. And this is where the notion of topic/focus comes in as an aid to correct assignment of bridging reference.

Erku & Gundel suggest, citing Sidner (1983b), that these facts about (18) and (19) can be explained along the following lines: an anaphoric expression will be interpreted as referring to the topic of the sentence (i.e. the item that is currently 'in focus' in Sidner's terms); the topic for a following discourse is most likely to be introduced in the VP of a main clause, and therefore, the topic for the first sentence in (18) will be the Thai restaurant, but for (19) it will be the Hilton. Thus, in (18), the referring expression 'the waitress' should be interpreted as
the waitress in the Thai restaurant, and in (19), as the waitress in the Hilton. Any other interpretation would then be stylistically infelicitous. In addition, the following example is used to demonstrate that the form of an utterance which goes against the hearer's expectation might result in stylistic infelicity:

(20) ?We stopped for drinks at the Hilton before going to the zoo. The baby orangutan was really cute.

Erku & Gundel say that this example is judged to be somewhat odd, because after hearing the first sentence, the hearer is expecting to hear something about drinking at the Hilton, not about the zoo.

Erku & Gundel's account raises two questions. First, do they provide an adequate mechanism for choosing the topic of a discourse, and hence, assigning reference to subsequent anaphoric expressions? And second, what happens when the topic chosen by their mechanism does not yield a suitable candidate for reference assignment? I shall argue that their treatment of reference assignment fails on both counts.

3.2. Problems with Erku & Gundel

Let's consider the first question. It seems that Erku & Gundel assume that there is only one topic in a sentence, which is most likely to be introduced in the verb phrase of the main clause. But it is not difficult to imagine cases where this claim makes the wrong predictions. Consider (27) and (28):

(27) I couldn't attend the semantics lecture because I had a temperature.
(28) My brother studied very hard in order to pass the exam.
According to Erku & Gundel, in the examples of (27) and (28), the topics will be ‘the semantic lecture’ and ‘studying hard’ respectively. But there are problems with this claim. In the first place, there is no reason to assume that there is always at most one local topic in a sentence as Erku & Gundel suggest. For example, in (27) and (28), the whole sentence may be the topic/focus. In the second place, the clearest indication of topic/focus may be not the syntactic structure of the sentence but the position of the intonational nucleus. And there may be more than one intonational nucleus per sentence, as in (29) and (30) with the stress patterns below:

(29) I couldn’t attend the seMANtics lecture, because I had a TEMperature.
(30) My brother studied very HArd, in order to pass the exAM.

Here, it is most likely that there are two local topics/foci in each sentence, or that the scope of the topic/focus is the whole sentence. Now these are perfectly acceptable utterances. The question is: what is the hearer supposed to do? Does he somehow try to select one unique local topic and use that in assigning reference to subsequent referring expressions? I believe that the answer is ‘no’. Let me give two examples of perfectly acceptable continuation of these sentences, which support this claim.

(31) I couldn’t attend the semantics lecture because I had a temperature. The doctor said it was flu.
(32) My brother studied very hard in order to pass the exam. The questions were exactly what he wanted.

Bridging implicatures for these examples might be:
If you have a temperature, you see a doctor.

An exam has questions.

If, as Erku & Gundel assume, there is only one local topic/focus in each sentence, which should be the direct object in (31) and the verb phrase 'studying hard' in (32), these examples should be judged odd, because the bridging reference in the second sentence doesn't refer back to the predicted focus, 'the semantics lecture', and 'studying hard'. Hence, if one sticks to the idea that there is only one local topic per sentence, these examples also demonstrate that Erku & Gundel's claim that an anaphoric expression will be invariably interpreted as referring to the topic of the sentence is not plausible.

This discussion suggests two conclusions. First, if a notion of topic is to be used in reference assignment, then the method of computing the topic, and hence predicting the most accessible candidate referent, must deal with the effect not only of syntactic structure but also of intonation. I should note in passing that intonation may affect judgements of acceptability in our original examples (19) and (20). Neither Erku & Gundel nor Sidner mentions a range of further factors such as parallelism of linguistic structure, which, as shown in the first half of this chapter, would have to be integrated into a fully adequate treatment. I assume, then, that much work remains to be done if existing accounts of topic/focus selection are to achieve descriptive adequacy.

Second, there is no guarantee that the current topic will be an acceptable candidate for reference assignment. Consider (35), for example:

(35) The train pulled into the station. The passengers ran for the taxis.
Here there are two bridging references, 'the passengers' and 'the taxis'. Intuitively, the correct antecedent for 'the passengers' is 'the train' (since passengers ride on trains), whereas the correct antecedent for 'the taxis' is the 'station' (since taxis are found at stations). Hence, either there must be two topics in this discourse, and some method must be provided for deciding which bridging reference goes with topic; or there is only one topic, and at least bridging reference has an antecedent which is not the topic. In either case, what is needed is some method for evaluating candidate reference assignments, and this Erku & Gundel do not provide.

I shall turn now to Sidner's account, which does provide a method for evaluating candidate reference assignments, and thus offers a solution to the second of the two problems just mentioned.

3.3. Sidner

As mentioned in section 2.5., Sidner's criterion for selecting focus is based on grammatical and thematic relations in a sentence. I repeat her algorithm here for convenience:

The Expected Focus Algorithm
1. The subject of a sentence if the sentence is a 'is-a' or 'there'-insertion sentence.
2. The first member of the default expected focus list, computed from the thematic relations of the verb, as follows: Order the set of phrases in the sentence using the following preference schema:
   - theme, unless the theme is a verb complement in which case theme from the complement is used.
   - all other thematic positions with the agent last.
   - the verb phrase.
An important feature of Sidner's account is that for her, focus is a default notion: in other words, it is possible to reject the expected focus and choose an alternative candidate as focus if necessary. She suggests that the expected focus will be rejected when the resulting interpretation yields a contradiction either with earlier discourse or with general knowledge. This idea is illustrated in the following example:

(36) Cathy wants to have a big party at her house. She cleaned it up so that there would be room for everyone.

The anaphoric expression used in this example is the pronoun 'it'. Unlike Erku & Gundel, Sidner allows for the fact that anaphoric expressions do not always refer to the topic of the previous sentence. In (36), the expected focus is the graduation party, but in the second sentence, the use of 'it' to refer to Cathy's house indicates that the focus is on the house. Sidner explains how an alternative noun phrase can be chosen as focus in the following passage:

[focus] Recognition and selection both depend on the use of inferences about general knowledge. For example, in [example (36)] the choice of party for 'it' can be rejected since having cleaned up an event would be rejected as incompatible with other knowledge about cleaning. Following the rejection of the expected focus, a correct [referent] can be selected because it is available in the previous sentence. To find it, each alternative default focus must be considered in turn, until one is found which is not rejected on the basis of general knowledge.

(288, my additions in parentheses)

For Sidner, then, focus is a default notion, which may be
overridden by general knowledge. Thus, she can explain the acceptability of the following example of bridging reference, which according to Erku & Gundel, will be unacceptable:

(37) Someone stole my wallet at the tube station. The platform was full of people.

Within Sidner's framework, what goes on in the hearer's mind in interpreting (37) will be: (a) the expected focus is 'my wallet'; but (b) the bridging reference 'the platform' in the second sentence has nothing to do with wallets according to one's general knowledge; so (c) reject the focus and start searching for alternative candidates which are compatible with general knowledge about platforms. The hearer thus finds that 'the tube station' is a good candidate, since tube stations have platforms. Thus, he constructs the bridging implicature that there was a platform at the tube station where the speaker's wallet was stolen.

In Sidner's framework, both focus and inference based on general knowledge play crucial roles, and their functions are complementary. Sidner claims that:

... focusing does not eliminate the need for making inferences; it offers a constraint on how they are made. The complexity of the inferring process is constrained to asking for confirmation of the sentence prediction, thereby eliminating combinatorial search for free variable bindings and non-terminating inferring.
(1983b: 291)

What she means by this is roughly the following: in encountering a referring expression, the hearer does not need to check all the possible candidates for reference assignment; he can simply start with the focused item; if it yields an adequate result, he
does not need to do any further pragmatic analysis, i.e. he does not need to check any other candidates; if the result is unacceptable, he should reject it and try the next candidate; and so on until the one which fits his general knowledge is found.

Thus Sidner's ultimate criterion for evaluating candidate reference assignments seems to be that the resulting overall interpretation must be compatible with the hearer's general knowledge: in other words, she is proposing a criterion of truth, or truthfulness. And her account raises two questions: (a) does this criterion amount to a satisfactory pragmatic criterion for reference assignment?; and (b) are her proposed constraints on the order in which candidates are considered plausible? It is to these questions that I now turn.

3.4. Problems with Sidner's Pragmatic Criterion

One problem with Sidner's account is that it no longer explains the stylistic infelicity of (20):

(20) We stopped for drinks at the Hilton before going to the zoo. The baby orangutan was really cute.

Here, the predicted focus would be the Hilton, but in Sidner's framework, this would be rejected as a candidate antecedent for 'the baby orangutan' on the grounds that baby orangutans are not found at the Hilton, and the antecedent 'the zoo' would be chosen. There is no suggestion in Sidner's account that the rejection of a default focus should lead to stylistic infelicity; and indeed, in her own examples, no such infelicity results. Sidner's problem, then, is to explain why rejection of the expected focus sometimes leads to stylistic infelicity, and at other times does not.

However, the main examples I want to use to test Sidner's account are those in which two equally salient or accessible
items are apparently found, as in (38) and (39):

(38) I moved from Earl's Court to Ealing. The rent was less expensive.

(39) I moved from Earl's Court to Ealing. The rent was too expensive.

Intuitively, the preferred interpretation for (38) is that the rent in Ealing was less expensive than that in Earl's Court; and the preferred interpretation for (39) is that the rent in Earl's Court was too expensive. The question is: does Sidner's account explain how these assignments of reference are made? Let us consider first what Sidner says about choice of focus in these examples. Her algorithm suggests that it will be one of the thematic NPs 'Ealing' or 'Earl's Court'. Sidner adds that there is a weak preference for the thematic position 'goal', although it is difficult to know how reliable the preference is. If Sidner does not want to use this weak preference, then she will wrongly predict that (38) and (39) are uninterpretable or ambiguous. So let's assume that however weak the preference is, it works, and see what it predicts. Since the NP 'Ealing' is the goal in both (38) and (39), we will predict that this is the expected focus in both examples. The resulting interpretations of the second sentences are: for (38), that the rent in Ealing was less expensive; and for (39), that the rent in Ealing was too expensive. Notice that in case of (39), this interpretation is not the one we preferred. While most people find both interpretations of (39) possible, there is a clear preference for the 'Earl's Court' interpretation. The problem with Sidner's account is that if the 'Ealing' interpretation is capable of being true, which it is for everyone, she predicts that the 'Earl's Court' interpretation should never be considered at all. It seems, in other words, that capability of being true is not enough to make an interpretation acceptable, despite what Sidner's
pragmatic algorithm claims.

Now let's look at some more examples which make a similar point:

(40) John Major succeeded Margaret Thatcher. The government's policy was just as disappointing.

(41) Margaret Thatcher gave way to John Major. The government's policy was just as disappointing.

The preferred interpretation of the second sentence in both examples is that the policy of John Major's government was just as disappointing as that of Margaret Thatcher's government. The question is, can Sidner's account handle these preferences in interpretation? According to Sidner, the actor focus is preferred in cases like this. Thus, in (40), John Major is the expected focus, and in (41), the expected focus is Margaret Thatcher. The case that interests me here is (41).

In the case of (41), Sidner's account faces a crucial problem. The expected focus is 'Margaret Thatcher'. The evaluation procedure goes something like this: (a) test the acceptability of 'Margaret Thatcher' as an antecedent for the NP 'the government's policy'; (b) test the acceptability of the resulting interpretation of the second sentence, namely, (42):

(42) Margaret Thacher's government's policy was just as disappointing as John Major's.

(42) is clearly compatible with general knowledge; (c) the expected focus has passed both tests, so confirm it as a focus and stop testing. So Sidner's account chooses the interpretation (42). Notice that this isn't what we wanted. Our preferred interpretation was (43), not (42) as Sidner's account predicts!

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2 These examples are modelled on examples used in Wilson (1992).
(43) John Major's government's policy was just as disappointing as Margaret Thatcher's.

The point here is that (42) and (43) are true and false together, but it is (43), not (42), that is preferred. Sidner's account is inadequate to explain this type of choice.

The reason why Sidner's account makes the wrong prediction in this case seems to stem from two wrong assumptions: (1) an expected focus which passes the acceptability test must be the intended referent (in the case of bridging reference, the NP which yields the intended bridging assumption); (2) a criterion of truth, or truthfulness, is used in evaluating the resulting overall interpretation. These assumptions fail when there is more than one interpretation which is equally compatible with the hearer's general knowledge, one of which is chosen for some reason. Since Sidner's account fails to choose the right one, it seems necessary to conclude that focusing combined with a criterion of truth, or truthfulness does not yield an adequate account. This point will be discussed in more detail and tested experimentally later. In the rest of the chapter, I will suggest a relevance-theoretic solution to the problems that arise from Sidner's account.

4. The Principle of Relevance and Bridging Reference Assignment

In this section, I will first discuss how relevance theory accounts for bridging reference assignment, with special emphasis on the following points: (a) how it treats accessibility factors; (b) what it suggests about the order of evaluating candidate referents; (c) what can be considered to be other crucial factors besides accessibility factors; (d) what the criterion for evaluating candidate referents is and how it works.
4.1. Accessibility of Discourse Entities and Processing Effort

I started this chapter by looking at various factors affecting accessibility of candidate referents. Some past studies suggest, or at least implicitly assume, that when a clearly preferred candidate referent in terms of accessibility fails because of world knowledge, the hearer should judge the utterance awkward or infelicitous. For example, Asher & Wada (1991) cite the following example from Grosz, Joshi & Weinstein (1986) to demonstrate that 'in some cases the salience of one discourse referent is so extreme that a failure to choose it as an antecedent for a discourse referent subsequently introduced by an anaphoric pronoun leads to infelicity' (331):

(44) a. Sam really goofs sometimes.
    b. Yesterday was a beautiful day and he was excited about trying out his new twin.
    c. He wanted Fred to join him on a practice flight.
    d. He called him at 6am.
    e. He was furious at being awakened at that hour (just to go for an airplane ride).

The crucial sentence is the last one and the referring expression concerned is the pronoun 'he'. Here, although 'Fred' is clearly preferred as a referent according to general knowledge, 'Sam' is preferred according to salience ranking. Thus, the sentence is most likely to be judged infelicitous.

Similarly, as we have already seen, an example from Erku & Gundel (1987) is judged awkward:

(20) We stopped for drinks at the Hilton before going to the zoo. The baby orangutan was really cute.
Erku & Gundel claim that this utterance is odd because, after the first sentence, the hearer is expecting to hear something about drinking at the Hilton, not about the zoo. In other words, 'the Hilton' is clearly more accessible than 'the zoo', and hence is preferred as a referent for the subsequent bridging reference, 'the baby orangutan'.

The question of when and why such stylistic infelicity occurs interests us all. It is likely that degree of accessibility plays a vital role in answering it, and topic/focus-based accounts have offered ample evidence for that. However, none of the existing accounts of reference assignment based on accessibility factors has offered a satisfactory explanation for why it is the case.

Sidner (1983b) takes at least a step in this direction. Citing Grice's notion of 'relevance' (1975), she says:

Focusing seems to be a necessary part of the theory of the pragmatics of language. . . . As long as relevance is a part of a theory of pragmatics, focusing must be included in that theory . . . Nothing less than the use of focus will suffice for relevance: for the moment the speaker fails to provide a focus for the hearer and to point back to it in successive utterances, the hearer has no means of knowing what is relevant in the discourse at hand. In some sense the discourse ceases to be a discourse. (330)

The suggestion is that focusing provides a means to achieve relevance, and that inadequate handling of 'focus' leads to stylistic infelicity. Although Sidner is only talking about 'focus' here, her insight seems to me to have an important implication for the treatment of other accessibility factors: it seems reasonable to assume that all accessibility factors in some way contribute to relevance. In fact, this is exactly what relevance
theory would suggest, and I will now explain why.

The definitions of relevance introduced in relevance theory all involve two factors: contextual effects and processing effort. On the cognitive level, the aim is to maximise relevance, i.e. to make the most efficient or productive use of the available processing resources. On the communicative level, the very act of entering into communication creates in the audience expectations of optimal relevance, defined as follows:

**Optimal relevance**

An utterance, on a given interpretation, is optimally relevant iff:

(a) it has enough contextual effects to be worth the hearer's attention;
(b) it puts the hearer to no unjustifiable effort in obtaining those effects.

The factors affecting accessibility of candidate referents, and the resulting judgements of stylistic infelicity, are dealt with under clause (b) of the definition of optimal relevance. Relevance theory suggests that an interpretation is stylistically infelicitous when it puts the hearer to unjustifiable processing effort in achieving the intended effects. Where two candidates are equally accessible, it is assumed that they will be tested in parallel, and that either can yield an optimally relevant interpretation. However, where one candidate is highly accessible yet the intended referent is another, much less accessible, candidate, the result will be some wasted effort and a perception of stylistic infelicity.

This account should allow us in principle to account for cases in which 'rejection of an expected focus' does not result in stylistic infelicity (because there was another candidate referent being tested in parallel), and for those where 'rejection of an expected focus' does result in stylistic infelicity (because
there was one highly accessible candidate, and no parallel testing of alternatives). It in turn suggests a new way of testing claims about accessibility of candidate referents, by tapping stylistic judgements about alternative assignments of reference. A start will be made on this in Chapter 5.

In Sidner's account, 'rejection of the expected focus' was based on consideration of context or general knowledge: the most accessible referent would be accepted if it was consistent with the context, and otherwise rejected. As we have seen, this part of Sidner's account raises two questions which need further investigation: (a) what does Sidner predict will happen when there are two roughly equally accessible candidates, both of which are consistent with the context? Should the hearer be unable to choose between them? Should the hearer compare them and choose the one that is most likely to be true? Sidner's framework is uncertain on these points; (b) What would happen if there was one highly accessible candidate which yielded an interpretation that was consistent with the context but rather unlikely to be true, and another much less accessible candidate which yielded an interpretation that was consistent with the context and highly likely to be true? In other words, is her criterion for rejection of the expected focus best formulated as merely consistency with the context, i.e. logical possibility of being true, or is there perhaps some threshold of plausibility, below which an interpretation cannot fall? These questions will also be taken up in Chapter 5.

Relevance theory shares the assumption with Sidner and others, that accessibility of candidate referents and the available contextual assumptions are crucial factors affecting the hearer's choice of the right referent. As we have seen, in relevance theory, it is assumed that the first interpretation tested and found consistent with the principle of relevance is the only interpretation consistent with the principle of relevance, and is the one the hearer should choose. In other
words, if an utterance has a highly salient (i.e. immediately accessible) interpretation which the speaker could have intended, this is the one she should have intended; all other interpretations are disallowed. Suppose, for example, that in a given discourse the accessibility of candidate referent in (45) below, with possible interpretation (46a) and (46b), is such that, after hearing the first sentence, 'England' is much more accessible than 'France':

(45) I prefer England to France. The wine is better.
(46) a. The wine produced in England is better than French wine.
    b. The wine produced in France is better than English wine.

Then unless the second sentence contains material which can somehow alter this ranking, (46a) should be the only possible interpretation as long as it achieves enough contextual effects, e.g. by telling the hearer that English wine is better than French wine, which is the opposite of what people generally believe; the reason is that the utterance, on this interpretation, puts the hearer to no unjustifiable effort (because 'England' is most accessible candidate referent). By contrast, the utterance on interpretation (46b) puts the hearer to the unjustifiable effort, on the assumption that 'France' is a less accessible candidate referent and hence requires more processing effort. Therefore, (46b) cannot be the interpretation consistent with the principle of relevance.

The claim that the first interpretation tested and found consistent with the principle of relevance is the only acceptable interpretation depends on clause (b) of the definition of optimal relevance. This clause also has a further consequence not generally discussed in work on reference assignment: that accessibility of the contextual assumptions necessary to
achieve an overall interpretation consistent with the principle of relevance also affects the acceptability of the resulting overall interpretation, via their effect on processing effort. It is to this that I now turn.

4.2. Accessibility of Contextual Assumptions

In the last section, we have considered how accessibility of candidate referents affects the hearer's choice of intended interpretation. We discussed some examples in which there is a highly salient candidate referent and all other referents are disallowed. But what happens when there are two roughly equally accessible candidate referents and the hearer has to choose between them?

In relevance theory, in addition to accessibility of candidate referents, there is another, equally important factor affecting overall processing effort, namely, accessibility of contextual assumptions. When there is more than one roughly equally accessible candidate referent, it is assumed that they are tested in parallel, with the one which gives quickest access to a context in which the utterance as a whole yields an acceptable overall interpretation being selected. Thus, there is no need in these cases to compute a unique local topic/focus, which will determine a unique order in which candidates will be tested.

Consider the following example:

(47) Tim eventually got rid of his old video recorder and bought a new one yesterday. The circuit board was broken.

Here, the second sentence in (47) can be interpreted in two ways, namely:
(48) a. The circuit board in Tim's old video recorder was broken.
   b. The circuit board in Tim's new video recorder was broken.

Let us assume here that the two candidate referents, 'Tim's old video recorder' and 'Tim's new video recorder', are equally accessible and therefore tested in parallel. The question is which of the two interpretation the hearer is more likely to choose. In the absence of further information, the preferred interpretation would generally be (48a) rather than (48b). How can this preference be explained? The answer seems to lie in the accessibility of the contextual assumptions required.

Here, there are two quite separate factors to be taken into account. First, in a cognitive system geared to the maximisation of relevance, the stronger (more plausible, more evidenced) the contextual assumptions used, the greater the resulting overall relevance, and hence the greater the likelihood that context-construction strategies geared to selecting such assumptions will be used, and re-used. Compare now the strength of (50a) and (50b), the two potential bridging assumptions for the interpretation of (49):

(49) John moved from Edinburgh to London. He couldn't stand the snowy winters.

(50) a. London has snowy winters.
   b. Edinburgh has snowy winters.

For someone familiar with Edinburgh and London, it is clear that (50b) is stronger (more evidenced), and hence more likely to be retrieved and used by a relevance-based cognitive system. In this way, consideration of plausibility can be integrated into a relevance-based system.

Second, in a communication system based on a notion of
optimal relevance, an acceptable interpretation must achieve adequate contextual effects, and for this, a range of accessible contextual assumptions is needed. Of two possible sets of contextual assumptions both of which would yield adequate contextual effects, the smallest and most accessible set should be chosen for reasons of relevance. Thus, consider (47) again. Here, the interpretation (48a) achieves contextual effects very easily by giving a reason why Tim might have bought a new video recorder. By contrast, a scenario in which a brand-new record has a broken circuit board is more difficult to construct. Therefore, even if (48b) might achieve adequate contextual effects by, e.g., describing the consequences of having bought a defective new video recorder, because of the extra amount of processing effort required to supply the necessary contextual assumptions, this interpretation should be ruled out. Thus, interpretation (48a) should be the only interpretation consistent with the principle of relevance: it is the one which manifestly yields adequate effects, and puts the hearer to no unjustifiable effort in achieving those effects. In the next section, I will show how crucial the accessibility of contextual assumptions is for the hearer's choice of an intended interpretation, by looking at some of our examples which Sidner's account could not handle.

4.3. A Relevance-Theoretic Solution to Sidner's Problem

Recall that Sidner's pragmatic criterion for choosing the right interpretation for an utterance was that of truth, or truthfulness, and that this criterion fails to explain why the hearer chooses the interpretation (43) rather than (42) for (41):

(41) Margaret Thatcher gave way to John Major. The government's policy was just as disappointing.
In this final section, I would like to show what solution relevance theory can offer to this problem. Let me note that further issues raised by Sidner’s account, which concern judgements of stylistic acceptability will be dealt with separately in Chapter 5.

In a relevance-theoretic account of bridging reference assignment, the main claims are the following:

(a) reference assignment is a part of an overall process of utterance interpretation whose goal is to recognise what propositions and propositional attitudes the speaker intended to convey.

(b) therefore, an adequate pragmatic criterion for reference assignment is the same as that for overall interpretation of an utterance, namely, consistency with the principle of optimal relevance.

As we have seen, if there is more than one candidate referent for bridging reference assignment, the hearer should choose the one which leads to an overall interpretation which is consistent with the principle of relevance. Let me demonstrate how this account applies to the following problematic examples:

(38) I moved from Earl’s Court to Ealing. The rent was less expensive.

(39) I moved from Earl’s Court to Ealing. The rent was too expensive.
(40) John Major succeeded Margaret Thatcher. The government's policy was just as disappointing.

(41) Margaret Thatcher gave way to John Major. The government's policy was just as disappointing.

Within the relevance-theoretic framework, we can legitimately assume that 'Earl's Court' and 'Ealing' in (38) and (39), and 'John Major' and 'Margaret Thatcher' in (40) and (41), are roughly equally accessible as candidate referents, and that both the resulting interpretations of the second sentences are tested in parallel. The hearer's goal in testing these is to find an interpretation which is consistent with the principle of relevance. A central claim of relevance theory is that the first such interpretation is the only such interpretation, and is the one the hearer should choose.

Often, as with examples (38) and (39) above, there are two possible ways in which the second of two sentences might be intended to achieve relevance in a context created by the first: (a) as an explanation for why some action was performed; (b) as a description of the results of such action. With (38) above, as Wilson (1992) has shown for similar examples, if the intended antecedent is 'Ealing', the utterance will achieve relevance in both these ways, whereas if the intended antecedent is 'Earl's Court', it will achieve relevance in neither of these ways, and it is hard to see how it could have been intended to be relevant at all. Thus, the 'Ealing' interpretation is the only one consistent with the principle of relevance.

With (39) above, the situation is rather different. If the intended antecedent is 'Earl's Court', the utterance, on this interpretation, will explain why the speaker made the move; if the intended antecedent is 'Ealing', the utterance, on this interpretation, will not explain the move, but might, with some thought, be seen as describing what the speaker found after making the move. The fact that this last interpretation requires
more thought should rule it out as inconsistent with the principle of relevance, although a rephrasing along the lines of ‘The rent was still too expensive’ would favour it. In the absence of such rephrasing, the ‘Earl’s Court’ interpretation should be preferred.

In the case of (40) and (41) above, an interpretation along the lines of (a) is ruled out. There is no way in which either interpretation could yield an explanation of why John Major succeeded Margaret Thatcher. Hence, the only way for these utterances to achieve relevance is along the lines of (b) - i.e. as a description of the results of the change of government. And in that case, the interpretation must be constructed around the NP ‘John Major’. Hence, this is the only interpretation that will be consistent with the principle of relevance.

5. Summary

In this chapter, we have looked at approaches to reference assignment which share the view that the degree of accessibility of discourse entities affects the hearer’s choice of referent. As the survey of past studies has shown, various different factors are claimed to affect the accessibility of candidate referents, and a further investigation of the correlation between each such factor and our cognitive mechanisms seems necessary to achieve a full account of the phenomenon in the future.

The main point of my argument in the chapter is that although the accessibility of candidate referents is an important factor affecting the hearer’s choice of the right referent, and therefore, should be properly integrated into an account of reference assignment, existing accounts (e.g. Sidner’s) based on such factors failed to define crucial notions (such as ‘topic’ or ‘focus’) clearly enough to be useful, and to offer an adequate
pragmatic criterion. I have shown that relevance theory can offer a solution to these problems.

Towards the end of the chapter, I also began to discuss another crucial factor affecting the hearer's choice of referent, namely, the accessibility of contextual assumptions. In fact, this needs to be considered more extensively, since it has vital importance particularly in bridging reference assignment, which involves the construction of bridging assumptions, which are themselves contextual assumptions. A central issue concerning accessibility of contextual assumptions is what enables the hearer to access the intended bridging assumption, and the further contextual assumptions needed to construct and process the resulting overall interpretation. To this, some answers have been offered, among which that of Sanford & Garrod (1981) seems promising. In the next chapter, I will consider the issue primarily by examining their work, and try to suggest some way of improving its shortcomings.
1. Introduction

In identifying an appropriate referent for a bridging reference, and establishing and evaluating an overall interpretation of the utterance containing it, the hearer is required to construct appropriate contextual assumptions. For example, in order to assign a referent to the bridging references in (1) and (2), the hearer has to construct assumptions such as (3) and (4) respectively:

(1) I went to a French restaurant. The waiter was Italian.
(2) Harry fell several times. He didn't like skiing at all. The snow was cold and wet.

(3) There was a waiter in the French restaurant to which the speaker went.
(4) There was snow where Harry was skiing.

Assumptions such as (3) and (4) can be called 'bridging assumptions/implicatures/inferences'. In general, as I will show later, they are distinguished from other types of contextual assumption or inference.

There are two opposing views about the way bridging assumptions are accessed. In the first, it is assumed that the search for the required assumption starts some time after the hearer encounters the referring expression, and not before. This view is held by, for example, Haviland & Clark (1974), whose reading-time experiments show that the process of constructing a bridging assumption is time-consuming.
The second view is based on the hypothesis that bridging assumptions and certain other kinds of contextual assumptions can be accessed before the hearer comes across the bridging reference. This view is held by Sanford & Garrod (1981), whose hypothesis is that the hearer constructs a discourse representation of what the speaker is saying (i.e. a linguistic [or textual] representation and a representation of an appropriate situation retrieved from the knowledge-base) as soon as it is possible for him to do so. Among models of the mental representation of discourse (e.g. Johnson-Laird 1983; Kintsch 1988; Schank & Abelson 1977; van Dijk & Kintsch 1983), Sanford & Garrod's is unique in the following two ways: (a) it was originally designed to explain the difference between resolution of bridging reference and pronoun resolution; (b) it provides the most detailed psychological account of the use of situation-based knowledge in comprehension. I will discuss the details of their account later, but its outline is roughly as follows: (a) our long-term memory is organised in a situation-based way, and in chunks each of which can be retrieved as a unit; (b) hence, if an appropriate chunk, which they call a 'scenario', has been successfully retrieved from a hearer's long-term memory to form part of his mental model of a discourse at some stage before he encounters a bridging reference, a slot for the referent is most likely to be already present in the mental model; (c) therefore, reference resolution will be rapid and automatic, because the hearer does not need to make any inferential bridge involving a search for the referent in the whole general-knowledge base, which is supposed to be much more time-consuming. Sanford & Garrod call successful reference assignment achieved through use of a selected scenario 'primary processing', and distinguish it from what they call 'secondary processing'. Secondary processing, which is more time-consuming, takes place when primary processing fails for some reason, such as that there is no current scenario available or
that the current scenario is inappropriate for interpreting the new input.

Let me explain their idea of primary processing using examples (1) and (2). According to Sanford & Garrod, on hearing the first sentence (the first two sentences for (2)), the hearer retrieves a scenario: for example, a 'going to a restaurant' scenario for (1) and a 'learning to ski' scenario for (2), with slots for WAITER and SNOW, respectively. As a result, on encountering the bridging reference 'the waiter' or 'the snow', the hearer need not make an inferential bridge or search for a referent through the whole knowledge-base, because there is an appropriate antecedent already waiting in his mental model of the discourse.

Sanford & Garrod's account is a major contribution to research on the accessibility of contextual assumptions required for assignment of bridging reference. However, it also has limitations which seem too significant to ignore. In this chapter, I will therefore examine the plausibility of this account, and point out two crucial theoretical limitations: (a) a problem of computation (selection) of the scenario and (b) a problem of representation (content) of the scenario. I will try to show that, although it seems plausible to assume that our knowledge is stored and retrieved in a situation-based way, and that each such chunk plays an important role in facilitation of language processing, such a role is merely a part of the whole mechanism of language comprehension, which Sanford & Garrod's scenario-based account does not satisfactorily explain. I will then propose an alternative explanation of the phenomenon of bridging, using Sperber & Wilson's relevance theory. I will demonstrate that a relevance-theoretic approach can offer a better account of the role of context selection in the overall utterance interpretation process of which reference assignment is a part. On this account, examples which cannot be handled in a scenario-based account can be explained. To conclude, I will
propose that relevance theory can shed some light on how situationally organised chunks of knowledge are effectively used.

