EVENT PROCESSING FOR LANGUAGE:

AN INVESTIGATION OF THE

RELATIONSHIP BETWEEN EVENTS,

SENTENCES AND VERBS:

USING DATA FROM 6 PEOPLE WITH

NON-FLUENT APHASIA

LUCY TAMISIN DIPPER

PhD SPEECH SCIENCES

DEPARTMENT OF HUMAN COMMUNICATION SCIENCE

UNIVERSITY COLLEGE LONDON

1999
ABSTRACT

This thesis focuses on conceptualisation for language, or event processing, and identifies some of its key aspects. Five tasks were created in order to isolate various layers of conceptual processing: two video tasks requiring no language output; a further video task requiring verbs to be selected from a choice of three; an odd-one-out task with photographs of events; and a sentence judgement task. These tasks were performed by six people with non-fluent aphasia. A major finding was that there are some aspects of processing common to both language and non-language tasks. It is claimed that the linguistic system contains certain organising principles that enable information to be structured so that it is expressible in language. These organising principles can be seen to exert a strong influence on the conceptual system, even in non-language tasks. The results from the tasks also indicated five separable layers of conceptual processing: distinguishing events from non-events; identifying event type; identifying the relationship encoded by the event; identifying the roles played by participant entities; and identifying perspective. These aspects of processing may be selectively impaired in aphasia and methods for their independent assessment are discussed. The implications for the characterisation of conceptual processing and the relationship between conceptualisation and language are considered. In conclusion, the clinical implications of this finding are examined; in terms of stimulus materials for assessment and therapeutic intervention and in relation to functional communication.

ACKNOWLEDGEMENTS

I am extremely grateful to all the participants in this study, particularly to J.D., J.F., L.H., L.S., R.B., R.K. and their families. I am also grateful to everyone who has helped, supported or simply tolerated me during the last three years. There are some of you who deserve a particular ‘thank-you’: first and foremost, to Steve for your inimitable interest, support and love; to Lynne, for the proof-reading which began within hours of your return from holiday - that shows some style! - also to Jayash, for the regular phone-calls - “just to see how you’re getting on”. Finally, though, I must thank Karen and Maria for their continuous support, enthusiasm, and advice; but most of all for their ‘trumpet-blowing’!
<table>
<thead>
<tr>
<th>CONTENTS</th>
<th>PAGE NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. LITERATURE REVIEW</td>
<td>6</td>
</tr>
<tr>
<td>1.1 INTRODUCTION</td>
<td>6</td>
</tr>
<tr>
<td>1.2 LINGUISTIC AND PSYCHOLINGUISTIC MODELS OF LANGUAGE PROCESSING</td>
<td>12</td>
</tr>
<tr>
<td>1.2.1 Production</td>
<td>14</td>
</tr>
<tr>
<td>1.2.2 Comprehension</td>
<td>30</td>
</tr>
<tr>
<td>A: The Use of Linguistic Theory in the investigation of Sentence Comprehension</td>
<td>31</td>
</tr>
<tr>
<td>B: The Interaction of Syntax, Semantics and Conceptualisation in Comprehension</td>
<td>37</td>
</tr>
<tr>
<td>1.2.3 Summary</td>
<td>42</td>
</tr>
<tr>
<td>1.3 EVENT LEVEL PROCESSING</td>
<td>44</td>
</tr>
<tr>
<td>1.3.1 Linguistic behaviour as evidence for conceptual representation</td>
<td>46</td>
</tr>
<tr>
<td>1: Characterising Conceptualisation</td>
<td>49</td>
</tr>
<tr>
<td>A) Decomposition and Conceptual Constituents</td>
<td>49</td>
</tr>
<tr>
<td>B) Categorisation</td>
<td>53</td>
</tr>
<tr>
<td>C) Enriched Meaning</td>
<td>54</td>
</tr>
<tr>
<td>2: Characterising The Interaction Between Language and Conceptualisation</td>
<td>65</td>
</tr>
<tr>
<td>1.3.2 Cross-Linguistic Language Differences as Evidence for Conceptual Organisation</td>
<td>95</td>
</tr>
<tr>
<td>1.3.3 Visually-mediated Language effects as Evidence for Conceptual Organisation</td>
<td>116</td>
</tr>
<tr>
<td>1.3.4 Summary</td>
<td>126</td>
</tr>
<tr>
<td>1.4 CLINICAL INVESTIGATIONS OF VERB AND SENTENCE PROCESSING</td>
<td>128</td>
</tr>
<tr>
<td>1.4.1 Sentence processing</td>
<td>130</td>
</tr>
<tr>
<td>A: Asyntactic comprehension</td>
<td>130</td>
</tr>
<tr>
<td>B: Agrammatism</td>
<td>143</td>
</tr>
<tr>
<td>1.4.2 Verb processing</td>
<td>145</td>
</tr>
<tr>
<td>1.4.3 Relationship between sentence processing and verb processing</td>
<td>151</td>
</tr>
<tr>
<td>1.4.4 Summary</td>
<td>155</td>
</tr>
<tr>
<td>1.5 ‘MAPPING’ THERAPY PAPERS</td>
<td>157</td>
</tr>
<tr>
<td>1.5.1 Constraining Conceptualisation Through Therapy Materials</td>
<td>160</td>
</tr>
<tr>
<td>1.5.2 Event Processing Impairments</td>
<td>170</td>
</tr>
</tbody>
</table>
1.6 SUMMARY

2. METHODOLOGY

2.1 SELECTION TASKS

A. Noun / Verb Naming Task
B. Narrative Task
C. Syntax Judgement Task
D. NP Pointing Task
E. Summary

2.2 CONTROL PARTICIPANTS

2.3 PARTICIPANTS WITH APHASIA

2.4 EXPERIMENTAL TASKS

2.4.1 Event Video
2.4.2 Event Photographs
2.4.3 Role Video
2.4.4 Perspective Video
2.4.5 Sentence Judgement Task
2.4.6 Objects and Actions Video

2.5 TASK ORDERING

2.6 SUMMARY OF EXPERIMENTAL TASKS

3. PILOT STUDY

3.1 EVENT VIDEO
3.2 EVENT PHOTOGRAPHS
3.3 PERSPECTIVE VIDEO
3.4 SENTENCE JUDGEMENT

3.4.1 RESULTS for 1st version of Sentence Judgement Task
3.4.2 REVISION of Sentence Judgement Task

3.5 OBJECTS & ACTIONS VIDEO

4. RESULTS

4.1 GROUP RESULTS

4.1.1 Event Video
1. LITERATURE REVIEW

1.1 INTRODUCTION

The research presented in this thesis is intended to extend the theoretical understanding of events and their expression in language. ‘Event’ (or more precisely ‘event’ or ‘state’) is a category of experience that must be conceptualised in order to communicate most thoughts, experiences, needs and emotions; it is a way of relating entities in time and/or space. For example, the entities depicted below can be referred to by the labels Sue and the newspaper:

a)

In order to talk about the link between the two entities, however, this picture must be conceptualised as some sort of relationship, which in this case would probably be a reading event:

b) Sue is reading the paper.

Situations do not occur ready packaged for encoding into language, they “have to be filtered through language into verbalised events” (Slobin, 1996a). In order to fully appreciate the constructed nature of events, it is useful to compare them with entities. Entities, like Sue or the newspaper depicted below, can be pre-linguistically perceived as units because of their sub-components co-occur in space and time. For example, the sub-components of the head, hair, body, arms and hands in c) below can be easily conceptualised as a unit (namely Sue). Similarly, the sub-components of the print, paper and pages in d) are easily conceptualised as a newspaper:

c) d)
Events and states are not perceptual units in the same way; consider, for example reading:

- this is an action that evolves over time with various sub-component actions (such as lifting the newspaper, looking at the printed words, internally processing the information conveyed by those words and so on),
- the action involves more than one entity (most obviously Sue and the newspaper, but also the printed words and Sue’s eyes, hands, mind and so on),
- in order to talk about the situation depicted in a) it is necessary to refer not just to the individual entities involved but to the relationship between them.

Even a situation involving just one entity should be understood as a relationship. Consider this jumping event:

d) Sue is jumping

The event label relates the various sub-components of the action (for example bending and pushing down with the legs, the upward thrust of the body, the repetition of the action), unitising something that is essentially componential.

Events are conceptual constructs (the relationship between conceptual and linguistic processing in the representation of events is discussed in section 1.3). They are a means of categorising experience so that it can be communicated: in Pinker’s (1989) terms, “a highly schematic construal” of a situation. As the previous example shows, however, in order to illustrate the nature of events, reference must be made to the way they are expressed in language. This fact causes a potential confusion between events themselves and the predicates that express them. Predicates are those words which express relations, actions, event or states that by definition involve participants, such as read, jump or on. On their own, the meaning of such predicates is incomplete and must be completed by the participation of some other entity (people, objects, things etc). Consider, for example, the complete meaning of a word such as cup. The meaning of this word can be understood by reference to a set of properties, which can be visually symbolised like this:

e) ☕
If a particular entity has most of the properties symbolised in e), it is conceived of as 'a cup'. However, the word *on* (a two argument predicate) cannot be understood from a set of properties alone, as it is a relation that involves two other entities, such as *a cup* and *a table*.

The *on* relationship can be represented visually like this:

\[ f) \]

![](image)

The meaning of the word *on* must make reference to these other entities (the arguments of this predicate).

Although events and the predicates that express them are defined in similar ways, they should be distinguished.

Predicate-argument structure is a linguistic construct, individual to a particular language. Events are language-independent concepts that are represented in the conceptual system (see section 1.3.1 for a justification of this viewpoint). However, one of the main findings of this thesis is that conceptualisation must be organised by influence from other representational systems, including vision and language. It is only possible to conceptualise an event because of linguistically-mediated influence. In this sense, events are an inherently linguistic concept. The importance of event processing has meant that there has been a fairly wide range of interest in the nature of events and their role in language: in linguistic research (e.g. Givon, 1984, 1986; Parsons, 1996), in psycholinguistic research (e.g. Langacker, 1987, 1991; Jackendoff, 1983, 1990, 1997) and in clinical research (e.g. Byng et al, 1994; Marshall et al, 1993).

The investigation of events presented in this thesis, draws on the findings from all these areas of research and is based on an analysis of the language processing (dis)abilities of people who have non-fluent aphasia. Aphasia is a difficulty in communicating through language, that happens as the result of focal damage to the brain, most
commonly following a stroke. It can affect any means of communication including speaking, understanding, reading, writing and gesture and can affect these means in a variety of ways. Historically clinicians and researchers have distinguished between ‘fluent’ and ‘non-fluent’ aphasia: the latter is defined by slow effortful speech with frequent omissions of verbs and inflectional morphology. However, a key characteristic of aphasia is the variability of the language impairment that results - both in terms of severity and type. The classic diagnostic categories are recognised to be applicable only as short-hand labels (Ellis and Young, 1988; Caramazza, 1984; Howard and Hatfield, 1987), used to impart information about the general character of someone’s language. Of key interest to an investigation of events is the difficulty with verb and sentence processing commonly experienced by people with non-fluent aphasia. These difficulties, their common manifestations and the light such difficulties shed on the theoretical understanding of events is discussed further below.

There is general agreement among researchers in this area that the best way to understand language impairment is by reference to models of unimpaired language processing (Caramazza & Hillis, 1983; Howard & Patterson, 1989; Marshall & Newcombe, 1973; Shallice, 1988; Ellis & Young, 1988). This is an approach contrasting with the observation and description of the language itself, concentrating instead on an explanation of the language in terms of underlying representations and processes. Ellis & Young (1988) describe this approach as, “explaining the symptoms of brain-injured patients in terms of impairment to the psychological operations which are necessary for normal, efficient perception, language and memory.” The models of unimpaired language are drawn from the field of psycholinguistics, in which the focus is on the processes by which language is understood and produced. In the investigation of impaired language processing, the concerns of a psycholinguistic approach converge with that of Cognitive Neuropsychology. Both approaches seek to identify the way language is represented in the mind, as well as the mechanisms by which these representations are processed and how they might be damaged. Consequently, this kind of approach can shed light on the processes underlying impaired language and can also be used to draw general conclusions about intact processes. So, as well as the basis for explaining the language problems of people with non-fluent aphasia, such models will be used in this thesis to form the framework in which the processing of events can be understood.
These models should not be seen as models of the brain itself, rather they are intended to represent a
"functional architecture" (Coltheart, 1983). Some of the core assumptions about the characterisation of this
architecture include:

- modularity; cognitive activity is assumed to consist of multiple cognitive processors, or modules. Each
  module engages in its own form of processing, using its own type of representations and processes. This
  assumption derives largely from the finding that brain injury can affect one aspect of processing whilst
  leaving other aspects intact.

- transparency; Caramazza (1984) suggests that, “the pathological performance observed will provide a basis
  for discerning which component or module in the system is disrupted”. Symptoms only provide the ‘basis’
  for characterising underlying processing because factors other than the damaged processor will have an
  effect on a person’s language performance. For example, there may be compensatory processes involved,
  there may be other processes disrupted and there will be idiosyncratic individual variation in performance.

- “subtractivity”; this is a term used by Saffran (1982) to reflect the assumption that the performance of a
  person with a language impairment reflects their total cognitive processing minus those systems which
  have been impaired: “the mature brain is not capable of sprouting new modules after brain injury” (Ellis &
  Young, 1988).

It should be noted that in these representations a limited domain is being modelled: the models are a
“functional architecture”, rather than one which represents the structure of processes, or issues such as the
timing of processes or the flow of information. However, these issues do not need to be addressed in this thesis,
in order to characterise the processes underlying the conceptualisation and description of events.