2. Background
2.1. Schemas, Scripts and Frames

Sanford & Garrod assume that language understanding is a process in which linguistic input and a knowledge-base (or memory) interact. Their main interest is in describing how this interaction takes place. A crucial feature of their account is a view of how conceptual information must be stored in the mind, in order to be able to be utilised in the process of language understanding.

The question of how a vast amount of information is stored in the knowledge-base so that it can be used effectively and efficiently in discourse comprehension has attracted tremendous interest, especially in the 70s and early 80s. During this period, the traditional notion of schema (Bartlett 1932) was reinstated and modified into several different forms: works such as Minsky (1975), Rumelhart (e.g. Rumelhart 1980; Norman et al. 1977) and Schank and Abelson (1977) are well-known. In fact, Sanford & Garrod owe many of their basic assumptions to these works. I will not discuss those accounts here, but they share the basic assumption that chunks of conceptual information are stored in the mind in a situation-based way. Minsky calls the chunk a 'frame', Rumelhart calls it a 'schema' and Schank and Abelson a 'script'. Thus, according to their account, the knowledge-base consists of a large number of frames/schemas/scripts.

There is considerable evidence to support the hypothesis that such situation-based chunks are used in discourse comprehension (Bower et al. 1979; Fincher-Kiefer 1993; Haberlandt & Bingham 1984; Morrow et al. 1989; Sanford &
However, as I will show later, it has also attracted many objections. There have been two major lines of criticism: the first concerns its inflexibility (it is not flexible enough to work in individually characterised contexts) (e.g. Bower et al. 1979; Kintsch 1988; Rumelhart et al. 1986; Sharkey 1990; Stevenson 1993), and the second with the plausibility of the claim that situation-based forward inferences are generated during discourse comprehension to facilitate understanding (e.g. Corbet & Dosher 1978; McKoon & Ratcliff 1981, 1986; Potts et al. 1988; Singer 1979; Singer & Ferreira 1983; Thorndyke 1976). In the next section, I will discuss the second issue in more detail.

2.2. Research on Inference Generation

The question of when various inferences required in discourse comprehension are generated has been one of the central issues in the psychology of text understanding for more than a decade. 'Bridging inferences' have been the most frequently discussed, and other types of inference such as 'causal inferences' and 'elaborative inferences' have often been discussed in comparison with bridging inference.

In the psychological literature, several different terms are used to refer to different types of inferences, and some clarification of these terms seems necessary here. In general, inferences generated to achieve understanding of discourse are classified on the basis of the following two criteria: (a) whether a particular inference is necessary to establish coherence in the discourse or not; (b) whether a particular inference is necessary to establish coherence in the discourse or not.

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3 See Sharkey (1990) for a good survey of this type of criticism and for his own solution for the problem, based on the connectionist framework. See also Kintsch (1988) for a similar criticism and his own theory, which may provide some solution to the problem.

4 Vonk & Noordman (1990), however, regard this criterion as problematic.
generated in a forward manner ('forward inference') or a backward manner ('backward inference'). According to Vonk & Noordman (1990:451), forward inferences 'relate the current information to possible subsequent information, or rather, they anticipate subsequent information' and backward inferences 'relate the current information to previous information in the discourse context'. Sometimes, the inferences considered necessary to establish coherence are regarded as backward whereas those not considered necessary are regarded as forward (Keenan et al. 1990). However, I prefer to treat the two criteria separately here, since they are of different natures and their relations should not be taken for granted (see Vonk & Noordman ibid. for a similar view).

In psychological discussions, the term 'bridging inference' is typically used to refer to an inference 'which provides links among discourse ideas' (Singer 1994: 486), and is usually considered to be the opposite of 'elaborative inference'. Hence, 'bridging inference' as discussed in psychology includes what I call bridging inference, i.e. inferences required to assign bridging reference, but also others such as the one illustrated in the following examples from Singer (ibid.: 489):

(5) Tom didn't see the banana peel. He fell down.
(6) Laurie left early for the birthday party. She spent an hour shopping at the mall.

These examples do not involve bridging references, but some inference such as 'not seeing the peel caused Tom to fall down' for (5) and 'Laurie left early to buy a birthday present' for (6) might be generated to interpret them. Inferences such as (5) are often seen as involving physical causes and those such as (6) as

They suggest that the assumption that coherence of the discourse representation is a prerequisite for the comprehension of a text is premature, and that the question of how coherent a representation one constructs in comprehending a text should be tested empirically. I will return to this issue in a later chapter.
involving motivational causes. Both types of inference are called ‘causal inference’, and are usually treated as a sub-category of ‘bridging inference’. Causal inferences, as well as other bridging inferences, are considered to be generated in a backward manner (Keenan et al. 1984; Magliano et al. 1993).

On the other hand, the term ‘elaborative inference’ is used to refer to inferences which are not necessary to maintain textual coherence. The following examples illustrate some such inferences:

(7) The teacher cut into the juicy steak [with a knife]. (Paris & Lindauer 1976)
(8) The director and the cameraman were ready to shoot closeups when suddenly the actress fell from the 14th storey [and is dead]. (McKoon & Ratcliff 1986)
(9) This still life would require great accuracy. The painter searched many days to find the color most suited to use in the painting of the ripe tomato [which is red]. (McKoon & Ratcliff 1988)
(10) Julie was convinced that spring was near when she saw a cute red-breasted bird [i.e. a robin] in her yard. (Singer ibid.)

(my additions in square brackets as possible inferences)

Example (7) illustrates so-called ‘instrumental inferences’: having heard the utterance in (7), the hearer might infer that the teacher was using a knife to cut the steak. Some studies have been claimed to show that instrumental inferences are rarely generated on-line (Corbet & Dosher 1978; Dosher & Corbet 1982; Lucas et al. 1990; Singer 1979; Singer & Ferreira 1983; Thorndyke 1976). Example (8) illustrates so-called ‘predictive

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5 Singer (1994) uses the term ‘causal bridging inference’ to refer to the type of inferences illustrated in (5) and (6).
inferences' (Fincher-Kiefer 1993) or 'causal consequence inferences' (Magliano et al 1993): having heard the utterance in (8), the hearer might infer the most probable consequence of the event described in the utterance, namely, 'the actress is dead'. Again, this kind of inference is often considered to be rarely generated on-line (Keenan et al. 1984; McKoon & Ratcliff 1986, 1992; c.f. Potts et al. 1988; Sanford 1990; Singer et al. 1994).

Example (9) illustrates how an utterance might make the hearer infer contextually relevant aspects of meaning, e.g. 'tomatoes are red' (McKoon & Ratcliff 1988). Finally, example (10) illustrates how inferences about the most typical exemplars of a category can be made (Garrod et al. 1990; McKoon & Ratcliff 1989).

There is an on-going debate about the question whether elaborative inferences are made on-line or off-line: in other words, whether those inferences are made during the reader's construction of the discourse representation or later, for example during a retrieval task (e.g. Fincher-Kiefer 1993; Garrod & Sanford 1994; Kintsch 1988, 1992; Magliano et al. 1993; McKoon & Ratcliff 1986, 1992; Potts et al. 1988; Sharkey & Sharkey 1987; Singer et al. 1994). One of the main questions addressed here is what inferences are made during comprehension; this is an important issue since the number of potential inferences is indefinitely large and could cause an inferential explosion. Everyone agrees that the inferences actually generated during comprehension should be constrained to avoid an inferential explosion, but there is no definite answer to the question of what the necessary constraints are. This is a very important issue and later, I will show how relevance theory can shed some light on it. Before that, however, let us look at Sanford & Garrod's account in more detail. This is regarded as making a promising contribution to the debate mentioned above, in the sense that it offers some way of constraining possible inferences; it is supported especially by those who claim that
elaborative inferences are actually made on-line (e.g. Sharkey & Sharkey 1987; Fincher-Kiefer 1993).

3. The Scenario-based Account
3.1. Scenario and the Domain of Reference

Among the various aspects of language understanding, Sanford & Garrod are mainly interested in reference resolution, and their notion of a scenario is discussed largely in relation to this (e.g. Garrod [in press]; Garrod, Freudenthal & Boyle 1993; Garrod & Sanford 1981, 1982, 1983, 1985, 1990, 1994; Sanford 1989, Sanford & Garrod 1981, 1989). Their main proposal is that the reader uses 'the text to identify an appropriate domain of reference, loosely corresponding to what the text is about', and that he then uses 'the identified domain to interpret the subsequent text as far as this is possible' (Sanford & Garrod 1981:109). The domain of reference is called a 'scenario', which is conceived of as one particular part of the knowledge-base.

Sanford & Garrod argue that this view is more plausible than an alternative view in which the mental representation of a text is made up with a chain of propositions derived from explicitly stated information, represented by, for example Kintsch (1974) and Clark (1977). In this type of account, Sanford & Garrod point out, 'the major problem for the reader is seen as one of linking together text-based propositions' (Sanford & Garrod ibid.:109). They argue that Kintsch's model fails simply because it does not provide an adequate mechanism to accommodate knowledge-based inferences that are required to construct the intended representation of a text. Clark's account of 'bridging', on the other hand, does offer such a mechanism, but Sanford & Garrod object to the idea that knowledge-based inferences are used only after explicitly stated information fails to offer a coherent representation of the text. They believe that a relevant part of knowledge is accessed even before the
explicit content of the text fails. I will elaborate briefly the main difference between Clark and Sanford & Garrod below.

According to Clark (ibid. and Clark & Haviland 1977), a speaker and a hearer share an implicit agreement on communication based on the given-new structure of the language. The speaker must try to formulate her utterances so that information which is linguistically marked as given indeed contains information that she believes the hearer already knows and so that the information marked new is in fact new to the hearer. The hearer tacitly agrees to interpret the utterances accordingly. Thus, when the hearer encounters, for example, a definite NP anaphor, he takes it as given information and starts searching for a matching antecedent in his memory. When there is no exactly matching antecedent, what he is most likely to do is to make a bridging implicature. The following example is a case in point:

(11) We checked the picnic supplies. The beer was warm.
(from Haviland & Clark 1974)

Here, the hearer takes 'the beer' as given information and starts searching for an antecedent. However, there is no mention of beer in the previous sentence, and he has to make a bridging inference that the beer was part of the picnic supplies. One experiment (Haviland & Clark 1974) shows that subjects took about 200 msec longer to comprehend an utterance containing a bridging reference, than an utterance containing a definite NP which has an explicitly mentioned antecedent.

Sanford & Garrod argue that Clark’s model can ‘not in itself account for how and when the reader builds inferential bridges between items mentioned at different points in the text’ (Sanford & Garrod ibid.:101): the details of this I will not discuss here. However, let me mention one crucial difference between the two approaches: while Clark suggests that bridging
inference is always necessary when a referring expression does not have a direct antecedent in the previous text, Sanford & Garrod claim that any item mentioned in a lexical decomposition, or part of a scenario already used in the interpretation of the text, will be able to act as antecedent without any additional bridging inference being made. The following shows how Sanford & Garrod see the difference between their own approach and Clark's:

The essential difference between an account such as Clark's and the one which is being entertained here may be expressed in terms of a contrast between data-driven and concept-driven processes. With an interpreter working in the data-driven mode, any decisions about how events mentioned in the current sentence can be related to previous material only arise as result of the local analysis of the sentence in question. When interpretation is concept-driven, however, decisions, and sometimes potential inferences which could relate to the event, may be made even before the critical sentence is encountered (Sanford & Garrod ibid.: 101)

Sanford & Garrod assume that the reference domain consists of not only explicitly mentioned items, but also some additional information retrieved from long-term memory which provides the setting for the text. And on the basis of this assumption, their scenario-based account has been developed.

3.2. The Content of the Scenario

Sanford & Garrod predict that if an appropriate scenario is constructed in the reader's mind, there will be no measurable increase in reading time when an entity implied by the scenario is introduced; if, on the other hand, an inappropriate scenario is
evoked, there is an increase in reading time for the same sentence ‘due to the extra bridging process’ (ibid. 112). This is confirmed by an experiment based on the following materials:

(12) Appropriate scenario
Title: In court
Fred was being questioned (by a lawyer).
He had been accused of murder.
Target: The lawyer was trying to prove his innocence.

(13) Inappropriate scenario
Title: Telling a lie
Fred was being questioned (by a lawyer).
He couldn’t tell the truth.
Target: The lawyer was trying to prove his innocence.

In this experiment, the time taken to interpret the target sentence in either an appropriate or an inappropriate context is measured. For the appropriate scenario condition, it is expected that as part of the structure of the ‘court’ scenario evoked by the title, a slot for ‘lawyer’ is provided. Thus the mention of ‘lawyer’ in the first and target sentences would be predictable. In the inappropriate scenario condition this would not be the case. In order to test this, it is arranged that mention of the phrase ‘by a lawyer’ in the first sentence was either present or absent. It is predicted that under the appropriate scenario condition, there will be no significant difference in time taken to read the final sentence.

The result of the experiment was as predicted. The explanation goes as follows: the title ‘In court’ evoked a ‘court’ scenario, which has a slot for ‘lawyer’ as part of its structure; as a result, the reference of ‘lawyer’ in the first and target sentences would be predictable, even if there is no mention of ‘lawyer’ in the first; however, because there is no slot for
‘lawyer’ in the inappropriate scenario ‘Telling a lie’, the target sentence is read much more slowly when that title is given.

Sanford & Garrod propose that a scenario not only contains appropriate entities for a particular situation, but also includes such basic information as ‘Lawyers probe witnesses and defendants for evidence’, and ‘The jury evaluates the evidence and gives a verdict’, etc.. In other words, a scenario consists of not only entities, but also ‘the roles those entities play in the situation which the scenario represents’ (ibid.:114). Therefore, if an entity in a scenario does not play an appropriate role, it will cause comprehension difficulties. Their account is summarised in the following comment:

Essentially, this account supposes that discourse serves to trigger situational representations in memory (as in Minsky 1975). Entities that figure in these representations can be referred to easily, as though they were given (Sanford 1990: 518).

3.3. Selecting an Appropriate Scenario

The experiment cited above raises an immediate issue: in order for a scenario to work properly, it must be the most appropriate one for the given discourse. In the experiment, titles such as ‘In court’ and ‘Telling a lie’ are used to evoke the matching scenarios in the subjects’ minds. But the question is: in a real situation, how can the most appropriate scenario be selected?

Sanford & Garrod’s answer is as follows: ‘the success of scenario-based comprehension depends upon the writer employing suitable descriptions to elicit appropriate scenarios at the right time’ (Sanford & Garrod 1981:127). Thus, ‘in order to elicit a scenario, it is crucial for a piece of text to constitute a specific partial description of an element of the scenario
itself (ibid.: 129). Here is their example of an appropriate partial description for the 'restaurant' scenario:

(14) The waiter brought the soup.

Sanford & Garrod say that 'such a statement portrays an action which is central to the scenario, and the action involves someone (waiter) who fills a definite role slot in it'; they add that 'the crucial thing appears to be that the scenario is singled out by the intersection of these two pieces of evidence: neither piece of evidence is quite sufficient by itself' (ibid.: 128).  

Sanford & Garrod then summarise their answer as follows: 'there are thus two complementary aspects to scenario selection: the specificity of description of roles and actions, and the interests of the reader, which would be reflected in the availability of various scenarios' (ibid.: 129).

3.4. The Structure of the Scenario - Explicit and Implicit Focus

Sanford & Garrod assume that during reading and conversation, not everything previously mentioned is equally accessible for reference, due to the nature of 'working memory' (Baddeley & Hitch 1974; Baddeley 1976), which is conceived of as a mental workspace of limited capacity. Since working memory is limited, only a relatively small subset of one's memory representation is easily accessible at any given time in language comprehension. Sanford & Garrod suggest that this small subset is determined by 'topicalization' or 'foregrounding' (Chafe 1972) and 'recency'. In other words, the topic of the

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6 Sanford & Garrod notice that there are cases where the description is so general as to be applicable to a wide range of situations, and is thus unlikely to be sufficiently selective to call up a particular scenario representing that situation, e.g. 'John opened the door' (ibid.: 129). But they do not give a full explanation for how scenarios can be retrieved in these cases.
sentence, often the early part of the sentence, and recently mentioned items, take up a large proportion of the foregrounded working memory space.

Thus, an activated scenario is conceived of as the subset of memory representation which is foregrounded, and which is currently being used in processing. Sanford & Garrod call this the 'focus', and if a scenario is currently active, they say it is 'in focus':

By focus we mean that the scenario both as an interpretive structure and domain of reference is currently available to the processing system (ibid.:151).

In other words, a scenario in focus automatically constrains possible inferences made by the hearer, leaving all other scenarios more or less inaccessible.

Along the same lines as Grosz (1977), they divide focus into two kinds: explicit and implicit. In their framework, entities mentioned explicitly in the text are said to be in 'explicit focus' as long as they are represented in working memory, while entities implied by the text but not mentioned explicitly, and provided by the current scenario, are described as being in 'implicit focus'.

Sanford & Garrod go on to define certain partitions of memory as 'independently addressable and capable of being treated by a processor as distinct search domains' (ibid.:158). They suggest that there should be at least four such domains. The first distinction is made between those 'in current focus' (which are in the dynamic partitions of memory) and those not in current focus (which are in the static partition of memory). The second distinction is the one between explicit and implicit focus.
3.5. The Nature of Focus

In this section, I will look more closely at explicit and implicit focus and at what happens to them during comprehension.

Sanford & Garrod claim that the two types of focus have only one feature in common: specifically the ability to provide a retrieval domain which incorporates the information most pertinent to understanding the text (ibid:160). Apart from this, explicit and implicit focus have very different properties. Explicit focus is conceived of as consisting of representations of items mentioned in the discourse, which they call ‘tokens’, and pointers to scenarios. Implicit focus has a more complex structure: it comprises ‘scenario representations, made up of slots and default specifications, bound together by relational programmatic information’ (ibid.:161).

This difference in properties affects reference resolution. When this results from a search of explicit focus, the outcome of the search process is ‘a note that the partial description matches a specified token’ (161). When it results from a search of implicit focus, on the other hand, ‘there will be no token corresponding to the partial description, but there may be a slot corresponding to it in the scenario’ (161). Thus, the outcome of ‘a successful search will be a note that the partial description matches a slot in implicit focus’ (161).

When a linguistically ‘new’ entity is incorporated into the memory representation, Sanford & Garrod propose that this is done by the following two types of CONSTRUCT operation (161):

(a) CONSTRUCT (in explicit focus, on basis of partial description, token)
(b) CONSTRUCT (in explicit focus, on basis of implicit focus slot, role description scenario)
They also suggest that when implicit focus is involved in the search procedure, a mapping between a token in explicit focus and the scenario results from the consequent CONSTRUCT. For example, when ‘the waiter’ is introduced as a linguistically ‘new’ entity (represented as a role slot in the current scenario), the resulting structure in explicit focus might look like the following (161):

Role 1
Waiter -----> Scenario 1 (restaurant scenario)

Here, scenario 1 is supposed to have been currently singled out in implicit focus, in order for such a mapping to occur.

Sanford & Garrod also explain the difference between explicit and implicit focus in terms of the organisation of memory. They suggest that ‘explicit focus is a short-term store of limited capacity’, and therefore, as new tokens are added, the activation of old ones will be gradually diminished, until eventually they are no longer in focus (ibid.:162). By contrast, it is assumed that there is no capacity limitation for implicit focus, since this is thought of as a partition of long term memory which is easier to access. Accordingly, they also suggest that the search domain ‘implicit focus’ is ‘an address in a partition of long-term memory’ (162).

Now let us look at how reference resolution takes place in each type of focus. Sanford & Garrod assume that the processor will carry out a retrieval operation such as the following (ibid:163):

RETRIEVE   (a) domain: focus
(b) partial description: noun-phrase (or pronoun) decomposition
(c) return: token identity (if explicit focus)
            slot identity (if implicit focus)
A successful RETRIEVE will provide either a token (in explicit focus) or a role slot (in implicit focus). Further CONSTRUCT operation will be required to integrate the new information associated with the reference: if it is a token in explicit focus, new information is simply added to it; if it is a role slot in implicit focus, a new token for the entity has to be created in explicit focus, and an identity mapping is made to the appropriate role slot. It is suggested that ‘the outcome of this process may be represented as a token for the entity connected to a token labelled with the scenario address’ (ibid.: 164).

Sanford & Garrod show this connection as an arc labelled in terms of the role specification in the scenario. Figure 2 shows the hypothetical state of explicit and implicit focus, suggested by Sanford & Garrod (ibid.: 177), after interpretation of the utterance: ‘Mary was dressing the baby. When she had finished, they went to the shops’.
Figure 2. Hypothetical state of explicit and implicit focus after interpretation of the following sentences (Stanford & Garrod, 1981): *Mary was dressing the baby. When she had finished, they went to the shops.*

3.6. Primary and Secondary Processing

As we saw in the previous section, Sanford & Garrod assume that reference resolution can succeed when ‘there is either a token in explicit focus, or a suitable slot in implicit focus, or both’ (Sanford & Garrod ibid.:167). They call this direct interpretation process ‘primary processing’. Primary processing is characterised as automatic and rapid, since the route to access entities which act as potential candidate referents is already open. According to Sanford & Garrod, the majority of reference should be resolved in this manner. It would fail, however, when a new scenario has to be selected at the beginning of a discourse, or when a currently operating scenario cannot accommodate new input. In these cases, Sanford & Garrod
suggest that 'secondary processing' is called for. Secondary processing is thought to be more time-consuming than primary processing. The most typical functions of secondary processing are (a) to accommodate a newly introduced topic and (b) to accommodate the reintroduction of earlier topics.

In terms of memory structure, primary and secondary processing are seen as follows: 'primary processing is processing within the constraints of the local topic of the discourse itself, embodied in the focus partitions of memory'; by contrast, the search domain for secondary processing 'is large, comprising the entire memory space' (ibid:170-171). Thus, secondary processing is seen to be a much less economical operation than primary processing. Because it demands more processing effort, according to Sanford & Garrod, secondary processing is supposed to operate only when primary processing fails: in other words, the current scenario is always the first search domain for the referent before secondary processing is introduced and the search domain gets extended beyond the current scenario. Later, I will argue against this view.

3.7. Pragmatic Considerations

Before finishing the outline of Sanford & Garrod's account, let us look briefly at how they relate it to pragmatics. Their view of pragmatics seems to be broadly Gricean, and they suggest that their scenario-based account fits Grice's Cooperative Principle:

Conversation can then be thought of as A trying to isolate a scenario in B's current focus . . . . . . . . To the extent that A's utterances successfully isolate an appropriate scenario for B, B is understanding A in the way A intends. (Sanford & Garrod 1981:190)
Grice's maxims can be related to the scenario-based theory of comprehension which we have developed in this book. For example, the maxim of quantity relates directly to the question of specificity discussed in Chapter 6 . . . . . . Similarly, maxims (3) (relation) and (4) (manner) may both be construed as requiring the speaker to relate new utterances to any existing scenario-based model in an unambiguous way. (Sanford & Garrod ibid.: 189)

So it seems that Sanford & Garrod assume that there is an expectation on the part of the hearer that the speaker will not say things which are clearly unrelated to the scenario-based model in the hearer's mind, unless the topic of the discourse is being changed. In other words, they believe that the context for interpretation of incoming information is largely present in advance of the utterance. However, as I will argue in later sections, this is too strong an assumption; in actual verbal communication, a hearer cannot have access to all the contextual assumptions needed for interpretation before the utterance is processed. This assumption creates serious problems for their theory. My hope is that relevance theory, one of whose strong points is its ability to explain the nature of context selection/construction, can suggest one way of improving on their insights.

4. **Limitations**

Now I would like to illustrate the limitations of Sanford & Garrod's account from two different points of view: one concerns the computation of the scenario\(^7\), and the other the representation of the scenario.

\(^7\) The problem with selection of an appropriate script/frame is also discussed briefly in Stevenson (1993: 38-39).
4.1. Computation of the Scenario

Sanford & Garrod suggest that what is needed for a hearer to select an appropriate scenario from long-term memory is a partial description which is specific enough to enable him to do so. For example, if a hearer comes across an utterance such as the following,

(15) James and Anita had a holiday in Cannes last month.

this should be enough to select, say, the ‘having a holiday in Cannes’ scenario. However, things do not seem to be so simple, because exactly the same utterance may lead a hearer to select different scenarios, depending on available contextual assumptions. Let us imagine two different situations, in which (15) might be uttered:

(16) Available assumptions: 1. Anita is Peter’s friend.
    2. James is Peter’s best friend.

    Utterance: James and Anita had a holiday in Cannes last month.
    Scenario: ‘stealing best friend’s girlfriend’ scenario

(17) Available assumptions: 1. James is a rich young executive and he is Anita’s new boyfriend.
    2. Jane and Mary feel envious of her.

    Utterance: James and Anita had a holiday in Cannes last month. (uttered by Jane, to Mary)
    Scenario: ‘having a rich young boyfriend’ scenario
These examples show that a partial description which is specific enough to select one particular scenario does not always lead a listener to select that scenario. It might be wondered how exactly the above scenarios are different. This will be discussed in detail later, but meanwhile, a commonsensical explanation such as the following might do. These scenarios differ in implicit focus, i.e. in the slots for default specifications of implied entities. Thus, in the 'having a holiday in Cannes' scenario, there might be slots for various activities one can do in Cannes, places to visit, local food and drink, etc, whereas in the 'stealing best friend's girlfriend' scenario, there might be slots for people who are more or less involved with James, Peter, and Anita, and slots for predictable consequences of what is going on, etc.. In the 'having a rich young boyfriend' scenario, on the other hand, there may be a slot for a first class Air France ticket, a slot for the best hotel in Cannes, and a slot for a party with celebrities. Thus, the contents of implicit focus for these scenarios are quite different.

This raises the question of how the contents of implicit focus are decided. My assumption is that they are decided by the explicitly stated content of the utterance AND contextual assumptions available in the situation of utterance. I will discuss the issue further in a later section, but first, let us look at how Sanford & Garrod might answer this question. Their only comment on contextual factors is the following: 'when events and roles are central to a situation depends upon the interests of the individual reader' (Sanford & Garrod 1981:129). This needs to be developed further in order to be integrated into their account.

Unfortunately, instead of considering the contextual aspect further, Sanford & Garrod take almost the opposite direction. In their paper, 'Topic Dependent Effects in Language Processing' (Garrod & Sanford 1983), they emphasise the 'global topic of discourse' as the most crucial factor affecting scenario
selection. This seems to me to lead to an over-dependency on linguistic information. I will discuss problems generated by their claim in the next section, but meanwhile I would like to emphasise that these problems stem from the very fact that they have given up searching for a way to accommodate contextual factors more appropriately.

Let me illustrate briefly what Garrod & Sanford mean by the 'global topic of discourse', using their own example:

(18) Learning to ski
    Harry fell several times.
    He didn't like skiing at all.
    The snow was cold and wet.

According to Garrod & Sanford, the text as a whole is about learning to ski, and this could properly be called the 'global topic' of the discourse. The function of the global topic is to enable the listener to set up an appropriate scenario, consisting of not only an explicit focus, but also an implicit focus. Thus, 'for a text with a well defined global topic such as "Learning to ski", a mental model is evoked in the reader which consists in part of a representation of things, and perhaps events, which are a normal part of our knowledge of learning to ski' (276).

Now consider how Garrod & Sanford see the global topic of discourse as being identified. Within their framework, a listener can decide on the global topic of discourse ONLY by using the explicitly mentioned contents of the discourse as clues. In other words, contextual factors are completely ignored. As a result, Garrod & Sanford cannot explain the phenomena illustrated in (16) and (17). Within their account, the scenario for (15) will always be 'having a holiday in Cannes', regardless of what assumptions are available to the hearer.

It seems reasonable to conclude that Garrod & Sanford cannot give a satisfactory explanation of how a listener selects
an appropriate topic. This neglect of contextual factors causes other serious problems, problems concerning the contents of implicit focus, to which I now turn.

4.2. Representation of the Scenario

Let me repeat my main questions concerning representation of the scenario: (a) is it possible to decide exactly what slots there are in a particular scenario at a given time?; (b) what are the factors which affect the contents of implicit focus? Let us start with the first question. In fact, this is raised by Garrod & Sanford themselves, and they do not give any clear answer. Referring to the example used in their experiment, which is quoted (18) above, they wonder:

In the example described above, the claim was made that some representation of 'snow' was part of the scenario for 'learning to ski'. One might expect representations of other entities to be part of the scenario, such as 'skis', 'sloping ground', 'piste', 'instructor' etc. Clearly, there is a problem here - where does the scenario representation end? How is it possible to decide what is in a scenario? (280)

This is a crucial question for Garrod & Sanford, because of their distinction between primary and secondary processing, which rests solely on whether the referent is currently in the hearer's mental model of the discourse, i.e. focus/scenario, or not. Let me outline part of their experiment, to show how important it is to specify the content of a scenario in their framework, in order to account for different degrees of processing difficulty.

The following is a pair of texts drawn from twenty sets used in their reading-time experiment, whose results were presented as evidence for the importance of discourse topic. In each case a pair of titles were used to indicate an appropriate or
an inappropriate topic with respect to the target sentence. There was also an option in the initial context sentence, which could either mention the critical referent or not. Thus each passage could be presented in either the appropriate or inappropriate topic condition and either with or without the stated antecedent.

(19) APPROPRIATE TOPIC PASSAGE
Title: Learning to ski
Context sentence: Harry fell several times (in the snow).
Filler sentence: He didn’t like skiing at all.
Target sentence: The snow was wet and cold.

(20) INAPPROPRIATE TOPIC PASSAGE
Title: Cross-country running
Context sentence: Harry fell several times (in the snow).
Filler sentence: He hated running in winter.
Target sentence: The snow was wet and cold.

They found that under the appropriate topic condition, there was only a small reading time difference of 21 msec in favor of the stated antecedent, whereas under the inappropriate topic condition the corresponding difference was 104 msec. Garrod & Sanford take the result as confirmation of their ‘intuitions about the importance of discourse topic in the resolution of reference’. They comment that ‘provided a representation of an entity is part of the mental model set up by the discourse, [in the example shown above, a slot for ‘snow’], it is given, and a reference to the entity can be resolved equally easily whether it has been mentioned explicitly or whether it is represented as an implicit component of the global topic’ (279) (my addition in parenthesis).

Thus, it is clear that Garrod & Sanford distinguish primary
and secondary processing by whether an entity referred to by a bridging reference has a matching slot in the hearer's scenario or not. If there is a matching slot under the appropriate topic, as in (19), this is a case of primary processing and if not, as in (20), it is a case of secondary processing.

It is important for Garrod & Sanford, then, that the contents of implicit focus should somehow be specified. But they do not offer a full explanation of how this can be done. It may perhaps be reasonable to take the following claim about secondary processing and change of topic as a partial answer:

Under what circumstances therefore might such an apparently maladapted form of processing be of communicative value? Looked at in terms of the reader's assessment of discourse topic, secondary semantic analysis can be seen as a device for registering shifts in topic. For whenever it is impossible to resolve a reference during primary processing, this must mean that the reference introduces in some way a new topic (295).

On this view, the time difference between (19) and (20), for example, is explained as follows: when a hearer encounters the target sentence in (20), he has to construct a new slot for 'snow', and realises that the topic 'cross-country running' must be changed to accommodate the new slot. This implies that the hearer can roughly specify the contents of a scenario by looking at the topic; if he cannot find a matching slot, the topic itself has to be changed. Thus, their suggested answer to our first question seems to be that we cannot strictly specify the contents of implicit focus, but the topic of the discourse will give a rough idea about what slots there are in the scenario under the topic.

This might also be Garrod & Sanford’s suggested answer to our second question: what are the factors which affect the
contents of implicit focus? Their answer is, as I understand it, that the only relevant factor is the topic of discourse, which, we should recall, is somehow worked out using the explicit content of the discourse alone.

However, this causes a problem. What follows is that a hearer may need to change his scenario every so often, and in ways that seem to me absurd. To illustrate the problem, let us return to example (15) ('James and Anita had a holiday in Cannes last summer'). If, as Garrod & Sanford imply, a hearer decides what the text is about using the explicitly mentioned content of the utterance alone, most probably the global topic of (15) will be 'having a holiday in Cannes', and a matching scenario will be selected. Then, if, in situation A, the speaker goes on to tell the hearer, 'Peter doesn't know about it, but his sister seems to suspect it. Which is Peter going to choose: the friendship, the love, or neither of them?', the hearer will have to change the topic from 'having a holiday in Cannes' to something else, in order to find slots for those referring expressions. Similarly, if, in situation B, the speaker goes on to say, 'The luxurious suite facing the sea must cost a fortune. I heard George Michael was around there at the same time; maybe he was at the party with them,' again the hearer will have to change the topic to something else.

The issue is this. In situation A, knowing the relationships between James, Peter and Anita, would the hearer not activate the 'stealing best friend's girlfriend' scenario immediately on hearing (15)? Surely this would be the way to grasp the intended relevance of (15)? Yet according to Sanford & Garrod as I understand it, this scenario would not be immediately activated because it has not been explicitly cued. Alternatively, if it has been explicitly cued, then so have an indefinite range of further scenarios having to do with James, Peter, Anita, Cannes, etc, and the question is how the hearer chooses an actual scenario from this indefinite range.
However odd this account seems, Garrod & Sanford cannot offer a better explanation, because they set up a framework in which the hearer has to rely too much on the explicitly mentioned content of the utterance. My own assumption is, as I mentioned earlier, that the contents of implicit focus are decided both by the explicit content of the utterance and the contextual assumptions available in the situation of utterance. On this assumption, a hearer should not have to change his scenario unnecessarily often. Also it allows the speaker to assume that the hearer uses available contextual assumptions to set up necessary slots in his scenario. As for the question whether it is possible to decide exactly what slots there are in a particular scenario, I do not expect it to be possible. I believe that it will not be necessary to specify the exact contents of implicit focus, if one has a more plausible account of how slots and default specifications are actually set up in the mind.

4.3. Examples: Sanford & Garrod's Problem

Here, I would like to give some examples of bridging reference which cannot be handled by a scenario-based account. First, recall Sanford & Garrod's examples of bridging reference assignment mentioned above:

(21) Fred was being questioned. He had been accused of murder. The lawyer was trying to prove his innocence. ('Court' scenario)

(22) Harry fell several times. He didn't like skiing at all. The snow was cold and wet. ('Learning to ski' scenario)

Recall that their account of these examples goes roughly like this: in (21), the 'court' scenario is activated before the hearer
encounters the phrase ‘the lawyer’, and therefore assigning a referent to it requires no extra effort; similarly, in (22), the ‘learning to ski’ scenario has been activated before he encounters the phrase ‘the snow’, and reference assignment is equally effortless.

However, there are cases of bridging reference which cannot be explained as simply as this. I would like to discuss three kinds of such cases: (a) cases where there is more than one candidate referent in a given scenario; (b) cases where there is more than one scenario evoked by the previous discourse, each involving a potential referent; (c) cases where a bridging reference is used to refer to something which may not be represented in the scenario being activated.

Let us start with type (a), where the hearer has to choose the right referent from several candidate referents. The following examples illustrate:

(23) A. How long have you and John been together?
    B. Well, about two months. I used to see a Japanese guy, but I stopped seeing him and started going out with John after Easter. The conversation was less boring.

(24) A. How long have you and John been together?
    B. Well, about two months. I used to see a Japanese guy, but I stopped seeing him and started going out with John after Easter. The conversation was too boring.

In both (23) and (24), the bridging reference is ‘the conversation’. Notice that there are two possible candidate referents in the previous part of the utterance, namely ‘a Japanese guy’ and ‘John’. Intuitively, the preferred interpretation for (23) is that the conversation with John was
less boring than that with the Japanese guy; and the preferred interpretation for (24) is that the conversation with the Japanese guy was too boring. The question is: does Sanford & Garrod's scenario-based account offer a proper explanation for these interpretations? Suppose that in A's mind there is, say, a 'being together (with John)' scenario, in which there may be a slot for 'conversation'. A may have this scenario in mind when asking the question, and keep it in mind when processing the answer. Then probably 'the conversation' should be interpreted as being with John. This explanation works for (23), but how about (24), where the preferred interpretation is that the conversation is with the Japanese guy? Then the previous account makes the wrong prediction. However, there is another possible way to explain (23): hearing 'I used to see a Japanese guy', A changes the scenario to, say, 'being together (with a Japanese guy)', and in that scenario, there is a slot for 'conversation' which should be interpreted as conversation with the Japanese guy. But then notice that this account will make the wrong prediction for (24). A third explanation might be that in the 'being together (with John)' scenario there are two slots for 'the conversation', one with John and one with the Japanese guy. Here the problem is that there is no criterion for choosing between the two.

Now let us look at an example of type (b), where there is more than one current scenario and the hearer must choose both the right scenario and the right referent. In this example, there are three possible ways of finishing B's utterance, indicated by *.

(25) A. Do you do any sports regularly?
B. Yes. In that sense, I am quite health-conscious. In summer, I play tennis a lot. I am a member of a local tennis club. In winter, I go skiing twice or three times, mainly to the French Alps, but
sometimes I go to some pretty Tirolean village for a change. In addition, I used to do aerobics classes a lot. Now I am getting more keen on Yoga classes.*

* (i) One of the advantages is that you can relax easily.
(ii) One of the advantages is that you can spend time outdoors.
(iii) The fee for one lesson was too expensive.

The preferred interpretation for (i) might be that one of the advantages of Yoga classes is that you can relax; the preferred interpretation for (ii) might be that one of the advantages of doing sports is that you can spend more time outdoors; that for (iii) is that the fee for one aerobics class was too expensive. What can Sanford & Garrod say about these examples? This time, let us suppose that A changes scenarios each time he hears a different sport: the first scenario may be a ‘playing tennis’ scenario, followed by a ‘skiing’ scenario, a ‘having aerobics classes’ scenario and finally a ‘having Yoga classes’ scenario. When A reaches the end of the penultimate sentence marked by *, he should then have the ‘Yoga classes’ scenario currently activated. When the bridging reference ‘the advantages’ comes, there may be a slot for ‘the advantages’ in the scenario. If so, the reference will be understood along these lines, as a case of primary processing. However, the same account fails to explain (ii) and (iii). The preferred interpretation of (ii) requires either that all the scenarios used during B’s utterance should be retrieved at once or that those scenarios should be kept activated while the ‘Yoga classes’ scenario is currently activated, (or that a more abstract scenario - doing sports - which subsumes those previously activated should be chosen). None of these explanations is considered in Sanford & Garrod’s
account. As for (iii), similar problems to those in example (24) seem to arise.

Finally, I would like to consider examples of type (c), where a bridging reference is used to refer to something which may not be represented in the current scenario:

(26) Sorry, I couldn’t get here on time. The traffic was awful and it was nearly impossible to get into the car park.

(27) I assume Japanese society is very stable. The divorce rate is very low.

(28) A: Shall we go?  
    B: The windows are still open.

(29) A: What time is it?  
    B: The milkman has just come.

(30) A: Did your ski trip go well?  
    B: The camera didn’t work properly.

(31) A: Can you give me a lift?  
    B: The Japanese rice wine made me quite drunk, I’m sorry.

(32) A: I finished all my homework. Can I play my new computer game now, mummy?  
    B: I see your textbooks are still in the bag and the telly has been on quite a while. So, I don’t believe you. Finish your homework first.

The first two examples are uttered by one person and the rest involve conversation between two people. Let me start with the first two. Examples (26) and (27) seem to me perfectly natural, and it is unlikely that the hearer will have difficulty in assigning a referent to bridging references such as ‘the traffic’, ‘the car park’ and ‘the divorce rate’. However, it is impossible to tell whether a slot for ‘traffic’, ‘car park’ or ‘divorce rate’ was already in the hearer’s implicit focus. According to Sanford &
Garrod, unless the hearer is given an explicit linguistic clue, as in the case of (21) and (22), he cannot select a specific enough scenario in advance, and therefore, it is more likely that for cases like (26) and (27), Sanford & Garrod would say that the hearer has to resort to secondary processing. This is far more effort-consuming than primary processing, which is always preferred and is used to interpret the bridging reference in examples (21) and (22). But then, why do examples (26) and (27) seem so natural? Even if there was no slot for 'traffic', 'car park' and 'divorce rate' in the hearer's mind, still the utterances seem to cause him no difficulty in interpretation and assignment of reference. There must be some other method for assigning reference, one which is not affected by whether there is a pre-existing slot for the referent or not.

Examples (28) to (32) are all in 'question-answer' form. Let me repeat that Sanford & Garrod assume that their scenario-based account can explain reference assignment in spoken discourse or conversation (see Sanford & Garrod 1981:212). However, it fails to deal with cases such as (28) to (32), where the referent may not be found in the currently activated scenario. In none of the above cases does B's answer to A's question seem to be direct. So perhaps it takes more time for A to interpret B's answer than when the answer is more direct: e.g., for (28), (30), (31) and (32), either 'yes' or 'no', and for (29), say, 'a quarter past eleven'. The point I would like to make is that according to Sanford & Garrod, these cases should not involve primary processing, as the referent cannot be found in the currently activated scenario; therefore, the hearer has to resort to secondary processing; but the trouble is that the second sentence cannot be regarded as the beginning of a new topic either. Therefore, it seems that Sanford & Garrod cannot handle these cases.

I can think of some reasons for this. One is that they treat primary processing as the norm and secondary processing as a
sort of deviation from it. (Recall their pragmatic assumption that contexts should be given in advance). Because secondary processing is not essential to their account, they do not offer a full explanation of how it goes: in other words, they do not explain how an appropriate referent can be selected when the search domain is the whole knowledge-base. Here is what they say about secondary processing:

. . . . . secondary analysis must be seen as more complex and hence likely to impose a greater load on the processing system, with subsequent effects on overall comprehension time. As soon as the size of the unit of analysis goes up or the domain of memory search is de-restricted, some executive processing control must be necessary and it is no longer possible to carry out the sort of simple automatic search associated with what we have described as primary analysis (Garrod & Sanford 1983:294).

This quotation suggests that Sanford & Garrod are not too sure what the appropriate ‘executive processing control’ might be. Because of this, their scenario-based account does not offer an adequate pragmatic criterion for reference assignment.

Sperber & Wilson, by contrast, propose that the hearer’s expectation of optimal relevance is a crucial pragmatic factor: it enables him to select appropriate contexts from his knowledge base and from observation of the physical environment, or to form new assumptions if necessary, which eventually leads him to an interpretation consistent with the principle of relevance. In their framework, reference assignment is one of the sub-processes needed to achieve such an interpretation, and there is no need to set up any other criterion especially for it. In fact, in this framework, it is possible to treat Sanford & Garrod’s secondary processing as the norm, with primary processing being merely a special case of it.
Let me explain. As examples (28)-(32) show, in conversation, where the contexts used for interpretation are restricted to those which are easily accessible to participants, referring to something not explicitly mentioned in previous discourse is a common practice. The fact that we are capable of identifying the referents of the bridging references used in these examples suggests that we are far better at selecting appropriate contexts from the whole knowledge-base than Sanford & Garrod assume (c.f. Singer 1979). I do agree that much conceptual information is stored in a situation-based way, which makes utterance interpretation easier when one particular chunk of stored information is the only context needed. This does not mean, however, that what is called a 'scenario', 'script', or 'frame' always yields an adequate context for reaching the intended interpretation. Often, it is necessary for a hearer to extend or revise his original scenario, or to combine several different scenarios, even if that particular extension, revision, or combination is totally new to him and may not happen again. Hence, I conclude that primary processing, the type of processing in which one currently activated scenario is the only necessary context, as in examples (21) and (22) above, is a special case. It is one of the cases where the referent is most easily accessible. Secondary processing, on the other hand, may require more complex procedures, in which one currently activated scenario is merely a part of the necessary context. What is crucial is that in both cases, the basic mechanism of reference assignment is the same: reference is assigned in such a way as to obtain an interpretation consistent with the principle of relevance. In the next section, I will discuss the details of this claim.
5. The Principle of Relevance and Selection/
Construction of Contextual Assumptions

5.1. Context and Search for Relevance

Sperber & Wilson's basic assumption is that in interpreting an utterance, the individual automatically aims at optimal relevance. In order to achieve optimal relevance, he will try to pick out, from whatever source, a context in which to process the utterance so that it gives adequate contextual effects for no unjustifiable processing effort in a way the speaker might manifestly have foreseen.

This idea is different from the more widely accepted view that the context is fixed before the interpretation process starts. The simplest version of such a view is that the context for the comprehension of a given utterance is the set of assumptions explicitly expressed by preceding utterances in the same dialogue or discourse. However, this view is obviously too strong (see Sperber & Wilson 1986:132-137). Consider the following conversation:

(33) Peter: Jane didn't come to the seminar today.
John: Agassi was playing the match this afternoon.

The question here is how Peter is going to interpret John's utterance. Suppose both Peter and John know that Jane is a great fan of Andre Agassi and that she will never miss any match he plays. The most natural interpretation of John's utterance is as an explanation for Jane's absence from the seminar. Relevance theory can offer an account of how this is possible, and I will discuss that later in this section. On the view that the context is the set of assumptions explicitly expressed by the preceding utterance, however, the proposition expressed by Peter's utterance should be the only context in which John's utterance is interpreted. Clearly, John's utterance will yield no contextual
effects when the proposition it expresses is combined with the one expressed by Peter's utterance, unless the assumptions 'Jane is a great fan of Andre Agassi' and 'Jane will never miss any match Agassi plays' are retrieved from Peter's encyclopaedic knowledge and used as additional information. Thus, the idea that the context for utterance interpretation is simply the proposition expressed by the preceding utterance is too restrictive.

Another possible view is that the context for comprehension consists not only of the assumption explicitly expressed in the preceding utterance or discourse, but also of information associated with concepts connected to explicitly mentioned concepts by general knowledge. This is the view shared by, for example, Sanford & Garrod's 'scenario' account, Minsky's 'frame' account, and Schank's 'script' account. On this view, the context for the conversation in (33) may contain not only the explicitly expressed information, but also encyclopaedic knowledge about the seminar, and so on.

Suppose Sanford & Garrod are right, and Peter's utterance is associated in his mind with a 'skipping a seminar' scenario with Jane as a main actor. Then which concepts (slots) are most likely to be activated in his implicit focus immediately after his utterance? Probably, the main activity in a seminar, those who attended the seminar, and various activities one can do when one skips a seminar, etc.. But is there a slot for 'Agassi' in Peter's implicit focus at this point? It seems there is no definite answer to that. Recall that Garrod & Sanford do not offer any criteria for deciding which slots there are in a hearer's implicit focus. So Sanford & Garrod's reaction to this dilemma is that if there IS a slot for 'Agassi' in Peter's 'skipping a seminar' scenario, John's utterance can be easily interpreted with little processing effort, WITHIN THE SAME SCENARIO; and if, alternatively, there IS NOT a slot for 'Agassi', Peter has to CHANGE his scenario to accommodate it.
Let us suppose that there is no slot for 'Agassi' in Peter's implicit focus in his 'skipping a seminar' scenario. Garrod & Sanford's account predicts that the 'skipping a seminar' scenario is changed to a 'playing a tennis match' scenario with Agassi as a main actor, in which slots for items such as 'tennis courts', 'opponent', 'umpire', 'ace', etc. may be typically included. The trouble with this prediction is that it should then be quite possible for Peter to interpret John's utterance as beginning a new subject of conversation, completely unrelated to Peter's own utterance. In other words, on this account, there are two totally unrelated scenarios in Peter's mind. If this picture is right, then, there is no way for Peter to interpret John's utterance as an explanation for Jane's absence from the seminar, which I suppose is the most natural interpretation. Since Garrod & Sanford do not offer answers to such questions as: (a) what happens to scenarios previously used after a new scenario is retrieved? and (b) can several scenarios be somehow combined? the picture in which the two scenarios remain unrelated is as far as I can get.

Relevance theory offers a different solution. Within this framework, it is often necessary that the context should be EXTENDED in search of optimal relevance. Extending the context is different from changing a scenario into some other scenario, in the following ways: (a) the sources of assumptions are not restricted to explicitly expressed information; (b) the choice of appropriate assumptions is based on the criterion of consistency with the principle of relevance; (c) the full set of assumptions (context) required for comprehension can be extremely idiosyncratic, i.e. can be something which does not fit any existing 'scenario', but is drawn from several sources.

Thus, for the example (33), a relevance-theoretic account might go like this. On hearing John's utterance, Peter, in his search for optimal relevance, starts picking up necessary assumptions from whichever sources are most accessible, with
the initial context being information associated with his own
utterance, 'Jane didn’t come to the seminar today'. John’s
utterance can achieve relevance either by (a) yielding contextual
implications when combined with information derived from
Peter’s utterance, (b) strengthening existing assumptions, e.g.
‘Jane didn’t come to the seminar today’, or (c) contradicting and
eliminating existing assumptions. Intuitively, John’s utterance
should be interpreted as an explanation for Jane’s absence: it
therefore answers an implicit ‘why’ question ('why didn’t Jane
come to the seminar?'). This answer can be derived as a
contextual implication of John’s utterance in a context
containing such assumptions as ‘Jane is a great fan of Agassi’,
‘If there is a match in which Agassi plays, she will never miss
it’, ‘In order to watch Agassi’s match, she may skip a seminar’
and so on.

Notice that these assumptions cannot be deduced from
explicitly expressed information alone. Nor can they be retrieved
purely from a pre-fixed ‘skipping a seminar’ scenario. Moreover,
the criterion of consistency with the principle of relevance
enables a listener to make new assumptions if necessary.
Suppose Peter knew that Jane was a great fan of Agassi but
didn’t know that she is so mad about him that she is prepared to
skip the seminar to see him. Still, some such assumption needs
to be accessed in order to achieve an optimally relevant
interpretation of John’s utterance. If assumptions are retrieved
only from a pre-fixed scenario, as Garrod & Sanford seem to take
for granted, in this situation Peter will never be able to access
assumptions such as ‘Jane will never miss a match of Agassi’
and ‘In order to watch a match of his, she is prepared to skip a
seminar’, even though these are new assumptions he is required
to make to understand the utterance. By contrast, given the
immediate context, ‘Jane didn’t come to the seminar today’ and
given the criterion of consistency with the principle of
relevance, the assumption ‘Jane is a great fan of Agassi’ is
enough for Peter to make further assumptions about HOW great a fan she must be.

Furthermore, within relevance theory, this crucial assumption ‘Jane is a great fan of Agassi’ may be instantly retrieved from Peter’s long-term memory in the search for relevance. I will deal with the way in which various types of assumptions are accessed within the framework of relevance theory in the next section. Meanwhile, let me point out that according to Garrod & Sanford’s account, this process will be extremely effort-consuming, or even impossible, since within their framework, a scenario must be identified before a hearer starts processing incoming information, except in the case of topic change. In order to process John’s utterance properly within Garrod & Sanford’s framework, what Peter needs are not only the ‘skipping a seminar’ scenario and the ‘playing a tennis match’ scenario, but also a scenario which contains these two scenarios as subparts: say, for instance, a ‘being a great fan of a tennis player’ scenario. If this scenario is identified by Peter before John’s utterance, Garrod & Sanford's explanation will do, since within this scenario, both Agassi’s tennis match and Jane’s skipping a seminar can have matching slots. Since Garrod & Sanford do not say anything about the possibility of retrieving a new scenario to integrate existing ones by using existing scenarios as prior contexts, which I suppose is a plausible hypothesis, I assume that within their framework, it is necessary for a scenario to be chosen prior to processing the incoming utterance as long as the global topic of discourse stays the same. However, their story is too simple, because contexts are not always fixed in advance, even when the global topic of conversation does not change. Example (33) is a case in point. Rather, it often happens that in order to achieve adequate contextual effects for minimal processing effort, a speaker will omit information which the hearer can supply for himself. For example, knowing that Peter knows that Jane is a great fan of
Agassi, John is unlikely to say, ‘Jane is a great fan of Agassi and she won’t miss any match of his. He was playing this afternoon’. The reason is that to process this longer utterance needs more time and effort than would be required by the actual utterance in (33), which for that reason is the optimally relevant one.

Thus, what we need is an account of verbal communication which explains (a) how previously unknown contextual assumptions are accessed, and (b) by what criterion they are selected. In this section, I have discussed mainly (b), in order to give a rough idea of how contexts can be accommodated in relevance theory. In the next section, I will illustrate how such assumptions are accessed, using the examples of bridging reference given in section 4.3.

5.2. A Relevance-Theoretic Solution to Sanford & Garrod’s Problem

5.2.1. Basic Assumptions

Let me first explain what assumptions can be made within relevance theory about units such as scenarios/scripts/frames, since differences in assumptions about the nature of scenarios/scripts/frames will inevitably affect our explanation of bridging reference.

The first assumption is about the way concepts are activated. Relevance theory assumes (as a plausible auxiliary hypothesis rather than a central theoretical assumption) that each concept has three associated entries; logical, encyclopaedic and linguistic (see Sperber & Wilson 1986: 85-93). The logical entry consists of a set of deductive rules which apply to assumptions containing that concept. The encyclopaedic entry consists of a set of assumptions about the extension and/or denotation of the concept: the objects, events and/or properties which instantiate it. The lexical entry contains information about the natural-language lexical item used to
express it. Since what matters here with regard to the scenario-based account is the encyclopaedic entry, I will talk exclusively about it. The encyclopaedic entry of a concept consists of an organised set of propositions, each containing further concepts. So for example, the encyclopaedic entry for the concept ‘DOG’ may have propositions such as ‘DOGS CHASE CATS’, ‘A PIT BULL IS A DANGEROUS DOG’, ‘CHOMSKY OWNS A DOG’, etc. The crucial point here is that other concepts which appear in these propositions will be activated through activation of the propositions in which they appear. Thus, the concept ‘CAT’ will be activated through the proposition ‘DOGS CHASE CATS’.

Notice that this is quite different from Sanford & Garrod’s assumptions about concept activation. To compare the two approaches, it will be convenient to interpret Sanford & Garrod’s notion of implicit focus in terms of an activation account, following Sharkey & Mitchell (1985). On this approach, implicit focus can be seen as containing concepts which are connected to explicitly mentioned concepts, and are more weakly activated through the stronger activation of explicitly mentioned concepts. Along similar lines to the model of Sharkey & Mitchell (ibid.) and Walker & Yekovich (1987), Sanford & Garrod seem to share the most popular view about concepts: concepts are connected to each other directly via a network, with no propositions necessarily intervening in between. For example, the concept ‘DOG’ is connected with ‘CAT’ directly, regardless of whether the two are constituents of a proposition such as ‘DOGS CHASE CATS’.

In the relevance theoretic framework, encyclopaedic information may be scenario-based, but may also be more idiosyncratic. Moreover, it is accessible not only from situation-based addresses such as scenarios, but from the encyclopaedic entry of other types of concept, including proper names. Thus, for example in (15),
James and Anita had a holiday in Cannes last month.

not only information stored under the heading of 'having a holiday in Cannes', but also concepts activated through the encyclopaedic entries of 'John' and 'Anita' are accessible. Apart from the difference in how one concept activates others, there is also a difference in the way concepts are activated. Relevance theory assumes that the activation of concepts is graded (Dosher & Corbett 1982; Walker & Yekovich 1987). Some concepts which are easily accessible because of frequency or recency of use can be seen as strongly activated. Sanford & Garrod, by contrast, seem to assume that the content of implicit focus is either activated to threshold level or not at all activated, though they assume different degrees of activation of concepts in explicit focus.

The second assumption made within relevance theory about scenarios/scripts/frames has to do with their retrieval. In relevance theory, it is assumed that more than one scenario can be activated simultaneously, and that the deactivation of scenarios may be gradual (c.f. Bower, Black & Turner 1979; Sharkey & Mitchell 1985). Thus, for example, in the case of (33),

(33) Peter: Jane didn't come to the seminar today.

John: Agassi was playing the match this afternoon.

the 'skipping a seminar' scenario activated by Peter's utterance is still available for interpreting John's utterance, even though, according to Sanford & Garrod, John's utterance should apparently be regarded as a change of topic and hence as requiring a change of scenario plus deactivation of the previous scenario.

The third assumption is about when a bridging inference is made. It may be useful here to look at the general discussion by psychologists of instrumental inferences. In general, as McKoon
& Ratcliff (1981: 672) note, there are two extreme opposing views on instrumental inferences: first, that instrumental inferences are rarely made because they are rarely needed to produce a connected text representation; second, that instrumental inferences are always made because the schemas used to interpret incoming text have slots for instruments and those slots are automatically filled, either by an instrument provided in the text or by default values. Needless to say, Sanford & Garrod assume the latter. According to their scenario-based account, bridging inference in the case of primary processing is made in a forward manner and is thus not time consuming.

But this assumption causes a problem, as Singer (1980) notes: although inferences are often necessary for comprehension, the number of inferences that could be drawn for a particular sentence is potentially quite large, and it does not seem psychologically plausible that all such inferences are drawn. Relevance theory tends to share this view, since making unnecessary inferences is a waste of effort. Thus, for the time being, I would rather suggest that bridging inferences are made when necessary: for example, after a hearer encounters a bridging reference. This claim is supported by several psychological experiments, including Corbet & Dosher (1978), who comment as follows: 'subjects do not routinely draw highly likely inferences if those inferences are not needed for comprehension' (489). Then the next question is, in what cases are bridging inferences needed? On this point, Lucas, Tanenhaus & Carlson (1990: 617) suggest that 'presumably, limits on processing capacity will restrict the number of actual inferences to some small subset of those possible, and the inferences that would contribute to the coherence of the discourse would have priority'. I would like to modify Lucas et al.'s suggestion and to propose the following: the inferences that would contribute to the optimal relevance of the utterance
would have priority. The related crucial question is: when does a hearer actually start making bridging inferences? Here, I assume that as soon as enough evidence to make an appropriate inference is given, the hearer starts doing so, but it is more likely to happen at the end of an utterance. However, as noted in section 2.2., these questions are currently being tested experimentally, and I have to say that my suggestions are only of a speculative nature until further evidence becomes available.

5.2.2. Explanation

Here I would like to give a relevance-theoretic account of the examples in 4.3. on the basis of the assumptions mentioned above. Let me start with examples (23) and (24), where the hearer has to choose the right referent from among several candidate referents:

(23) A: How long have you and John been together?
    B: Well, about two months. I used to see a Japanese guy, but I stopped seeing him and started going out with John after Easter. The conversation was less boring.

(24) A: How long have you and John been together?
    B: Well, about two months. I used to see a Japanese guy, but I stopped seeing him and started going out with John after Easter. The conversation was too boring.

In relevance theory, reference assignment is seen as part of an overall process of utterance interpretation whose goal is to recognise what propositions and propositional attitudes the speaker intends to convey. The criterion for recognising the intended interpretation is one of consistency with the principle
of relevance. Hence, if there is more than one candidate antecedent for bridging reference assignment, the hearer has to choose the one which leads to an overall interpretation which is consistent with the principle of relevance.

According to Sperber & Wilson, the most accessible candidate will be tested first. If there are several equally accessible candidates, it is quite compatible with Sperber & Wilson’s framework to assume that these can be tested in parallel, with the one which gives quickest access to a context in which the utterance as a whole yields an acceptable overall interpretation being selected. Notice here that in relevance theory, several candidates can be simultaneously tested in a hearer’s mind, since there is no principled limit to the number of scenarios activated there.

As Wilson (1992) proposes, often, as with examples (23) and (24), there are two possible ways in which the second of two sentences might be intended to achieve relevance in a context created by the first: (a) as an explanation for why some action was performed; (b) as a description of the results of such action. In the case of (23), A can interpret the last sentence of B’s utterance as both a description of the result of her changing boyfriend, and an explanation for why she changed, on condition that he understands ‘the conversation’ as conversation with John. As a result, ‘the conversation’ in the sentence should be interpreted as that with John. In (24), he can take B’s remark as an explanation for why she stopped seeing a Japanese guy, on condition that she interprets ‘the conversation’ as conversation with the Japanese guy.

Notice that in order to arrive at the overall interpretation of these utterances, the hearer has to wait till the very end, with the phrases ‘too boring’ and ‘less boring’, even if concepts for both referents start getting activated after the hearer encounters the phrase ‘the conversation’. According to Sanford & Garrod, this type of processing is secondary processing, which is
time-consuming because of the extra effort needed to make a choice outside the limit of one scenario. However, as I mentioned above, with the principle of relevance, it is possible to assume that we are far better at selecting appropriate contexts from the whole knowledge base than Sanford & Garrod believe. Thus, in order to interpret (23) and (24), for example, contextual assumptions such as the following might be constructed by the hearer immediately after he has heard the whole utterance:

(34) a. Having good conversations is important in a relationship.
b. One should choose a partner whose conversations are not boring.

These assumptions then will lead the hearer to interpret the second part of (23) as giving a reason why the speaker goes out with ‘John’, and to interpret the second part of (24) as giving a reason why she stopped seeing ‘the Japanese guy’. Furthermore, I would like to suggest a hypothesis that reading time for (23) and (24) might not differ significantly from that of (35), where perhaps similar contextual assumptions are required to reach the intended interpretation, but the hearer does not have to make a choice (i.e. a case of primary processing):

(35) I couldn’t stand my ex-boyfriend. The conversation was too boring.

This of course needs to be experimentally tested.

Let us return now to (25), where there is more than one current scenario and the hearer must choose the right scenario and the right referent:

(25) A: Do you do any sports regularly?
B: Yes. In that sense, I am quite health-conscious. In summer, I play tennis a lot. I am a member of a local tennis club. In winter, I go skiing twice or three times mainly to the French Alps, but sometimes I go to some pretty Tirolean village for a change. In addition, I used to do aerobics classes a lot. Now I am getting more keen on Yoga classes. *

* (i) One of the advantages is that you can relax easily.
(ii) One of the advantages is that you can spend time outdoors.
(iii) The fee for one lesson was too expensive.

Let me repeat that the preferred interpretation for (i) may be that one of the advantages of Yoga classes is that you can relax easily; that the preferred interpretation for (ii) may be that one of the advantages of doing sports is that you can spend time outdoors; and that the preferred interpretation for (iii) is that the fee for one aerobics lesson was too expensive.

In relevance theory, there is no problem of principle in handling several scenarios simultaneously. Thus, there is no need to choose the right scenario before choosing the right reference: all the candidate referents may be tested in parallel for their contribution to the overall interpretation of the utterance. Therefore, the problems which Sanford & Garrod have to face, shown in section 4.3, will not be problems for us. Choosing a reference is a matter of finding the best combination of candidate referent and scenario from an indefinite range of possibilities.

The procedure needed to choose the right referent for these examples in relevance theory can be illustrated as
follows. For (i), hearing the phrase ‘the advantages’, concepts such as ‘SPORT’, ‘TENNIS’, ‘SKI’, ‘AEROBICS CLASSES’ and ‘YOGA CLASSES’ may get weakly activated. After hearing the whole sentence, the most plausible candidate, ‘YOGA LESSONS’ is the most strongly activated, through activation of a proposition in its encyclopedic entry, namely, ‘A YOGA LESSON TEACHES ONE HOW TO RELAX’. Here, the concept ‘RELAX’ can be connected with the concept ‘YOGA CLASSES’. For (ii), along similar lines, the concept ‘SPORT’ may be most strongly activated through activation of a proposition in its encyclopaedic entry, namely, ‘MANY SPORTS ARE PLAYED OUTDOORS’. For (iii), after hearing the phrase ‘the fee’, most probably the concepts of ‘AEROBIC CLASSES’ and ‘YOGA CLASSES’ get weakly activated, and the final choice is made along similar lines to example (24).

Finally, let us look at examples (26)-(32), where the bridging reference is used to refer to something which may not be represented in the current scenario:

(26) Sorry, I couldn’t get here on time. The traffic was awful and it was nearly impossible to get into the car park.

(27) I assume Japanese society is very stable. The divorce rate is very low.

(28) A: Shall we go?
    B: The windows are still open.

(29) A: What time is it?
    B: The milkman has just come.

(30) A: Did your ski trip go well?
    B: The camera didn’t work properly.

(31) A: Can you give me a lift?
    B: The Japanese rice wine made me quite drunk, I’m sorry.

(32) A: I finished all my homework. Can I play my new computer game now, mummy?
B: I see your textbooks are still in the bag and the telly has been on quite a while. So, I don't believe you. Finish your homework first.