The next section (1.2) provides an overview of the major models of language production and comprehension in
which the nature of events, and the semantic properties of the predicates that express them, must be understood.
Section 1.3 expands on the specific area of processing that most directly involves event representations. In this
section linguistic processing is related to conceptualisation so that the nature of events can be more fully
considered. The review shows that conceptualisation must be constrained by language in both verbal and non-
verbal tasks. There is evidence from cross-linguistic studies to justify this claim. This section also explores what it means to constrain conceptualisation, by considering findings from visual research which show that pre-attentive processes must be guided to a detailed attentive analysis by ‘higher’ processes such as language. Moreover, this consideration of event processing reveals that the constraining process is internally complex. Five separable layers of conceptual structure are postulated: distinguishing event from non-event; identifying the event type; identifying the participant entities; characterising the relationships between the participants/ the roles they play; taking a perspective.

In section 1.4 the findings from research into language impairment are added to the picture. The language impairments symptomatic of non-fluent aphasia are outlined: ‘agrammatism, ‘asyntactic’ comprehension and verb problems. Competing accounts of the underlying processing difficulty are considered and the ‘mapping’ hypothesis is shown to be the most inclusive and explanatory. The kinds of impairment that should be reconsidered in terms of conceptualisation are then outlined in more detail. Section 1.5 provides an overview and analysis of various treatment studies using the ‘mapping’ hypothesis. The focus of this section is on the assumptions made in these papers about the underlying impairment, specifically the assumptions made about conceptualisation. As a result, it is the therapy programmes and materials that are considered in detail because this where such assumptions are most explicit.
A common assumption of psycholinguistic modelling is that language processing is modular; the language system consists of distinct sets of representations and mechanisms that have specific properties and patterns of breakdown. In the models that follow, then, there will be levels or stages of processing (such as conceptual, semantic and syntactic) each with their own characteristics. These components originate largely from linguistically motivated theories of processing. That is, many linguistic theories separate phonology, syntax and semantics for individual study and so each of these has its own level of processing in a psycholinguistic model. However, a psycholinguistic approach further requires that there is empirical evidence to support the structure of the language processing model. So for example, slips of the tongue such as the following can provide supporting evidence for the separation of such processing components:

a) I started to feel really /fi:k/ and /wiː.bl/ [weak and feeble]
b) At the end of today’s lection [lecture/lesson]

The slip in a) provides evidence for distinguishing an independent level of phonological encoding. The slip is analysed as an error in assigning a phonological form to a particular word. As other aspects of the sentence are correct, including the meaning and the syntactic structure, it is assumed that the error occurred in a particular component of the language system that deals purely with phonology. Similarly, slip b) can be taken as evidence for a separate semantic processing component. In this slip, the error is caused by two words with similar meaning competing for a slot in the sentence, resulting in the production of a blend of the two.

A related approach is that of cognitive neuropsychology, in which cognitive deficits (including language impairment) are studied for the purpose of developing and constraining models of normal function. In these terms, there is an assumption that language deficits can provide information about the structure of the language system: the components of the language processing system and how they are related. For example, if a person has difficulties naming an object (such as a cup) but has no problems associating it with a related object (with, for example saucer) it is assumed that this is evidence for two separate components in the language production
system. In this case, the person would be hypothesised to have a problem with the phonological form of the word but not with its semantic structure.

However, such data also provides evidence that language processing often involves more than a series of individual modules. Models must also allow sources of information and processing mechanisms to interact in complex ways. As an example, consider semantic structure: knowledge of a verb’s semantic structure would allow access to other verbs with compatible semantic representations, a verb of transaction such as give has a semantic representation like the following:

a) the use of this item requires a ‘transferer’ (a ‘giver’ or ‘sender’ etc)
   a ‘transferred object’ &
   a ‘transferee’ (a ‘taker’ or ‘receiver’ etc)

This representation requires a semantic structure that can be paraphrased as:

b) someone transfers something to someone.

Other verbs have a similar semantic representation and structure, such as:

c) take, buy, sell, send and receive.

In this way, semantic processing helps lexical selection and conversely, the presence of these verbs in the lexicon might influence the formulation of the semantic structure of a sentence. The lexicon contains information about a verb’s semantic structure, like that in b) above which can be made available to the semantic component as it processes an incoming sentence. In this way, the lexical information constrains the interpretation of the sentence structure and thereby aids comprehension.

Such interactivity within the semantic system makes analysis of semantic impairment more difficult than was suggested above. Moreover, this internal complexity means that simple tasks, such as one where an object is associated with another (c.f. the cup with the saucer), cannot provide absolute evidence that semantic processing is intact. Rather, an internally complex component requires a set of precisely designed tasks for its assessment. The use of a set of tasks to build a complete processing profile is another characteristic of the psycholinguistic approach. Such an approach focuses on both the mental processes/representations involved in the language system and the way they function together, rather than focussing on a single component of the
language system, a fuller characterisation is provided. This full characterisation is achieved by examining a component in the context of the other processes and representations with which it interacts and by including details of both ability and disability.

Some of the major models of sentence processing are discussed below, and the aspects that are important for an investigation into the nature of events are highlighted. In section 1.2.1, the accounts considered are those modelling the production of sentences. The discussion focuses, in particular, on those aspects of structure that people with non-fluent aphasia find difficult: conceptual structure, semantic structure and those aspects of syntax that relate to meaning. Following this, section 1.2.2 reviews some specific models of comprehension. The focus is on the comprehension of verbs, the events they encode, and those aspects of sentence comprehension that relate form to meaning.

### 1.2.1 Production

One model of language production widely used with research into non-fluent aphasia is that of Garrett (1980, 1982, 1988, 1992). This model uses a body of data from slips of the tongue to hypothesise a number of processing levels:

- the **message** level, determining the content of the message to be communicated;
- the **functional** level, where the lexico-semantic structure is specified (along with the consequent assignment of syntactic category to predicates and their arguments); and
- the **positional** level, where aspects of form (other aspects of syntax and phonological form) are selected.

Evidence for the first of these levels comes from slips of the tongue where two or more concepts in a message seem to compete for inclusion in a sentence.
These are errors such as:

a)  *I would like to enlist your support*  \[enlist/elicit\] (Garrett, 1980)

This level is pre-linguistic, involving world knowledge and situational context.

The functional level, in Garrett’s terms is, “the first language specific level of representation” (1982; 67). At this level there a number of processes occur: the message is translated into lexico-semantic representations; the associated semantic structures become available; an initial guide to sentence structure is formed. The semantic representation is composed of ‘predicate-argument’ and ‘thematic’ information. Consider, for example the following sentence:

b)  *Hamsa gave a birthday card to Steve.*

In sentence b), the predicate *give* has a semantic representation that;

- specifies a thematic structure, reflecting the involvement in this event of a ‘giver’ a ‘receiver’ and a ‘given object’;
- it also specifies that the thematic structure is expressed by two noun phrase arguments (*Hamsa* and a *birthday card*) and a prepositional phrase argument (*to Steve*).

Lexico-semantic information does not specify word order, however. This is an aspect of the syntactic processing of the positional level. Compare, for example, the following:

b)  *Hamsa gave a birthday card to Steve*

c)  *Hamsa took the money from Walide’s piggy-bank.*

The semantic structure for take also specifies a ‘giver’ and ‘receiver’ and a ‘given object’. Notice, however, that although *Hamsa* is the subject in each sentence, the role he plays in each event is different:

- in b) he is the starting point (Source) of the movement of the *birthday card*,
- in c) he is the end-point (Goal) of the movement of the *money*.

The reason for this is that, although the semantic structures of *give* and *take* are the same, the way the semantics is expressed by the syntax differs. This fact motivates the separation of word-order and semantic structure in Garrett’s model.
The final level of processing is supported by slips of the tongue such as the following;

d)  *I got into this guy with a discussion*  
    *[a discussion with this guy]*  (Garrett, op cit.)

e)  *I had forgot abouten that*  
    *[forgotten about]*  (Garrett, 1982)

f)  *She was / kit / to / fil / him*  
    *[fit to kill]*  (Garrett, 1988)

In sentences d), e) and f), the errors all result from a mis-ordering of units: in c) it is nouns that exchange places; in d) an inflectional morpheme is placed in the wrong position; in e) two phonemes are exchanged.

This model makes various predictions about how sentence processing might be impaired:

1. There could be a problem with formulating the message to be communicated - for Garrett this is a conceptual level of processing;

2. There could be a problem with accessing information about semantic structure - this is an impairment to part of lexico-semantic representation which would affect the form of the sentence produced, although it does not control all aspects of syntactic processing;

3. There could be a problem accessing other aspects of syntactic form.

The model provides a principled means of distinguishing the types of impairment seen in the language of people with non-fluent aphasia. In particular, it raises the possibility that structural problems are not necessarily due to an impairment of syntactic processing. The use of this model in clinical papers is discussed in more detail in sections 1.4 & 1.5. Nonetheless, it is helpful if some data from the mapping therapy studies is presented in the present context, to illustrate the descriptive power of Garrett’s model.

Jones (1986) describes a therapeutic programme designed for B.B., who had suffered a stroke that resulted in non-fluent aphasia. B.B.’s output was restricted to single nouns and a few learnt phrases, and his comprehension relied on pragmatic and contextual cues. After some initial improvement, B.B.’s language had remained unchanged for six years despite long-standing intensive speech therapy. Jones describes this unsuccessful therapy as having concentrated on “sentence production in a hierarchical fashion, moving from word to phrase to complete sentences.” In addition an attempt was made to emphasise certain individual
aspects of sentences that B.B. seemed to have difficulty with: inflections, tense agreement and specific lexical categories, such as prepositions, pronouns and determiners. In other words, therapy was targeted at the positional level of Garrett’s model - with the implicit assumption that the functional level was intact. As this therapy had not helped B.B., Jones decided to challenge the assumption that the functional level of B.B.’s processing was intact and so she designed a programme that targeted this level.

In the ‘functional’ therapy, the emphasis was on the information about semantic relations that is contained within a verb’s meaning: specifically role information. B.B. was presented with a written sentence in which he had to identify the verb. Once this was done, the focus turned to the participants in the action described by that verb. For example, B.B. was presented with the following:

*The dog barked loudly at the milkman*

Once he had identified *bark* as the verb, he would be asked questions to emphasise the roles played by the participants in the scene described. He would be asked:

“What barks?”, to emphasise the Agent role; and

“What is barked at?” to emphasise the Theme.

Later, additional roles were introduced such as Goal and Location (using “where...?”) and finally complex non-canonical structures such as the passive were introduced (e.g. *the milkman was barked at by the dog*).

Following therapy, B.B. showed a marked improvement in comprehending sentences. Most importantly, his production also improved: he produced sentences with novel argument structures and used many inflections, pronouns and determiners (those aspects that had seemed especially difficult for him). This is a striking improvement, particularly since production was not targeted in the therapy programme. This improvement was achieved, according to Jones, by focussing on the meaning of verbs. In addition, she argues that this focus encompassed the roles played in that meaning by the other phrases in a sentence and the way this meaning is expressed in word order. Jones had targeted the functional level of Garrett’s model and had achieved improvement in both this and the positional level.
One problem with Garrett's model is that the message level processes are not described in any detail.

Moreover, there is no indication as to how message-level information is incorporated into the next level. The importance of this lack of detail can be appreciated by further considering the basis of the Jones therapy described above. Unlike previous therapy that targeted the positional level, Jones did not assume that the functional level was intact. However, the implicit assumption she did make was that the message level was intact. It is not clear on what basis this assumption was made but it is reasonable to assume that both the lack of detail about the message level and its characterisation (by Garrett) as a non-linguistic conceptual level contributed to its being overlooked. Indeed, in her description of Garrett's model Jones relegates the message level to the periphery of language processing and says there are "two main levels in sentence production - the functional level and the positional level." Although it was not part of Jones' test battery, a common kind of test for message level processing is a picture-association test such as Pyramids and Palm Trees (Howard and Patterson, 1992). In the light of the characterisation of conceptual processing outlined in this chapter, it is apparent that this kind of test is not sufficient to rule out message-level problems. The reasons for this are discussed in detail in section 1.5.

One plausible cause of B.B.'s problems with verbs would be an impairment at the message level: if the message level representation was impaired, it might not provide sufficient information to allow access to the semantic relations information stored at the functional level. By way of illustrating this possibility, it is useful to speculate in greater detail about how this might manifest in sentence production:

1. an appropriate message-representation would not be formed;
2. this impaired message-representation would hinder access to the functional level;
3. the functional level contains lexico-semantic representations: both 'core' meaning and predicate argument/thematic structure so that B.B. would either;
   a
   b
   c
4. without this information he would not be able to assemble the necessary word order at the positional level.
These processing stages are hypothetical, and are only partly motivated by Garrett’s model, but this recasting of B.B.’s problem serves to highlight some of the more under-developed aspects of the model. To evaluate this hypothesis about B.B.’s sentence processing, a number of questions need to be answered. These include:

A) What does a message-level representation look like?

B) How are such representations formed and how might they be impaired?

(theses questions are motivated by the hypothetical stage 1 above);

C) How does a message level representation provide for the selection of lexical items and their associated semantic specifications? How are the two levels linked?

(theses questions are motivated by the hypothetical stage 2 above);

D) Similarly, how is the functional level linked with the positional level?

(theses questions are motivated by the hypothetical stages 3 & 4)

This speculation apart, it is important to stress that Jones based her therapeutic programme on the functional level and was very successful. This seems to suggest that her assumptions were correct: that the message level was intact; the functional level was the site of the problems; and B.B. needed functional level representations emphasised. However, the therapy could also be recast as emphasising message level representations; it may be that the questions asked of B.B. (e.g. “who is barking?”) enabled him to conceptualise the message in a more structured way. This possibility will be discussed in more detail in section 1.5.

A more detailed model of language production is that of Levelt (1989). In this model there are also 3 levels of processing, although they do not correspond to the levels in Garrett’s model.

1. There is an initial, non-linguistic conceptual component that generates a preverbal message:

   “Talking as an intentional activity involves conceiving of an intention, selecting relevant information to be expressed for the realisation of this purpose, ordering this information for expression, keeping track of what was said before and so on.” (op cit.: 9).

All of these aspects of processing are accomplished by the conceptual component of Levelt’s model. An important aspect of this model is the form of the preverbal message. Levelt says that
"the message should contain the features that are necessary and sufficient for the next stage of processing - in, particular for grammatical encoding." (op cit.; 70).

This provides at least some indication of what the linguistic system requires as input and hence allows conjecture about what might be involved in an impairment to conceptual processing. Further details of the content of the pre-verbal message are discussed below.

2. The first linguistic component is the **formulator**, in which grammatical and phonological information is encoded:

This component accepts ‘well-formed’ fragments of conceptualisation as input. As output, it produces a sentence plan that is fully specified for lexical content, syntactic structure and phonological form. This is accomplished in two stages: firstly, the contents of the preverbal message are matched to the semantic content of lexical items, which allows the semantic and syntactic structure of the sentence to be assembled; secondly, the phonological form of the lexical items is accessed.

3. The **articulator**:

It is at this level that the articulatory plan is executed.

Levelt’s model is represented in the diagram overleaf, and the aspects most important to understanding the problems of people with non-fluent aphasia are then discussed:
Adapted from Levelt's "blueprint for the speaker" (Levelt, 1989: 9) - boxes represent processing modules, circles represent knowledge stores.
There are 2 key aspects of this approach that are crucial to an investigation of event processing:

1) The central role of conceptualisation in accessing the linguistic system;

2) The nature of the interaction between conceptualisation and language.

The outcome of conceptualisation is a preverbal message. Crucially, only fragments of a message in a particular format can trigger the processing at the next level. Levelt describes how the ‘formulator’, “accepts fragments of messages as characteristic input and produces as output an articulatory plan. In other words, the Formulator translates conceptual structure into a linguistic structure.” (op cit.: 11). The format of the preverbal message must therefore be important in analysing the language difficulties of people with non-fluent aphasia. Levelt specifies this format in enough detail to make some predictions about possible impairment patterns (this is discussed further below).

Grammatical encoding depends upon the accessing of information from the lexicon. For talking about an event, such information would include both the core meaning of the verb describing the event and certain structural details such as information about the components of meaning contained in that verb and the kinds of lexical item that must also appear in the sentence with it. Consider the verb give: its meaning involves some sort of transfer of an object between two people, consequently, in sentence structure, give requires nouns denoting the object and the two people to appear with it in a sentence. For example:

*Hamsa gave the birthday card to Steve.*

Levelt emphasises that a lexical item is “activated when its meaning matches part of the preverbal message. This will make its syntax available, which in turn will call or activate certain syntactic building procedures.” (op cit.: 11). In this way, Levelt provides further information about how semantics and syntax might be linked. This approach makes the lexicon a very crucial aspect of sentence processing. It suggests that damage to it will affect not only lexical access but also the structure of an associated sentence.

In this way, Levelt’s model is able to provide preliminary answers to the 4 questions raised by Garrett’s model. These questions and the answers provided by Levelt’s model are outlined below:
A) What does a message-level representation look like?

Levelt attempts to answer this by analysing the features of messages that are required by other parts of the model. In much of what follows, the components of conceptualisation are motivated purely by features of the language system. For example, Levelt suggests that conceptualisation has thematic structure because the semantic system does. On the whole there is no specific empirical evidence supporting this analysis (where there is, this has been described). Such an analysis results in two main features:

1. A message should be **propositional**: "...if a thought is to be expressed in natural language, the mediating code must be propositional." (op cit.: 71). This requirement emphasises that conceptualisation is non-linguistic and it makes use of information from a range of processing systems other than language. It follows that, to express a conceptualisation in language, a conceptualisation must be structured in such a way as to ‘translate’ into linguistic structure. The features of a structured conceptualisation most relevant to the present study are the following:
   - messages involve ‘function/argument’ relations, for example the function *give* denoting the relationship between *Hamsa*, the *birthday card* and *Steve*;
   - some of these argument play abstract roles that relate to the thematic roles specified in semantic structure (e.g. the ‘giver’ the ‘given object’ and the ‘receiver’);
   - a function (e.g. *give*) is an encoding of the relationship contained in the message and it may have something to do with assigning the abstract roles;
   - functions can also be built-up hierarchically to express complex conceptualisations (this notion is discussed in more detail in section 1.3).

2. A message should contain **perspective** information: the “structure of foregrounding and backgrounding, the ‘information structure’ of the message” (op cit.: 11). This requirement emphasises that situations can be viewed from many perspectives, but language needs to designate only one. As an example, Levelt describes a ‘linearization’ experiment, in which subjects were asked to describe a spatial array like that on the following page:
Starting from the arrow, subjects were asked to 'navigate' through the grid. As an example of the assignment of perspective, consider part of the descriptions of two of the subjects:

1) Then from pink, again to the left, a blue node.

2) Go straight on to the blue node.

One of the ways in which these descriptions differ, is in the choice of directional term: to the left and straight on. As the spatial arrays being described were identical, the difference must be due to perspective-choice. As Levelt says,

"Although the perceptual structures were identical for the two subjects, they were categorized in different ways." (op cit.; 153).

This example shows that there is no single necessary way of translating visual information into language. There is a certain amount of choice inherent in perspective-taking, at least in English. The choice made, however, determines a number of other factors, such as: which entities are reference locations for which others, and the direction of the relationship between them. For example, the first description shows that the speaker has chosen to describe the scene from her perspective and so the blue node is to the left the pink. In description 2), the perspective is that of an imaginary viewpoint that 'moves' through the spatial array, like a car along a road. From this perspective the blue node is straight on from the pink. These perspective choices must be made as part of the conceptualisation because the language system cannot accept perspective-free information as input. Consequently, if the 'translation' between conceptualisation and language is a source of difficulty for people with non-fluent aphasia then perspective-taking is likely to be disrupted.
The second question prompted by Garrett's model is the following:

B) How are conceptual representations formed and how might they be impaired?

Levelt's model provides an answer to this question in its description of message shaping. The procedures responsible for shaping a message into the correct format are referred to as 'micro-planning'. In general terms, this means attending to certain aspects of the situations to be communicated - those aspects that affect the structure of the language. This includes:

- identifying the topic & other salient entities - the speaker needs to decide which elements of the message are important and must highlight these for the rest of the processing system. "When a referent is topicalized in a speaker’s message, it will be given a kind of priority treatment in grammatical encoding. It will, for instance, tend to be expressed as the grammatical subject. Entities that are not topicalized but are still quite salient will also be given special treatment..." (op cit.: 152);

- structuring a message such that thoughts and perceptions, that may be in a format incompatible with language, are expressible in word order. An example of this structuring is perspective-taking. Levelt argues that producing language necessarily implies the assignment of perspective, "in particular the choice of relations and reference points for these relations." (op cit.: 159).

- other language-specific requirements - In some cases “there is obligatory grammatical encoding of particular conceptual features, even if these are irrelevant for communication” (op cit.: 157). In a language like English that marks tense, for example, the message must encode certain temporal and deictic properties of a state or event.

C) How does a conceptual representation provide for the selection of lexical items and their associated semantic specifications?

Aspects of the preverbal message must match the semantic and syntactic detail stored in the lexicon. So, for example, if the message stipulates an action involving the transfer of some entity from one place to another and in a particular direction, there must be a lexico-semantic representation in the lexicon that matches this. It must match in terms of:
• core meaning - there must be a label for such transfer available in the language, such as give, or sell;

• semantic structure - the relationship encoded by the predicate-argument and thematic structure of a lexical item must reflect the relationship specified by the message, for example the concept of giving involves:

  ◦ an Agent (X) causing a possession (Y) to go from X to Z.

the lexico-semantic representation of give specifies

  ◦ an NP subject, with the role of Source (X),
  ◦ an object NP, with the role of Theme (Y),
  ◦ an indirect object PP, with the role of Goal (Z).

D) How do semantic relations link to syntactic structure?

In Levelt’s model the procedures linking semantic and syntactic structures are contained within the lexicon. Linguistic theory has increasingly assumed a more enriched lexicon (Chomsky, 1981 & 1995; Jackendoff, 1983; Pustejovsky, 1995; Lakoff, 1987). The lexicon was traditionally a store of only idiosyncratic form-meaning relations, for example lexical labels: there is no principled reason why the concept ‘heat’ should be labelled heat in English and calor in Spanish. Form-meaning relations such as these are just facts of the individual languages. In an enriched account, rule-governed form-meaning relations are also located in the lexicon. In Levelt’s model, the lexicon contains a verb’s predicate-argument structure that activates “syntax and syntax building procedures”. However, although these procedures provide word-order information the actual syntactic phrase building is a separate procedure carried-out outside the lexicon. In this way the separation of syntactic and syntactic-semantic processing is retained.

Although this model provides a more detailed refinement of the sentence processing system, it does not provide enough detail to either, fully explain the patterns of impairment found in the language of people with non-fluent aphasia, or fully characterise events. Specifically the following issues remain:
Preverbal messages should be compatible with linguistic structure, but it does not follow from this that they should be propositional. Preverbal messages are not required to be like semantic structure in either structure or content, rather they should include the information that the linguistic system requires, in whatever form. It is important to highlight the information that the linguistic system requires, however, and this is discussed in more detail in section 1.3. Ultimately, it is important to provide some empirical evidence that can indicate how conceptualisation is organised, and from this to hypothesise more precisely about the transition from conceptualisation to language. Other approaches to the characterisation of conceptualisation are presented in section 1.3, and in chapter 2 a number of event tasks, designed to investigate conceptualisation directly, are outlined;

In Levelt’s model, although the message level influences linguistic encoding, there is no feedback from language to conceptualisation. Levelt allows for the possibility for feedback but claims that there is no empirical evidence to support the idea. The one study that Levelt puts forward to argue against feedback between language and conceptualisation, is not very convincing. Levelt and Maassen (1981: cited by Levelt, 1989) attempted to test whether the relative accessibility of lexical items affected the order of mention of those items. They presented visual arrays for description, in which two of the objects move. For example, see the array below:

Subjects were required to described what had happened, for example;
The square and the circle moved

The objects were selected so that they consisted of a set of ‘easy-to-name’ objects and a set of ‘hard-to-name’ objects: these distinctions were arrived at by measuring naming latency for each object. Surprisingly, the square was classified ‘hard-to-name’ and the circle ‘easy-to-name’. This finding led the experimenters to hypothesise that the description above would be unlikely. This is because in it, the ‘hard-to-name object’ is named first. It would be more likely that descriptions would encode the order “easy > hard”. For this description, it would mean:

The circle and the square moved.

The results did not support the hypothesis: ‘easy’ objects were produced first in only half of the descriptions. The authors took this to mean that lexical availability did not cause conceptualisation to be revised and so there is no evidence for feedback between language and conceptualisation. However, Levelt later acknowledges that the task “probably did not test that hypothesis” (op cit.: 280). It is much more likely that this task assesses whether phonological availability affects syntactic encoding. In later work, Levelt allows for the possibility of feedback between language and conceptualisation but maintains that there is no empirical evidence (e.g. 1992, 1996). Interestingly, however, he seems to rely on at least some kind of feedback to account for the different ways perspective is encoded by different languages. For example, he says, “A culture’s dominant perspective makes a speaker attend to spatial properties that are relevant to that perspective” (1996: 103). It is very hard to see how this would be accomplished without such feedback1.

The notion of feedback between language and conceptualisation is crucial to understanding event processing problems. Levelt’s model predicts that loss of access to lexico-semantic representations will not affect conceptualisation. Conversely, if these two components do interact then language problems can be shown to be the cause of some aspects of conceptual difficulty. It is the latter viewpoint with which the present study is concerned.

1 The encoding of perspective in language (and its effect on conceptualisation) is discussed in section 1.3.2
Evidence from other theorists is discussed in section 1.3 and in chapter 2 there are two tasks designed to address this issue directly.

(G) Conceptualisation, in Levelt’s model, involves the use of stored knowledge. Any impairment to this knowledge store would mean that messages would no longer be formulated in the correct format. However, there is a lack of detail about the various knowledge components in this store. It seems that the store includes encyclopaedic knowledge and ‘procedural’ knowledge that is learned because of linguistic requirements. If this is the case then it is possible that the distinction between these two aspects of knowledge could lead to separable impairments in the knowledge store. Considering the language difficulties of people with non-fluent aphasia, it is important to investigate this possibility and to elaborate on the hypothesised nature of such impairments (and the likely differences between them). This possibility is pursued in section 1.3.
1.2.2 Comprehension

Garrett’s model of sentence production, outlined above, is the model most commonly used in investigations of verb and sentence processing problems in aphasia. It is independently justified with evidence from processing and as such it has been considered particularly suitable for application to aphasia therapy. However, it is important to point out that this is a model of production and makes no claims for comprehension. That said, it has been used as a basis for sentence processing therapy in which both comprehension and production processes are involved (see ‘mapping’ therapy programmes in section 1.5). However, Garrett’s model is only one of a number of sources that have been used to create such therapy programmes.

The major sources for understanding sentence comprehension, particularly in terms of the role of verbs, have been twofold: on the one hand there are psycholinguistic models (applied in on-line and off-line tasks); and on the other there is linguistic theory. A comprehensive review of the literature on sentence comprehension is not the goal of the present section. The aim of this study is to elucidate the role of conceptual processing in language: to characterise in more detail the nature of conceptualisation and how it interacts with the language system. Ultimately, the goal is to understand the kinds of impairment in verb and sentence processing seen in non-fluent aphasia. In this context, the relevant aspects of the sentence comprehension literature are fairly limited. The aspects of importance are as follows:

- Conceptual comprehension in general: what happens in the conceptual system during comprehension? This notion involves more than just language comprehension. It is important to also understand what happens in non-language comprehension tasks (e.g. the comprehension of pictures). This is a subject that will be considered in section 1.3.

- The role of conceptualisation in language comprehension: a number of the ‘mapping’ therapy programmes have appealed to conceptual processes in comprehension and so it is important to examine the characterisations made in the context of the present study.

- The relationship between conceptualisation in language comprehension and language production: as noted above, the ‘mapping’ therapy programmes outlined in section 1.5, deal with sentence processing in both
production and comprehension. It is, therefore, important to discuss the relationship between production and comprehension as it is envisaged in these papers.