According to the scenario-based account, in order to assign reference in these examples, the hearer has to resort to secondary processing, since there is no slot for the bridging references in the current focus. Recall, however, that Sanford & Garrod do not offer any method for assigning reference efficiently when one has to resort to secondary processing. Relevance theory offers such a method, based on its criterion of consistency with the principle of relevance. Let me show how utterances such as (26) and (27) can be explained in this framework. In the case of (26) and (27), for the second part of the utterance to be optimally relevant, it must in normal circumstances be seen as giving some explanation for the event discussed in the first part. From this perspective, it is not difficult to activate an appropriate context and construct assumptions such as (36) and (37) to interpret (26) and (27) respectively:

(36) a. Heavy traffic might delay one's arrival.
    b. One might spend longer parking one's car in a busy car park.

(37) The high divorce rate might indicate social instability.

Notice, here, that whether the concepts 'TRAFFIC', 'CAR PARK' and 'DIVORCE RATE' were activated in some way before the second part of utterance is not the final criterion for success in reference assignment. As long as the overall interpretation is consistent with the principle of relevance, even if the concept was not activated previously, the extra effort required need not be significant, despite what Sanford & Garrod seem to suggest.
The other examples above can be explained along similar lines. They are all in 'question-answer' form; therefore, the speaker A in each example has a more or less definite expectation of how B's answer might be optimally relevant, which guides him towards an appropriate interpretation. In other words, in each of the examples (28) - (32), an optimally relevant reply for A is an answer of some sort to his question. Notice that in all these cases, B's answer is more or less indirect, so that A has to extend the context in looking for an appropriate interpretation. For example, in (29), A is asking the time, and B is not giving a direct answer such as 'a quarter past seven' for some reason. Suppose that the conversation took place one morning in winter, when it was completely dark, and therefore B could not read the clock. Instead, having heard the noise which B was sure that the milkman made, B was able to give the information that 'the milkman has just come.' Since A has a strong expectation that B will answer her question, this leads her to treat this utterance as an answer. This expectation then enables her to extend the context to include information such as 'the milkman usually comes around seven o'clock', which enables her to conclude that 'it is after seven o'clock', which is, of course, relevant information to her. And for B, this utterance is consistent with the principle of relevance, assuming that A was unable (or thought it unnecessary) to provide a more accurate answer.

Relevance theory can also offer an explanation of how the indirect answers in these examples can be consistent with the principle of relevance, in spite of the extra processing effort which they require. By giving these indirect answers, the speaker is offering not only a positive or negative answer, which can be easily inferred, but also an explanation why she is giving this answer. Thus, in example (28), the response 'the windows are still open' implies a negative answer to the question 'Shall we go?', given assumptions such as 'windows should be closed
before one leaves the house’ and ‘if windows are open, one cannot leave the house’. Even if the effort required to interpret this response is greater than that needed to interpret the direct answer, ‘no’, these assumptions are easily accessible, and the difference in processing effort should not be significant. Moreover, the contextual effects achieved by the indirect answer are obviously greater: in (28), B’s utterance not only gives a negative answer to A’s question, but also explains why the answer is negative. Hence, these indirect answers can well be optimally relevant, since the extra processing effort will be offset by extra contextual effects.

What is important here is that in each of these examples, it is quite possible for A not to have already activated the concept needed to interpret the bridging reference in B’s utterance, before she actually encounters it. According to Sanford & Garrod, if this is the case, A has to fail to assign reference first and then has to resort to secondary processing, in which the search domain is the whole knowledge-base. Recall that in Sanford & Garrod’s framework, there is no rule or principle to limit the possible candidate referents, except that the hearer has to change the scenario on the basis of the linguistic clues given in the second sentence. Accordingly, they do not offer an explanation of how an indirect answer such as B’s utterance in examples (28)-(32) should be related to the question, since they assume that if the hearer does not have slots ready for the incoming linguistic information, this means that the topic of discourse has changed. Hence, according to Sanford & Garrod’s account, it is quite possible for A to fail to identify the right referent among several candidates due to failure to select an appropriate scenario, or to relate several scenarios, when the relevance of the incoming information is discovered in several steps.
6. Summary

In this chapter, I discussed two different views about how and when bridging implicatures and the contextual assumptions required to achieve the resulting overall interpretations are constructed. One, held by Sanford & Garrod (1981), is that both bridging implicatures and contextual assumptions are accessed before the hearer encounters the bridging reference. The other, proposed by Sperber & Wilson (1986), is that ultimately, selection of the right referent for the bridging reference can only be done as part of the overall interpretation process, and that confirmation of whatever tentative choices have been previously made must wait till the whole interpretation has been constructed.

Sanford & Garrod provide a method which enables the hearer to have access to the necessary context for interpreting incoming utterances. According to their account, the human mind is organised in a situation-based way, each such unit being called a 'scenario'. A scenario, if chosen correctly at the outset of a discourse, will provide all the necessary contextual information to interpret incoming utterances, unless the topic of the discourse changes and a different scenario will be chosen. On the other hand, Sperber & Wilson provide a method which enables the hearer to access contextual assumptions which do not fall within a currently activated scenario. Relevance theory claims that the hearer is geared to search for an interpretation which is consistent with the principle of relevance, i.e. which provides adequate contextual effects with no unjustifiable processing effort, in a way the speaker could manifestly have foreseen. If the hearer's goal is set in this way, it is not difficult for him to access appropriate contexts in the whole knowledge-base, or even to construct assumptions, if required, which did not exist in his memory before, contrary to what Sanford & Garrod seem to assume.
It was argued that Sanford & Garrod's scenario-based account has crucial theoretical limitations. Furthermore, it was demonstrated that the central claims in Sanford & Garrod's scenario-based account were too strong. I challenged their claim that a single scenario should be able to provide the right referent for the bridging reference and the contextual assumptions required to interpret the utterance as a whole, as long as there is no change of the discourse topic: various examples discussed in this chapter demonstrated that (a) there are cases which require contextual assumptions which cannot be provided by the currently activated scenario itself; (b) there are cases of bridging which require more than one scenario simultaneously to select the right referent and the resulting overall interpretation. Also their claim that the inferences required to resolve the bridging reference and find the intended overall interpretation are generated in a forward manner proved to be inadequate to handle my examples, which are perfectly acceptable cases of bridging, though referring to an entity which cannot be inferred from the previous discourse.

It was demonstrated that relevance theory can provide solutions to Sanford & Garrod's problems. Unlike their scenario-based account, in the framework of relevance theory, it is quite legitimate that several candidate referents can be tested in parallel, with the one which gives quickest access to a context in which the utterance as a whole yields an acceptable overall interpretation being chosen. Also, in this framework, it is considered plausible that several scenarios can be simultaneously used to test candidate referents. Furthermore, in relevance theory, it is assumed that as long as the overall interpretation is consistent with the principle of relevance, even if the concept for the entity referred to by the bridging reference was not previously activated, the extra effort required need not be significant, contrary to what Sanford & Garrod claim. However, I should note that these assumptions
should be tested experimentally before we fully accept them.

What became clear in this chapter is that although situationally organised knowledge has an important role in facilitation of language processing, such a role is only partial and best utilised in combination with more idiosyncratic encyclopaedic knowledge to form assumptions rich enough to suit each individual situation. Then an important question is what constrains the indefinite range of possible assumptions? Recall that in Sanford & Garrod's scenario-based account, the mechanism of scenario activation (that only one scenario can be activated at one time and the rests become inaccessible at the same time) was considered to constrain inferences, by making some limited set of assumptions much more accessible and others more or less inaccessible. This chapter demonstrated that this idea is not adequate for various reasons. Relevance theory provides an alternative way of constraining them: the hearer's search for the intended interpretation is governed by the principle of relevance, which, in successful communication, precludes the possibility of assumptions being required which yield no contextual effects with processing effort totally wasted.

What follows from this is that if the speaker mistakenly formulates an utterance in a way that puts the hearer to unjustifiable processing effort, either because the resulting interpretation yields no contextual effect at all, or because the utterance provides more than one equally accessible and equally plausible interpretation, with no way of choosing between them, the hearer would be forced to make assumptions which were not intended, and the result would be either communication failure or a judgement of stylistic infelicity. In the next chapter, I will discuss the factors which affect hearers' judgements of stylistic infelicity and assess various accounts of and criteria for such judgements. Here, Sanford & Garrod's scenario-based
account, among others, will be tested further against new sets of examples.
1. Introduction

In the last two chapters, I have discussed two major factors which affect bridging reference assignment: accessibility of discourse entities and accessibility of contextual assumptions. I have argued that approaches to reference assignment which offer criteria solely based on one or other of these factors cannot satisfactorily explain the whole process of bridging reference assignment and the resulting interpretations. In this chapter, I would like to approach the issue from a different angle, by investigating how these two factors, perhaps together with other factors which I have not discussed so far, affect the acceptability and unacceptability of bridging reference. I believe that an adequate account of bridging reference assignment should indeed be able to identify correctly what makes some cases acceptable and others less so, and I will examine various accounts by testing them against sets of critical examples.

For instance, in the following examples, (1) and (2) appear to be felicitous, whereas the results of bridging in (3) and (4), which are parallel to (1) and (2), are to varying degrees unacceptable:

(1) John and Mary went to see Macbeth last night. The three witches were excellent.

(2) He moved to Ealing last year. The rent was incredibly cheap.

(3) John and Mary went to see a play last night. The three
witches were excellent.

(4) He stopped smoking suddenly. The rent was incredibly cheap.

Bridging assumptions for (3) and (4) might be the following (a warning: you may find (4’a) rather unexpected; but that is the way I intend it to be interpreted):

(3) a. The play John and Mary saw was Macbeth.
   b. Macbeth has parts for three witches.

(4’) a. There was accommodation for a non-smoker.
   b. He wanted the accommodation.
   c. The accommodation required payment of rent.

There have been a variety of hypotheses about why these differences in acceptability arise. Clark (Clark 1977a, b; Clark & Haviland 1977) mentions three factors: the shortness of the bridge (i.e. how many assumptions are needed to access the intended referent), the plausibility of the bridge (i.e. how likely the bridging assumptions are to be true), and the computability of the bridge (i.e. how easily identifiable the intended referent is). Erku & Gundel (1987) and Sidner (1983a, b) mention that the notion of sentence topic/focus might have a role to play in distinguishing acceptable from unacceptable cases. Sanford & Garrod (1981) would explain the differences in terms of scenarios: when the hearer’s mental scenario constructed on the basis of the first sentence does not contain the intended referent, the result must be infelicitous. Finally, many psychologists and text linguists consider the notion of ‘coherence’ to be of vital importance in judgements of acceptability/unacceptability of bridging and other reference assignment.

In this chapter, I will investigate how each of these
factors affects the acceptability and unacceptability of bridging reference. First, previous accounts, including those mentioned above, will be discussed. Second, each of the factors mentioned in these accounts will be examined in detail. The examples used in this section, like most of my previous ones, have more than one possible candidate referent, and hence, more than one resulting interpretation. Each account will be tested in terms of the following questions: (a) whether it can correctly choose the interpretation judged acceptable when only one such interpretation is available, and discard those judged unacceptable; (b) whether it can correctly choose the more acceptable interpretation when there is more than one acceptable interpretation available. It will be argued that none of the existing accounts seems adequate on its own. Finally, an alternative explanation for acceptability judgements, based on relevance theory (Sperber & Wilson 1986), will be discussed. As evidence to support my argument, the results of some psychological experiments will be cited when appropriate.

My hypothesis, following Wilson (1992), is that a hearer will find a given bridging reference stylistically infelicitous in the following conditions:

(i) when it is obvious that there is a better (i.e. more economical) way of achieving the intended effects;
(ii) when it is impossible for the hearer to decide what are the intended effects.

My claim is that, in both cases, the speaker is failing to achieve optimal relevance, either by asking the hearer to expend unjustifiable processing effort, or by failing to achieve adequate contextual effects. Given the definition of optimal relevance (adequate contextual effects, achieved for no unjustifiable effort), points (i) and (ii) above follow automatically from relevance theory. If my intuition is right, examples such as (3)
and (4) can be explained along these lines.

If I am right, it should follow that the way to increase the acceptability of an example such as (3) is to engineer a situation in which it is the most economical way of achieving the intended effects; and the way to increase the acceptability of an example such as (4) is to make more accessible the intended set of contextual assumptions, required to identify the intended set of contextual effects.

2. Previous Accounts

In this section, I will outline the salient features of some previous accounts of bridging reference.

2.1. Clark: the Given-New Contract

Clark (Clark 1977a, b; Clark & Haviland 1977) treats bridging implicatures (i.e. inferences drawn to introduce the referent of a bridging reference) as conversational implicatures in the Gricean sense. He says that a bridging implicature is drawn when Grice's Manner maxim is violated. In fact, he introduces a 'Maxim of Antecedence' as a subpart of the maxim of Manner, formulating it as follows:

**Maxim of Antecedence:**
- Try to construct your utterance such that the listener has one and only one direct antecedent for any given information and that it is the intended antecedent.

According to Clark, a bridging implicature is drawn, specifically, when the 'Maxim of Antecedence' is deliberately violated.

Clark further sets up, as a part of Grice's Cooperative Principle, a principle which is called the 'Given-New Contract':
Given-New Contract
Try to construct the given and the new information of each
utterance in context (a) so that the listener is able to
compute from memory the unique antecedent that was
intended for the given information, and (b) so that he will
not already have the new information attached to that
antecedent (Clark & Haviland ibid: 9)

Clark sees this contract as describing what a speaker has to do
in order to be cooperative in the Gricean sense.

As can be seen, Clark’s formulation of these rules is
heavily reliant on the generally rather loose notions of ‘given’
and ‘new’ information (see Prince 1981, for further discussion).
The notion of ‘given’ information is especially notorious. So,
before looking at Clark’s treatment of bridging reference more
closely, let us clarify what he means by ‘given’.

In the paper mentioned above, in which she surveys various
possible notions of givenness, Prince defines ‘givenness’ in
Clark’s sense as follows:

**Givenness:**
The speaker assumes that the hearer “knows”, assumes, or
can infer a particular thing (but is not necessarily
thinking about it) (Prince ibid: 220)

Prince further mentions the case of bridging reference, and
claims that for Clark and Haviland, ‘whether the hearer knows
the information directly for having been explicitly told it or
indirectly via inferencing (“bridging”) is immaterial’ (221). I do
not agree with this point. The reason is clear: it is crucial for
Clark and Haviland that bridging is an explicit violation of the
Manner maxim, and hence, the existence of the referent should
not be regarded as “given” prior to drawing the necessary
inference to identify it. Therefore, I would like to give my own
interpretation of Clark's notion of 'given' information here, and use this as a basis for my discussion:

**Clark’s ‘given’ information**

Conceptual entities (or combinations of conceptual entities) which the speaker assumes are already represented in a hearer's memory.

Let me explain why I reached this interpretation. The main reason is Clark's claim that in order for a hearer to draw a bridging implicature, the Maxim of Antecedence has to be violated. This means that the intended referent of the bridging reference should not already be in the hearer's memory: otherwise, the Maxim would not have been violated. If my interpretation is right, part of what Prince included in Clark's notion of 'givenness', namely 'the speaker . . . . can infer a particular thing', must be excluded, since in the case of bridging reference, according to Clark, the hearer has to construct a NEW assumption.

Assuming that the notion of 'given' information is clearer now, let us return to Clark's treatment of bridging reference, and consider what he says about the way the hearer finds the intended referent through bridging implicature. First, he draws two distinctions, between 'authorised' and 'unauthorised' inference, and between 'backward' and 'forward' inference, and suggests that only 'backward' inference can be authorised. By 'authorised' inference, Clark means an intended inference, and by 'unauthorised', an unintended one. To see what 'backward' and 'forward' inference are, let us look at Clark's example:

(5) I walked into the room. The chandeliers sparkled brightly.

Clark says that when we hear the phrase 'the room' in the first
sentence, we may begin imagining all sorts of things about this room, some necessary, but many others optional. These are ‘forward’ inferences. In contrast, after hearing ‘the chandeliers’, we are forced to make an inference, namely, a bridging implicature, to find its intended referent. This is called ‘backward’ inference. Clark claims that ‘both types of inferences occur, but only the latter types are fully determinate’ (Clark ibid: 420)

Thus, it is clear that Clark is only talking about ‘backward’ inference when he describes how the hearer chooses a particular bridging implicature. But, in principle, there may be many candidate implicatures. So the remaining question is how the hearer can exclude all other possible implicatures except the intended one. For example, in the case of (5), how can the hearer infer that the chandelier mentioned was the one in the room just mentioned, rather than the chandelier in Buckingham Palace? Here, Clark mentions two factors: the shortness and the plausibility of the bridge. He suggests that the hearer will choose the shortest possible route to finding the intended referent, using only assumptions which seem likely to be true:

In short, the listener takes as the intended implicature the one that requires the fewest assumptions, yet whose assumptions are all plausible given the listener’s knowledge of the speaker, the situation and facts about the world. (Clark 1977:420)

It is obvious that in order for the hearer to interpret ‘the chandelier’ in (5) as the one in Buckingham Palace, she would have to introduce several assumptions, unless she had already been told that the room just mentioned was in the Palace. By contrast, to arrive at the normal interpretation of (5), she needs to make only the following assumption:
There were chandeliers in the room about which the speaker was talking.

Finally, I will mention what Clark says about the acceptability and unacceptability of bridging reference. His view on this can be summarised as follows: the referent must be computable; if not, the result should be unacceptable. He looks at cases where (a) there is more than one equally accessible candidate referent and there is no clue to which is the right one, or where (b) the hearer does not have enough knowledge or skill to make appropriate bridging assumptions. The result in either case is failure to identify the intended referent; there is violation of the Given-New Contract due to the speaker’s negligence. The following are Clark’s own examples. (although (6) involves pronoun resolution rather than bridging reference):

(6) John and Bill entered the room. Suddenly he ran over to the plate on the floor and licked up all the dog food on it.

(7) The haystack was important because the cloth ripped.

Since (6) is straightforward, I will look at (7) here. This sentence was originally used in experiments reported in Bransford & McCarrell (1975). In (7), 'the cloth' in the second clause refers to the canopy of a parachute, but this is not known to the hearer. Clark claims that the utterance is unacceptable because the hearer does not have enough information on what it is about. He further suggests that if the speaker gives the hearer an appropriate discourse topic, such as 'a parachute' for (7), the hearer can compute the intended antecedent without difficulty.

Clark’s analysis of bridging can thus be summarised as follows: (1) bridging implicatures are drawn due to deliberate violation of Grice’s Maxim of Manner, or more specifically,
Clark's Maxim of Antecedence; (2) when the Maxim of Antecedence is deliberately violated, still the Given-New Contract (a part of Grice's Cooperative Principle) should not be breached; (3) accidental violation of the Given-New Contract, and in particular a violation of 'computability', will lead to an unacceptable utterance; (4) once the hearer starts bridging, she will take the shortest possible route, consisting of plausible assumptions, i.e. assumptions 'consistent with previous knowledge' (ibid: 420), which leads to successful reference assignment.

2.2. Sanford & Garrod: 'Scenario' - a Situational Model

Whereas Clark explains bridging in terms of contracts and maxims of communication, Sanford & Garrod (1981) take a more psychological view (see also Chapter 4 in this thesis). Following Minsky (1975), Schank (1977) and others, they propose a model of the mind in which knowledge is organised in a situation-based way, and each chunk provides a potential knowledge-base for reference resolution. For example, suppose a hearer comes across the following utterance:

(11) Fred was being questioned. He had been accused of murder. The lawyer was trying to prove his innocence. (Garrod & Sanford 1983)

According to Sanford & Garrod, he is going to interpret this using an 'In court' scenario, in which there is a slot for 'lawyer' which can be used to assign a referent to the NP 'the lawyer'. Their account is summarised in the following comment:

Essentially, this account supposes that discourse serves to trigger situational representations in memory (as in Minsky 1975). Entities that figure in these representations
can then be referred to easily, as though they were given (Sanford 1990: 518).

Since a more detailed outline of their account is given in Chapter 4, here I will repeat only their main proposals concerning bridging reference assignment. A scenario, according to Sanford & Garrod, is made up of two different components: explicit and implicit focus. Explicit focus contains entities explicitly mentioned in the utterance; implicit focus contains slots for entities which may play certain roles in the situation selected for interpretation of the utterance. So, for example, in the case of (11), the scenario to be selected is the 'in court' scenario, whose explicit focus might have entities such as 'Fred', and events such as 'being questioned', 'being accused' and 'murder', and whose implicit focus might contain slots for 'the lawyer', 'the judge', 'the jury' and possible actions taken by these people.

According to Sanford & Garrod, entities in implicit focus in a scenario play a major role in bridging reference assignment, and I would like to look at the nature of their implicit focus in more detail. I will consider specifically the question of how the contents of implicit focus are decided, since Sanford & Garrod's account seems to predict that only items that are represented in the hearer's implicit focus can be legitimately used in bridging reference.

More recently, Sanford & Garrod suggest that there must be some way of constraining the possible inferences to be made at any given time, and that here 'attentional factors' may play an important role (Garrod & Sanford 1990:467). By 'attentional factors', they mean mainly 'topicalisation' or 'focusing', i.e., the phenomenon in which some items of information received by a hearer become more salient than others. Often, more salient information is called the 'information focus' or 'topic' of a sentence/discourse (see Reinhart 1981, on discrepancies in the
Sanford & Garrod further suggest that there are two different types of focusing, as follows:

On the one hand, readers focus attention on particular individuals who constitute the topics or thematic subjects of the scene; but on the other, readers also focus attention in a somewhat different way on the roles afforded by the situations portrayed in the text. In either case this affects the reader's ability for rapid contextually appropriate interpretation (Garrod & Sanford ibid:478)

Sanford & Garrod call the former type of focusing 'entity-focusing', and the latter 'role-focusing'. This distinction is important for our discussion, because, according to Sanford & Garrod, role-focusing plays a crucial part in bridging reference assignment:

Entity focusing plays a major part in pronominal interpretation, whereas role focusing plays a major part in interpreting fuller definite descriptions and so helps the reader to anchor newly introduced entities to the scene or recover antecedents via their previously established roles in that scene (Garrod & Sanford ibid:478)

As we can see from this quotation, Sanford & Garrod are claiming that bridging reference assignment is possible if an appropriate situational role has been somehow established in the reader's mind, prior to actual reference assignment, through role-focusing.

However, this explanation raises some problems. For example, their description of crucial notions such as role-focusing is very vague. One of the important questions they leave unanswered concerning role-focusing is the following: how does
the reader/hearer decide what roles she actually picks out among all the possible candidate roles in a given situation? Sanford & Garrod use the following example to answer the question:

(12) Keith was giving a lecture in London. He was driving there overnight. The car/the engine had recently been overhauled. (Garrod & Sanford 1982)

Here, Sanford & Garrod claim that the verb ‘to drive’ should identify a situation establishing a role for the vehicle used. They mention other verbs such as ‘to buy’ (which establishes the role of money), ‘to carve’ (which establishes the role of a knife), and ‘to dress’ (which establishes the role of clothes) as the same types of verbs as ‘to drive’.

However, an obvious problem here is that the reader/hearer is not always given a verb which strongly implies a role slot for incoming bridging reference. As to the role of verbs, which Sanford & Garrod can comfortably handle since it is so restricted, Sanford himself gives a warning. Referring to experimental results reported in Singer (1979), which suggest that bridging inferences are not made until forced by the introduction of the bridging reference itself, in contradiction to Garrod & Sanford (1982), who claim that such inferences are made in advance, he concludes that when the instruments are part of the verb structure, there is certainly forward inference supported by scenarios, but otherwise, ‘there are no independent means for checking what might be in a scenario’ (Sanford 1990:518).

Thus, Sanford & Garrod’s scenario-based account, or more specifically, the idea that ‘role-focusing’ in prior texts will determine what is a possible bridging reference, has serious limitations. It seems to me that their basic assumptions that the inference involved is a mapping process between a referring
expression and a matching entity in a implicit focus, and that the control of inference is a largely top-down process through the focus system, are too strong. In fact, Sanford & Garrod tend to assume that 'forward inference' rather than 'backward inference' is the most natural inference process for a human brain, and therefore, cases which do not involve 'forward inference' are likely to be ignored in their account. However, since I believe that their basic intuition that situationally-organised knowledge plays a crucial role in inference is right, and also find it interesting to see how accurately an account which overwhelmingly supports 'forward inference' can explain the acceptability of bridging reference, I would like to include their account in our discussion. For the purpose of the discussion, though, I will assume that according to Sanford & Garrod, a hearer can choose only one scenario at a time, and that the most prototypical roles are included in the scenario. Further I assume that the hearer will find an utterance unacceptable when it is impossible to choose one particular scenario, or when she cannot find a matching role slot in the scenario she has already chosen which is necessary for interpreting the utterance.

2.3. Erku & Gundel, and Sidner: Focus-based Approach

In chapter 3, I have outlined the main proposals of Erku & Gundel (1987) and those of Sidner (1983a, b). Here, I will summarise their views on stylistic infelicity.

Let's start with Erku & Gundel. Their first claim concerning acceptability of bridging reference is that 'semantic' (or encyclopaedic) association between a candidate referent and a bridging reference is neither necessary nor sufficient to explain whether bridging cases are appropriate or not. They further suggest that the notion of relevance is crucial to explaining stylistic judgements in bridging. However, they do not
pursue their notion of 'relevance', and restrict themselves to a rather intuitive suggestion: that a relevance-based account 'should make crucial reference to the notion of “topic” or what a speech act is about' (543). Thus, their main discussion of stylistic appropriateness is based on the notion of 'topic'. Their view might be summarised as follows: the most salient, or accessible, discourse entity (i.e. the ‘topic’ of the sentence in their terms, or ‘an item ‘in focus’ in Sidner's terms) in the previous sentence must be the preferred candidate referent for bridging reference. The following example illustrates the point:

(8) We stopped for drinks at the New York Hilton before going to the Thai restaurant. The waitress was from Bangkok.

In (8), according to Erku & Gundel, the most likely candidate referent for the bridging reference 'the waitress' is 'the New York Hilton', which is the topic of the first sentence. Therefore, 'the waitress' in the second sentence should be interpreted as the waitress at the Hilton, despite the obvious semantic/encyclopaedic association between 'Thai restaurant' and 'waitress from Bangkok.'

The next example illustrates Erku & Gundel's view on how stylistic infelicity occurs:

(9) We stopped for drinks at the Hilton before going to the zoo. The baby orangutan was really cute.

Here they claim that the discourse is judged to be somewhat odd, even though a zoo is most certainly a good candidate for place where 'the orangutan' might come from. They offer the following as an explanation: after hearing the first sentence, the hearer is expecting to hear something about drinking at the Hilton, not about the zoo; therefore, the information about an
orangutan does not fit the hearer's expectation.

Thus, Erku & Gundel seem to suggest that only one factor affects stylistic appropriateness: a bridging reference should refer to the topic of the previous sentence (or focused item); otherwise, the utterance should be judged to be infelicitous.

Sidner's view of stylistic infelicity is slightly different from Erku & Gundel's, although the notion of 'focus', which is an equivalent of their notion of 'topic', has a role to play. As shown in Chapter 3, her 'expected focus algorithm' sets an order for candidate referents to be tested. Like Erku & Gundel's notion of 'topic', Sidner's notion of 'focus', which plays an important role in her account of reference assignment in general, can be seen as a crucial factor affecting stylistic appropriateness. However, there are some crucial differences between two views: unlike Erku & Gundel, Sidner predicts neither that there is only one focus in a sentence, nor that when there is only one focus, it has to be the referent. In other words, Sidner claims that the expected focus can be rejected on the basis of general knowledge. The following example illustrates the point:

(10) Cathy wants to have a big graduation party at her house. She cleaned it up so that there would be room for everyone.

In (10), the expected focus is 'a big graduation party' and it should be tested first as the referent of the referring expression 'it' in the second sentence. However, since the idea that one can clean up a graduation party is incompatible with general knowledge, this candidate has to be rejected. Following the rejection of the expected focus, Sidner claims, each alternate default focus should be tested in turn, until one is found which is not rejected on the basis of general knowledge.
Thus, Sidner seems to suggest two factors which affect stylistic appropriateness of bridging cases: (a) an accessibility factor (i.e. the most accessible discourse entity should be tested first); (b) a plausibility factor (i.e. the resulting interpretation must be plausible (in the sense that it is compatible with general knowledge).

2.4. Hobbs and Sanders et al.: Coherence-based Approach

In the last twenty years, an approach to the study of discourse has been developed in which the notion of coherence has been proposed as the most important factor in discourse comprehension. There have been several variants of this approach (see Hovy & Maier 1994), but most of them share roughly the following view of coherence: an utterance is judged to be coherent if there is some rhetorical or semantic relation that holds between the utterance and (some part of) the previous discourse.

The major goal of studies of coherence so far has been to identify such relations and to form appropriate taxonomies. There have been numerous attempts to identify such relations (see Hovy & Maier ibid.), which I call here 'coherence relations', following Hobbs (1978) and Sanders et al (1992). For example, Mann & Thompson (1986) propose the following fifteen:

Solutionhood / Evidence / Justification / Motivation / Reason / Sequence / Enablement / Elaboration / Restatement / Condition / Circumstance / Cause / Concession / Background / Thesis-Antithesis

Other researchers propose more or fewer relations. So far, none of those who offer taxonomies of such relations has claimed that their taxonomy is complete.
Attempts at such taxonomies have been largely descriptive, and it is striking that few of them have seriously addressed the psychological plausibility of coherence relations, or even of the notion of coherence itself. As a result, there has been little discussion about how an appropriate coherence relation can be successfully computed by actual hearers, apart from intuitive suggestions such as that connectives and world knowledge can play a useful role. In fact, there have been very few studies which discuss any psychological aspect of coherence relations, of which Dahlgren (1989), Grosz & Sidner (1986), and Sanders et al. (1992) seem fruitful. I will discuss Sanders et al.'s proposal about how to identify an appropriate coherence relation later in this section.

The most substantial claim about reference assignment offered by the coherence-based approach is the following: the recognition of certain coherence relations in a discourse, automatically solves the problem of reference assignment. I would like to pursue the implications of this approach for the acceptability and unacceptability of bridging reference. The main paper I will discuss in this chapter is Hobbs (1979), in which he shows how the referring expressions in the following example can be resolved:

(11) John can open Bill's safe. He knows the combination.

Hobbs claims that the two sentences should be understood as exhibiting the Elaboration relation, which is defined as follows:

Elaboration
S1 is an Elaboration of S0 if a proposition P follows from the assertions of both S0 and S1 (but S1 contains a property of one of the elements of P that is not in S0)
[S1 refers to the sentential unit currently being processed;
S0 to the previous one.]
Only if this relation is recognised can (11) be accepted as coherent. In order to recognise it, the hearer must, first, have access to such items of world knowledge as that dialling the combination of a safe causes it to open, and second, resolve the reference of ‘He’ to refer to John rather than Bill. In this way, on Hobbs’s account, reference resolution is a by-product of the search for coherence, much as, in the relevance-theoretic account of Sperber & Wilson (1986), reference resolution is a by-product of the search for relevance.

This claim is significant in the sense that it directly opposes the widely held view that coreference is sufficient for coherence (typically, Kintsch & van Dijk 1978). In general, Hobbs simply assumes that this view is wrong, but he gives one example which supports his view that coherence relations are also required:

(12) John took a train from Paris to Istanbul. He likes spinach.

He says that this discourse is incoherent even though ‘he’ can refer only to John. The reason is that no coherence relation is satisfied as a result of this assignment of reference: coreference alone - or coreference and factual plausibility alone - are insufficient for coherence.

Let me summarise Hobbs’s view on reference assignment: (a) assignment of reference is achieved in the course of identifying an appropriate coherence relation on the basis of general knowledge; (b) an utterance will be judged unacceptable when no coherence relation can be assigned between it and another segment of discourse, even if, as in (12), successful reference assignment is apparently achieved. Unfortunately, Hobbs’s description of the way an
appropriate coherence relation can be identified is not detailed enough to be fully usable or testable. Therefore, I will supplement Hobbs with Sanders et al.’s proposal about psychologically plausible identification of coherence relations, to which I will now turn.