It is these last two aspects of comprehension on which this section will focus. As noted above, sentence processing has been approached from two separate directions: from the point of view of linguistic theory and in terms of psycholinguistic processing. Consequently this review will begin with an explanation of the role of linguistic theory in clarifying the essentially psycholinguistic investigation of comprehension processes.

Because of their crucial role in comprehending sentences, verbs are the subject of the second part of this review. Finally there is a consideration of the interaction of syntax, semantics and conceptualisation in comprehending a sentence.

A: The use of Linguistic Theory in investigation of Sentence Comprehension

Linguistic theory is an abstract conception of language, dealing not with processing but with the nature of language and its structure. This point is stressed by Chiat and Jones (1988), when they say that, “linguistic concepts are part of a theory about language systems in the abstract, and not about realtime language processing.” (38). At this level of abstraction, there is no need for a distinction between comprehension and production. Crucially, however, linguistic theory provides a means to describe linguistic phenomena in a precise and principled way which is of clear importance in characterising those aspects of verb and sentence processing that relate to syntactic and semantic information. In this way linguistic theory can be used to formulate psycholinguistic questions.

A good example of this, is the descriptive framework for analysing sentences produced by people with non-fluent aphasia presented by Byng and Black (1989). This framework is intended to guide the analysis of sentence production, in terms of the syntactic realisation of predicate-argument structures. The authors draw on the theoretical notions of predicate-argument structure to describe the problematic output of people with non-fluent aphasia. From such a theoretical analysis, the authors are then able to articulate the psycholinguistic issues. The important point is that the development of linguistic theory allowed for a clarification of the psycholinguistic rationale.
The same theoretical framework can provide information about comprehension processing. The mapping between sentence form and meaning is a common focus for the analysis of sentences in linguistic theory (Williams, 1981; Grimshaw, 1990; Pustejovsky, 1995). The analysis of verbs is crucial in this context. The reason is that verbs provide information, not only about the type of event or state to which they refer, but also about the relationship between the other lexical items in the sentence. That is, they provide the main semantic structure of the sentence. In the psycholinguistic literature (Jackendoff, 1990 & 1997; Pinker, 1989) it is common to make a distinction between the core meaning of a verb and its thematic structure: between the “the rich and idiosyncratic nuances of verb’s meanings. . .” and “. . . various grammatically relevant elements...” (Pinker, 1989; 168). For example, the core meaning of the verb walk refers to movement using the legs and feet; grammatically relevant thematic information for this verb refers to the need for an animate Agent to carry out the action, someone/something to do the walking. The combination of ‘core’ meaning and semantic structure comprises a verb’s lexico-semantic structure.

‘Core’ meaning and semantic structure are very closely related, however, and probably overlap. Consider, for example the verb give: it is impossible to describe the core meaning of this verb without referring to the roles its arguments play. Particularly noticeable is the similarity between:

- the role information in verbs of transaction, such as give / take, buy / sell., and
- directional information in verbs of directed motion, such as fall / rise, lift / drop.

Transaction verbs have 3 arguments; both give and take are paraphrased with reference to 3 elements such as ‘someone gives something to someone’ or ‘someone takes something from someone’. These two verbs assign different roles to their arguments, however:

- **Hamsa gave a birthday card to Steve**
  - (Source) V (Theme) (Goal)

- **He took the money from Walide’s piggy bank.**
  - (Goal) V (Theme) (Source)
Consider the roles assigned by directed motion verbs in the following sentences:

*The book*  
 *(Theme) V*  

*Jayash pushed the box*  
 *(Agent) V (Theme)*  

Clearly, the second set of verbs does not have to encode the starting place (Source) and endpoint (Goal) of the action in the grammatically relevant part of their meaning. They both *can* appear in structures that express this aspect of their meaning, however:

*The book fell (off the table)*  
 *(Source)*  

*The book fell (on the floor)*  
 *(Goal)*  

*Jayash pushed the box (into the cupboard)*  
 *(Goal)*  

In these sentences, the bracketed phrases are optional arguments. Even without their optional arguments though, the core meaning of these verbs contains some reference to direction: downward motion in *fall*, motion away from the agent in *push*. These facts mean that it is quite difficult to draw a distinction between core meaning and thematic information in some cases.

In Pustejovsky’s (1995) account of the lexicon, the ‘core’/thematic distinction is not drawn in the same way. The premise is that the full, highly structured internal semantics of both nouns and verbs could be as important to syntax as semantic structure. That is the full lexico-semantic structure is used in comprehending sentences. An important part of this internal structure is a complex called ‘qualia structure’. In nouns naming objects, this would include specifications about the object’s appearance, how it comes into being and how it is used.

For example, the ‘qualia structure’ of a cup includes:
- its physical form; including its parts (handle, body, inside area);
- its role as a container for liquid, usually hot;
- how it is normally handled; and
- its membership of a group of other crockery items.

In this way, the meaning of the following sentence can be explained:

That’s a good cup

This does not mean something is a ‘cup’ and is also ‘good’. Compare this to the following sentence:

You’re a good boy!

In this sentence, someone is a boy and is good. In the former sentence, on the other hand, good is understood to refer to some part of the cup rather than the whole cup. Rather than leave this analysis in these general terms, Pustejovsky’s account provides a principled means of indicating the specific part of the cup to which good refers. That is, good is understood to evaluate the cup in its capacity to serve some function; or more precisely to refer to the role ‘quale’ of cup which reveals that a cup has a role as a container of liquids. This account therefore allows the interpretation of this sentence to be precisely defined as meaning that this cup is a good ‘container for liquids’.

The accounts reviewed so far illustrate the increasing role in comprehension given to lexico-semantic information. This role can be considered in a number of ways, including the following:

- many accounts focus on ‘grammatically’ relevant aspects of lexico-semantic structure such as the thematic and predicate-argument information;
- other accounts also highlight the importance of other aspects of meaning such as ‘core’ meaning an example is the ‘qualia’ structure proposed by Pustejovsky.

These aspects of comprehension are what Lesser and Milroy (1993: 93) refer to as “the semantic dimension of sentence structure”. This description emphasises that comprehending a sentence necessarily involves interpreting structure but that this interpretation is developed in the context of semantic information.

As well as acknowledging the importance of lexico-semantic information, it is also important to consider the role of the ‘syntactic and pragmatic dimensions’ of sentence comprehension. As MacDonald (1997) puts it,
"The process of language comprehension relies heavily on [semantic representations], but it also goes well beyond it, in that critical additional information is conveyed by syntactic structure and non-linguistic information." (121)

Sentence comprehension, in this light, can be viewed as a complex process of integrating various sources and kinds of information. One of the aims of this thesis is to disentangle these strands of information, particularly as they are involved in the interaction between language and conceptualisation.

Psycholinguistic models of sentence comprehension can be seen to fall into two broad groups: structural and constraint-based accounts. The structural accounts (e.g. Frazier, 1987; Ferreira and McClure, 1997; Stevenson and Merlo, 1997) tend to stress the role of syntactic processing in comprehension, as MacDonald says,

"... lexical information always shares the stage with strong structural principles in the structural models." (127)

These principles are procedures for analysing the structure of a sentence that rely on notions such as 'parsing', or more generally, that make reference to syntactic constituents such as noun phrases and verb phrases. By contrast, the constraint-based models (Spivey-Knowlton & Sedivy, 1995; Pearlmutter & MacDonald, 1995; McRae, Ferretti & Amyote, 1997) postulate processes that make reference primarily to lexico-semantic information. Such information is considered in relation to its role in constraining syntactic processing (also pragmatic and other non-linguistic processing). MacDonald encapsulates this approach with the following description,

"The extent to which a particular kind of information (lexical, syntactic, pragmatic, etc.) is used, and when it is used, is not governed by two stages of parsing, but rather by the extent to which the information constrains the interpretation." (op cit.; 129)

The constraint, provided by information other than syntax, is considered further in the discussion below, because of its importance in characterising the sentence comprehension difficulties of people with non-fluent aphasia. Findings about the role of syntax, are considered further in section 1.4, where traditional account of agrammatism are compared to more recent accounts in which the roles of syntax, semantics and conceptualisation each play a part.
The Role Of Verbs in Sentence Comprehension

Both linguistic and psycholinguistic accounts of the sentence ultimately emphasise the pivotal role of the verb. This is an idea pursued in some detail by Pinker (1989) in his analysis of a set of syntactic alternations. He looked at the following alternations:

- the passive alternation;
  
  \[
  \begin{align*}
  \text{The woman left her purse} & \quad \rightarrow \quad \text{The purse was left by the woman} \\
  \text{The woman left the room} & \quad \rightarrow \quad *\text{The room was left by the woman}
  \end{align*}
  \]

- the locative alternation;
  
  \[
  \begin{align*}
  \text{Cellan smeared chocolate on the carpet} & \quad \rightarrow \quad \text{Cellan smeared the carpet with chocolate} \\
  \text{Cellan daubed jam on the wall} & \quad \rightarrow \quad *\text{Cellan daubed the wall with jam}
  \end{align*}
  \]

- the causative alternation;
  
  \[
  \begin{align*}
  \text{The ball rolled} & \quad \rightarrow \quad \text{Max rolled the ball} \\
  \text{The ball fell} & \quad \rightarrow \quad *\text{Max fell the ball}
  \end{align*}
  \]

- the dative alternation;
  
  \[
  \begin{align*}
  \text{Matt gave money to the RSPCA} & \quad \rightarrow \quad \text{Matt gave the RSPCA money} \\
  \text{Matt donated money to Oxfam} & \quad \rightarrow \quad *\text{Matt donated Oxfam money}
  \end{align*}
  \]

Pinker was able to provide a semantic explanation in order to explain which verbs could alternate and which could not. For example, the group of motion verbs that can be 'causativised' is that which specifies both motion and manner in their semantic representation (in the example above the manner is 'rolling'). The group of motion verbs that cannot 'causativise' is that which does not specify manner, but specifies a direction instead (in the above example, fall specifies a 'downward') path. This is a linguistic account which is applied to processing, with the ultimate aim of explaining how children acquire this semantic and syntactic knowledge. As such, Pinker's account can be seen to be a good example of the use of linguistic theory to define a processing task.
Moreover, Pinker provides a semantic explanation for a syntactic phenomenon, emphasising the interaction between syntax and semantics. This interaction is also a focus for the descriptive framework devised by Byng and Black (1989: see above) and is crucial to the ‘mapping’ therapy papers described in section 1.5. The notion of ‘mapping’ derives from just such an interaction between syntax and semantics and deals with the principles for getting from one component to another. In terms of ‘mapping’ impairment, there are at least two aspects of processing that have been taken into account: problems with the semantic structure of verbs themselves; and a difficulty mapping such information onto syntax. Both of these aspects have often been analysed as processes/representations that are involved in both production and comprehension (e.g. Jones, 1986; Byng, 1988). That is, they are considered to be ‘supra-modal’ (Lesser & Milroy, 1993). This notion that some elements of the sentence processing system are ‘supra-modal’ is only an assumption, however. As section 1.4 shows, there is conflicting evidence about this: there are people with non-fluent aphasia whose verb and sentence problems only manifest in one modality but the ‘mapping’ therapies carried-out only in comprehension serve to improve production as well.

B: The Interaction of Syntax, Semantics and Conceptualisation in Sentence Comprehension

In the context of the present study, it is important to emphasise other aspects of sentence processing besides semantic representation and semantic/syntactic mapping procedures. As emphasised in section 1.2.1, a ‘mapping’ impairment may be due to difficulties with conceptual processing. Indeed, this is a possibility that has been explicitly considered in some of the ‘mapping’ therapy papers (e.g. Nickels, Byng & Black, 1991; Marshall, Pring & Chiat, 1993). Conceptualisation is discussed in detail in the next section, however some accounts of sentence comprehension also involve this component. These studies are discussed below.

The interaction of all three aspects of processing - syntactic, semantic and conceptual - is something that has been explicitly investigated using ‘on-line’ psycholinguistic tasks. Tyler (1992) has reported tasks which use the technique of measuring the time it takes to react to the presence of a target word in the context of a heard sentence. Through this method she has identified the role of syntactic, semantic and conceptual (in this case, pragmatic) processing in comprehending predicate-argument structure. The tasks involve monitoring for a
target noun in 4 types of context: in an acceptable sentence, in a syntactically unacceptable sentence, in a
semantically unacceptable sentence, and in a pragmatically unacceptable sentence. For example, subjects had
to monitor for the noun guitar in the following:

a) The crowed were waiting. The boy carried his guitar . . .
b) The crowed were waiting. *The boy slept his guitar . . .
c) The crowed were waiting. *The boy drank his guitar . . .
d) The crowed were waiting. *The boy buried his guitar . . .

The results, for unimpaired listeners, showed that all three types of anomaly caused slower reaction times
(compared to the reaction time for the acceptable sentence). This indicates that all three processing
components - syntactic, semantic and pragmatic - are involved in sentence comprehension at an early stage.
That is, comprehension should not be seen as a process where the syntactic analysis is carried out first, and
then the semantic and then pragmatic.

Importantly, similar tasks were also carried out by participants with aphasia (Tyler, 1985, 1987). One task
contained three types of sentence:

- coherent,
- ‘anomalous’ (that is, semantically incoherent but syntactically acceptable); and
- ‘scrambled’ (syntactically and semantically unacceptable)

A participant with non-fluent aphasia, D.E., was found to be able to use syntactic structure in the coherent
sentence but not in the ‘anomalous’ sentences (there was no syntactic structure to be used in the ‘scrambled’
sentences). This result was taken to mean that syntactic processing was unimpaired in non-fluent aphasia.
Other studies have also shown that certain aspects of syntactic processing are unaffected in non-fluent aphasia,
these are discussed in section 1.4. However, it is important to note in this context, that this particular result
could have another interpretation (as claimed by other commentators, including Lesser and Milroy, 1993).
The crucial thing about the coherent sentences is that they were both syntactically and semantically acceptable.
This fact means that D.E. could have been using either of these sources of information (or both of them). The
fact that he was unable to use the syntactic structure in the ‘anomalous’ sentences strongly suggests that he could not use syntactic information alone.

Other research supports the suggestion that the comprehension of sentences involves more than just syntactic processing: for example, Black, Nickels and Byng (1991) who present evidence indicating that passive sentence structures may be particularly difficult to process due to their semantic and conceptual features. They investigated the sentence comprehension of people with unimpaired language on a sentence-to-picture matching task. The sentences used were reversible and were presented in both the active and the passive form. Overall, passive sentences were not significantly more difficult than actives, although the participants made a number of errors, particularly on the passive sentences involving non-action verbs (verbs of perceptual or psychological state; e.g. see, hear, admire, astonish). This pattern of errors strongly suggests that some passive sentences might be more difficult to process because of the type of verb involved. Neither the easier sentences nor the error causing ones had any syntactic properties in common, but as the authors say “the results can be quite naturally described in semantic and/or conceptual terms, which strongly suggests that semantic/conceptual factors play a role in this task.”

Black et al (op cit.) argue that, in this task, there seemed to be an interaction between the pragmatic properties of the passive form and the meaning of the verb. Many theorists suggest that the passive differs in meaning (not just syntactic form) from the active. The authors draw on Pinker’s (1989) claim that the passive meaning is something like “X is in the circumstance defined by Y acting on it”. So for all aspects of the meaning of a passive sentence to be compatible:

- The verb must be capable of encoding both an action and a resultant state, e.g. wash -> was washed.
- The NPs must be capable of shifting from one position to another and be capable of taking on the meaning associated with that position. E.g in, The nun was washed by the queen, in addition to the meaning assigned by the verb, the passive construction forces an interpretation in which the by-object is more agent-like that the subject. With wash, and other action verbs, this works - the agent is more Agent-like than the Theme.
With non-action verbs it is more difficult, for example in the following:

_The queen was admired by the nun_

In this sentence, the verb assigns the roles of Experiencer (_the nun_) and Stimulus (_the queen_). The inherent causality in the Stimulus-Experiencer pairs means that the Stimulus tends to be interpreted as having the most causal weight. This conflicts with the causal weighting inherent in the passive structure. Recall that the passive meaning is something like “X is in the circumstance defined by Y acting on it”, consequently the Y position is interpreted as having the greater causal weight. With Stimulus-Experiencer verbs the Y position is taken by the Experiencer, the role with the least causal weight. This analysis suggests that stimulus-experiencer verbs are harder to interpret in passive sentences (than other verbs) because of the conflict of causal-weighting. This makes these sentences pragmatically difficult to interpret, or even pragmatically unacceptable.

Also in this paper, Black et al (op cit.) provide an outline of six stages of linguistic processing involved in their task. That is, six linguistic stages necessary to achieve a representation that may be used in selecting a matching picture. These stages are:

1. identification of phonological words in the input, with consequent lexical access;

2. construction of a syntactic representation based on this initial process of segmentation and recognition, revealing the linear order of the elements and the major structural relations between them;

3. selection of thematic roles by reference to the semantic representation of the verb, e.g. Source, Theme, Goal;

4. the mapping of these thematic roles onto structural positions, e.g. Source would be mapped onto subject position;

5. the integration of the semantic content of the phrases in the sentence to form a full semantic representation, specifying the precise nature of the event (or state) expressed by the sentence and the precise nature and identity of the entities participant in that event;

6. inferential processing, integrating, for example, semantic and pragmatic plausibility judgements.
These six stages will serve as the framework for the discussion of the language comprehension task used in the present study (see the Sentence Judgement Task, chapter 2). The other comprehension tasks in this study test event comprehension. That is, these task look at what happens in conceptualisation during the comprehension of non-linguistic material (this process is considered in section 1.3). These two comprehension processes are compared in chapter 6.
1.2.3 Summary

This section has reviewed the major models of language processing that relate to the production and comprehension of verbs and sentences.

In terms of production, the following claims were made:

- All the models of production supported the idea that problems with sentence structure can be caused by difficulty, not only with syntactic processing, but also with semantic and conceptual processing.
- This notion emphasises the pivotal role of events and the predicate that express them in sentence processing.
- In terms of the elements of those models that have been used to investigate language impairment, it seems that the conceptual system is the element that has received the least attention. This seems to be due in part to the lack of elaboration of this aspect of the models reviewed.
- The models reviewed, collectively make a number of claims about the fundamental structure of conceptualisation. There is general agreement that conceptual structure should be, in some way compatible with the information required by the language system. This need for compatibility suggests that conceptual structure should contain information about:
  - the main participants in an event;
  - the relationship between those participants;
  - the perspective from which to describe the event; and
  - other specific components of event meaning that are relevant to syntax.

The review of models of sentence comprehension also emphasised the role of syntactic, semantic and conceptual processing. A number of claims were made:

- Comprehension involves the integration of information from a range of processing sources; one of the main aims of this thesis is to disentangle the component layers of this process.
• The review emphasised the need to consider meaning in a wide sense, including:
  • the meaning of the sentence frame;
  • verb meaning;
  • the meaning the verb assigns to its arguments.

• verb meaning is itself internally complex, in that most of the accounts reviewed make a distinction between core meaning and syntactically relevant meaning components.

• there are conflicting views as to whether aspects of sentence processing are common to input and output.

  Lexico-semantic and conceptual representations are possibly ‘supra-modal’.

Overall, the reviewed accounts of comprehension processing serve to emphasise the importance of verb information. Consequently, information about related events and states is also likely to be of crucial importance. As noted above in the production summary, conceptualisation is an area of processing that has not received much attention. The next section reviews a broader range of theories and investigations into conceptual processing. The motivation for this review is twofold:

1. to elaborate the models reviewed so far by characterising in more detail the process of conceptualisation and its interaction with language;

2. to use this elaboration to illuminate the verb and sentence processing problems of people with non-fluent aphasia.
1.3 EVENT LEVEL PROCESSING

Of central interest to both cognitive and linguistic science is the relationship between linguistic and conceptual representations. As Levinson puts it, “What is the relation between the medium in which we think and the medium in which we talk?” (1997:13). At first sight this may appear to be a purely philosophical question, however this issue has functional importance when employed in the analysis of the structure of language: how do we translate the information that we want to convey into language? how do we interpret information from language so that we can perceive the intended message? these are crucial questions for linguistic analysis and have ramifications, in particular, for theories of semantic structure. Furthermore, an exploration of semantic structure from the perspective of conceptual structure has a direct bearing on the characteristic verb and sentence problems experienced by people with non-fluent aphasia.

The notion of ‘conceptual knowledge’ is derived from the observation that people acquire, store, utilise and convey information about the world: not only the external world but also other internally constructed worlds, based for example on social or psychological experience. Accordingly, such information and knowledge must be internally represented in some way - this representation is conceptualisation. Furthermore, conceptualisation must incorporate all sorts of different types of information, for example: visual, auditory, motoric, inferential, encyclopaedic and situational. Such information is potentially represented in different ways according to the different sources it is drawn from and according to the different mental processes it is used in. In other words there may be specific ‘modules’ in the mind, or notional areas of processing which use specific forms of representation, such as visual, auditory or motoric representation. By definition, all these different forms of information are implicated in conceptual processing and in forming conceptual representations.

---

2 the issue of modularity of mental representation is discussed in more detail in section 1.3.1
As Bierwisch and Schreuder note (1992: 24),

“Whatever the modular nature of the pertinent mental system and the eventual interaction of information they provide might be, [language] ultimately reflects a wide range of different, but somehow integrated conditions determining the truth, appropriateness, and communicative effect of linguistic utterances.”

This quote emphasises the complexity of conceptualisation and the complexity of the interaction between language and conceptualisation. It seems that the conceptual system has the dual task of integrating a mass of information and organising it in such a way as to make it useful for language. The aim of the present study is to clarify the nature of this intricate system in order to characterise its role in language processing.

To investigate the relationship between linguistic and conceptual representation, then, two distinct approaches are apparent:

1. Characterising conceptualisation by using linguistic behaviour as evidence.
   That is, using the structure and content of language as an indication of the kinds of information the conceptual system will have to deal with. This is the approach taken by Levelt in his model of language production. However, there is no need for conceptual structure and linguistic structure to be isomorphic, indeed the fact that the conceptual system has to deal with so many different sources of information suggests that this is unlikely. Ultimately, this investigation need only clarify conceptualisation at the point at which it meets the linguistic system which means that it is sufficient to focus on the mechanisms by which conceptual information becomes part of language. With this restricted aim in mind, the accounts of conceptualisation that are based on language will be of particular importance in this thesis.

2. Characterising conceptualisation directly.
   In practice this approach is not a viable option. Conceptualisation is inherently difficult to analyse and articulate because of what has been called the ‘black-box’ problem of the mind (Nuyts, 1992). The problem stems from the fact that conceptualisation is not a process that is directly observable; rather it’s workings must be inferred from other related mental processes, such as by an approach like that outlined in 1 above.
Nevertheless, the relationship between language and conceptualisation is likely to be a two-way relationship: conceptual structure must, in part, influence linguistic structure and similarly, linguistic structure may also have an effect on conceptual structure.

Accordingly there should be some way to approach the relationship from either side. In view of this, the next section is divided into the following sections:

1. A review of theories that take linguistic structure as a starting point from which to hypothesise about the nature of conceptual structure;

2. A review of psycholinguistic studies in which cross-linguistic differences are taken as a starting point from which to hypothesise about associated differences in conceptualisation; and

3. Finally, a discussion of a related approach, in which a visual stimulus is manipulated in order to induce the use of particular features in a linguistic description. The results of this manipulation are then used to hypothesise about the workings of the conceptual system.

### 1.3.1 Linguistic behaviour as evidence for Conceptual Organisation

Jackendoff (1997), outlines his approach to the linguistic system in terms of the following questions:

1. What does a person need to know in order to use language in the way s/he does?

2. What parts of this knowledge are specific to language?

There is general agreement among linguists as to the answer to question 1., in that such knowledge is provided by some sort of system of ‘rules’ or procedures. People can create and understand an infinite number of sentences in their own language, most of which they will have never heard before. This is what Chomsky (1965) calls the “discrete infinity” of language. As Jackendoff puts it,

“In order for speakers of a language to create and understand sentences they have never heard before, there must be a way to combine some finite number of memorized units - the words or morphemes of the language - into phrases and sentences of arbitrary length. The only way this is possible is for the speaker’s knowledge of the language to include a set of principles of combination ...”(p.3)
The answer to the second question is the source of much investigation in linguistic and psycholinguistic theories of meaning. Jackendoff’s account of the language system has three parallel generative systems: phonological, syntactic and conceptual (which is not purely linguistic). Each of these systems has its own properties but they are linked by sets of correspondence rules. Conceptualisation, in this account, is on the border of the language system: “... language is not necessary for the use of conceptual structure, ... on the other hand, the [conceptual-syntactic] correspondence rules are part of language: if there were no language, such rules would have no point.” (op cit.: 33).

Crucial to Jackendoff’s view of the language-conceptualisation division, is the notion that there is no privileged level of linguistic semantics at which specifically linguistic meaning components can be separated from more general conceptual components. This is because the core elements of linguistic meaning seem to be also implicated in conceptual representation: these are effects such as categorisation, perspective-taking and salience. In a sense this is an argument of ‘economy’; if both the linguistic system and other systems require similar processes and structures, then for reasons of economy these are likely to be located in the same system. This is not to say that all of conceptual knowledge is applicable to the linguistic system, however. Jackendoff stresses that only certain aspects of conceptual representation need be ‘visible’ to the rest of the linguistic system (more particularly to syntactic representation). Indeed, this is also true of the influence of syntax on conceptualisation: only part of syntactic representation need be ‘visible’ to conceptual representation.

The fact that there are only certain aspects of conceptual structure that are ‘visible’ means that there are only certain aspects that are of use to the linguistic system. In other words, there are certain aspects of conceptual structure that have a special status. Other theorists concur with this notion of a set of meaning components with a special status. They differ from Jackendoff, however, in that the status is assigned by creating a separate level of linguistic semantics at which the special aspects of meaning are marked. When compared in these specific terms, it is not clear whether these two approaches differ as much as they might appear to: both consider certain aspects of conceptualisation to have a privileged status. This apparent similarity is an issue that is discussed in more detail at the end of this section, in the context of a full account of the competing theories.
The correspondence rules linking conceptualisation and language are compared, by Jackendoff, to the relationship between two areas of land that are joined by a bridge. The metaphorical bridge links each domain but it makes contact with only a small area within each domain. It is these correspondence rules that both select those aspects of each domain that are required, and translate the information into a compatible format; “if conceptual structure... is not made out of syntactic units, it is a conceptual necessity that the theory of language contain rules that mediate between syntactic and conceptual units” (op cit.: 32). Correspondence rules are crucial to both comprehension and production: they are used for the description of a conceptualisation in language and for the understanding of a conceptualisation as it is encoded in language. Consequently, the correspondence rules are a possible source of event processing difficulty in non-fluent aphasia. Other models of conceptual processing are reviewed later in this section and are compared with Jackendoff’s model in terms of the processes linking conceptualisation and language and their role in language.

Conceptual representation and correspondence rules fit into Jackendoff’s account of the language system as outlined in the model below (adapted from Jackendoff, 1997):

![Diagram of the language system](image)

Before the interaction between language and conceptualisation can be described in any detailed, it is important to attempt to characterise the nature of conceptualisation itself, so the discussion below is divided into two sections:

1) ways of characterising conceptualisation;

2) identifying the nature of the interaction between language and conceptualisation.
1. Characterising Conceptualisation

Jackendoff has attempted to characterise conceptual representations by explorations in three main areas: decomposition and predicate-argument structure (Jackendoff, 1990); image schema representations (Jackendoff, 1987); and categorisation (Jackendoff, 1983). All of these approaches are important for the clarification of conceptualisation, both as it characteristically operates and in terms of how it might be impaired. For that reason, this section will be structured in terms of these different approaches, bringing in other theories at the points at which they relate. The section will begin (part A) with a review of decompositional theories of meaning. Such theories postulate a set of constituents of meaning - ‘conceptual constituents’ - that have a particular status in the language system. Consequently these constituents are likely to be of importance in understanding the difficulties of people who have non-fluent aphasia. Following this (part B), there will be a review of another aspect of conceptualisation that is of key importance to the language system: namely categorisation. Finally (part C), there will be a discussion of those aspect of meaning over and above conceptual constituents. That is, those aspects of meaning that constitute a fully enriched denotation of entities and events (and the predicates that express them). The notions covered in this section include image schemas, graded meanings and ‘qualia’ structure.