Sanders et al. share a similar view to other researchers about how to define coherence relations. However, their approach is different from others in that they explicitly pursue a psychologically plausible account of coherence relations. Their basic assumptions are as follows: (a) the set of coherence relations is ordered in terms of accessibility; (b) readers use their knowledge of a few cognitively basic concepts to infer coherence relations. On the basis of these assumptions, Sanders et al. propose a taxonomy which classifies coherence relations in terms of cognitively salient primitives such as the following:

The type of relation: either causal or additive
The source of the relation: either pragmatic or semantic (a relation is semantic if the discourse segments are related because of their propositional content; it is pragmatic if it involves the illocutionary meaning of one or both of the segments)
The order of segments: whether P and Q (the propositions mentioned in the definition of the relation) correspond to S1 and S2 (the segments in the discourse) [basic order] or not [non-basic order]
The polarity of the relation: whether one of the segments is negative [either S1 and not-S2, or not-S1 and S2] or not

These four primitives are considered to satisfy their ‘relational criterion’:
Relational criterion

A property of a coherence relation satisfies the relational criterion if it concerns the informational surplus that the coherence relation adds to the interpretation of the discourse segments in isolation (5).

They add that the meaning of the segments is also important, since it must be compatible with the coherence relation.

The four primitives mentioned above not only classify coherence relations, but also order them in terms of accessibility. According to Sanders et al., a given coherence relation is characterised by the four primitives. Therefore, the hearer’s task in determining a coherence relation is to ask the following four questions: is it causal or additive?; is its source semantic or pragmatic?; does it have basic or non-basic order?; is it positive or negative? Sanders et al. claim that these questions are asked strictly in this order. It is assumed that for each primitive, one feature is more accessible than the other: features such as ‘causal’, ‘semantic’, ‘basic order’ and ‘positive’ are more accessible than ‘additive’, ‘pragmatic’, ‘non-basic order’ and ‘negative’. I will use the term ‘plus features’ for those which are the more accessible and ‘minus features’ for those which are less accessible, in order to distinguish the two types. Hence, if there is a coherence relation which is characterised by all four plus features, it should be the most accessible coherence relation overall. Indeed, according to Sanders et al.’s taxonomy, such a relation exists: they call it the ‘cause-consequence’ relation. Table 1 shows Sanders et al.’s taxonomy of coherence relations. By contrast, the relation ‘consequence-cause’ is less accessible, since it has one minus feature, namely, ‘non-basic order’.

204
### Overview of the Taxonomy and Prototypical Relations

<table>
<thead>
<tr>
<th>Basic Operation</th>
<th>Source of Coherence</th>
<th>Order</th>
<th>Polarity</th>
<th>Class</th>
<th>Relation</th>
</tr>
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<tr>
<td>Causal</td>
<td>Semantic Basic</td>
<td>Positive</td>
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<tr>
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<td>Negative</td>
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</tr>
<tr>
<td>Causal</td>
<td>Semantic Nonbasic</td>
<td>Positive</td>
<td>3</td>
<td>3</td>
<td>Consequence-cause</td>
</tr>
<tr>
<td>Causal</td>
<td>Semantic Nonbasic</td>
<td>Negative</td>
<td>4</td>
<td>4</td>
<td>Contrastive consequence-cause</td>
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<td>Positive</td>
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<td>5a</td>
<td>Argument-claim</td>
</tr>
<tr>
<td></td>
<td></td>
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<td>5b</td>
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<td>Instrument-goal</td>
</tr>
<tr>
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<td></td>
<td>5c</td>
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<td>Condition-consequence</td>
</tr>
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</tr>
<tr>
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<td>Positive</td>
<td>7a</td>
<td>7a</td>
<td>Claim-argument</td>
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<td>Goal-instrument</td>
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<td>7c</td>
<td>7c</td>
<td>Consequence-condition</td>
</tr>
<tr>
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<td>Pragmatic Nonbasic</td>
<td>Negative</td>
<td>8</td>
<td>8</td>
<td>Contrastive claim-argument</td>
</tr>
<tr>
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<td>Semantic -</td>
<td>Positive</td>
<td>9</td>
<td>9</td>
<td>List</td>
</tr>
<tr>
<td>Additive</td>
<td>Semantic -</td>
<td>Negative</td>
<td>10a</td>
<td>10a</td>
<td>Exception</td>
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<td>10b</td>
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</tr>
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<td>Positive</td>
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<td>Enumeration</td>
</tr>
<tr>
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<td>Negative</td>
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<th>Relation</th>
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<td>Concession</td>
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Table 1. Overview of the Taxonomy and Prototypical Relations (Sanders et al. 1992:11)

In summary, Sanders et al. propose the following: (a) the identification of a coherence relation is achieved through its analysis in terms of four cognitive primitives - type of relation, source of relation, order of segments, and polarity of relation; (b) each primitive offers two distinct features from which an appropriate one should be chosen to characterise a coherence relation; (c) the two features differ in their accessibility, which in turn affects the overall accessibility of a coherence relation.
3. Truth-based Criteria: Clark and Sanford & Garrod

In the next two sections, I will examine the various criteria for acceptability of bridging sketched above. In section 3, I will discuss Clark and Sanford & Garrod, whose accounts of acceptability of bridging are mainly based on judgements of factual plausibility. Although there are some crucial differences between these two approaches, both invoke what I will call ‘truth-based criteria’. Clark believes that three factors affect acceptability of bridging reference: plausibility, shortness of the bridge and computability of the bridge. I will compare Clark’s approach with Sanford & Garrod’s in terms of these three notions.

In section 4, I will discuss two other approaches which suggest additional factors affecting acceptability of bridging. On the one hand, there are those, like Sidner, who invoke a notion of ‘focus’; on the other, there are those, like Hobbs, who invoke coherence relations.8

Each account will be tested against various examples of bridging used in my questionnaires. I have carried out three questionnaires, which I will call Questionnaires A, B and C. Questionnaire A was to test acceptability judgements, and included instances such as our examples (3) and (4). The subjects, 13 students at UCL, were asked to read short passages and choose one point on a seven-point scale of acceptability for... 

8 Although Sanford & Garrod also suggest that ‘focusing’ may play an important role in constraining candidate referents, as illustrated in 2.2., they do not give any detailed description of how hearers can actually use it to determine degrees of acceptability for alternative interpretations. Therefore, I assume that for Sanford & Garrod, ‘focusing’ has relatively less importance in this domain than the criterion of factual plausibility. For this reason, I will not include their notion of ‘focusing’ here as an additional factor affecting acceptability of bridging. (Compare it with Sidner’s notion of ‘focus’, which is considered to be at least as important as her truth-based criterion.)
each instance. Questionnaires B and C were to test the choice between two alternative candidate referents. For Questionnaire B, 40 subjects, who were staff and students at the University of London, were asked to read short passages and to answer questions which basically ask which of the two candidates is the intended referent. For Questionnaire C, 24 subjects, who were first year linguistics students, were asked to do a similar task to the one in Questionnaire B. Further details of these questionnaires are given in the Appendix.

3.1. Plausibility

It is important to notice that when plausibility of bridging reference is discussed, there are two different ways of understanding the notion. The first is to claim that the bridging assumption must be plausibly inferable by someone who has only heard the first part of the utterance: in other words, the bridging assumption should be regarded as likely to be true at that point. The second is to define a bridging assumption as plausible if the audience would be likely to accept it as true given that they were told it, or given that the second part of the utterance contained a bridging reference that required it: in other words, it should be consistent with the audience's existing assumptions, however unlikely they might have thought it beforehand. The first is roughly equivalent to the notion used in Sanford & Garrod's scenario-based account, and the second to the notion used by Clark and Sidner.

According to the first definition, the bridging assumption required in (13) is plausible, but not the one in (14):

(13) John dressed the baby. The clothes were made of wool.
(14) John went to see a play. The three witches were excellent.
Having heard that John dressed the baby, it is plausible to infer that the baby had some clothes put on. However, having heard that John went to see a play, it is not plausible to infer that the play had three witches in it. Similarly, the following examples should be acceptable, and the bridging assumptions should be plausible in the first sense we are considering:

(15) I went to a restaurant. The waiters smiled.
(15') There were waiters in the restaurant that the speaker went to.

(16) I went to a restaurant. The diners smiled.
(16') There were diners in the restaurant that the speaker went to.

Both (15') and (16') are plausible by the first definition, because they are plausibly inferable from the first part of (15) and (16) respectively.

However, this notion of plausibility is inadequate as it stands to yield an account of acceptability of bridging reference. Consider (17):

(17) I went into a restaurant. Both the waiters smiled.

The bridging assumptions for (17) might be:

(17') There were 2 waiters in the restaurant to which the speaker went.

(17) is a perfectly acceptable utterance for everyone. The question is whether the first definition of plausibility, and the resulting criterion of acceptability, can explain this example. For this to be so, (17') has to be inferable from the first part of
(17). If we claim that (17') is NOT inferable from the first part of (17), we have to conclude that the first criterion cannot handle cases such as (17). On the other hand, if we claim that (17') is in fact inferable from the first part of (17), in the same way as (15') is inferable from the first part of (15), then we have to explain the difference between (17) and (18):

(18) ?I went into a restaurant. Both the diners smiled.

(17) and (18) look very similar, but whereas (17) is perfectly acceptable, (18) is much less so. We need to explain why this is the case.

The reason seems to lie in judgements of the plausibility of the bridging assumption required for (18):

(18') There were 2 diners in the restaurant that the speaker went to.

(18') seems less plausible than (17'). To account for these differences in acceptability, we must therefore allow for degrees of plausibility, and claim, for example, that the more likely the bridging assumption is to be true, the more acceptable the bridging reference will be. Notice that this is not the definition of plausibility proposed by Clark and Sidner, who treat an assumption as plausible if it is merely consistent with our background knowledge (Clark 1977: 420). An assumption may be plausible in this sense even if there is virtually no evidence for it. Hence, the notion of plausibility needs to be developed and clarified if it is to play a useful role in an account of bridging reference.

Moreover, this first notion of plausibility, and the resulting criterion of acceptability, cannot handle the following examples, where the first part of utterance does not enable the hearer to infer the required bridging assumption:
(19) John was having a date with Jane. The coffee spilled over his trousers.
(20) Kate was shopping in Selfridges. The sushi looked delicious.
(21) I went to see a film. The dinosaurs looked real.
(22) I went to see a musical. The phantom seemed to have a cold.

(19') John was drinking coffee during the date with Jane.
(20') Kate saw sushi at Selfridges.
(21') a. The film the speaker saw was 'Jurassic Park'.
   b. There were dinosaurs in 'Jurassic Park'.
(22') a. The musical the speaker saw was 'The Phantom of the Opera'.
   b. 'The Phantom of the Opera' has a part for a phantom.

All these examples were judged acceptable in Questionnaire A. However, the bridging assumptions are not plausible in the first sense being discussed here: the hearer cannot plausibly infer the existence of the intended referent after hearing the first part of the utterances; they are, of course, plausible in Clark's (and Sidner's) weak sense - i.e. consistent with the context. In passing, I would like to suggest that (19') and (20') are likely to be accepted as true after hearing the second part of the utterances, and that (21) and (22) are acceptable because of the high accessibility of assumptions (21'b) and (22'b) in our general knowledge (at least at the time when this chapter was written). I will return to these points below.

Now let us consider the second notion of plausibility and the resulting criterion of acceptability: that a bridging assumption is plausible if the audience would be likely to accept it as true given that they were told it, or given that the second
part of the utterance contained a bridging reference that required it. This coincides much more with Clark and Sidner's weak sense of plausibility - i.e. consistency with what is known or believed. According to this criterion, not only (11) and (13), but also the following examples, should be acceptable:

(23) John dressed the baby. The sunbonnet was little too small.
(24) I went into a restaurant. The chandeliers sparkled brightly.

And indeed they are. However, this notion of plausibility also has its limitations, Consider (17) and (18) again:

(17) I went into a restaurant. Both the waiters smiled.
(18) I went into a restaurant. Both the diners smiled.

As noted earlier, (18) seems less acceptable than (17). However, a criterion based on the second notion of plausibility cannot explain the difference between them. By this second criterion, both (17) and (18) should be acceptable because the hearer is likely to accept them as being true: and there seems no obvious room for a notion of degrees of plausibility (and hence acceptability) here. I will return to the notion of plausibility in the section on computability below.

3.2. Shortness of the Bridge

Let us now consider Clark's notion of shortness. First, I should point out that Clark's notion of 'shortness' is a relative one. He is claiming that the chain of bridging assumptions required to access a referent should be the shortest among those which give access to the intended referent. What follows from this claim is that the hearer has to go on making
assumptions until she finds the intended referent regardless of how long the resulting bridge is. There may be a general preference for a shorter bridge, i.e. a less effort-consuming inferential process, in some absolute sense. This is, in fact, what I am more concerned with and will discuss later in this chapter. However, Clark does not mention this kind of ‘shortness’, and hence apparently cannot explain the difference between (1) and (3):

(1) John and Mary went to see Macbeth last night. The three witches were excellent.
(3) John and Mary went to see a play last night. The three witches were excellent.

The point being that, however long the bridge required for (3), as long as it is the shortest route to the intended referent for that utterance, it will pass Clark’s ‘shortness’ test. Hence, Clark’s notion of shortness is inadequate as it stands.

Next, let us look at how the bridging assumptions are counted. Clark offers no suggestions here. Consider the following example:

(25) John went to a Japanese restaurant. The bill was surprisingly reasonable.

The bridging assumptions for (25) might be something like (25'):

(25') a. John had a meal in the Japanese restaurant.
   b. The cost of the meal was shown in a bill.

Example (25) raises an interesting question: how does the hearer access the concept ‘bill’? There are two possibilities: (a) the concept ‘bill’ is directly accessible from something like a ‘restaurant’ scenario (see Sanford & Garrod 1981); (2) it is not
directly accessible but is indirectly accessible through another concept, namely, the concept of ‘meal’. If we take the second view, we have to accept that there are two steps needed to access the concept ‘bill’, and that the bridge is longer than that of, for example, (26), where the concept of ‘meal’ is directly accessible via the concept of ‘restaurant’:

(26) John went to a Japanese restaurant yesterday. The meal was excellent.

Let us see if a scenario-based account along the lines of Sanford & Garrod can offer some way of counting bridging assumptions. I could not find any specific comment on the matter in Sanford & Garrod’s own work, but Walker and Yekovich (1987) offer some suggestions in their script-based account. They suggest that there are two different types of concepts in each script: central and peripheral. Central concepts have connections to many other concepts in the structure by virtue of their associative relevance to much of the information in the script; they are thus available as antecedents regardless of whether they are present or absent in the discourse. For example, in an ‘eating in a restaurant’ script, a large proportion of the activity centres around the table and the meal, so ‘table’ and ‘meal’ are important or central concepts in the script. In contrast, peripheral concepts have fewer connections to other concepts in the script because their contribution to the completion of the activity is less important; as a result, their availability as antecedents depends on textual factors: i.e. they are more accessible when mentioned explicitly than when not mentioned in the previous discourse. Examples of peripheral concepts in the ‘eating in a restaurant’ script include ‘hostess’, ‘salt and pepper’, and ‘cocktails’.

Walker and Yekovich carried out several experiments to confirm their hypothesis. In one, subjects were asked to read a
passage about familiar topics, such as Going to a Restaurant, Going to the Doctor, Applying to College, etc. For each passage, there were six noun concepts (three central, three peripheral). For each central and peripheral noun, one sentence was constructed in which the noun was preceded by the definite modifier 'the', and the noun phrase served as the subject of the sentence. For each anaphoric sentence, a set of three antecedents was constructed, corresponding to three stylistic conditions: Explicit, Implied, No Referent. In the Explicit condition, the antecedent sentence mentioned the scripted concept in a definite noun phrase in object position. In the Implied condition, the object was deleted, leaving an unfilled case slot for the verb. Care was taken to use verbs which invited the case slot to be filled. In the No Referent condition, the antecedent sentence was constructed to fit the current sequence of actions, but no mention or implication of the anaphor occurred. The following is a set of antecedent sentences followed by the same anaphoric sentence 'The table was near the window':

(a) The hostess seated Jack and Chris at the table. The table was near the window. [Explicit]
(b) The hostess seated Jack and Chris. The table was near the window. [Implied]
(c) Jack and Chris walked into the dining room. The table was near the window. [No referent]

They measured reading times for the anaphoric sentences. The results confirmed their hypothesis: for central concepts, there was no noticeable difference in reading time between Explicit, Implied and No Referent condition; for peripheral concepts, there was a significant difference in reading time, with the following order: Explicit $<$ Implied $<$ No referent condition.

Walker and Yekovich's experiment gives us a certain
insight into the hearer's judgement of the length of the bridge. One possible implication is that central concepts might be accessed in one step whereas peripheral ones require more. However, their basic assumption also raises a crucial problem, which is in fact shared by Sanford and Garrod. It is assumed, in their framework, that scripts or scenarios are relatively fixed mental models, with fixed stereotypical roles and entities. For example, they assume that in the 'eating in a restaurant' script, concepts such as 'table' and 'meal' are always more accessible than concepts such as 'hostess' and 'salt and pepper'. I suppose that in their framework, the concept 'bill' might be peripheral, compared with the centrality of the concept 'meal', and hence the concept 'bill' will be less accessible than 'meal'. The problem here is that this is not always the case. Consider (27), for instance:

(27) John went to a Japanese restaurant yesterday. He would never enjoy a meal if it cost more than 15 pounds, you know. He enjoyed the meal, because the bill was reasonable.

In (27), even though the 'eating in a restaurant' script/scenario is operating here, no one would deny that the concept 'bill' is highly accessible. An obvious reason for this is that apart from script/scenario-based information, there is almost always other contextual information available to a hearer in interpreting a discourse. In (27), the second sentence, which describes John's character, gives extra contextual information. Furthermore, even when this information is not explicitly mentioned in the discourse, if the hearer knows John's character, the assumption explicitly stated in the second sentence in (27) may be available to him, and thus, the concept 'bill' will be equally highly accessible.

Example (27) demonstrates that the accessibility of
concepts determined by a script/scenario changes radically
depending on the other contextual assumptions available. Hence,
it seems reasonable to conclude that the length of the bridge,
and the accessibility of candidate referents, cannot be measured
in absolute terms. In other words, the length of the bridge can be
affected by the availability of contextual assumptions which are
used, and perhaps required, in interpreting an utterance.

3.3. Computability of the Bridge

Let us look at what Clark says about the computability of
the bridge:

The most fundamental requirement of all is that the
listener must be assumed to have sufficient knowledge and
skill to be able to compute the intended antecedent. ......
when [the Maxim of Antecedence] is violated, and, say,
bridging is required, the speaker must be confident that
the listener has the information from which he can build a
bridge to the intended antecedent and that he has the skill
to do so. Whether the intended antecedent is computable or
not will depend on all sorts of factors - the listener’s
beliefs, his sophistication in computing bridges (which
children, for example, may lack), and the gap to be bridged
- and these must all be judged by the speaker.
(Clark & Haviland 1977: 9)

In this quotation, Clark mentions three factors which affect the
speaker’s computation of the bridge: plausibility, contextual
information (‘the listener’s beliefs’), and the shortness of the
bridge (‘the gap to be bridged’). Elsewhere, as I noted previously,
Clark elaborates on the second factor, namely, the presence or
absence of the required contextual information:
sequences can be judged unacceptable because they violate the requirement of computability. These violations arise when the listener does not have the information necessary for computing the intended antecedent (ibid: 17).

His examples to illustrate this are (6) and (7), repeated below:

(6) John and Bill entered the room. Suddenly he ran over to the plate on the floor and licked up all the dog food on it.

(7) The haystack was important because the cloth ripped.

Clark explains the unacceptability of these examples as follows: the second sentence of (6) is unacceptable because it lacks a unique antecedent for ‘he’; (7) is unacceptable because the listener does not have enough information to compute the intended antecedent. (As noted earlier, the intended indirect antecedent of ‘the cloth’ is the canopy of a parachute.)

Thus, Clark suggests three factors which might affect computability of bridging: the plausibility of the bridge, the shortness of the bridge, and the presence (or absence) of the required contextual information. Of these, the most crucial seems to me the last one, and I agree with Clark on this particular point: there is no way that a hearer can find the intended referent when there is not enough information to do so. Notice that our example (4) falls into the same category:

(4) He stopped smoking suddenly. The rent was incredibly cheap.

(4) will generally be found unacceptable because it does not make sense as it stands. However, if an extra sentence is added at the beginning of this example, namely, ‘There was
accommodation for a non-smoker’, it becomes acceptable. In a relevance-theoretic account, we might describe (4) as making it impossible for the hearer to decide what the intended effects are. The way to increase the acceptability of such examples is to make more accessible the intended set of contextual assumptions, required to identify the intended set of contextual effects.

Although I agree with Clark on this point, I do not agree with all of his suggestions. For example, he suggests that the plausibility and shortness of the bridge are important factors in singling out the intended antecedent, and that if these two factors do not single out a unique antecedent, the utterance will be unacceptable. I would like to argue that this is not so.

The following examples are cases in point. These are perfectly acceptable, although there is more than one equally accessible candidate referent (which goes against Clark’s shortness test), and the required bridging assumptions for each interpretation are equally plausible (which goes against Clark’s plausibility test):

(28) I moved from St. John’s Wood to Brixton. The rent was less expensive.

(29) I left England for Italy. The weather is better.

Bridging assumptions for these examples might be:

(28’) a. One pays rent in St. John’s Wood.
   b. One pays rent in Brixton.

(29’) a. There is weather of some sort in England.
   b. There is weather of some sort in Italy.

The resulting possible interpretations for (28) might be:
(30) a. The rent in St. John's Wood is less expensive (than in Brixton).
    b. The rent in Brixton is less expensive (than in St. John's Wood).

Similarly, for (29):

(31) a. The weather in England is better (than in Italy).
    b. The weather in Italy is better (than in England).

In each case, the two bridging assumptions seem equally plausible (in the sense that they are equally compatible with existing assumptions) and equally accessible. Hence, for Clark, it should be impossible to choose the right referent for the bridging reference in these examples. In fact, hearers can choose the right referent: there is clearly a preferred interpretation for examples (28) and (29), namely (30b) and (31b). This needs to be explained.

There may be a way to rescue Clark, if we extend his notion of plausibility to cover judgements of the plausibility of the overall interpretation of an utterance. In fact, Clark suggests some ways of eliminating unintended antecedents (Clark & Haviland 1977: 17), one of which seems to include judgements of the plausibility ('semantic considerations' is the phrase they use) of the resulting overall interpretation. His examples are the following:

(32) The car rolled toward the telephone pole, and it hit it.
(33) The car rolled toward the telephone pole, and it stopped it.

According to Clark, the first 'it' in (32) must refer to 'the car' and the second, to 'the telephone pole'; in (31), the first 'it'
must refer to 'the telephone pole' and the second, to 'the car'. Here it is clear that for Clark, 'semantic considerations' must include the encyclopaedic knowledge that when a car rolls towards a telephone pole, the car may hit the pole and be stopped as a result, etc.

Thus, let us suppose that Clark also has in mind the plausibility of the overall result of reference assignment, and allows general knowledge to eliminate one of the two possible candidate referents in (28) and (29). There is then a further problem: in order to eliminate one of the candidate referents, Clark’s original notion of plausibility, i.e. consistency with existing assumptions, as we have seen, appears to be too weak, since both overall interpretations for (28) and (29) could in principle be accepted as true (as will be demonstrated below). Hence, to deal with these examples, one would have to introduce a stronger version of the notion, i.e. likelihood of being true, and make the claim that the most plausible overall interpretation is chosen. Then, if you compare (30a) and (30b), and (31a) and (31b), in terms of which of the two is more likely to be true, (28b) and (29b) are definitely more plausible, which coincides with our preferred interpretations of (28) and (29). So it seems that judgements of overall plausibility, i.e. judgements of relative likelihood of being true, are reliable enough so far.

However, there are cases which even the stronger notion of plausibility cannot handle. Consider the following:

(34) I moved from Brixton to St. John's Wood. The rent was less expensive.
(35) I left Italy for England. The weather is better.

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9 One can imagine scenarios where even Clark's own examples (32) and (33) above would be differently understood, or would at least have a more and a less plausible interpretation - e.g. if a load of telephone poles is being transported on a lorry, and one escapes and rolls towards a following car, (33) could have either of two interpretations.
These are parallel examples to (28) and (29), with the position of the NPs in the first sentence being reversed. The bridging assumptions for (34) and (35) are the same as for (28) and (29). But notice that the preferred interpretation for (34) is now (30a), and the preferred interpretation for (35) is (31a). These preferred interpretations clearly go against judgements of the relative likelihood of being true: in other words, the stronger notion of plausibility makes the wrong prediction. Here, Clark apparently cannot offer any explanation.

Now let us look at what Sanford & Garrod can add to our discussion of computability. First, remember that their notion of plausibility rules out apparently acceptable cases such as the following:

(36) I liked my friend's new house. The swimming pool/sauna was very relaxing.

Thus, in general, Sanford & Garrod's notion of plausibility and the resulting criterion of acceptability (the bridging assumptions must be plausibly inferable by someone who has only heard the first part of the utterance, seems far too strong.

Next, let us see if Sanford & Garrod's scenario-based account can handle cases like (28) and (29), where there is more than one candidate referent. They discuss briefly some cases of pronoun resolution where there is more than one candidate referent, e.g. the following:

(37) Give the monkeys the bananas, although they are not ripe, because they are hungry.
(38) Simon lent money to Jim because he needed it.
(39) Simon lent money to Jim because he was generous.

They say that the assignment of the two 'they' references in
(37) depends upon our knowledge of monkeys and bananas. Similarly, they say that 'he' in (38) and (39) receives different reference assignments, and that this can only be done by working out the implications associated with 'lending' and 'being generous'. They also suggest that in terms of the scenario-based account, an adequate pronominal assignment must lead to a representation in which the actions of the entity described by the pronoun fit the role specification of the tentative antecedent.

Thus, it seems that when there is more than one candidate antecedent, Sanford & Garrod use the weak notion of plausibility of the resulting overall interpretation, namely, consistency with existing assumptions. This will lead to the same problems as in Clark's account. The weak notion of plausibility can deal with cases where there is more than one candidate, hence, more than one resulting interpretation, one of which is a contradiction, or would not conceivably be accepted as true. However, when there is no obvious contradiction in either of the two interpretations, the weak notion of plausibility does not work and the stronger notion is required. Hence, Sanford & Garrod still cannot offer any solution for examples such as (28), (29), (32) and (33).

There is an additional problem for Sanford & Garrod. Recall that for them, examples (13) and (41) are acceptable, but (40) and (36) are not:

(13) John dressed the baby. The clothes were made of pink wool.
(40) John dressed the baby. The kimono was a little too small.

(41) I liked my friend's new house. The ceiling was very high.
(36) I liked my friend's new house. The swimming pool/sauna was very relaxing.
Examples (13) and (41) are predicted to be acceptable because the bridging assumptions required in both examples are inferable on hearing only the first part of each utterance. By contrast, examples (40) and (36) are predicted not to be acceptable because the bridging assumptions required are not inferable in the same way. Hence, it seems reasonable to suppose that according to their notion of plausibility, and the resulting criterion of acceptability, (42) below should be acceptable whereas (43) should not:

(42) I was teaching at the local school. I was annoyed by the noisy children.
(43) I travelled by tube. I was annoyed by the noisy children.

Note that there is a slight difference between these examples and the ones cited above: in (42) and (43), the second parts of the utterances are the same and the first parts are different. Still, acceptability judgements for these examples should be the same as in our previous examples, with Sanford & Garrod predicting that (42) will be acceptable and (43) unacceptable. In a similar way, (44) below should be acceptable whereas (45) should not, because the scenario for staying at the Hilton, but not for riding in a taxi, would involve a reference to an air-conditioner:

(44) I stayed at the Hilton Hotel in summer. I was glad of the air-conditioner.
(45) I was in a taxi on a very hot afternoon. I was glad of the air-conditioner.

There is a reason why I have chosen to vary the first rather than the second part of these utterances: with these examples, I can
make a discourse in which there is more than one candidate referent and the hearer has to make a choice between the two. The following is one such discourse:

(46) Giving up teaching
I had been working at the local state school for 4 years by then. I liked teaching, but I was beginning to feel that the job was physically too demanding for me. One evening, after teaching all day, I was to meet some friends to discuss whether I should continue or not. I arrived half an hour late because I got stuck in the tube on the way. Nothing annoyed me as much as the noisy children.

Here, the bridging reference is 'the noisy children' and possible candidate antecedents are 'the local state school' or 'the tube'. Bridging assumptions for the two interpretations might be the following:

(47) There were noisy children at the school.
(48) There were noisy children in the tube.

The important thing here is that for Sanford & Garrod, there should be only one acceptable bridging assumption, namely, (47). (47) is acceptable for them because it is a part of the 'giving up teaching' scenario. According to their scenario-based criterion of acceptability, (48) should not be an acceptable bridging assumption, because it is not a part of the scenario. The question is: what prediction do Sanford & Garrod make about the choice of the intended referent? The most natural prediction would be that the hearer will always go for (47), which is part of the scenario, and (48), which is not part of the scenario, will never be considered.

In fact, this is not the case. What actually happens, when
the discourse cited above is interpreted, is that some people choose (47) and others choose (48). This needs to be explained, and apparently Sanford & Garrod cannot offer an adequate explanation. Later, I will discuss how relevance theory can offer possible solutions to this problem as well as other problems left unsolved by both Clark and Sanford & Garrod.

4. Two Further Approaches: Focus-based and Coherence-based Accounts

4.1. Focus-based Account: Sidner and Erku & Gundel

4.1.1. Sidner

In this section, I will examine whether Sidner's account, whose criteria for acceptability are based on both truth (factual plausibility) and 'focus', can offer a better analysis of bridging cases than the previous two, which were based largely on the notion of truth (factual plausibility). In her account, Sidner concentrates on the focus algorithm rather than the criterion of truth, and therefore, I conclude that for her, 'focus' is the most important factor.

Since a more detailed discussion of Sidner's account was given in Chapter 3, let me briefly summarise her proposal about reference resolution. First, the most salient discourse entity (an item 'in focus') in the previous utterance is selected as a candidate referent on the basis of the expected focus algorithm. The candidate referent will then be tested in terms of whether the resulting bridging assumption and the resulting overall interpretation of the utterance are both consistent with existing assumptions. If they are judged to be plausible in this weak sense, the selected entity is established as the intended referent. If the selected entity does not pass the test, either because the bridging assumption is not plausible or because the resulting overall interpretation of the utterance is not
plausible, then a second candidate will be selected on the basis of the algorithm. The same procedure is repeated until a candidate referent is found which passes the plausibility test.

Let us look at some examples of bridging where there is more than one candidate referent:

(49) I prefer Edinburgh to London. I love the snowy winters.
(50) I prefer Italy to England. I love the pasta there.
(51) I prefer the town to the country. The traffic doesn’t bother me.

Potential bridging assumptions for these examples might be:

(49’) a. There are snowy winters in Edinburgh.
     b. There are snowy winters in London.

(50’) a. People eat pasta in Italy. 

(51’) a. There is traffic in the town.
     b. There is traffic in the country.

The resulting possible interpretations might be:

(52) a. The speaker loves the snowy winters in Edinburgh.
     b. The speaker loves the snowy winters in London

(53) a. The speaker loves the pasta in Italy.
     b. The speaker loves the pasta in England.

(54) a. The traffic in the town does not bother the speaker.
b. The traffic in the country does not bother the speaker.

According to Sidner's algorithm, for these three examples, entities picked out by the object of the verb in the main clause should be selected first and tested as candidate referents. Thus, 'Edinburgh' in (49), 'Italy' in (50), and 'the town' in (51) should be selected as candidate referents, and the plausibility of bridging assumptions (49'a), (50'a) and (51'a) and the resulting interpretations (52a), (53a) and (54a) should be tested. All three bridging assumptions and the resulting interpretations are plausible in Sidner's sense, and hence, 'Edinburgh', 'Italy' and 'the town' should be accepted as the intended referents.

The resulting interpretations of (49), (50) and (51) do in fact coincide with the generally preferred interpretations: these examples were tested in Questionnaire C, and the subjects preferred the interpretations just mentioned. Thus, Sidner's account can indeed select the more acceptable interpretation at least some of the time.

However, this is not always the case. Consider the following examples, which appear similar to those just discussed:

(55) I prefer Edinburgh to London. I hate the snowy winters.
(56) I prefer Italy to England. I hate the pasta there.
(57) I prefer the town to the country. The traffic really bothers me.

The potential bridging assumptions for these examples are exactly the same as those for (49), (50) and (51). The possible resulting interpretations might be the following:

(58) a. The speaker hates the snowy winters in Edinburgh.
b. The speaker hates the snowy winters in London.