A) Decomposition and Conceptual Constituents

To describe conceptual structure, Jackendoff posits a set of ‘conceptual constituents’ which consist of certain primitive concepts and principles of combination. The componential analysis of meaning has long been an integral part of linguistic theory, the aim is to account for the creative potential of language within a finite brain. As Jackendoff puts it, “sentential concepts cannot be listed but must be mentally generated on the basis of a finite set of primitives and principles of combination.” (Jackendoff, 1990: 9). An example is the ‘primitive’ component [CAUSE] thought to underlie a verb such as kill. The idea is that kill is not stored in the lexicon as a whole item but decomposed into the elements [CAUSE] and [BECOME] ‘dead’. Such an account is also useful to explain similarities among word meanings. For example the similarity between: kill, break and melt would be explained by the fact that their semantic structures all contain the component [CAUSE] and [BECOME]. There is general agreement that meaning is componential, although opinion differs as to what form these components take. The modification that Jackendoff makes to this tradition, is to assume that it is conceptualisation, rather than the linguistic component of semantics, that represents this structure.
This componential analysis of verbs can be extended to account for sentence meaning. So, for example:

Tom melted the butter

can be analysed as:

\[ \text{EVENT CAUSE} \rightarrow \left[ \text{ACT } ( )_a ( )_b \text{ BECOME } [ ( )_b \text{ PROPERTY 'melted'} ]] \]

\[ \text{EVENT CAUSE} \rightarrow \left[ \text{ACT Tom, butter BECOME } [ \text{butter PROPERTY 'melted'} ]] \]

In this structure, there are a number of conceptual constituents that will recur in various events. For example, break and kill will have similar structures, differing primarily in terms of the [BECOME] property (i.e. 'broken' and 'dead' rather than 'melted'). This example also shows how a componential analysis of sentence meaning can also account for two other important aspects of the structure of meaning.

1. Thematic roles

Within an account like this, thematic roles can be defined as configurations in conceptual structure. For example, it is not that the 1st argument of the verb melt is assigned the role AGENT, rather all ACT events have AGENTS as their 1st argument.

2. Selectional restrictions

The event melt requires an entity that is capable of being 'melted'. That is, there is a restriction on the kind of entity that this event selects. In a componential account, this sort of information can be included in the conceptual structure of the event. For example, in the above structure, the 2nd open argument position can be marked with this information.

However, componential accounts have been criticised on a number of grounds, most notably by Fodor (Fodor, 1970; Fodor, Garrett, Walker and Parkes 1980). These objections revolve around two main points. The first concerns the adequacy of constituents such as [CAUSE]. For example, when the components are translated back into language they are not synonymous with the original word: kill is not the same as cause to die, melt does not mean cause to become melted. Furthermore, there is no principled way of deciding when a component has been decomposed enough to be a 'primitive' component and no principled reason for preferring
one decomposition over another. So, for example, is the meaning of melt best described as ‘cause to be melted’ or ‘act on something such that it changes state’ with or perhaps ‘act in order to cause an effect such that something becomes melted’? The second important objection to decomposition is that it cannot account for the elements of encyclopaedic knowledge in a word’s meaning. Such ‘real-world’ knowledge can be of particular importance for some events, such as the fact that assassinate is an act only done to politically prominent people, but it seems unlikely that there is a ‘primitive’ component [politically prominent].

Given the aim of characterising those aspects of conceptualisation that have a special status throughout the language system, these objections are not important for now (although they are addressed in part C). The reason is that a componential analysis means only that a concept, such as melt, is composed of at least three notions ([CAUSE], [BECOME] and ‘melted’). As Jackendoff suggests, conceptual constituents are not “necessary and sufficient conditions but criteria for fixing reference in mentally projected world” (op cit.: 54). As such, conceptual constituents seem to play a key role in the conceptualisation of events.

There are two main reasons for the special status of conceptual constituents in the language system:

1. They can account for perceived similarities among events (e.g. kill, break and melt). This feature of constituents relates to the ability to categorise experience into language-relevant units (see part B).

2. Conceptual constituents seem to be an aspect of meaning that have special status in the language system. Recall the semantic account of syntactic alternations given by Pinker (see section 1.2.2). In that account, the syntax needed conceptual (or semantic) constituents as a guide to permissible syntactic structures. That is, the group of motion verbs that can be ‘causativised’ is that which specifies both MOTION and MANNER. The group of motion verbs that cannot ‘causativise’ is that which does not specify MANNER, (but specifies a DIRECTION.).

The fact that Jackendoff places such constituents in conceptualisation and Pinker places them in a separate semantic component has important ramifications. The reason is that, in order to account for the different syntactic behaviour of verbs that have similar meanings, Jackendoff would suggest that the events that these verbs represent are conceptualised differently. Consider, for example, the fact that roll can be ‘causativised’
but *fall* cannot. *Roll*'s conceptual structure would contain [MOTION] and [MANNER] concepts and *fall*'s would contain [PATH] and [MOTION] concepts. This account differs from Pinker’s, in that Jackendoff is suggesting that *roll* and *fall* are conceptualized as different types of event (not merely represented in semantic structure differently as in Pinker’s account). In other words, when conceptualising, or perceiving *roll* we pay attention to the manner in which the event is carried out. By contrast, when conceptualising *fall* we ignore manner, and pay attention instead to the downward direction of the event. These events do not necessarily differ visually along these lines.

Consider the picture of a moving ball, below:

a)

![Diagram of a moving ball](image)

there is no visual way of telling whether it is *falling* or *rolling* (or both). If it was described in language, the speaker would have to conceptualise the extra information (either the MANNER or the PATH) both to access a lexical label and to know about the syntactic structures in which it could appear. The loss of the ability to conceptualise an event in the way language requires would, consequently, have a devastating effect. The notion that it is language that influences the conceptual system to pay attention to manner is crucial: it raises the possibility that conceptualisation per se may be influenced by language. That is, not only does conceptualisation utilise linguistic notions (like MANNER), when the conceptualisation is for expression in language (i.e. ‘thought for language’ in Slobin’s terms, see section 1.3.2) it may use such notions in non-language processing. This possibility is considered further in the review of other models of conceptualisation presented later in this section, along with a the discussion of what it might mean for the characterisation of event processing difficulties.
B) Categorisation

Categorisation is another aspect of conceptual structure that Jackendoff highlights as being the kind of information required by the linguistic system. Categorisation is the process of associating different situations (or entities) as instances of the same type. This requires constructional effort: categorisation is therefore a process of construal rather than simple recognition. Consider, for example, the following:

In English, all these pictures can be described as open states although it is arguable whether these three situations would be categorised as instances of the same type in the absence of the word open in the language.

With a set of associated events, e.g.:

the boy is opening (his mouth/ the box/ the envelope)

it is even more difficult to see how each action is similar. Thus, accessing language is a process of construing a situation so as to categorise it in a language-appropriate way. The important point is that it is the language system that influences the construal. In other words, an English language system will provide the conceptual system with information such as the range of lexical labels available to describe actions resulting in spatial states. These labels include open, put in & take out, so there is little choice as to how describe the pictured situations, in consequence a number of the visual features of the pictures can (and should) be ignored in favour of those features that fit the available labels. Whatever the differences between these situations, they are ignored due to the narrowness of focus needed to categorise them alike (as open rather than put in or take out).

To emphasise this point, it is useful to compare English with another language. A later section deals more fully with cross-linguistic differences as evidence for conceptual structure, however it is important to mention this evidence briefly in this context, in order to make clear the notion of categorisation. In the conceptual system of a Korean speaker, the language influence would be different. In fact, the Korean system would encourage a more detailed focus due to the fact that there are more concepts available that encode actions-resulting-in-spatial-states.

53
In Korean the relevant actions include:

- *ppellita* - separating two parts symmetrically (such as a *mouth*)
- *yelda* - opening objects (such as a *box*)
- *ttutta* - tear away from base (such as an *envelope*)

(taken from Bowerman, 1996)

These facts would influence the conceptual system to construe the pictured situations in a particular way: in terms of the features involved in the three available lexical labels (and consequently, differently from a English-influenced construal). This difference results in the three pictures being categorised alike in English, but being categorised as three different types of events in Korean. The linguistic system seems to be important (if not essential) for organising conceptualisation, at least in terms of categorisation. It is likely, therefore, that conceptualisation would be affected by the language impairment of people with non-fluent aphasia. This possibility will be considered further at the end of this section.

C) Enriched meaning - encyclopaedic knowledge, 'qualia' structure, 'fuzzy' concepts and image schemas

Other elements of meaning, such as pragmatic and encyclopaedic knowledge, are just as important to an understanding of conceptualisation. Moreover all these elements can be seen to grade into each other, as in Pustejovsky’s account of the lexicon mentioned in section 1.2.2. Consequently, organising and integrating all the components of meaning in conceptualisation is likely to be a complex process. As such, the elements of meaning over and above the foundational structure of conceptual constituents should be characterised in as much detail as possible and must be considered as a possible source of difficulty in language impairment.

Categorisation involves the complex encyclopaedic structure of a lexico-semantic representation; the extra detail that is needed for a full representation of what it means to know the meaning of a word (includes aspects of meaning such as family resemblance effects, prototypes and preference rules). This is what Pinker refers to as a verb’s ‘core’ meaning. In the previous section the division of ‘core’ meaning and thematic meaning was noted and the difficulty of drawing such a distinction, in some cases, was discussed. One approach to the semantics of sentences that attempts to incorporate meaning more fully is Pustejovsky’s ‘generative lexicon’ (see 1.2.2). The premise is that the full, highly structured internal semantics of both nouns and verbs could be
as important to syntax as the simple set of conceptual components most usually discussed (e.g. in Pinker's theory). An important part of this internal structure is a complex called ‘qualia structure’. In nouns naming objects, this would include specifications about the object’s appearance, how it comes into being, how it is used and so on. For example, the qualia of a *cup* includes its role as a container for liquid. In this way, *That’s a good cup*, is understood to evaluate an object in its capacity as such a container.

With a predicate such as *on*, the spatial relationship encoded should interact with the participant entities; in the earlier example, *the cup and the table*. *On* in this case would be interpreted as locating the whole of *the cup* with reference to the horizontal surface of *the table*; a *cup* touching a vertical surface of *the table* (e.g., a table-leg) would not be *on*. This is partly to do with the meaning of the predicate, which refers to supporting an object, although a cup hanging from a hook on the side of a table is also not *on the table*; neither is it *on the shelf* if it is supported by a hook on the side of a shelf. However, if the hook is attached to the wall, a cup hanging from this hook could be described as *on the wall*: this is because a wall has no horizontal surface.

Similarly, events have a ‘qualia structure’ that might relate to manner, result, intention and so on. However, events have not yet been considered in detail in either Pustejovsky’s account or Jackendoff’s theory of ‘enriched composition’ (Jackendoff, 1997; derived from Pustejovsky). The notion of enriched meaning does have ramifications for the analysis of verb and event processing problems, however. If the full internal semantic details of events and objects have an effect on the way a sentence is either interpreted or expressed then this is an aspect of meaning that is likely to be affected by non fluent aphasia. The reason is that one of the problems experienced by people with non-fluent aphasia is a difficulty with the relationship between a predicate and its arguments, and ‘qualia’ structure seems to be part of this relational information. It is not an aspect of meaning that has had much attention in the clinical literature. In explorations of non-fluent aphasia the emphasis has been on the impairment of the fundamental, grammatically-relevant structure of sentence meaning, in particular argument structure and thematic roles (see section 1.5). Some papers have explored meaning in a wider sense and some of the findings provide some support for ‘qualia’ structure (these are also reviewed in section 1.5).
Evidently, the integration of various sources and forms of information in a conceptualisation - such as conceptual constituents, pragmatic inferences and encyclopaedic information - is a complex process. It is made more complex by the fact that, even with componential analysis, situations and entities are not precisely definable. That is, a situation (or entity) may be a more or less typical exemplar of a particular conceptual constituent. Language seems to be composed of ‘fuzzy concepts’ (Lakoff, 1972) and graded meanings. For example, consider animacy: this is a conceptual/semantic notion distinguishing one group of nouns from another that can be seen to be reflected in language in various ways. In English, the pronoun system is sensitive to animacy: he and she generally refer to animate entities, whereas it generally refers to inanimate entities:

Steve burned because he/*it was in the sun for too long.

The cake burned because *he/it was in the oven for too long.

The concept Steve has the component [animate] underlying its meaning and cake has [inanimate]. However, animacy is a graded notion, for example consider animals and toys:

The dog was very special because she/it was a birthday present.

The doll was very special because she/it was a birthday present.

It seems then, that there is focal animacy - the prototypical case being humans - and less focal animacy. The entities in the above examples can be defined in relation to each other, in terms of how they encode animacy and Jackendoff deals with this aspect of meaning by proposing a set of ‘preference rules’. These rules are statements of the relative typicality of concepts as instances of a particular component; in terms of animacy then, Steve is preferred over the dog or doll, but all three are preferred over the inanimate cake. The enriched view of meaning and the notion of ‘fuzzy concepts’ both serve emphasise the complexity of conceptualisation. As such, these are aspects of meaning that may be particularly important in a understanding of non-fluent aphasia.

In an attempt to integrate graded meaning with decompositional structure, Jackendoff makes use of the notion of image schemas (Jackendoff, 1987 & 1990; Lakoff, 1987 & 1990; Talmy, 1988). Based on Marr’s (1982)
theory of object shape, this is a way of modelling conceptual representation that is derived from visual perception. The idea is that much of conceptualisation is not static and propositional, as suggested by decompositional structures and most importantly it is not structured exclusively for language. As Lakoff (1990) puts it, conceptualisation is “grounded in and structured by various patterns of our perceptual interactions, bodily interactions and manipulations of objects.” (40), emphasising that, although this approach is derived from visual theory, it was developed to include other perceptual modalities. Jackendoff develops Marr's theory so as to include the behaviour of objects in the full spatial field (Jackendoff, 1987 & 1990); the idea is that notions such as [PLACE] and [PATH] play an important role in both representations of visual perception and in conceptual representation, consequently the format of the representation should be compatible. So although these spatial relationships have been notated in this thesis just like the other components used in the last section (e.g. [CAUSE]), it is more likely that they are represented in an imagistic way.

Consider again this on situation:

![Diagram of a cup on a table]

There is no reason to believe that such a relationship would be conceptualised as a decompositional formula, e.g.:

BE [THING (cup)] [PLACE[ON[THING (table)]]]

before being described. Moreover there is evidence that this sort of information should be represented in a perspective-free way (Levelt, 1996) because scenes can be described from more than one perspective, e.g.:

*The cup is on the table*

*The table is under the cup*

*The table and the cup are touching.*
These sentences are not equally likely but the fact remains that they are possible, suggesting that the depicted situation must be conceptually represented in such a way as to allow them all. In order to describe the situation in language, it is necessary to know how a particular language chooses to describe each of these perspective, both in terms of lexical labels and word order; however perspective is not necessary, indeed not useful, for conceptualisation per se.

Although an imagistic representation of spatial situations seems more likely than a decompositional structure, it is not quite accurate to say that we literally see such concepts; rather, image schemas are a conceptual but non-perceptual aspect of spatial and linguistic representation. For example, consider the concept [PLACE] in the state depicted above - on is not part of the visual image in the way that the cup and the table are. For this reason, it is valuable to bring the theory of image schemas together with other notions from research into visual representation. One such concept that seems to be of direct relevance is that which Talmy (1996) calls ‘nonveridical’ representation. In other words not actually there in reality but perceived. He emphasises that there are many instances of this kind of abstracted concept in conceptual representation - apparent in both visual representation and in linguistic expression - and they share certain characteristic tendencies. Consider, for example, the way sequences of flashing lights are perceived: although each light simply switches on or off, the whole sequence is perceived as motion, the light seems to moved along the line. Talmy calls this ‘fictive motion’. The same phenomena can be seen in language, for example in the following sentences:

That arrow points north.

The road runs across the country.

The chair faces the window.

In other words ‘fictive motion’ can be both experienced perceptually and represented in language, although in both cases there is no real-world (or ‘factive’) motion. There are also examples of ‘fictive stationariness’: in perception, for example the way a waterfall is perceived as an entity: in language, this effect can be seen in sentences like the following:

His route made a circle of the town.
In this sentence, what is being described is, in fact, a movement; although what is being focussed on by this description is the path of the route. The instances of ‘fictive stationariness’ are much rarer in both vision and language. Talmy concludes that this fact reflects a cognitive bias toward dynamism.

In terms of event processing generally, this conclusion suggests that there might be a bias to interpret relationships and situations as events (rather than states). Perhaps this prediction also means that states are harder to conceptualise; or more precisely, take more constructive effort. Also, the non-dynamic aspect of events may be more difficult; the temporal profile of an event might take less constructive effort than the relational information that must also be encoded. Any impairment to the conceptual processing system might lead to a particular difficulty:

a) in constructing a representation for a state; and/or
b) in representing the non-dynamic aspect of an event.

This is important in the context of this thesis as it provides a counterpoint to the claim that language influences much of conceptual structure. Theories and investigations utilising image schemas provide evidence that conceptualisation is based on information from a number of sources, not just language. This means that, in non-fluent aphasia, although an impairment in the language system may affect conceptualisation, it will not impair all aspects of its processing. The result of bringing these two approaches together is to clarify the aims of an investigation into event processing. That is:

• Conceptual theories focussed on the interaction of language and conceptualisation, such as Jackendoff’s, predict that language impairment may affect conceptualisation.

⇒ Therefore, tasks can be designed to find those aspect of conceptualisation that are affected by language impairment;

⇒ People with non-fluent aphasia may have impairments in just those aspects of conceptual processing.

These claims are pursued below: the rest of this section considers the relationship between language and conceptualisation in more detail; section 1.3.2 reviews evidence for language-influenced conceptualisation;
In chapter 2, two tasks designed to investigate this aspect of processing are outlined; chapter 6 reviews these claims in the light of the performance of the participants with non-fluent aphasia in this context and clinical implications are considered.

- Image schema accounts of conceptualisation predict that there will be other aspects of conceptualisation untouched by language impairment.
  
  Therefore, tasks can be designed to find those aspects of conceptualisation that are unaffected by language impairment; and
  
  People with non-fluent aphasia may be unimpaired with respect to these aspects of conceptual processing.

These claims are pursued in more detail in section 1.3.3. There is also a task designed to investigate the influence of visual representation on language outlined in chapter 2. The results from this task for the participants with non-fluent aphasia are discussed in chapter 6, along with clinical implications.

Research into visual representation is a very useful source of information for an understanding of conceptualisation. The reason is that conceptualisation in the broadest sense - what might be termed 'thought' - can be shown to consist of at least two subsystems: spatial representation and conceptual representation.

Spatial representation integrates information from visual, haptic and proprioceptive perception in the way that conceptual representation integrates language, situational and encyclopaedic information. As Jackendoff puts it,

"the 'meaning' of a word goes beyond the features and functions available in conceptual structure, in particular permitting detailed shape information in a spatial representation. (A word must have a conceptual structure; it may have a spatial representation as well)." (1996; 12).

This idea is the same as that presented above in terms of image schemas: conceptualisation is structured partly by language-appropriate principles and partly by non-language principles. In the theories presented above the non-language principles are thought to be image schema representations; this is a useful notion for characterising this aspect of conceptual organisation but it is not certain that image schemas are the only form...
of non-language organisation. However, what does seem to be more certain is that conceptualisation consist in part of visuo-spatial representations, whatever form these take.

Another important aspect of the research into visual perception is the pivotal role given to the representational aspect of perception. That is, in order to perceive something it is not enough to simply 'see' it, it must be visually processed which requires the information to be represented in some way (Wolfe 1994, 1998; Chun and Wolfe 1996). The key role given to representation in visual processing has an equivalence in language processing: a situation must also be processed and represented in order to use its information in language, it must be represented in a language appropriate way. The important point is that both visual perception and event processing require constructive effort: they both involve construal. For example, a visually perceived action is a construct: in order to 'see' a series of movements as an action the various sub-parts must be construed as a whole; similarly to conceptualise an event, particularly a specific event which has a lexical label such as falling, various sub-movements must be construed as a whole. There is evidence in the visual research that without attention, this constructive process of perception does not occur. That is, when visual attention is not directed to a particular object or action it remains an unprocessed miscellany of visual features. Because of the importance of these findings in the context of this thesis, the nature of visual attention is considered in detail in section 1.3.3.

To summarise, the preceding discussion has considered various ways of characterising conceptualisation. Most accounts analyse conceptualisation as being composed of a variety of types of information from a number of different sources; the most important elements of conceptualisation, if it is to be expressed in language, are the 'grammatically relevant' elements or conceptual constituents. These are conceived of as forming the basic 'foundation' on which the fully-enriched meaning of a concept may be built. As Pinker puts it, fully-enriched concepts

"will be hybrid structures, consisting of a scaffolding of universal, recurring, grammatically relevant meaning elements plus slots for bits of conceptual information about [encyclopaedic and situational knowledge]." (1989; pg 168).
Jackendoff agrees, to a certain extent, in that he says,

"... conceptual structure is taken to include all sorts of fuzzy, stereotype, and preference rule phenomena, but the aspects of it that relate to syntactic argument
... structure do not involve such phenomena.”.

This is the division of a concept into 'core' meaning and grammatically-relevant decompositional structure (or thematic structure). The preceding review, therefore, first considered the grammatically relevant elements and then considered the other elements of meaning that compose a concept's fully-enriched representation. All these aspects of meaning are important to an understanding of the language problems of people with non-fluent aphasia.

The main aim of this thesis is to identify the separable layers of processing implicated in the interaction between language and conceptualisation. This aim notwithstanding, it is also important to emphasise that all these aspects of meaning have to be integrated, particularly to fully interpret a sentence. Given the need for integration, the site of such processing is likely to be the interface between language and conceptualisation. Consequently, in explicating conceptualisation, this thesis must consider both the separate identification of aspects of meaning and their interaction. Some of the literature reviewed above can be used to illustrate the importance of this interaction: for example, Pustejovsky's notion of the 'qualia' structure of nouns formalises certain aspects of encyclopaedic knowledge and shows how these aspects interact with the linguistic system; Tyler's (1988) on-line tasks also demonstrate the importance of the interaction of aspects of meaning, such as the tasks that show the involvement in sentence processing of selectional restrictions alongside syntactic structure; similarly, Black et al. (1991) show that semantic and conceptual inferences interact with the meaning encoded in the grammatical structure of sentences, in some tasks. In other words, it is at the interface of language and conceptualisation that the various elements of the conceptualisation are integrated: in comprehension this might result in a full conceptualisation; in production, integration might mean structuring all the aspects of meaning in a language-appropriate way. This potential difference between input and output is explored in detail in the next section.
Finally, the present section highlighted the fact that much of the organisation of the conceptual system is
influenced by the structure and content of language. Such an account predicts that language impairment may
affect both:

- conceptualisation for language; and
- conceptualisation per se (for example comprehending an event depicted in a photograph)

Nonetheless, there are also other aspects of conceptual structure that are language-independent such as image
schemas. One aspect of conceptual organisation that may be language-independent is a preference for
dynamism (see Talmy's notion of a cognitive bias toward representing dynamism, above).

This suggests that:

- language impairment will not affect those aspects of conceptual organisation that are not influenced by
  language: for example, the hypothesised bias toward dynamism.

This section thereby clarifies the nature of conceptualisation to an extent that allows a number of predictions to
be made about the event processing skills of people with non-fluent aphasia. However, the two main claims
made above require further consideration. These claims are restated below along with the principal issues for
clarification:

1. The structure and content of language influences the organisation of conceptualisation.
   - How is this influence effected?
   - Which aspects of conceptualisation are constrained by language, and which are not?

2. The interaction of language and conceptualisation requires a complex process of integration.
   - Does this integration occur in a separate semantic system, or as part of conceptual processing?
   - What are the elements of meaning that are integrated in the interaction between language and
     conceptualisation?

These questions are discussed in the rest of this chapter.

The next section compares a number of different theories in order to more precisely identify the interaction
between language an conceptual processing. The section begins with an elaboration of Pinker's model of verb
processing in which he postulates a separate linguistic level of semantics. At this level, the grammatically relevant meaning components are identified and are used to organise the other aspects of meaning into a particular structure. A further model (Bierwisch & Schreuder, 1996), which also contains a semantic component, is discussed and compared to that of Pinker and Jackendoff in order to highlight the commonalities and to discover the main difference. That difference is that the Bierwisch and Schreuder model separates the interaction between conceptualisation and language into input and output. Subsequently, Langacker's theory of cognitive grammar is considered: this account forms a useful comparison to the other models in this section in that Langacker postulates an inclusive conceptual system that processes not only meaning but also grammatical structure. Throughout this discussion the aim will be to identify the specific elements that comprise conceptualisation. That is, each account will be considered in terms of the distinct layers of conceptual processing they implicate.
2. Characterising the Interaction between Language and Conceptualisation

As discussed above, Jackendoff believes that there is no privileged level of linguistic semantics but that correspondence rules make reference primarily (perhaps exclusively) to those aspects of conceptual representation that affect syntax. Other theorists (e.g. Bierwisch, 1986; Bierwisch and Schreuder 1992; Pinker, 1989) disagree, arguing that there must be a level of representation that specifically encodes those aspects of semantic information that relate to syntax. The first account that should be considered is that outlined by Pinker (1989), in an attempt to explain how children learn the argument structure of verbs and the wide range of syntactic structures they can appear in.

The fundamental structure of Pinker’s approach is represented in the model below:

![Diagram]

CONTEXT

\[\text{Perception} \& \text{Cognition} \]

\[\text{CONCEPTUAL STRUCTURE} \]

\[\text{Category Labelling} \]

\[\text{SEMANTIC REPRESENTATION} \]

\[\text{Linking} \]

\[\text{SYNTACTIC REPRESENTATION} \]
Pinker's account proposes that the semantic structure of a verb is the motivation for syntactic alternations, he takes this approach for two main reasons:

1. children have to learn to distinguish between related verb meanings anyway; such as the difference between roll and fall which are verbs which can refer to the same event (see the rolling/falling of the ball depicted above);
2. certain aspects of these meaning distinctions correlate with certain of the syntactic behaviours of verbs; such as the observation that a ball rolling can be expressed in a transitive structure - the boy rolled the ball - but a ball falling cannot.

Consequently, Pinker develops a detailed theory of lexicosemantic representation and processing, focussing on the following questions:

- what does the lexicosemantic representation of a verb look like?
- how does it link to syntax?
- what kinds of meaning are encoded?

In other words, this account concentrates on semantic structure and processing, with only a general treatment of conceptual representation and processing. However, this theory is worthy of further consideration for two reasons:

1. the separation of semantic structure from conceptual structure should be considered; and
2. the content of semantic structure is also important, as it represents those parts of meaning that are directly relevant to syntax.

The main reason for separating out these levels is that the semantic structure associated with a verb contains only certain aspects of the event being described. Other aspects of the event meaning, other conceptual components, do not have a role to play. This seems to be the case no matter how characteristic these irrelevant (to syntax) components are. Consider, for example, the following set of verbs:

hit, cut, break

The similarities between the three events referred to by these verbs can be seen when the verbs are put into sentences like the following:
The pen hit the desk
The pen cut his arm
The pen broke the chair

The similarity could be even greater; for example, the same event can be described with any of these verbs:

She threw the pen at him and

the pen hit his arm / cut his arm / broke his arm.