(59) a. The speaker hates the pasta in Italy.
   b. The speaker hates the pasta in England.

(60) a. The traffic in the town really bothers the speaker.
    b. The traffic in the country really bothers the speaker.

According to my questionnaire, the preferred interpretations of these examples are (58b), (59b) and (60b) respectively, even though some people suggested that these utterances seem awkward. I will discuss later why some people found them awkward and yet still preferred them to the other interpretation. Here let me just mention that the preferred interpretations go against Sidner's predictions: her account will choose (58a), (59a) and (60a) as the intended interpretations as a result of the same screening procedure as in the previous cases.

Sidner's account also fails to explain the following examples:

(61) I prefer London to Edinburgh. I hate the snowy winters.
(62) I prefer England to Italy. I hate the pasta there.
(63) I prefer the country to the town. The traffic really bothers me.

These examples are different from the previous three in that the item which occupied the object position in each of the previous examples is now occupying the prepositional position and vice versa. The possible bridging assumptions and the resulting interpretations are exactly the same as for the previous three examples. However, this time, the preferred interpretations are
different: they are (58a), (59a) and (60a) respectively. Again, for these cases, Sidner's account makes the wrong predictions.

According to Sidner's focusing algorithm, it is the item in verb-phrase object position that should be tested first. In the case of (61), (62) and (63), this will be 'London', 'England' and 'the country' respectively. Hence, the bridging assumptions to be tested are (49'b), (50'b) and (51'b). If you compare these with (49'a), (50'a) and (51'a) respectively, it is obvious that the ones chosen by Sidner's account are less plausible than the others; so one might think that (49'b), (50'b) and (51'b) will not pass Sidner's plausibility test. However, this is not the case. Remember that Sidner's notion of plausibility is the weak one, which is similar to Clark's: an assumption is plausible if it is consistent with existing assumptions. Therefore, for example, in the case of (49'b), the fact that it occasionally snows in London should be enough for the system to accept it as plausible. Moreover, in Sidner's framework, there is no mechanism for checking the plausibility of more than one bridging assumption at the same time; hence, there is always a possibility that the least plausible of a range of potential assumptions might be chosen.

In the previous section, I discussed problems with Clark's weak notion of plausibility. One of its shortcomings is that it is simply too weak to choose between several possible interpretations. Sidner has added a further factor to account for judgements of acceptability, namely, accessibility of discourse entities ordered by a specific algorithm. This is meant to solve to problem of the combinatorial explosion. However, as we have just seen, this mechanism is not right as it stands, and wrong predictions of acceptability are made.

4.1.2. Erku & Gundel

Now I will briefly discuss Erku & Gundel's approach. Their
claim is as follows: a referring expression should refer to the topic (i.e. ‘focus’ in Sidner’s terms) of the previous sentence; otherwise, the utterance which contains it is likely to be judged stylistically infelicitous. Erku & Gundel adopt Sidner’s algorithm to predict the topic of a sentence. However, unlike Sidner, they do not suggest that plausibility is also an important factor; hence, they do not seem to allow for the possibility that general knowledge may override the choice of topic.

Erku & Gundel’s account can explain the preferred interpretations of (49)-(51) in the same way as Sidner’s:

(49) I prefer Edinburgh to London. I love the snowy winters.
(50) I prefer Italy to England. I love the pasta there.
(51) I prefer the town to the country. The traffic doesn’t bother me.

In these examples, the topic of the first sentence is ‘Edinburgh’, ‘Italy’, and ‘the town’ respectively, and each is considered to be the indirect antecedent of the bridging reference in the following sentence.

Moreover, Erku & Gundel can explain why some people have found examples such as (65) to be awkward:

(65) Jane moved from California to Manchester. She loves the warm winters.

Erku & Gundel’s account predicts that the referent of ‘the warm winters’ should be ‘Manchester’, which is the topic of the sentence (thematic role ‘Goal’ is preferred over ‘Source’ in cases like this). However, the resulting interpretation is unlikely to be accepted as true. Therefore, the hearer of the second part of (65) might find it awkward on this interpretation. Indeed, the majority of subjects chose ‘Manchester’ as the referent of the
bridging reference, and half of them found the whole utterance awkward.

However, Erku & Gundel cannot explain the following examples, which also cause Sidner a problem, as shown above:

(55) I prefer Edinburgh to London. I hate the snowy winters.
(56) I prefer Italy to England. I hate the pasta there.
(57) I prefer the town to the country. The traffic really bothers me.

The topics of these are 'Edinburgh', 'Italy' and 'the town' respectively. According to Erku & Gundel, the second sentence in each example should be about the topic of the first sentence. And indeed, in all these examples, the second sentences can be interpreted in this way, with 'Edinburgh', 'Italy' and 'the town' being the referents of the bridging reference. The resulting interpretations for these examples will be (58a), (59a) and (60a) respectively. However, in my questionnaire, these were not the interpretations selected. My subjects chose 'London', 'England', and 'the country' respectively. Erku & Gundel cannot explain why these three are preferred. Examples (61)-(63) cause a similar problem.

Later, I will discuss why subjects preferred the interpretations which go against Erku & Gundel’s predictions. Let me just note here that although the notion of 'focus' or 'topic' may indeed have a role to play in verbal communication, the above discussion shows that Erku & Gundel’s focus-based account, and Sidner’s too, seems unsatisfactory on its own. In the next section, we will look at an alternative approach, whose criterion for acceptability is based on the notion of coherence as well as (or instead of) truth.
4.2. Coherence-based Account: Hobbs and Sanders et al.

Recall Hobbs's claim about how reference assignment is achieved in discourse: the hearer has to identify a coherence relation between two discourse segments, and reference is assigned as a by-product of the search for coherence. Thus, for Hobbs, success or failure in the identification of a coherence relation (guided by general knowledge) is the sole determinant of success or failure of reference assignment.

As pointed out in section 2.4., Hobbs's description of how coherence relations are identified is rather sketchy, although he does suggest, like Sanders et al., that coherence relations are ordered in terms of accessibility. Here I will consider two versions of the identification procedure: (a) a coherence relation is identified largely on the basis of general knowledge (the hearer has to choose a coherence relation which fits the content of the two segments), but there is no order of accessibility between coherence relations; (b) a coherence relation is identified, as Sanders et al. suggest, by testing against some cognitive primitives; coherence relations differ in accessibility and generally the most accessible one is favoured (i.e. the first one tested and accepted on the basis of general knowledge will be chosen).

I would like to test both versions of the coherence-based account against the following examples:

(64) Jane moved from Manchester to California. She loves the warm winters.
(65) Jane moved from California to Manchester. She loves the warm winters.

(66) Sara left England for Australia. She loves the sandy beaches.
(67) Sara left Australia for England. She loves the sandy beaches.

232
beaches.

Potential bridging assumptions for (64) and (65) might be:

(68) a. There are warm winters in Manchester.
    b. There are warm winters in California.

For (66) and (67) they might be:

(69) a. There are sandy beaches in England.
    b. There are sandy beaches in Australia.

As can be seen, the bridging assumptions (68a) and (68b) differ significantly in their plausibility: (68a) is much less plausible than (68b). Some people might even think that (68a) is not at all acceptable. On the other hand, (69a) and (69b) are roughly equally plausible. It will be interesting to see if the interpretation process for these two sets turns out to be different or not.

The possible resulting interpretations for the second segment in (64) and (65) are the following:

(70) a. Jane loves the warm winters in Manchester.
    b. Jane loves the warm winters in California.

For (66) and (67), they might be:

(71) a. Sara loves the sandy beaches in England.
    b. Sara loves the sandy beaches in Australia.

The question here is whether either version of the coherence-based criterion can pick out the more acceptable interpretations. Let us start with the first version, which suggests that a coherence relation is identified through a
mapping process between possible coherence relations and the content of the two segments. Judging by the list of discourse relations given in the survey by Hovy and Maier (1994), for (64) the possible coherence relations might be: 'Cause-Result' (in this case, in reverse order), 'Sequence', or 'Concession': in other words, the second segment can describe either a cause of Jane's moving, a consequence of her moving, or a negative factor that might have prevented her moving. If my interpretation of Hobbs is right, these coherence relations can be selected on the basis of the content of (64) plus encyclopaedic assumptions such as 'people move from one place to another for love of something', 'people who have moved from one place to another face various consequences', 'people might move from one place to another despite some negative consequences', etc.

Obviously, each of the coherence relations mentioned above yields a different overall interpretation of the sequence in (64). They might be something like the following:

(72) a. Jane moved from Manchester to California, because she loves the warm winters there (=California).
   [Cause-result (reversed)]

b. Jane moved from Manchester to California, and now she loves the warm winters there (=California).
   [Sequence]

c. Jane moved from Manchester to California, although she loves the warm winters there (=Manchester). [Concession]

According to Hobbs, if any of these involves an obvious contradiction of existing assumptions, it has to be rejected. Therefore, (72c) probably has to be rejected, since for most of us, Manchester is not a place with warm winters. On the other hand, two interpretations based on two different relations, namely, 'Cause-result (reversed)' and 'Sequence', should remain
possible, since California is renowned for its mild winters.

In both of these interpretations, (72a) and (72b), 'California' is chosen as the place with warm winters. So, one might say that in either case, reference is successfully assigned and the first version of the coherence-based criterion is adequate. This is not the case, however, since there should be only one intended interpretation of (64): the question is whether the first version of the coherence-based criterion can favour one coherence relation over the other. This question is crucial because the resulting overall interpretations of (64), namely, (72a) and (72b), are quite different. Unfortunately, the first version of the coherence-based criterion does not offer any mechanism for choosing one of several potential coherence relations, because it imposes no order of accessibility between them. Thus, according to the first version of the coherence-based criterion, (64) should be ambiguous. Moreover, the fact that this account cannot single out a unique interpretation can cause more serious problems, which will be discussed later in this section.

Let us now consider (65). In this case, the same three coherence relations might hold between the two segments, with the following overall interpretations:

(73) a. Jane moved from California to Manchester because she loves the warm winters there (=Manchester).  
   [Cause-result (reversed)]

   b. Jane moved from California to Manchester and now she loves the warm winters there (= Manchester).  
   [Sequence]

   c. Jane moved from California to Manchester, although she loves the warm winters there (= California). [Concession]

Of these interpretations, (73a) and (73b) should be discarded, as
before, because the assumption that there are warm winters in Manchester is implausible. As a result, interpretation (73c) should be chosen, with the coherence relation ‘Concession’, as the intended interpretation of (65), with ‘California’ being interpreted as the place where Jane loves its warm winters. In this case, there should be no problem of ambiguity.

Now let me disclose the result of my questionnaire concerning (64) and (65). For (64), subjects preferred ‘California’ as the place where Jane loves the warm winters. This coincides with the preferred antecedent as chosen by the first version of the coherence-based criterion. However, for (65), the preferred antecedent was ‘Manchester’, though half the subjects who chose ‘Manchester’ thought (65) was awkward. I will discuss possible reasons for why this is the case and yet they still chose the interpretation later in this chapter; here I will merely note that the the first version of the coherence-based criterion fails to predict this result and that it does not explain what exactly happens when the hearer tries to interpret an utterance like (65).

Next, consider examples (66) and (67). The possible coherence relations and resulting overall interpretations for (66) might be the following:

(74) a. Sara left England for Australia because she loves the sandy beaches there (= Australia). [Cause-result (reversed)]
   b. Sara left England for Australia and now she loves the sandy beaches there (= Australia). [Sequence]
   c. Sara left England for Australia, although she loves the sandy beaches there (= England). [Concession]

The three coherence relations selected for (66) are the same as for the two previous examples. However, the situation with (66) is crucially different, since all three resulting overall
interpretations seem acceptable. This is because in the case of (66), both potential bridging assumptions (69a) and (69b) seem plausible, although for some, (69b) might be slightly more accessible than (69a). This is a much more problematic situation for the first version of the coherence-based criterion than the previous ones, since this time, it can choose neither the right coherence relation, nor the right referent. Notice that in (74a) and (74b), ‘Australia’ is chosen as the place where Sara loves the sandy beaches, whereas in (74c), it is ‘England’. Unfortunately, as I mentioned earlier, the first version of the coherence-based criterion offers no mechanism for singling out a unique coherence relation and resulting overall interpretation in these circumstances. Thus, according to this criterion, (66) should be impossible to interpret. My questionnaire shows that this is not so. I will give the full details later.

Example (67) causes exactly the same problem. The possible candidates for coherence relation and resulting overall interpretation might be:

(75) a. Sara left Australia for England because she loves the sandy beaches there (= England). [Cause-result (reversed)]
   b. Sara left Australia for England and now she loves the sandy beaches there (= England). [Sequence]
   c. Sara left Australia for England, although she loves the sandy beaches there (= Australia).
   [Concession]

In this case, all three coherence relations could potentially hold between the two segments in (67), and there is no way to choose one out of the three. Again, my questionnaire shows that most subjects did make a choice.

In fact, the choice of subjects for the place where Sara loves the sandy beaches was clearly one-sided. For (66), they
preferred 'Australia' and for (67), 'England'. This must be explained, and for that, the first version of the coherence-based criterion seems inadequate.

Now I would like to move on to the second version of the coherence-based criterion, which is represented here by Sanders et al. (1992). First, I will show how it can yield an overall interpretation for each of the examples discussed above.

Let us begin with (64). The first step is to decide whether it involves a 'causal' or an 'additive' relation. Here, the answer should be 'causal', since according to Sanders et al., even if the 'additive' relation can also hold, the 'causal' relation should be selected because it is more accessible. The next question is whether this relation is pragmatic or semantic (a relation is semantic if the discourse segments are related because of their propositional content; if a relation is based on the illocutionary meaning of one or both of the segments, it is pragmatic). Since all the examples considered in this chapter involve semantic relations, I will simply ignore this test in my discussion. The third question is whether the two segments stand in basic or non-basic order. They seem capable of standing in either order, and in that case, basic order which is more accessible should be chosen. The last question is whether one of the segments is negative or not. Neither of them is negative. As a result of these tests, one coherence relation, namely, 'Cause-consequence' (which is equivalent to Hovy and Maier's 'Cause-result') is chosen and assigned to (64). The resulting interpretation should be something like the following:

\[(72d)\] Jane moved from Manchester to California, \textbf{and consequently}, she loves the warm winters there (=California).

This interpretation coincides with the preferred interpretation...
chosen by my subjects.

Next consider (65). Here, the answers to the four questions should be the same as before. For the first question, it should be a 'causal' relation. For the third question, it should be basic order, for the same reason as for (64). For the fourth question, there is no explicit sign of either segment being negative, therefore it should be a positive relation. The result of these tests assigns (65) the 'Cause-consequence' relation, which is the same as the one assigned to (64). The resulting interpretation should be something like the following:

(73d) Jane moved from California to Manchester, and consequently, she loves the warm winters there (= Manchester).

This is a problematic result, because (73d) is clearly not compatible with existing assumptions, which means that the coherence relation chosen for (65) is not compatible with the content of the two segments. Remember that Sanders et al. claim that 'the meaning of the segments must be compatible with the coherence relation' (5). Unfortunately, Sanders et al. do not discuss how to proceed further when a situation like this arises.

Let us assume here that Sanders et al. would say that such a relation should be rejected and the next most accessible one should be tested and chosen if it is compatible with existing assumptions. In the case of (65), the next most accessible relation is 'Contrastive cause-consequence' (causal, semantic, basic order and negative), with an overall interpretation such as (73e):

(73e) Jane moved from California to Manchester, although she loves the warm winters there (= California).
This interpretation seems to be compatible with our existing knowledge about the content of (65), and therefore, should be accepted as the intended interpretation.

This result, however, does not coincide with my subjects’ interpretation of (65). They chose the interpretation in which ‘Manchester’ is the place where Jane loves the warm winters. This is a very interesting result, and I will consider why this interpretation, which obviously goes against our general knowledge, was preferred. To this question, Sanders et al. are unlikely to offer any answer.

Now let us look at how Sanders et al. handle examples (66) and (67). For both these cases, it will go for the ‘Cause-consequence’ coherence relation (causal, semantic, basic order, and positive), which is the most accessible. As a result, the preferred interpretations for (66) and (67) might look like (74d) and (75d) respectively:

(74d) Sara left England for Australia, and consequently, she loves the sandy beaches there (= Australia).

(75d) Sara left Australia for England, and consequently, she loves the sandy beaches there (= England).

The preferred antecedent for (66) is thus ‘Australia’ and that for (67) is ‘England’. These results indeed coincide with our subjects’ choice.

Finally, consider (76) and (77), which look similar to (66) and (67) respectively:

(76) Sara left England for Australia. She hates the sandy beaches.

(77) Sara left Australia for England. She hates the sandy beaches.

For both these examples, Sanders et al. would choose the
'Cause-consequence' coherence relation for the same reason as in the previous cases, and the resulting overall interpretations might be (78) and (79):

(78) Sara left England for Australia, and consequently, she hates the sandy beaches there (= Australia).
(79) Sara left Australia for England, and consequently, she hates the sandy beaches there (= England).

These interpretations seem perfectly plausible, and therefore, they should be accepted as the intended interpretations by Sanders et al. However, for some reason, my subjects did not prefer these interpretations when they read the same examples in Questionnaire C. They chose 'England' for (76) and 'Australia' for (77) as the place where Sara loves the sandy beaches. Clearly, Sanders et al. fail to handle these examples. In the next section, I will discuss why they cannot handle these cases, together with those examples which cannot be handled by other previously discussed accounts. I will also consider an alternative account of the critical results of the three questionnaires.

5. A Relevance-Theoretic Account of Acceptability Judgements for Bridging Reference

Now I would like to show how relevance theory explains the stylistic acceptability/unacceptability of the types of bridging reference discussed in this chapter. The examples to be considered in this section are the following types:

A (1) John and Mary went to see Macbeth last night. The three witches were excellent.
(3) John and Mary went to see a play last night. The three
witches were excellent.

B (4) He stopped smoking suddenly. The rent was incredibly cheap.

C (34) I moved from Brixton to St. John’s Wood. The rent was less expensive.

D (43) I travelled by tube. I was annoyed by the noisy children.
(45) I was in a taxi on a very hot afternoon. I was glad of the air-conditioner.
(46) Giving up teaching
I had been working at the local state school for 4 years by then. I liked teaching, but I was beginning to feel that the job was physically too demanding for me. One evening, after teaching all day, I was to meet some friends to discuss whether I should continue or not. I arrived half an hour late because I got stuck in the tube on the way. Nothing annoyed me as much as the noisy children.

E (55) I prefer Edinburgh to London. I hate the snowy winters.
(61) I prefer London to Edinburgh. I hate the snowy winters.

F (65) Jane moved from California to Manchester. She loves the warm winters.
(76) Sara left England for Australia. She hates the sandy beaches.
(77) Sara left Australia for England. She hates the sandy beaches.
Let me start with example (3). Remember that according to Sanford & Garrod, this should be unacceptable because 'the three witches' is not plausibly inferable from the first sentence alone. Also remember that Clark cannot offer an adequate explanation for the unacceptability of this example.

Relevance theory can offer an explanation for the stylistic unacceptability of (3) in terms of processing effort. Recall that optimal relevance can be judged in terms of two factors, namely, contextual effect and processing effort. An utterance (e.g. (3)) cannot be optimally relevant if some other utterance (e.g. (1)), that was manifestly as easy for the speaker to formulate, would have achieved the same effects for less processing effort. For this reason, example (1) is usually preferred to (3).

However, notice that the processing effort required to process a particular utterance can vary significantly in different circumstances. Sometimes, the bridging assumptions required may be highly accessible, and at other times less so. One obvious factor which affects the accessibility of bridging assumptions is the hearer's interests, which affect the richness and accessibility of encyclopedic assumptions. If the hearer of example (3) is keen on Shakespeare's plays, the bridging assumptions (3'a) and (3'b) may be highly accessible. Let me bring in here similar instances from Questionnaire A, together with their corresponding bridging assumptions:

(80) I went to see a ballet last night. The black swan was marvellous.
(80') a. The ballet the speaker saw was Swan Lake.
   b. Swan Lake has a part for a black swan.

(21) I went to see a film. The dinosaurs looked real.
(21') a. The film the speaker saw was Jurassic Park.
b. There were dinosaurs in Jurassic Park.

(22) I went to see a musical last evening. The phantom seemed to have a cold.
(22') a. The musical the speaker saw was The Phantom of the Opera.
    b. The Phantom of the Opera has a part for a phantom.

With maximum rating score being 7, (80) scored 5.53. (21) 5.31, and (22) 5.15. The results show that although these examples were not judged 'highly acceptable', still they are explainable in terms of the accessibility of bridging assumptions: we assume that (80), (21) and (22) are judged acceptable because of the high accessibility of the required bridging assumptions in our general knowledge.

Furthermore, relevance theory claims that there is another crucial factor which might affect processing effort: that is, the accessibility of contextual information needed to interpret the utterance. Hence an utterance such as (3) can be judged acceptable/unacceptable not only because of the accessibility of bridging assumptions, but also because of the accessibility of the contextual information required to achieve an optimally relevant overall interpretation. This is illustrated in the following example:

(81) Mary: I couldn’t believe that John has never seen Macbeth in his life.
    Jane: He should see it at all costs. Actually, Macbeth is currently on at the National.

(A week later)
John (to Jane): Mary and I went to see a play last night. The three witches were excellent.
Here, perhaps, hearing ‘the three witches’, Jane can retrieve the information about Macbeth relatively easily. We can say that the proposition ‘Macbeth has roles for three witches’ is highly accessible in Jane’s mind when she hears John’s utterance, because of the conversation she and Mary had had a week before, which here can provide crucial contextual information. As a result, Jane would probably judge John’s utterance more acceptable than our subjects’ rating, although it will never be judged 100 per cent acceptable.\(^\text{10}\)

Let us now move on to example (4). In terms of relevance theory, this is a case in which it is impossible for the hearer to decide what are the intended effects. In terms of our notion of optimal relevance, this kind of utterance should be unacceptable since it breaches both the requirement of adequate contextual effects and the requirement of no unjustifiable effort. In other words, in the process of trying to decide what are the intended contextual effects, the hearer is bound to waste processing effort. In Questionnaire A, similar instances, such as the following, were given very low points in the acceptability scale, as expected:

(82) John lost his job last month. **The cruise down the Nile** was excellent.
(83) Rachel lost weight suddenly. **The waiter** was very charming.

The intended bridging assumptions for these are the following:

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\(^{10}\) Relevance theory claims that an utterance can be fully acceptable only if the speaker might reasonably have expected it to be optimally relevant to the hearer. In the circumstances just described, even if John knew that the required bridging assumptions would be highly accessible to Jane, still the alternative formulation in (1) would have required less processing effort, and for this reason (3) would still violate clause (b) of the definition of optimal relevance.
(82') a. John received a good retirement package.
   b. He spent part of the money on a tour in Egypt.

(83') a. There was a waiter in a restaurant.
   b. Rachel fell in love with the waiter.
   c. She lost her appetite.

The mean rating score for example (4) was 1.62, (82) 2.08 and (83) 2.38.

Let me point out, however, that there is a way to increase the acceptability of bridging references of this type. The problem of utterances such as (4) and (82) is that they require unjustifiable effort and may not offer any contextual effects. Thus, if we make the intended set of contextual assumptions more accessible, there is more chance of the hearer's obtaining the intended contextual effects. For example, imagine that, prior to hearing example (83), you have the following information:

(83'') a. The only time Rachel loses weight is when she falls in love with someone.
   b. One local Italian restaurant has been her favourite for the last three months.

Then, the bridging assumptions required for (83) become highly accessible, and hence the overall interpretation will no longer be difficult.

Now consider (34). This is the example which neither Clark nor Sanford & Garrod can handle. In Questionnaire B, similar examples were given:

(84) We took a taxi to the airport this year although we used a bus last year. The fare was less expensive.
(85) I prefer the restaurant on the corner to the student canteen. The cappuccino is less expensive.
In the questionnaire, subjects were asked to answer the following questions for (34), (84) and (85) respectively.

(34) Question 1: Where was the rent less expensive?
   Question 2: In general, where do you pay less rent, Brixton or St. John’s Wood?

(84) Question 1: Which fare was less expensive?
   Question 2: In general, which costs less, a taxi or a bus?

(85) Question 1: Where is the cappuccino less expensive?
   Question 2: In general, where do you get less expensive cappuccino, a student canteen or a restaurant?

Question 1 is to test subjects’ selection of the intended reference, and Question 2 is to test their judgements of plausibility (i.e. judgements of the degree of likelihood of being true). We deliberately made the passages so that the intended referent is not the one which is more likely to be true according to our general knowledge. Hence our expected answers for Question 1 are ‘St. John’s Wood’, ‘The taxi’ and ‘The restaurant on the corner’ respectively, and the expected answers for Question 2 are ‘Brixton’, ‘The bus’ and ‘A student canteen’ respectively. The percentage of answers that agreed with our predictions was as follows:

(34) Question 1: 100% Question 2: 60%
(84) Question 1: 80% Question 2: 100%
(85) Question 1: 100% Question 2: 80%

The most important figure here is the percentage of expected
answers to Question 1. The implication is that plausibility
judgements, i.e. about which one of the two candidate referents
leads to an overall interpretation which is more likely to be
true, is overpowered by something else. Neither Clark nor
Sanford & Garrod offer any possible suggestion about what this
crucial factor might be.

Relevance theory claims that these facts can be explained
by the criterion of consistency with the principle of relevance
and the notion of optimal relevance. The claim is that when a
hearer has to choose the intended referent from a range of
candidate referents, he will choose the one which leads to an
overall interpretation consistent with the principle of
relevance.

Let us consider example (34) in detail, since the rest of
the examples can be explained in a more or less similar way.
Here again, the contextual information required to interpret
these utterances plays a crucial role. In interpreting (34), apart
from information about Brixton and St. John’s Wood, the
available contextual assumptions might include the following:

(86) a. People who move from one place to another have
    some reason to do so.
    b. They move willingly so that they can have
        preferable conditions (unless they are forced to
        move by undesirable circumstances).

With this information, the state of affairs described in the
second sentence in (34), namely that the rent was less
expensive, can be considered as a preferable condition, and
hence, a hearer would select ‘St. John’s Wood’ as the place where
the speaker has chosen to live. In other words, with this
contextual information, the second sentence in (34) can be
interpreted as mentioning a positive reason why the speaker
moved. Notice that it is very difficult to get the other
interpretation, even though we all know that generally speaking, to live in Brixton is less expensive than to live in St. John’s Wood.

Now let us look at examples (43) and (45). Recall that these are claimed to be stylistically unacceptable by Sanford & Garrod, and hence, in (46), ‘the tube’ cannot be considered as a possible candidate referent. In contrast, we predict that in (46), both ‘the tube’ and ‘the local state school’ can be candidate referents, with ‘the tube’ preferred for reasons of accessibility. To test Sanford & Garrod’s prediction and our prediction for these examples, in Questionnaire B, I asked subjects to read passages such as (46) and the following:

(87) Arriving at a hotel in Paris
I went to Paris last summer. I had booked to stay at the Hilton. I arrived at the airport on a very hot day and a friend of mine picked me up there. We were planning to have lunch at the hotel with some other friends. Unfortunately, we couldn’t make it because we were stuck in the friend’s car for about two hours before we got to the Hilton. I was glad of the air-conditioner.

The subjects were then asked to answer two questions. The following are the questions for (46) and (87):

(46) Question 1: Where was the speaker annoyed by the noisy children?
Question 2: In general, which do you associate noisy children with more strongly, a school or a tube?

(87) Question 1: Where was the air-conditioner?
Question 2: In general, which do you associate an air-
conditioner with more strongly, a car or a Hilton Hotel?

Question 1 is to test their choice of bridging reference assignment, and Question 2 is to test their judgement of which of the two candidate referents can more plausibly evoke the entity referred to by the bridging reference in the hearer's mind, or in other words, which of the two candidates is regarded as scenario-activated entity in Sanford & Garrod's sense.

The result of the questionnaire regarding the two passages shown above was the following:

(46) Question 1: tube 80% school 20%
    Question 2: tube 30% school 70%

(87) Question 1: car 90% Hilton Hotel 10%
    Question 2: car 30% Hilton Hotel 70%

There are various factors which have affected subjects' answers. But here, I would like to make one point: the results for (46) and (87) show that even though there is still a strong association between noisy children and a school and between an air-conditioner and a Hilton hotel respectively, the proportion of answers to Question 1 which go against Sanford & Garrod's prediction is striking.

The reason why more people have chosen alternatives to the scenario-induced entities as the intended referents for bridging reference in (46) and (87) can again be explained by the criterion of consistency with the principle of relevance. One can say that the other candidate referents, namely, 'the tube' in (46) and 'the car' in (87), are more accessible than their scenario-induced counterparts, because of factors such as recency of mention, syntactic position in the sentence, etc; hence it is consistent with principle of relevance to choose these as the
intended referents provided that the resulting overall interpretation if acceptable. However, we do not exclude alternative readings completely, because accessibility of candidate referents is not the only factor. Having accessed a candidate referent, one must also find a context in which the resulting overall interpretation is (or might be expected be) optimally relevant - and here the existence of scenarios has an obvious part to play.

Now let us consider the examples (55) and (61). These are the ones which cannot be handled by the topic/focus-based approach, and (56), (57), (62) and (63) are similar. Let me repeat these examples here:

(55) I prefer Edinburgh to London. I hate the snowy winters.
(56) I prefer Italy to England. I hate the pasta there.
(57) I prefer the town to the country. The traffic really bothers me.
(61) I prefer London to Edinburgh. I hate the snowy winters.
(62) I prefer England to Italy. I hate the pasta there.
(63) I prefer the country to the town. The traffic really bothers me.

In Questionnaire C, after reading each of these, subjects were asked to answer one question such as the following:

(55) Where does the speaker hate the snowy winters? [the same question for (61)]
(56) Where does the speaker hate the pasta? [the same question for (62)]
(57) Where does the traffic bother the speaker? [the same question for (63)]
The subjects' answers to these questions are as follows:

<table>
<thead>
<tr>
<th></th>
<th>(55) Edinburgh</th>
<th>0%</th>
<th>London</th>
<th>100% (60%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(56) Italy</td>
<td>20%</td>
<td>England</td>
<td>80%</td>
<td></td>
</tr>
<tr>
<td>(57) the town</td>
<td>20%</td>
<td>the country</td>
<td>80% (20%)</td>
<td></td>
</tr>
<tr>
<td>(61) Edinburgh</td>
<td>100%</td>
<td>London</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>(62) Italy</td>
<td>100%</td>
<td>(40%) England</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>(63) the town</td>
<td>100%</td>
<td>the country</td>
<td>0%</td>
<td></td>
</tr>
</tbody>
</table>

(figures in parentheses show the percentage of subjects who found the example stylistically awkward)

All the answers here go against Sidner's prediction as well as Erku & Gundel's. This has to be explained.

In a relevance-theoretic approach, the criterion of consistency with the principle of relevance explains the above results. This time, the decisive factors seem to be the accessibility of contextual assumptions and the degree of influence given by such assumptions if required for an utterance to achieve relevance. I assume that after hearing the first sentence in (55) or (61), there might be several assumptions available to the hearer, among which the following would be highly accessible:

(88) Someone prefers A to B for certain positive reasons.

This contextual assumption is likely to generate in the hearer's mind an expectation that he will hear the positive reasons for the speaker's preference. In this situation, if the speaker indeed offers something interpretable as a positive reason for the preference in the following utterance, it will certainly achieve relevance.
In fact, our examples such as (49), (50) and (51) are formulated in that way:

(49) I prefer Edinburgh to London. I love the snowy winters.
(50) I prefer Italy to England. I love the pasta there.
(51) I prefer the town to the country. The traffic doesn’t bother me.

In Questionnaire C, for these examples, subjects were asked to answer the following questions:

(49) Where does the speaker love the snowy winters?
(50) Where does the speaker love the pasta?
(51) Where does the traffic not bother the speaker?

The results for these examples in our questionnaire show that 100% of the subjects chose the interpretations in which the second sentences indeed give a positive reason for the preference described in the first sentence (i.e. they chose ‘Edinburgh’, ‘Italy’, and ‘the town’ respectively). Needless to say, other factors such as the high accessibility of ‘Edinburgh’, ‘Italy’ and ‘the town’, and the plausibility of the resulting overall interpretation must have also contributed to these results.

Let me mention another set of examples in the questionnaire, which seems to raise an interesting question concerning the hearer’s expectation mentioned above:

(89) I prefer London to Edinburgh. I love the snowy winters.
(90) I prefer England to Italy. I love the pasta there.
(91) I prefer the country to the town. The traffic doesn’t bother me.
As you can see, the difference between (49) and (89), (50) and (90), and (51) and (91) is that the item in the verb phrase object position and the item in the prepositional position have been switched. As a result, (89), (90) and (91) turned out to be harder to interpret than their counterparts for some reasons, one of which might be the following: in the case of (49), (50) and (51), probably all the factors which affect the subjects' choice of interpretation including plausibility of bridging assumptions and resulting overall interpretation, accessibility of discourse entities, and accessibility of contextual information, favour one interpretation; whereas in the case of (89), (90) and (91), for example, plausibility judgements encourage them to choose one, and accessibility factors the other. In the case of (89), for instance, the plausibility test favours 'Edinburgh' as the indirect antecedent of 'the snowy winters' [which results in more plausible bridging assumption as well as a more plausible overall interpretation], whereas the accessibility test favours 'London' [which is a more salient discourse entity and more compatible with highly accessible contextual assumptions such as (86)]. The conflict between these factors is seen clearly in the subjects' choice of interpretations:

(89) Edinburgh 60% (20%) London 40%
(90) Italy 40% England 60% (20%)
(91) the town 40% (20%) the country 60%

Therefore, one possible explanation for the results above goes like this: those who were more strongly affected by accessibility factors chose 'London', 'England' and 'the country'; whereas those who were more strongly affected by the plausibility of candidate interpretations chose 'Edinburgh', 'Italy' and 'the town'. Although all the subjects might have had an equally strong expectation of hearing some positive reason
for the preference described in the first sentence, for those who chose ‘London’, ‘England’ and ‘the country’, the expectation was strong enough to override any resulting implausibility.

It might be suggested that the expectation we are talking about here is in fact simply an expectation of hearing something about the topic/focus of the previous sentence, as Erku & Gundel and Sidner claim, and nothing to do with contextual assumptions such as (88). The results cited above cannot be used to argue against such a suggestion. However, I will show in what follows that the hearer’s expectation is created on the basis of not only the accessibility of discourse entities but also the accessibility of contextual assumptions, and that sometimes the accessibility of contextual assumptions becomes an even more crucial factor in deciding the hearer’s choice of interpretation.

Now let us go back to our examples (55) and (61). Unlike the parallel example (49), the second sentences in (55) and (61) do not seem to offer any positive reason for the preference described in the first sentence: hating something about A cannot normally be the reason why one prefers A. However, the second sentences in (55) and (61), can be seen as giving a reason why the speaker does not like B as much as A, and in this way, it can also achieve relevance. The contextual assumption required for this interpretation might be something like the following:

(92) Someone can prefer A to B because of some undesirable properties of B or some undesirable consequences caused by B.

Let me mention, however, that for many people, this assumption might be less accessible than (88).

In relevance theory, it is claimed that if there is an interpretation which gives a hearer adequate contextual effects for no unjustifiable processing effort in a way the speaker could clearly have foreseen, he will choose that interpretation. It is
also claimed that the first such interpretation available to the hearer is the one he should choose. The example (49) is a straightforward case: the intended interpretation is likely to be accessed and chosen by the hearer with very little effort. If an utterance is formulated in this way, from a stylistic point of view it should be very highly acceptable. The interpretation process for (61), however, is a little more costly: in order for it to achieve enough contextual effects, an assumption such as (92) is required, which may be much less accessible than (90). Does this make (61) less stylistically acceptable than (49)? Not necessarily. Recall that for an utterance to be consistent with the principle of relevance on a given interpretation, it must be such that the speaker could reasonably have expected it to achieve adequate effects, for no gratuitous effort, on that interpretation. In the case of (61), while the intended interpretation may require more effort, this extra effort might be justifiable for one of two reasons: either the speaker could not reasonably foreseen it, or she could not have seen any immediately obvious way of eliminating it. It might be interesting to investigate whether either of these conditions ever gives rise to stylistic unacceptability. In any case, an interpretation based on (92) should be entirely comprehensible as consistent with the principle of relevance. This is the prediction relevance theory makes, and as the results in the questionnaire concerning (61) show, 100% of the subjects indeed chose the indirect antecedent ‘Edinburgh’, whose resulting overall interpretation might be along the following lines:

(93) The speaker prefers London to Edinburgh because she hates the snowy winters in Edinburgh.

The fact that no subject found (61) stylistically awkward suggests that all the contextual assumptions required to reach an overall interpretation such as (93), including an assumption
(92), were accessible enough to leave the processing costs within a justifiable range. This in turn suggests that the main source of stylistic unacceptability is not merely extra processing effort but unjustifiable processing effort: i.e. effort that any reasonable speaker should have been able both to foresee and to avoid.

The interpretation process for example (55) is slightly more complicated, mainly because the overall interpretation achieved along the same lines as for (61) would be judged much less plausible:

(94) The speaker prefers Edinburgh to London because she hates the snowy winters in London.

In fact, the interpretation in (95), which requires some thought for someone expecting a causal interpretation, is better in terms of plausibility:

(95) The speaker prefers Edinburgh to London although she hates the snowy winters there (= Edinburgh).

In order to reach this interpretation, the following contextual assumption is crucial:

(96) Someone can prefer A to B despite some undesirable properties in A or some undesirable consequences caused by A.

Certainly, Sidner should prefer (95) to (94), since (95) suits her criterion based on the notions of focus and truth: it would choose the interpretation in which the second sentence is about the focused item in the first sentence as long as it is plausible: in this case, the focus is ‘Edinburgh’, and the interpretation is plausible. However, as the results in the questionnaire show, the
majority of our subjects did not choose an interpretation such as (94). This has to be explained, and for this, Sidner offers no clue.

Here I would like to suggest that what might have happened is that the accessibility of an assumption such as (96) was so low for our subjects that an interpretation such as (94) was never considered; instead, they went for more highly accessible assumptions such as (92), yielding an interpretation such as (94), and stopped searching as soon as this was found. This is, of course, despite the fact that 60% of them found the chosen interpretation unsatisfactory. Should we blame our subjects because they were too lazy and did not think hard enough to reach a better interpretation?

I do not think so. Our subjects were entitled to stop looking for an alternative interpretations as soon as they reached one which seemed to them to be consistent with the principle of relevance. In the case of (55), the fault is rather on the side of the speaker. Let us assume that the line of interpretation given in (95) is indeed the interpretation intended by the speaker. If so, as the results show, she failed to communicate what she intended. She failed partly because she wrongly assumed that an assumption such as (96) is highly accessible to the hearer. It would be interesting to investigate whether this was true even in 'out of contexts' cases, or only within sequences of examples where causal interpretations tend to predominate, as in my questionnaire. In any case, in circumstances where a causal interpretation is highly accessible, either for general or for idiosyncratic reasons, if the speaker really wanted to communicate (95), she should have formulated her utterance in a different way. For example, something like the following could have made the intended interpretation much more accessible:

(97) I prefer Edinburgh to London. However, I hate the
snowy winters.

In fact, in Questionnaire C, subjects were also asked to consider examples such as (97). Other similar examples are:

(98) I prefer Italy to England. However, I hate the pasta there.

(99) I prefer the town to the country. However, the traffic really bothers me.

Here, our subjects' choice of the antecedents was as follows:

(97) Edinburgh 100% London 0%
(98) Italy 100% England 0%
(99) the town 100% the country 0%

Let us compare these results with the results for (55), (56) and (57), which are identical to (97), (98) and (99), except that they do not have the connective 'however':

(55) Edinburgh 0% London 100% (60%)
(56) Italy 20% (20%) England 80%
(57) the town 20% the country 80% (20%)

As you can see, with the appropriate connective, the subjects' choice was almost completely switched. I would suggest the following explanation. In relevance theory, an utterance such as (55) is considered to fail either because it is obvious that there is a better (more economical) way of achieving the intended effects (such as (97)), or, for some people, because there is more than one line of contextual assumptions and resulting overall interpretation and the hearer cannot decide which is the intended one. Thus, the problem will be solved if somehow the possible contextual assumptions and implications are
constrained so that only the intended ones can be chosen. According to Blakemore (1987), discourse connectives have such a function: for example, those such as 'however' introduce an utterance (or clause) which is intended to achieve relevance by contradicting and eliminating existing assumptions. In the case of (97), after hearing the first sentence, the hearer might draw the conclusion that for the speaker, Edinburgh is better than London in every sense. And if the speaker believes that the hearer is likely to draw this conclusion, the use of connectives such as 'however' is appropriate to signal how the second sentence is intended to achieve relevance by contradicting and eliminating this assumption. In this way, the connective 'however' in (97) seems to have blocked the route to retrieving contextual assumptions such as (92), which is more consistent with the content of the first part of (97) and hence, is likely to be more accessible when no further guidance is given.

An utterance such as (55) should be judged stylistically unacceptable by the majority of people, but Sidner's account can not explain why this is so. I have shown above how relevance theory explains such judgements, and in addition, how it explains why, despite such judgements, the final choice of the antecedent for the bridging reference and the resulting interpretation for (55) turned out to be unanimous. It was suggested that the crucial factor contributing to such results is the accessibility of contextual assumptions, and that in the case of (55), this seems to have overpowered other factors such as accessibility of entities and plausibility of the resulting overall interpretation. It should be clearer by now that Sidner's account, whose criterion based only on the accessibility of discourse entities and the consistency with existing assumptions, is not good enough.

Now let us move on to (65):

(65) Jane moved from California to Manchester. She loves
the warm winters.

This is the example which neither version of the coherence-based approach could handle. Recall that the first version of this approach is based on the notions of coherence and truth (i.e. consistency with existing assumptions), and the second version is based on the notion of coherence, the accessibility of coherence relations and the notion of truth.

Let us start with the first version of the coherence-based approach. As illustrated in the last section, it would accept only ‘California’ as the indirect antecedent of ‘the warm winters’ in (65). The resulting overall interpretation with an appropriate coherence relation might be (73c):

(73c) Jane moved from California to Manchester, although she loves the warm winters there (= California).

[Concession]

The reason why this version of the coherence-based criterion would not accept any other possible interpretations is that they are not acceptable in terms of their factual plausibility. (73a) and (73b) are such interpretations:

(73a) Jane moved from California to Manchester because she loves the warm winters there (= Manchester).

[Cause-result (reversed)]

(73b) Jane moved from California to Manchester and now she loves the warm winters there (= Manchester).

[Sequence]

Both interpretations requires bridging assumptions such as that there are warm winters in Manchester, which is obviously not consistent with our existing assumptions. Therefore, according to the first version of the coherence-based criterion, these
interpretations should be rejected.

The interpretation chosen by this criterion, however, is not the one chosen by most subjects in my questionnaire. As the following results show, 'Manchester' was preferred as the indirect antecedent of 'the warm winters':

(65) California 20% (20%) Manchester 80% (40%)

It is important to note that although half of the subjects who chose 'Manchester' found (65) awkward, they did not choose the obvious alternative candidate 'California', with the resulting overall interpretation (73c), which is more plausible than (73a) and (73b).

For this, relevance theory offers the following explanation. Again, the crucial factor seems to be the accessibility of contextual assumptions, which affects the amounts of processing effort and is thus covered by clause (b) of the definition of optimal relevance. In order for the hearer of (65) to obtain an overall interpretation such as (73c), contextual assumptions such as (100) might be required:

(100) Someone may move from A to B although he still likes or even prefers (some properties of) A.

Probably nobody disagrees with the view that this assumption is difficult to obtain without any explicit clues. In relevance-theoretic terms, accessing this assumption requires a great deal of cognitive effort. In fact, the results of Questionnaire C concerning (65) suggest that the majority of the subjects did not use an assumption such as (100). What happened with (65) seems to be the same as with (55): the accessibility of (100) is so low that most subjects did not use it and an interpretation such as (73c) was never considered; instead, they used more highly accessible assumptions such as (101) and (102), shown
below, yielding either interpretation (73a) or (73b), and at that point stopped searching for other possible interpretations:

(101) Someone can move from A to B because she likes (some properties of) B.

(102) Someone can move from A to B and as a result, like (some properties of) B.

In short, (73c), which is more acceptable in terms of plausibility, was not the optimally relevant interpretation for my subjects, because it requires unjustifiable processing effort. In order to communicate (73c), the speaker has to make an assumption such as (98) more accessible. Here again, giving an explicit clue by use of the connective 'however' can be effective:

(103) Jane moved from California to Manchester. However, she loves the warm winters.

When this examples was tested, subjects' choice of the indirect antecedent for 'the warm winters' was as follows:

(103) California 80% Manchester 20% (20%)

This clearly shows that the connective 'however' can block the route to interpretations such as (73a) and (73b).

Now I would like to discuss why the second version of the coherence-based criterion failed to explain (65) and (76)-(77). Recall first that Sanders et al. would have to reject the interpretation (73d), which is based on the most accessible coherence relation 'Cause-consequence', and should choose (73e), which is derived from the next most accessible coherence relation 'Contrastive cause-consequence':
(73d) Jane moved from California to Manchester, and consequently, she loves the warm winters there (=Manchester).

(73e) Jane moved from California to Manchester, although she loves the warm winters there (=California).

(73d) should be rejected, according to Sanders et al., because it does not satisfy the requirement of plausibility. The interpretation chosen by their account is, however, obviously not the one chosen by my subjects.

There are two reasons why Sanders et al.'s account cannot handle (65) and (76)-(77): first, as we have seen, the most factually plausible interpretation is not always the one chosen by the hearer; second, their account of the ordered accessibility of coherence relations does not always work. I will not discuss the first point here, since this problem is shared by the first version of the coherence-based criterion: I have shown above that the interpretation which seems most factually plausible is not always chosen by the hearer, and have explained why. I will now discuss the second point in more detail.

One of the important consequences of Sanders et al.'s proposal that a coherence relation is chosen by checking four cognitive primitives is that if more than one coherence relation can hold between two segments of a discourse, the more accessible one will always be chosen as long as the resulting overall interpretation is factually plausible. Thus, as in (76) and (77), if, as a result of the checking the primitives, the 'Cause-consequence' relation is chosen, and the resulting overall interpretation is plausible, that interpretation should be accepted as the intended interpretation and no further search of other possible coherence relations should occur. In the case of (76) and (77), the resulting interpretations are (78) and (79) respectively:
(78) Sara left England for Australia, and consequently, she hates the sandy beaches there (= Australia).

(79) Sara left Australia for England, and consequently, she hates the sandy beaches there (= England).

However, the problem is that the majority of my subjects apparently did not choose these interpretations. The results are as follows:

(76) England 60% Australia 40%
(77) England 0% Australia 100% (20%)

This has to be explained, and here is one explanation using the framework of relevance theory. The reason why most of my subject did not choose (78) and none of them chose (79) is that these interpretations are not seen as consistent with the principle of relevance: for example, because the contextual assumptions required to reach them are too difficult to access, so that they did not consider them, contrary to Sanders et al.’s prediction. The overall interpretations chosen by my subjects for (76) and (77) seem to be more like (104) and (105) respectively:

(104) Sara left England for Australia because she hates the sandy beaches in England.
(105) Sara left Australia for England because she hates the sandy beaches in Australia.

In Sanders et al.’s taxonomy, these interpretations should exhibit the coherence relation ‘Consequence-cause’ (causal, semantic, non-basic order and positive), which is less accessible than ‘Cause-consequence’ because of the non-basic order. Thus, the actual order of the accessibility of coherence relations suggested by Sanders et al. seems to be inadequate
Moreover, the idea that there is a fixed order of accessibility for causal inferences seems to be too strong. Consider (106) and (107):

(106) John hit Bill. He was angry.
(107) Mary had to return the book she bought and got a new copy. The pages were missing.

The preferred interpretation for (106) might be that ‘John hit Bill because John was angry’, and for (107), ‘Mary had to return the book she bought and got a new copy, because the pages of the first copy were missing.’ In these interpretations, the second sentence can be seen as offering an explanation for the event described in the first sentence. However, it is not too difficult to see that there is another line of interpretation for both of them: for (106), ‘John hit Bill, and as a result, Bill was angry’, and for (107), ‘Mary had to return the book she bought and got a new copy, and consequently, she found that the pages of the new copy were missing’. In these interpretations, the second sentence can be seen as stating a consequence of the event described in the first sentence. Sanders et al. would predict the latter line of interpretation for (106) and (107), and an alternative line of interpretation should then never be considered. This view is clearly too strong, since for many, if not most, people, the preferred interpretations for (106) and (107) are not the ones thus predicted.

There is also some psychological evidence to invalidate Sanders et al.’s claim that ‘Cause-consequence’ is the most accessible coherence relation, and more accessible than

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11 These alternative lines of interpretation have been much discussed in the coherence-based approaches of the discourse representation theorists Asher, Lascarides and Oberlander (see, for example, Lascarides. A. & Oberlander, J. 1993). As it stands, however, this work is not designed to deal with cognitive effort considerations of the type I am considering here, and I will not discuss it directly.
'Consequence-cause' (see Graesser et al. 1995). For example, the result of experiments carried out by Magliano et al. (1993) show that causal-antecedent inferences are generated on-line during comprehension, but causal-consequence inferences are not. For (108), (109a) is a causal-antecedent inference, and (109b) is a causal-consequence inference:

(108) John left the bar and got into an accident.
(109) a. John had been drinking.
     b. John was hurt.

In their experiments, Magliano et al. used a lexical decision task to test whether causal-antecedent and causal-consequence inferences are generated on-line. The experiments were carried out as follows. Subjects were asked to read a short text consisting of 4 inference passages (which provide the context in which the critical inferences were potentially generated) and 4 unrelated passages (which serve as a control), which was presented on the computer screen word by word: the words appeared for either 200 or 350 ms, with a 50-ms blank between words. After each sentence, there was a blank of either 50, 200, 400, or 1000 ms, followed by a lexical target (non-words, inference words, or unrelated words). Subjects were instructed to press a computer key marked 'yes' if the lexical target was a word and a computer key marked 'no' if the lexical target was not a word. Times taken to respond were measured.

The inference words were selected from question-answering protocols collected by Graesser and Clark (1985). Graesser and Clark used question-answering methodology to investigate what kind of inferences are generated on-line: subjects were asked to read several passages and after reading each passage, they were asked questions about it, which include 'why', 'how' and 'what happened next'. For example, after reading a passage 'the dragon kidnapped the daughters', subjects were
asked why the dragon kidnapped the daughters or what happened next. Subjects' answers to 'why' question include 'the dragon saw the daughters' and answers to 'what happened next' question include 'the dragon kills the daughters'. Although Magliano et al. do not give any examples of their inference words, they say that they chose the causal-antecedent inference words from the answers to 'why' questions and the causal-consequence inference words from 'what happened next' questions. Thus, I guess that for the sentence 'the dragon kidnapped the daughters', the causal-antecedent inference word was 'saw' and the causal-consequence word was 'kill'. Half of the time an inference word appeared in the inference passage and the other half of the time it appeared in the unrelated passage: when these inference words were presented after unrelated passages, they were called 'unrelated words'.

Activation level for inferences was taken to be the difference between the decision latency of an unrelated word and the decision latency of an inference word. Interestingly, Magliano et al. found significant negative activation levels. However, they suggest that rather than comparing activation scores to zero in order to determine whether an inference category is sometimes generated on-line, one should assess the

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12 Magliano et al. propose an explanation for why negative activation scores occur, based on what they call a 'dual source feature comparison model'. Here they assume that the listener has the choice of two sources to test inference words: the lexicon and the passage representation. They then go on to suggest that the mean decision latency might differ depending on against which of the two sources the test word is checked: they assume that there might be the mean decision latency of 500 ms when the comparison was made between the test word and the lexicon; that when the test word is compared with the passage representation, the mean decision latency might be one of two extreme states (although the authors readily admit a continuum is more appropriate); (1) Moderate overlap (model assumes 1000ms); (2) Strong overlap (model assumes 300ms). By treating the process in two steps and assigning a probability for each step, Magliano et al. produced simulations which predict negative activation levels for inferences. In essence, the model demonstrates how lexical decision judgements result in negative activation scores, even when an inference category is sometimes generated on-line.
pattern of activation across the rate of word presentation, the interval between the last word in a sentence and the test word, and the inference categories. The results show that activation scores for the causal antecedent inferences were above zero, but only at least 400ms after lexical targets appeared on screen, and that the activation scores for the causal consequence inferences were nearly always negative. These results indicate that there was a threshold of 400 ms after stimulus presentation before causal antecedents were generated on-line. In contrast, the causal consequence inferences were not generated on-line.

One of the implications of Magliano et al.'s study is that after being told that something has happened, people tend to seek for an explanation why it happened, rather than a description of what happened next. Magliano et al. suggest that causal consequence inferences can only be generated when the context allows for only a couple of possible outcomes rather than several alternatives. Therefore, in the cases of (76) and (77), subjects should be more likely to choose the interpretations such as (104) and (105) than (78) and (79), unless there are enough contextual constraints to exclude (104) and (105).

If Magliano et al.'s view is correct, it is clear that if the speaker indeed intends to communicate (78) and (79) by saying (76) and (77) respectively, by doing so, she is asking the hearer to make unjustifiable effort in processing these utterances, and therefore, it would not be consistent with the principle of relevance, at least in questionnaire situations. Stylistically, (76) and (77) are infelicitous when used to communicate (78) and (79). What the speaker can do to avoid this situation is to make the contextual assumptions required to reach the 'Cause-consequence' interpretation more accessible, or to block the route to the 'Explanation' interpretation completely by, for example, using a connective in a following way:
(110) Sara left England for Australia. However, she hates the sandy beaches.
(111) Sara left Australia for England. However, she hates the sandy beaches.

The results of my questionnaire for these utterances show that such blocking actually happened:

<table>
<thead>
<tr>
<th></th>
<th>England</th>
<th>Australia</th>
</tr>
</thead>
<tbody>
<tr>
<td>(110)</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>(111)</td>
<td>100%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Sanders et al.'s account of utterance interpretation is one step ahead of other coherence-based accounts in the sense that it actually offers a mechanism for singling out a unique coherence relation among all the possible ones. However, their mechanism, the ordered accessibility of coherence relations, is inadequate as illustrated above. Relevance theory claims that when an utterance has more than one sufficiently plausible interpretation, the hearer should choose the one which is consistent with the principle of relevance - usually the one which requires less processing effort. There are various factors which affect overall processing effort, one of which is the accessibility of contextual assumptions. As demonstrated above, this crucially affects the overall accessibility of interpretations, and the interpretation chosen by the hearer can change dramatically if it is somehow manipulated by the speaker: for example, by using explicit linguistic indicators such as connectives. What this seems to show is that no fixed accessibility of coherence relations as such exists, and that our interpretation system is more fluid than Sanders et al. would have imagined.
6. Summary

In this chapter, I have examined several accounts of the stylistic acceptability of bridging cases, which suggest that factors such as the following crucially affect the hearer’s judgements of style:

- plausibility of the bridge
- shortness of the bridge
- computability of the bridge
- accessibility of candidate referents (‘focus’ or ‘topic’)
- accessibility of coherence relations

Each account discussed uses one or several of these factors to explain why some bridging cases are acceptable and others are less so.

It was argued that none of the existing accounts is satisfactory as it stands. Also, more crucially, it was demonstrated that an alternative account based on relevance theory, in which various factors including those mentioned above are considered to contribute to overall processing effort, which in turn affects acceptability, can solve the problems other accounts cannot handle.

At the beginning, I suggested the following hypothesis based on the definition of optimal relevance:

A hearer will find a given bridging reference stylistically infelicitous in the following conditions:

(i) when it is obvious that there is a better (i.e. more economical) way of achieving the intended effects;
(ii) when it is impossible for the hearer to decide what are the intended effects.

Various examples cited in this chapter, mainly from my three
questionnaires, confirmed that the cases judged to be unacceptable indeed fit either or both of these conditions. Thus, my above claim was confirmed: when a bridging case is judged unacceptable, this is because the speaker is failing to achieve optimal relevance, either by asking the hearer to expend unjustifiable processing effort, or by failing to achieve adequate contextual effects. It was also suggested that the speaker could increase the acceptability of such an utterance by making the intended set of contextual assumptions more accessible, or by creating a situation in which it is the most economical way of achieving the intended effects. As one way of increasing the accessibility of the intended sets of contextual assumptions, the use of connectives was suggested and tested. The questionnaire results confirmed that the acceptability of some cases was indeed dramatically increased when an appropriate connective was added.
Chapter 6  Conclusions

1. Introduction

In this final chapter, I will draw together some of the conclusions of this thesis. I will also point out some limitations, and outline further issues which will have to be left for future research.

2. Conclusions and Limitations

This thesis examines factors affecting the success or failure of bridging reference assignment, from two different angles: (a) factors affecting the resolution of bridging; (b) factors affecting the appropriateness or stylistic acceptability of bridging. The two most important factors, the accessibility of candidate referents and the accessibility of contextual assumptions were chosen for detailed investigation. I also investigated various possible pragmatic criteria that might interact with accessibility factors in bridging, and tried to show that the relevance-theoretic criterion of consistency with the principle of relevance offers better explanations of a wide range of examples than any other existing accounts.

As regards the resolution of bridging, there is no doubt that the accessibility of candidate referents (investigated by e.g. Erku & Gundel 1987; Gernsbacher and Hargreaves 1988; Grosz et al. 1995; Sidner 1983a) and the accessibility of contextual assumptions (examined by e.g. Magliano et al. 1993; McKoon & Ratcliff 1992; Sanford & Garrod 1981) indeed affect the outcome in a wide variety of cases. However, I have tried to show that even accounts which place major emphasis on accessibility factors must nonetheless involve some pragmatic criterion (e.g. of truth or coherence) with which hearers can evaluate the resulting interpretation, and either accept it or
reject it. I have argued that the best way to accommodate all the factors affecting bridging reference assignment is to regard each of them as contributing to the contextual effects and processing effort required to reach an acceptable overall interpretation, i.e. an interpretation consistent with the principle of relevance. In this way, the important work done by previous scholars can be integrated into an explanatory general account.

One of my main conclusions was that various proposed criteria which have been seen as interacting with accessibility factors in bridging failed to handle crucial cases. In particular, truth-based and coherence-based criteria at best work only for particular types of example. By contrast, I argued that the criterion of consistency with the principle of relevance could explain cases for which those alternative criteria failed. I conducted some questionnaires designed to test acceptability judgements and preferred interpretations for various types of bridging. The following hypothesis, which is based on consideration of relevance, was confirmed:

A hearer will find a given bridging reference stylistically infelicitous in the following conditions:

(i) when it is obvious that there is a better (i.e. more economical) way of achieving the intended effects;
(ii) when it is impossible for the hearer to decide what are the intended effects.

It was suggested that, by paying attention to these factors, the acceptability of bridging can be manipulated. For example, the speaker can increase the acceptability of some cases by making more accessible the intended set of contextual assumptions, and for this, the use of appropriate connectives seems to be effective.
Having briefly summarised the contents of the thesis, let me now turn to issues. In the first chapter, I introduced five main questions which the thesis was intended to address. In what follows, I will summarise my answers to each question.

**Q1. How can bridging reference be defined?**

In the literature, the terms 'bridging reference' and 'bridging implicature' have been used very broadly, and in different ways by different authors. I have suggested the following cognitive definition of bridging implicature: a bridging implicature is a contextual assumption, warranted by the explicit content of previous discourse, needed to introduce an intended referent which has not itself been explicitly mentioned.

According to this definition, bridging implicatures are distinguished from inferences required for other types of reference assignment. For example, a definite noun phrase which shares a noun with its antecedent does not require a bridging implicature, since there is no need to introduce a new entity to act as antecedent. Also, a definite noun phrase which redescribes its antecedent does not require a bridging implicature (although it requires a different type of implicature), since there is no need to introduce a new entity.

It was also suggested that bridging implicatures, which are derived from encyclopaedic knowledge, should be distinguished from logical entailments. However, this suggestion needs to be developed further. When the existence of a newly introduced object is logically entailed by a previously mentioned expression, as in the following example, there is no phonetically realised antecedent in the previous discourse, which makes it look like a case of bridging:

(1) Mary dressed the baby. The clothes were made of pink
However, it might be felt that logical entailments fall on the explicit rather than the implicit side, and should therefore not be regarded as implicatures at all. Sperber & Wilson (personal communication) suggest that entailments should not be treated as necessarily distinct from implicatures. The present research leaves this question open, as a matter for future research.

Q2. What are the factors affecting bridging reference assignment?

As noted above, research on reference assignment suggests that there are two major factors which affect it. One is the accessibility of candidate referents and the other is the accessibility of contextual assumptions. This thesis surveys previous work on these factors and agrees that they do indeed make a major contribution to bridging reference assignment.

The main claim I have made here is that a further crucial factor affecting bridging reference assignment is the criterion of consistency with the principle of relevance proposed by Sperber & Wilson (1986). This allows us to accommodate all the factors affecting assignment of bridging reference within a single overall framework which integrates all the factors affecting processing effort and all those affecting contextual effects.

Other existing accounts which single out particular factors affecting bridging reference assignment (e.g. Sidner's focus-based account and Sanford & Garrod's scenario-based account), were tested against sets of examples, and none of them turned out to be adequate on its own. I have tried to show that by contrast, a relevance-theoretic account can deal with the full range of examples in cognitively plausible terms.

The examples of bridging used to test different accounts
were constructed in such a way that each has more than one candidate referent, and by varying the examples, I was able to check the predictions of different criteria for evaluating alternative possible interpretations. Question 5 addresses this issue in more detail.

The thesis also emphasises the important role of contextual assumptions in constructing and evaluating possible interpretations. This has been taken for granted in many studies, but has not been examined seriously outside scenario-based or script-based accounts. Here, I have tried to show that contextual assumptions can be both more idiosyncratic and more flexible than is suggested by such accounts, and have emphasised the role played by considerations of relevance in their construction and selection.

For the future, this thesis suggests that more research on factors affecting individual and cross-cultural differences in accessibility of contextual assumptions might contribute to a better understanding of relevance-based communication. There are some existing hypotheses about what makes some assumptions more accessible than others: for example, Anderson et al. (1977) claim that encyclopaedic knowledge affects the interpretation of ambiguous texts; Reynolds et al. (1982) claim that different cultural backgrounds lead to the use of different contextual assumptions in interpreting ambiguous texts; and much research on children and old people suggests that age affects ease of accessing certain assumptions (see Singer 1994: 501-502). Relevance theory claims that characteristic misunderstandings will occur if, in such circumstances, the hearer simply chooses the interpretation which is optimally relevant to him individually. Thus, it provides a theoretical framework for investigating individual and cross-cultural differences in preferred interpretation, and would explain such difference in terms of different accessibility of contextual assumptions.
Q3. What is actually going on during the bridging process?

This thesis suggests that there are two different steps involved in the interpretation of bridging: the first is to construct the required bridging implicature; the second is to evaluate resulting overall interpretation, and accept or reject it on the basis of some pragmatic criterion.

In the literature, studies of bridging reference assignment have concentrated more on the issue of what is involved in the construction of bridging implicatures, than on what pragmatic criterion is involved in the evaluation process. The two main pragmatic criteria that have been proposed are those of truth (factual plausibility) and coherence. I argued that both were inadequate. Here I will sum up my arguments about the truth-based criterion. One problem is that when there is more than one roughly equally accessible candidate referent, as in (2), a criterion which says merely 'choose a true interpretation' cannot decide which is the intended one. When there are two candidate referents, one of which leads to a perfectly plausible overall interpretation, while the other results in a less plausible interpretation, as in (3), a criterion which says 'choose the most plausible interpretation' will invariably reject the second of these:

(2) John Major succeeded Margaret Thatcher. The government's policy was just as disappointing.

(3) I moved from Brixton to St. John's Wood. The rent was less expensive.

For (2), the preferred interpretation for most people is that John Major's government's policy was just as disappointing as Margaret Thatcher's, and for (3), the preferred interpretation for
most people is that the rent in St. John's Wood was less expensive than in Brixton. The criterion of consistency with the principle of relevance explains these preferences in a way that truth-based criteria do not. In (2), one interpretation is preferred although truth-based criteria cannot choose between them, in (3), hearers prefer the interpretation that is less likely to be true, despite the prediction of the truth-based account.

Recently, psychologists have begun to recognise the importance of the evaluation process in reference assignment. A series of works by Singer (1993, 1994, 1995) deserves mentioning here. Singer proposes a 'validation model' of comprehension, which claims that an 'inferential bridge must be validated with reference to relevant world knowledge before it is accepted by the reader' (1995:242). One of his hypotheses is that 'the reader cannot tell, a priori, whether a tentative bridging inference [i.e. causal inference] is valid or not' (my addition in square brackets), and this is confirmed by a reading-time experiment reported in Singer (1993), using sets of materials such as the following:

(4) Mark poured the bucket of water on the bonfire. The bonfire went out.
(5) Mark poured the bucket of water on the bonfire. The bonfire grew hotter.

The second part of (4) is a consistent follow-up to the first part, while the second part of (5) is not. The reading time was slower for (5) than (4). Singer concludes that the result suggests that 'the processes associated with detecting causal inconsistency are time consuming' (Singer 1995: 250). Although his work is so far based on the assumption that a truth-based criterion is adequate on its own, an assumption which I have

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13Singer uses the term 'bridging' to refer to causal inferences, which is different from what I mean by 'bridging'.

279
rejected, it is a useful starting point for further research on the evaluation process. In particular, this thesis suggests that there is a need for further experimental research to test the adequacy of the truth-based criterion, and for this, some of the examples discussed in this thesis, in which there are more than one set of possible inferences, yielding sets of equally plausible overall interpretations, might be useful as test materials.

As regards the construction of bridging implicatures, the central question so far has been when it is constructed. This thesis tested the view, represented by Sanford & Garrod’s scenario-based account, that the existence of the antecedent for bridging reference is inferred (at least as a slot) before the hearer actually encounters the bridging reference. It was argued that their account has serious theoretical limitations. I also tried to show that their scenario-based account is not flexible enough to handle the full range of cases of bridging: it cannot explain (a) cases where there is more than one candidate referent in a given scenario; (b) cases where there is more than one scenario evoked by the previous discourse, each involving a potential referent; (c) cases where a bridging reference is used to refer to something which might not be represented in the scenario being activated. I have argued that Sanford & Garrod’s view that bridging implicatures are forward inferences except where the topic of the discourse changes is too strong, and suggested that a relevance-theoretic account of bridging might shed some light on the issue in the following way. Relevance theory assumes that in order for the hearer to construct the intended set of contextual assumptions, not only situation-based information, but also more idiosyncratic assumptions, including some which the hearer has never constructed before, might be required. Obviously, this assumption is more compatible with the view that a fair range of bridging implicatures are backward inferences, drawn after all the explicit linguistic clues become available to the hearer, than with the view held by Sanford &
Garrod. I conclude that although situationally organised knowledge plays an important role in facilitation of language processing, this role is only partial and such knowledge best utilised in combination with more idiosyncratic encyclopaedic knowledge in a way that is flexible to suit each individual situation. For some people, this proposal might seem so unconstrained that it risks an inferential explosion. I have suggested that in relevance-oriented communication, assumptions which are doomed to be wasted will not normally be constructed, and if constructed, may lead to a hearer’s judgement of stylistic infelicity or a failure of communication.

Finally, let me note that scenarios might also play an important role in the evaluation process, although such information is not adequate on its own (for example, it fails when there are two candidate referents, both of which yield interpretations which are consistent with the given context). Thus, in a relevance theoretic framework, units such as scenarios are seen as specific types of information chunk, among many others, all of which have two important roles: they might form part of the assumptions needed to achieve an acceptable overall interpretation; they might also form part of the assumptions against which the overall interpretation is evaluated, in terms of whether it satisfies the criterion of consistency with the principle of relevance.

Q4. What makes some cases of bridging appropriate and others inappropriate?

In the existing literature, little research has been done on the stylistic appropriateness of bridging. Even existing research on the subject discusses only a limited range of cases (e.g. Clark & Haviland 1977; Erku & Gundel 1987). The present research looks at a range of new types of examples, and offers experimental evidence of an audience’s preferred interpretations.
I have argued that an adequate pragmatic criterion for explaining the stylistic appropriateness of bridging is the criterion of the consistency with the principle of relevance. Three questionnaires were carried out to test subjects' choices of referent and acceptability judgements in bridging cases. The results of the questionnaires clearly support my claim.

Other existing accounts were examined in detail, and the results of the questionnaires were used to test their predictions. I looked at two versions of the truth-based criterion: the first, represented by Clark, defines an assumption as plausible if the audience would be likely to accept it as true given that they were told it, and the second, represented by Sanford & Garrod, defines an assumption as plausible if it is plausibly inferable from the previous discourse. Both versions typically fail when there are two candidate referents, which lead to two interpretations which are roughly equally plausible. A criterion based solely on accessibility of candidate referents fail§ when the preferred referent is a NP which is not the most accessible. A coherence-based criterion fail§ when there is more than one coherent overall interpretation, and hearers make systematic choices not predicted by coherence-based frameworks (which are also rather undeveloped from a theoretical point of view).

Following Wilson (1992), this thesis proposes the following hypothesis, which has been confirmed by the evidence from the questionnaires mentioned above:

A hearer will find a given bridging reference stylistically infelicitous in the following conditions:

(i) when it is obvious that there is a better (i.e. more economical) way of achieving the intended effects;
(ii) when it is impossible for the hearer to decide what
are the intended effects.

What follows from this hypothesis is that the acceptability of cases which potentially violate one of these conditions can be increased if, (a) a situation is engineered so that they provide the most economical way of achieving the intended effects, or (b) the intended set of contextual assumptions, required to identify the intended contextual effects, are made more accessible. How conditions (a) and (b) can be manipulated was illustrated in the thesis. In addition, the results of the questionnaires confirmed Blakemore's claim that connectives have the function of constraining contextual assumptions, which is of course useful for increasing the acceptability of potentially less acceptable cases.

Q5. How are interpretations evaluated? When there is more than one candidate referent, how is the right one selected?

These are the questions which my previous answers have led up to, and which are raised throughout this thesis. Partial answers have already been offered in dealing with questions 2, 3 and 4.

As noted under Q3, investigations into the evaluation process for reference assignment have only just started. This thesis challenges the widely held view that a truth-based pragmatic criterion is adequate on its own for evaluating the results of reference assignment, and claims that the alternative criterion of consistency with the principle of relevance will yield more satisfactory results.

To demonstrate this claim, various examples of bridging were constructed, which share one common feature: there is more than one candidate referent available. Examples of this type force the hearer to test both candidates against some
pragmatic criterion and accept one and reject the other accordingly. As I have shown, both throughout the thesis and in this brief conclusion, the evidence is that truth-based and coherence-based criteria are not adequate to deal with the full range of examples.

This thesis claims, using the framework of relevance theory, that when a hearer has to choose the intended referent from a range of potential candidates, he should choose the one which leads to an overall interpretation which is consistent with the principle of relevance. What follows from this is that: (a) when an utterance has two accessible interpretations, both of which yield enough contextual effects, the hearer should choose the one which manifestly requires less processing effort: this is in turn determined largely by accessibility of candidate referents and accessibility of contextual assumptions (as illustrated in (6) below); (b) when an utterance has two accessible interpretations, only one of which yields enough contextual effects, the hearer should choose this interpretation (as illustrated in (7) below); (c) when an utterance has two accessible interpretations, one of which is plausible but requires more processing effort if it is to yield enough contextual effects, and the other of which is less plausible but manifestly requires much less processing effort if it is to yield adequate contextual effects, the hearer should choose the one which requires less effort (as illustrated in (8) below):

(6) Sara left England for Australia. She hates the sandy beaches.

(6') Sara hates the sandy beaches in England.

(6") Sara hates the sandy beaches in Australia.

(7) John Major succeeded Margaret Thatcher. The government's policy was just as disappointing.
(7') John Major's government's policy was just as disappointing as Margaret Thatcher's.

(7'') Margaret Thatcher's government's policy was just as disappointing as John Major's.

(8) Jane moved from California to Manchester. She loves the warm winters.

(8') Jane loves the warm winters in Manchester.

(8'') Jane loves the warm winters in California.

Here, (6'), (7') and (8') are the interpretation claimed to be consistent with the principle of relevance (although in the case of (6'), and alternative interpretation is possible if the contextual assumptions required for (6'') are more accessible to the hearer. Needless to say, in cases where there are two accessible interpretations, only one of which is plausible and yields enough contextual effects, the hearer should choose this interpretation, as illustrated in (9):

(9) Jane moved from Manchester to California. She loves the warm winters.

(9') Jane loves the warm winters in California.

(9'') Jane loves the warm winters in Manchester.

One approach which goes beyond truth-based criteria is the coherence-based approach, which claims that the hearer should choose the interpretation which is coherent with the previous discourse. In such an approach, where coherence is generally defined in terms of coherence relations, some mechanism of singling out one coherence relation among all the possible ones is vital, but so far, few attempts at providing such a mechanism have been made. One of them is Sanders et al. (1992). However, their mechanism, based on the accessibility of coherence
relations, was found inadequate in this thesis: their coherence-based criterion failed to predict the hearer's choice of interpretation across the full range of examples.

I have not, of course, considered all possible approaches to bridging in this thesis. In particular, I have largely ignored the most recent computational accounts - or at least those arising out of discourse representation theory (e.g. Lascarides & Asher 1991; Lascarides & Oberlander 1993) which explicitly defer questions of psychological plausibility until a later date. I have chosen instead to look at more cognitively oriented approaches to bridging, which seem to me to raise more interesting issues in the current state of research. In this area, I hope I have shown that relevance theory can make a useful contribution, on both descriptive and explanatory grounds.
Appendix

Here, I will give a brief report of the three questionnaires carried out in relation to this thesis. Since the most relevant implications of the results have already been discussed in the thesis, the report here concentrates on other details of the questionnaires. A list of all the materials used in the questionnaires will be given in the last section.

Questionnaire A

This questionnaire was designed to see if different degrees of factual plausibility of possible interpretations of bridging cases influences subjects' acceptability judgements. In this questionnaire, subjects were asked to rate the acceptability of sets of sentences such as (1), using a seven-point scale, where 7 was highly acceptable and 1 was not acceptable:

(1) a. I went to see Swan Lake last night. The black swan was marvellous.
    b. I went to see a Tchaikovsky ballet last night. The black swan was marvellous.
    c. I went to see a ballet last night. The black swan was marvellous.
    d. I went out with friends last night. The black swan was marvellous.

Method

13 students at University College London were asked to read short two-sentence passages and to choose one point on a seven-point scale of acceptability for each instance. Each
subject received a booklet which contained 15 sets of sentences, and was instructed to give a ranking immediately after reading the sentence in question. No time limit was imposed.

Each set was constructed so that it consists of four two-sentence passages which differ in degree of plausibility: one in which the referent of the bridging reference is plausibly inferable from the context given in the first sentence (and hence the resulting interpretation is also plausible), one in which the referent of the bridging reference cannot be plausibly found in the context given in the first sentence (hence it is impossible to find any plausible interpretation for it), and two whose plausibility ranking is somewhere between the two extremes. These 4 passages were presented in random order within each set in the booklet given to subjects.

15 sets of materials were made up, with three sub-sets. The first 5 sets, which I call group A, were constructed so that in order to understand them, subjects need to infer the existence of the item referred to by the bridging reference in the context given by the first sentence. In terms of structure, 4 passages in each set in this category have the same second sentence with different first sentences. The next 5 sets, which I call group B, were constructed so that they require subjects to extend the context given by the first sentence in order to accommodate the item referred to by the bridging reference, as in (1). The last 5 sets, which I call group C, were similar to group A in that they require subjects to infer the existence of the entity referred to by the bridging reference, but different from it in that 4 passages in each set share the same first sentence with different second sentences.

Results

There was a significant difference in acceptability ranking
between condition 1 (most plausible) and condition 4 (least plausible). Also, the difference in acceptability ranking between each condition was significant (both by Friedman test). The mean rating score and mean rank for the 15 material sets are shown in Table 2.

Questionnaire B

This questionnaire was designed to test the choice of intended referent between two available candidates. The effect of connectives on the choice of referent was also tested, and most of the passages had two versions: one with an appropriate connective at the beginning of the sentence containing the bridging reference and the other with no connective (except for those such as (3), where the two versions were differentiated by the title of the passage). Subjects were asked to read a passage such as (2)-(4), and to answer two questions for each passage:

(2) Mary moved from Brixton to St. John's Wood. [Nevertheless,] The rent was less expensive.

Question 1: Where was the rent less expensive? Question 2: In general, where do you pay less rent, Brixton or St. John's Wood?

(3) [Giving up teaching]
I had been working at the local school for 4 years by then. I liked teaching, but I was beginning to feel that the job was physically too demanding for me. One evening, after teaching all day, I was to meet some friends to discuss whether I should continue or not. I arrived half an hour late because I got stuck in the tube on the way. Nothing annoyed me as much as the noisy children.
Question 1: Where was the speaker annoyed by the noisy children?
Question 2: In general, which do you associate noisy children with more strongly, a school or a tube?

(4) I prefer Italy to England. [However,] The weather is worse.

Question 1: Where is the weather worse, according to the speaker?
Question 2: In general, where would you expect the weather to be worse, in Italy or England?

Method

40 subjects, who were staff and students at the University of London, were asked to answer Questionnaire B. Subjects were given a booklet which contained four passages (one per page), each of which was followed by two questions (one per page). There were eight versions of the booklet, each of which contained a different set of passages. Subjects were instructed not to go back to the previous pages, and therefore, to make sure that they had understood each passage before they moved on to the questions. They were also instructed not to go back to Question 1 once they started answering Question 2. No time limit was imposed.

Three different types of materials were constructed. The first type, which I call group A, was designed to see if a criterion based on truth (factual plausibility, see Chapter 5 in this thesis or Clark & Haviland 1977) can be overridden by other factors affecting the choice of the intended referent (e.g.
accessibility of candidate referents). Passages in this group were constructed so that the preferred candidate referent in each passage leads to a less plausible overall interpretation than the resulting interpretation of the alternative candidate referent, as in (2). The second type, which I call group B, was designed to see if subjects use the strong notion of plausibility used by Sanford & Garrod, i.e. the bridging assumption must be plausibly inferable by someone who has only heard the first part of the utterance (see Chapter 5 in this thesis or Sanford & Garrod 1981), in order to choose the intended referent. Passages in this group were constructed so that they are strongly biased towards a particular scenario indicated by the titles. In addition, in order to see to what extent the title itself affects the choice of interpretation, a second version of each passage, without a title was constructed. Each passage has two candidate referents, one of which is a scenario-induced entity and the other is not: for example, in (3), the bridging reference is 'the children' and the scenario-induced candidate referent is 'school' (mention of which enables subjects to infer the existence of children, according to Sanford & Garrod) and the non-scenario-induced candidate referent is 'tube' (mention of which does not enable subjects to infer the existence of children). Care was taken to construct a context in which a non-scenario-induced candidate referent appears naturally in the passage and stays more accessible than the scenario-induced candidate referent until the sentence which contains the bridging reference is processed by subjects. The third type, which I call group C, was designed to test the choice of the intended referent when there are two candidate referents, in a similar way to group A. However, this group is different from group A in that it includes cases such that one of the two candidate referents is clearly much more accessible than the other, for various reasons, but results in a much less plausible overall interpretation, as in (4). It was also different from group A in the following sense:
whereas passages in group A contained a second sentence which is more likely to be seen as giving a positive reason/consequence for the event described in the first sentence, some of the passages in group C contained a second sentence which is more likely to be seen as giving a negative reason/consequence for the event described in the first sentence, as in (4). For each passage in group A and C, a second version, with a connective which makes one interpretation more accessible than the other was constructed.

Results

Table 3 shows the percentage of subjects' choices of referent for each passage used in Questionnaire B. For passages in group A, the majority of subjects chose the referent whose resulting overall interpretation is less plausible than the resulting interpretation of the alternative candidate referent. This implies that criterion of truth (factual plausibility) is not the ultimate criterion for choosing the intended referent, but merely one of the factors affecting such choices.

For passages in group B, the majority of subjects chose a non-scenario-induced candidate referent as the intended referent. The implication of this result is that Sanford & Garrod's notion of plausibility, i.e. that the bridging assumption must be plausibly inferable by someone who has only heard the first part of the utterance, is too strong. There was no significance difference between the two versions of the passages (with or without a title).

The results for the passages in group C were similar to those for group A. As for the cases where one of the two candidate referents was much more accessible than the other but results in a much less plausible overall interpretation, the subjects' choices of the intended referent was either one-sided or divided. When the choices were one-sided, subjects were
more likely to choose the more accessible candidate referent.

Finally, for passages in groups A and B, the choices of referent were clearly affected by the use of connectives.

**Questionnaire C**

Questionnaire C was an extension of Questionnaire B (groups A and C) and was designed to test subjects’ choices of intended referent when there are two candidate referents. It included materials such as (5) and (6), in which one of the two candidate referents is more accessible than the other, but results in varying degrees to a less plausible overall interpretation. It was also designed to see in what conditions subjects find a passage stylistically infelicitous. Subjects were asked to read passages such as (5) and (6), to answer a question about each passage, and to judge whether the passage is stylistically awkward:

(5) I prefer London to Edinburgh. [However,] I love the snowy winters.
    Question: Where does the speaker love the snowy winters?

(6) Jane moved from Manchester to California. [However,] She hates the warm winters.
    Question: Where does Jane hate the warm winters?

**Method**

24 subjects, who were first year linguistics students at UCL, participated in Questionnaire C. They received two booklets: Booklet 1 contained 9 passages without connectives (one per page) and Booklet 2 contained 9 passages with connectives (one
per page). They were instructed to start with Booklet 1, to read each passages carefully and answer the question about the passage, which was placed on the following page. They were also instructed to write down their stylistic judgements after answering the question, if they found any passage awkward in style. They were encouraged to give a brief explanation for why they found the passage infelicitous. Finally, they were instructed to proceed to Booklet 2 after finishing Booklet 1, and to complete it in the same manner as for Booklet 1. No time limit was imposed. There were four versions of the booklets, each containing different passages.

Passages were constructed so that they contain two candidate referents, one of which is to varying degrees more accessible than the other. The plausibility of the resulting interpretation of each candidate referent was manipulated, with the most straightforward cases being those in which the more accessible candidate referent results in a plausible enough overall interpretation. It was predicted that subjects would find such cases stylistically felicitous. Among the less straightforward cases, the following two were of special interest: (a) cases in which the more accessible candidate referent results in a much less plausible overall interpretation than the other (as in (5) and (6)); (b) cases in which the differences in accessibility of candidate referents are relatively small and they result in equally plausible overall interpretations as in (7):

(7) Sara left England for Australia. [However,] She hates the sandy beaches.

Passages such as (5) and (6) were constructed to see whether subjects favour a more accessible candidate referent with a less plausible resulting overall interpretation over a less
accessible candidate referent with a more plausible resulting overall interpretation, or vice versa. It was predicted that in cases such as (5) and (6), some subjects might find the passage stylistically awkward. Passages such as (7) were constructed to see if either one of the candidate referents would be strongly favoured by subjects or not when, unlike (5) and (6), neither the accessibility factor nor the plausibility of the resulting overall interpretation favours a particular one. The results were to be compared with predictions made within the following accounts of bridging: accounts using the truth-based criterion (Clark 1977; Sanford & Garrod 1981); accounts based on the accessibility of candidate referents (Erku & Gundel 1987); accounts based on the accessibility of candidate referents and a truth-based criterion (Sidner 1983a, b); and accounts based on the notion of coherence (Hobbs 1979; Sanders et al. 1992).

Results

Table 4 shows the percentage of subjects' choices of referent for each passage. Similar results to Questionnaire B (group A and C) were found: when there are two candidate referents, one of which is much more accessible than the other but results in a much less plausible overall interpretation, subjects' choice was either one-sided or divided with judgements of stylistic infelicity. On the other hand, when there are two candidate referents with a smaller difference in accessibility and no difference in plausibility of the resulting overall interpretation, subjects' choice was also either one-sided or divided, but with fewer subjects who judged them stylistically infelicitous. Beyond these generalisations, I believe that the results of this questionnaire can only be properly analysed on a case-by-case basis, and the first such attempt was given in Chapter 5.
1. Materials used in Questionnaire A

A-1
1  Jane saw a Japanese wedding. The kimono was beautiful.
2  Jane went to see the bride. The kimono was beautiful.
3  Jane was watching the TV. The kimono was beautiful.
4  Jane went into the room. The kimono was beautiful.

A-2
1  He moved to Ealing last year. The rent was incredibly cheap.
2  He didn’t have his own kitchen. The rent was incredibly cheap.
3  He goes to a launderette once a week. The rent was incredibly cheap.
4  He stopped smoking suddenly. The rent was incredibly cheap.

A-3
1  John won the prize in a quiz show. The cruise down the Nile was excellent.
2  John was dreaming last night. The cruise down the Nile was excellent.
3  John bought a new TV with a large screen. The cruise down the Nile was excellent.
4  John lost his job last month. The cruise down the Nile was excellent.

A-4
1  Mary went to her favorite restaurant. The waiter was very charming.
2  Fiona had too much wine last evening. The waiter was very charming.
3  Jane gained weight suddenly. The waiter was very
charming.

4 Rachel lost weight suddenly. The waiter was very charming.

A-5
1 John stumbled against the table. The coffee spilled over his trousers.
2 John was hardly awake. The coffee spilled over his trousers.
3 John was having a date with Jane. The coffee spilled over his trousers.
4 John went to see a film. The coffee spilled over his trousers.

B-1
1 I went to see Swan Lake last night. The black swan was marvellous.
2 I went to see a Tchaikovsky ballet last night. The black swan was marvellous.
3 I went to see a ballet last night. The black swan was marvellous.
4 I went out with friends last night. The black swan was marvellous.

B-2
1 I went to see Jurassic Park. The dinosaurs looked real.
2 I went to see Spielberg’s film. The dinosaurs looked real.
3 I went to see a film. The dinosaurs looked real.
4 I went out with friends. The dinosaurs looked real.

B-3
1 I was looking at van Gogh’s self-portrait. The missing ear made me feel sad.
2 I went to see some impressionist paintings. The missing
ear made me feel sad.

3 I went to a gallery yesterday. The missing ear made me feel sad.

4 I spent all day in London. The missing ear made me feel sad.

B-4
1 I went to see The Phantom of the Opera. The phantom seemed to have a cold.
2 I went to see Lloyd Webber’s musical. The phantom seemed to have a cold.
3 I went to see a musical last evening. The phantom seemed to have a cold.
4 I went out with Japanese friends. The phantom seemed to have a cold.

B-5
1 I went to see Madam Butterfly. The kimono was beautiful.
2 I went to see a Puccini opera. The kimono was beautiful.
3 I went to see an opera. The kimono was beautiful.
4 I went out with friends. The kimono was beautiful.

C-1
1 John was on his way home in Clapham. The traffic was very heavy.
2 John was on his way home in Clapham. The bus did not come immediately.
3 John was on his way home in Clapham. The mugger was carrying a gun.
4 John was on his way home in Clapham. The policeman was very sympathetic.

C-2
1 Peter went to a Japanese restaurant. The waitress was
from Osaka.
2 Peter went to a Japanese restaurant. The cashier was very friendly.
3 Peter went to a Japanese restaurant. The poison was from the fish.
4 Peter went to a Japanese restaurant. The ambulance came in ten minutes.

C-3
1 Jane spent her holiday skiing in France. The snow was excellent.
2 Jane spent her holiday skiing in France. The video recording was successful.
3 Jane spent her holiday skiing in France. The leg injury was quite serious.
4 Jane spent her holiday skiing in France. The doctor was very kind.

C-4
1 Kate was shopping in Selfridges. The food section was very crowded.
2 Kate was shopping in Selfridges. The sushi looked delicious.
3 Kate was shopping in Selfridges. The pickpocket was too quick to catch.
4 Kate was shopping in Selfridges. The policewoman was very kind.

C-5
1 Angela came back from her holiday in Hong Kong. The plane fare cost a fortune.
2 Angela came back from her holiday in Hong Kong. The answering machine was full of messages.
3 Angela came back from her holiday in Hong Kong. The
burglar did not take her diamond ring.

4 Angela came back from her holiday in Hong Kong. The policeman was very kind.

2. Passages & questions for Questionnaire B

Group A

1. Mary moved from Brixton to St. John’s Wood. [Nevertheless] The rent was less expensive.

Question: 1. Where was the rent less expensive?
2. In general, where do you pay less rent, Brixton or St John’s Wood?

2. We took a taxi to the airport this year although we used a bus last year. [Nevertheless] The fare was less expensive.

Question: 1. Which fare was less expensive?
2. In general, which costs less, a taxi or a bus?

3. Mike changed his job from house-husband to stockbroker. [Nevertheless] The stress was not so bad.

Question: 1. In which job was the stress not so bad?
2. In general, which job is more stressful, that of house-husband or that of stockbroker?

4. I prefer the restaurant on the corner to the student canteen. [Moreover] The cappuccino is less expensive.

Question: 1. Where is the cappuccino less expensive?
2. In general, where do you get less expensive cappuccino, a student canteen or a restaurant?
Group B

1. [Going to a concert]
   We went to a concert last Friday. We were looking forward to it very much, since we haven’t been to one for about six months. We met for a drink in the City first at about half past five. Unfortunately, we had to miss the first half of the programme, because we were stuck in a lift for half an hour on our way. The music was very loud.

Question: 1. Where did the speaker hear the music?
   2. In general, which do you associate music with more strongly, a lift or a concert?

2. [Arriving at a hotel in Paris]
   I went to Paris last summer. I had booked to stay at the Hilton. I arrived at the airport on a very hot day and a friend of mine picked me up there. We were planning to have lunch at the hotel with some other friends. Unfortunately, we couldn’t make it because we were stuck in the friend’s car for about two hours before we got to the Hilton. I was glad of the air conditioner.

Question: 1. Where was the air conditioner?
   2. In general, which do you associate an air-conditioner with more strongly, a car or a Hilton hotel?

3. [Giving up teaching]
   I had been working at the local state school for 4 years by then. I liked teaching, but I was beginning to feel that the job was physically too demanding for me. One evening,
after teaching all day, I was to meet some friends to discuss whether I should continue or not. I arrived half an hour late because I got stuck in the tube on the way. Nothing annoyed me as much as the noisy children.

Question: 1. Where was the speaker annoyed by the noisy children?
2. In general, which do you associate noisy children with more strongly, a school or a tube?

4. [Buying cosmetics]
I went to the cosmetics section at Harvey Nichols last Thursday. I went there because one of my friends, who always buys cosmetics there, asked me to help her to choose the color of her new lipstick. I left my flat early enough, but I arrived there half an hour late, because I was stuck in the tube for half an hour. I still can’t forget the smell of perfume.

Question: 1. Where was the smell of perfume?
2. In general, which do you associate the smell of perfume with more strongly, a tube or the cosmetics section of a department store?

Group C

1. (a) I prefer Italy to England. [Moreover,] The weather is better.
(b) I prefer England to Italy. [Moreover,] The weather is better.
(c) I prefer Italy to England. [However,] The weather is worse.
(d) I prefer England to Italy. [However,] The weather is worse.
2. (a) I left Italy for England. [Nevertheless,] The weather was better.
(b) I left England for Italy. [You see,] The weather was better.
(c) I left Italy for England. [However,] The weather was worse.
(d) I left England for Italy. [However,] The weather was worse.

Question: 1. Where is/was the weather better/worse, according to the speaker?
2. In general, where would you expect the weather to be better, in Italy or England?

3. Passages and questions for Questionnaire C

1 (a) I prefer Edinburgh to London. [Moreover,] I love the snowy winters.
(b) I prefer London to Edinburgh. [However,] I love the snowy winters.
(c) I prefer Edinburgh to London. [However,] I hate the showy winters.
(d) I prefer London to Edinburgh. [Moreover,] I hate the showy winters.

Question: Where does the speaker love/hate the snowy winters?

2 (a) I prefer Italy to England. [Moreover,] I love the pasta there.
(b) I prefer England to Italy. [However,] I love the pasta there.
(c) I prefer Italy to England. [However,] I hate the pasta there.
(d) I prefer England to Italy. [Moreover,] I hate the pasta there.

Question: Where does the speaker love/hate the pasta?

3
(a) I prefer the town to the country. [However,] The traffic doesn’t bother me.
(b) I prefer the country to the town. [However,] The traffic doesn’t bother me.
(c) I prefer the town to the country. [However,] The traffic really bothers me.
(d) I prefer the country to the town. [Moreover,] The traffic really bothers me.

Question: Where does the traffic not bother/bother the speaker?

4
(a) Jane moved from Manchester to California. [You see,] She loves the warm winters.
(b) Jane moved from California to Manchester. [However,] She loves the warm winters.
(c) Jane moved from Manchester to California. [However,] She hates the warm winters.
(d) Jane moved from California to Manchester. [You see,] She hates the warm winters.

Question: Where does Jane love/hate the warm winters?

5
(a) Kevin moved from England to New Zealand. [You see,] He hates the warm winters.
(b) Kevin moved from New Zealand to England. [However,] He loves the sheep.
(c) Kevin moved from England to New Zealand. [Nevertheless,] He hates the sheep.

(d) Kevin moved from New Zealand to England. [You see,] He hates the sheep.

Question: Where does Kevin love/hate the sheep?

6 (a) Peter left Morocco for Norway. [You see,] He loves the cool summers.

(b) Peter left Norway for Morocco. [However,] He loves the cool summers.

(c) Peter left Morocco for Norway. [However,] He hates the cool summers.

(d) Peter left Norway for Morocco. [You see,] He hates the cool summers.

Question: Where does Peter love/hate the cool summers?

7 (a) Sara left England for Australia. [You see,] She loves the sandy beaches.

(b) Sara left Australia for England. [Nevertheless,] She loves the sandy beaches.

(c) Sara left England for Australia. [However,] She hates the sandy beaches.

(d) Sara left Australia for England. [You see,] She hates the sandy beaches.

Question: Where does Sara love/hate the sandy beaches?

8 (a) Karen lived in Tokyo before moving to Los Angeles in 1985. [You see,] The high crime rate didn’t bother her.

(b) Karen lived in Los Angeles before moving to Tokyo in 1985. [Nevertheless,] The high crime rate didn’t bother her.
(c) Karen lived in Tokyo before moving to Los Angeles in 1985. [However,] The high crime rate really bothered her.

(d) Karen lived in Los Angeles before moving to Tokyo in 1985. [You see,] The high crime rate really bothered her.

Question: Where did the high crime rate not bother/bother Karen?

9 (a) John worked in England before moving to Hong Kong five years ago. [You see,] The humidity didn’t bother him.

(b) John worked in Hong Kong before moving to England five years ago. [However,] The humidity didn’t bother him.

(c) John worked in England before moving to Hong Kong five years ago. [However,] The humidity really bothered him.

(d) John worked in Hong Kong before moving to England five years ago. [You see,] The humidity really bothered him.

Question: Where did the humidity not bother/bother John?
Table 2  Results of Questionnaire A

Mean Rating and Mean Ranking of Acceptability Using a Seven-point Scale

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<thead>
<tr>
<th></th>
<th>Condition 1</th>
<th>Condition 2</th>
<th>Condition 3</th>
<th>Condition 4</th>
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Table 3  Results of Questionnaire B

Percentage of subjects' choices of referent

**Group A**

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Table 4  Results of Questionnaire C

Percentage of subjects’ choices of referent

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Note: Figures in brackets show the percentage of subjects who judged the passage stylistically infelicitous.
Bibliography


Clark, H. & Haviland, S.E. 1974. Psychological processes as


Hovy, E. & Maier. E. (forthcoming) Parsimonious or profligate:
how many and which discourse structure relations?


McKoon, G. & Ratcliff, R. 1989. Inferences about contextually
defined categories, in *Journal of Experimental Psychology: Learning, Memory, and Cognition* 15, 326-338.


Reynolds, R., Taylor, M., Steffensen, M., Shirey, L. and Anderson,


Sanford, A., Moar, K. & Garrod, S. 1988. Proper names as controllers of discourse focus, in Language and Speech 31/1, 43-56.


connections between thematically similar episodes, in Journal of Experimental Psychology: Learning, Memory, and Cognition 12, 220-231.