The important question is how to characterise the similarity, and what effect this association might have on syntactic structure. Perhaps these are all motion events: in order to hit the desk the pen moved towards it; in order to cut his arm the pen also moved towards it; similarly the breaking of the chair would involve the movement of the pen toward it. Equally all these events suggest that some sort of contact occurs, and all three events have some sort of effect on one of the participants. However, these characteristics do not necessarily imply that these verbs have a similar semantic structure. In other words, there is no implication that the characteristics of motion, contact and effect correspond to semantic components like [MOTION], [CONTACT] and [EFFECT].

Pinker (op cit.) argues that the semantic structures associated with hit, break and cut, cannot all contain these semantic components. The reason for this is that these three verbs behave differently in terms of the syntactic structures they can appear in. For example:

He hit the pen against the desk.

but;

*He cut the pen against his arm.

*He broke the pen against the chair.

(this is acceptable if it means that the pen broke, but not if the chair broke)

This ‘X hit Y’ — ‘X hit at Y’ alternation is possible with verbs that specify [MOTION] and [CONTACT] in their semantic structures, however the alternation does not occur if the verb also specifies [EFFECT]. This suggests that, although an event describable by hit might typically have a specific effect (something gets cut, broken, bruised etc), the [EFFECT] component is not part of hit’s semantic structure.
Another syntactic alternation that *hit* does not participate in is the ‘anticausative’ alternation. This is an alternation in which a verb in a transitive frame (with a ‘causer’ and an ‘affected’ participant) can also appear in an intransitive frame (with the ‘affected’ participant in the subject position); in other words ‘X affects Y’ can be expressed as ‘Y is affected’. As *hit* does not specify [EFFECT], it cannot appear in the intransitive frame, e.g.:

*The desk hit*

The other two verbs, *break* and *cut*, do specify an [EFFECT] and so should be able to alternate in this way. However, only one of them can, i.e.:

*The chair broke*

but,

*His arm cut*

The explanation Pinker (op cit.) gives for this, is that the ‘anticausative’ is also problematic for verbs specifying [MOTION] and [CONTACT]. This means that *break* specifies [EFFECT] (see previous alternation) but not [MOTION] or [CONTACT] and *cut* specifies all three of these semantic components.

In summary, these three verbs which seemed to be conceptually related can be seen to differ in their semantic structure (as evidenced by their syntactic behaviour). The semantic difference between them can be summarised as follows:

<table>
<thead>
<tr>
<th>Verb</th>
<th>Motion</th>
<th>Contact</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>hit</td>
<td>[MOTION]</td>
<td>[CONTACT]</td>
<td></td>
</tr>
<tr>
<td>cut</td>
<td>[MOTION]</td>
<td>[CONTACT]</td>
<td>[EFFECT]</td>
</tr>
<tr>
<td>break</td>
<td></td>
<td></td>
<td>[EFFECT]</td>
</tr>
</tbody>
</table>

Pinker (op cit.) argues that there are conceptual similarities between the events described by these verbs - we can perceive the similarities and can associate the events in our minds - but that these similarities are not all relevant to syntax. He says “… it’s not what possibly or typically goes on in an event that matters; it’s what the verb’s semantic representation is choosy about in that event that matters.” (op cit.: pp. 108)
In other words, these three verbs can be used to describe very similar events. This similarity covers a number of domains: the events may be visually similar, similar in terms of resultant effect, and they may involve similar parts of the body and bodily movements. However, the language system categorises the events as distinct. This means that the language system ignores the similarities in favour of those aspect that differentiate the events. This point is the antithesis of that made for the three open events (opened his mouth / the box / the envelope). Recall, that in that case the situations were quite different (visually, in terms of body parts and movements and in terms of the perceptual features of the resultant state). However, in English there is only one concept that encodes all three situations and so the language system ignores the differences in favour of those aspects that are similar. In either case, what is important to the language system is not the whole concept, but only certain linguistically relevant elements.

Of the questions that remain, the are two that have particular importance in this thesis:

1. Which aspects of conceptualisation are linguistically-relevant and which are not? Are they as distinguishable as Pinker suggests?

2. How are such elements marked for their special status? In a separate semantic system (Pinker’s view) or by some aspect of the organisation of conceptual structure itself (Jackendoff’s view)?

Whatever the answers prove to be, most theories hold that certain components of semantic structure (or constituents of conceptual structure) have a special status in the translation of conceptualisation to language because of their direct relevance to syntax. It is important, therefore, to consider whether such components may be selectively impaired in brain damage. In order to do this, it is first necessary to further characterise those aspects of events that are singled out in the semantic system.

Pinker, following Jackendoff and others (e.g. Levin, 1985, 1988; Talmy, 1988, 1996; Keil, 1979), proposes a set of conceptual categories that includes: Thing, Event, State, Action, Path. In order to capture their role in structuring meaning, the proposal includes a set of formation rules that combine these categories into more complex concepts. The resulting concepts are conceptual constituents, the most common being: HAVE, BE,
ACT and GO. HAVE and BE are canonical states and ACT and GO are canonical events. For example, an event may consist of a THING moving along a PATH. The function relating them in this case would be GO:

EVENT \[\rightarrow \] \[\text{event GO (THING, PATH)}\]

In other words, conceptual constituents are structures encoding the relationship in the event. That is to say, the structure selects a particular relational aspect of the event to describe.

This basic machinery accounts for a range of features of language. As noted earlier, one important outcome of this kind of account is that it allows thematic roles to be defined as configurations in conceptual/semantic structure. E.g. Agent is the first argument of ACT. These constituents are also those that seem to have an important role to play in driving syntactic alternations. For example, those verbs that allow the ‘anticausative’ alternation discussed above, were those that had an EFFECT constituent in their semantic structure. More precisely they are ACT events that have an EFFECT such that something changes state. Moreover, the ‘change of state’ aspect of their meaning is represented in semantic structure as an event in which something GO-es to a particularly property (e.g. broken). For example, the sentence:

The pen broke the chair.

has the semantic structure:

a) \[\text{ACT (THING, THING, EFFECT [GO (THING, PROPERTY)])}\]; or

b) \[\text{ACT (pen, chair, EFFECT [GO (chair, broken)])}\].

The ‘anticausative’ alternation then ‘looks’ for any verbs that have the semantic structure in a), and allows these to appear in the related semantic structure:

c) \[\text{GO (THING, PROPERTY)}\]; or

d) \[\text{GO (chair, broken)}\];

which is then expressed as:

The chair broke.

---

3 The event itself will be interpretable in terms of various relationships. This issue is explained using evidence from cross-linguistic data in section 1.3.2
Such conceptual constituents are important in the characterisation of verb and sentence processing problems because of their special status: they are special elements of conceptualisation, and/or appear in a separate level of semantic structure. In either cases they have an important role to play and so some aspect of the processing system must mark these elements as important so that they can be used in linguistic processing. Without a marker of their status, it is difficult to see how conceptualisation ‘knows’ which aspects of an event to encode. Most situations can be construed in many different ways involving different combinations of these special conceptual constituents. This is demonstrated in the following quote from Pinker:

“When I pour water into a glass, am I affecting the water by causing it to move, or am I affecting the glass by causing it to go from not being full to being full? When Sue likes John, is she causing herself to think well of him, or is John causing her to approve of him? If Jim does an impression of Richard Nixon for Bill, is he causing Bill’s laughter in the same way that he can cause a spoon to fall…” (1989: 101)

In non-fluent aphasia, it is possible that the marker showing the status of these constituents is lost. This loss may mean that the kinds of choice referred to in this quote would be impossible to make. The claim is not that these choices are conscious, either in an impaired system or otherwise, but that they illustrate one aspect of the complexity of conceptual processing.

This discussion, therefore provides the first potentially separable layer of conceptualisation: that is:

- the selection of a particular aspect of the relational information encoded by an event.

Moreover:

- the procedures by which this selection is made may involve the identification of conceptual constituents, such as HAVE, BE, ACT and GO.

To summarise Pinker’s position, the meaning of a verb is a combination of semantic structure and pragmatic/real-world information. That is, “a full verb definition is an ‘hybrid structure’ consisting of a scaffolding of universal, recurring, grammatically relevant elements plus slots for bits of conceptual information...” (1989: 168).
There are two important points that follow from this:

1. there should be a separate linguistic level of processing - the semantic level - in order to account for the elements of meaning that are 'recurring' and 'grammatically relevant'; and

2. this semantic structure is the place where the enriched elements of a verb's meaning are organised; that is, the pragmatic and encyclopaedic elements are slotted into the semantic structure.

In this way, the semantic level has the dual task of selecting the linguistically essential aspects of a conceptualisation and organising other aspects of meaning. Each part of this dual task is itself internally complex. The most important effect of this viewpoint is that it stresses the organisational role of the semantic system. In other words, in order to access language, conceptual information must first be organised or structured by language. One of the primary objectives in the design of the tasks for this thesis was to clarify this organisational process and to attempt to individuate its processing layers. The first layer that may be identified is the selection of relationship type (e.g. HAVE, BE, ACT or GO): other layers will be identified in the discussion below.

The integration of various sources of information (syntactic, semantic, conceptual) would seem to be a crucial component of this organisational process. Moreover, Pinker's account specifically places this integration at the interface of conceptualisation and language. Given that people with non-fluent aphasia have difficulty with this interface, this theoretical account raises the possibility that a major source of the difficulty might be this integration process. Further, this theoretical possibility has some empirical support from the findings of Black et al (1991): the results of their sentence-picture matching task strongly suggested that the comprehension of causative sentences involves calculations of causal weight using information from just such sources. In addition, the results indicated that such causal calculations became more difficult (more prone to error) when these sources of information supplied conflicting information. For example, in the following sentence

*The nun was admired by the queen*

information must be integrated from various sources in order to interpret the direction of causality. The integration is problematic in this case because of a conflict between the causality assigned by the sentence structure and that assigned by the predicate. The conclusion, drawn from Pinker's account, that the interface between conceptualisation and language involves a complex integration process is crucial to an understanding
of event processing problems in non-fluent aphasia. It also gives rise to important questions about the precise nature of such an integration and requires that the various strands of processing are teased apart. The main aim of this thesis is to identify at least some of these processing layers.

Bierwisch (e.g. Bierwisch, 1986; Bierwisch & Schreuder, 1992) agrees with Pinker that there must be some intermediate processing between conceptualisation and syntax. Bierwisch & Schreuder (op cit.) say that,

“the way in which experience is conceptualized is no simple isomorphism of the way in which it is verbally expressed.”

In other words there is no necessity for conceptualisation to share either components or structure with the language system. It is likely that conceptualisation reflects a complex interaction of many different forms and sources of knowledge whereas syntactic structure is determined only by the linguistic system, in this way, the two are not compatible. This incompatibility raises questions about how the linguistic system knows which aspects of conceptual structure to encode.

Bierwisch (and colleagues) answer this question by suggesting that there are intermediary processes between conceptual structure and syntax, and moreover that these intermediary processes are part of the language system. In output, this means that the linguistic system, via the intermediary processes, can identify just those aspects of conceptual structure that are important. The processing involves both identifying the important parts of conceptual information (such as the participant entities and the relationships between them) and matching such information to available lexical items:

“This mechanism has to effect two things: first, it must split up [the conceptualisation] into chunks that can be lexicalised, thereby registering the relation between them and making them available for [syntax], second it must feed chunks into the [lexicon] where they must be matched with the semantic form ... of appropriate lexical entries.” (Bierwisch & Schreuder op cit.; 43).

The role of the intermediary processing is symbolised in the diagram on the next page:
This account takes Pinker’s notion of the semantic system a step further: the process of getting from conceptualisation can be seen to consist of a number of sub-processes:

- organising conceptualisation into a structure compatible with language: ‘category labelling’ for Pinker; the intermediary processes for Bierwisch.
- identifying grammatically relevant conceptual constituents (the semantic level for both Pinker and Bierwisch);
- ‘matching’ conceptual constituents to semantic representations (only outlined explicitly in Bierwisch’s account)

The notion of ‘matching’ refers to the influence of language on conceptualisation: conceptualisation provides a mass of information including details about entities and the relationships between them; semantic structure supplies information about the particular arguments of a verb and a specifically defined relationship; and the two sorts of information must be combined. Notice that situations themselves do not exclusively encode one relationship and, therefore, do not isolate ‘participant entities’: each entity may be a participant in more than one relationship, or maybe peripheral to them all. In order to select a particular relationship to describe, it is
necessary to know about the relational structures available in language; this ‘knowledge’ is supplied to the conceptual system via the intermediary processes and consequently there is feedback between language and conceptualisation.

The assumption of feedback is contrary to Levelt’s (1989 & 1996) account, and more generally contrary to traditional ideas about the ‘modularity of mind’ (Fodor, 1983). In Fodor’s theory, processing components are characterised by “informational encapsulation”: a term which refers to the strict constraints on the kinds of information a particular component processes. Levelt (1989) adopts this traditional framework when he says,

“Generally speaking, one should try to partition the [language] system in such a way that (a) a component’s characteristic input is of a maximally restricted sort and (b) a component’s mode of operation is minimally affected by the output of other components.”

It is this position, coupled with a lack of empirical evidence to the contrary, that leads Levelt to postulate that there is no direct feedback from language to conceptualisation. However, as noted earlier, in later work Levelt seems more open to the possibility of such feedback. In particular, it is difficult to account for a number of cross-linguistic differences in perspective-taking and event categorisation without this interactivity. Recall, for example, that Levelt appeals to some kind of feedback to account for the different ways perspective is encoded by different languages (e.g. Brown and Levinson, 1993) when he suggests that

“A culture’s dominant perspective makes a speaker attend to spatial properties that are relevant to that perspective” (1997; 103).

Jackendoff addresses this question of feedback by recasting the notion of modularity: he suggests that the language system is best understood in terms of ‘representational modularity’. This means that the overall language module (as originally conceived by Fodor) is understood instead as a number of representational systems; each of these systems is an autonomous module, however in order to communicate information from one module to another, these systems must be connected to each other by interface systems. These, by definition, are not autonomous.
It seems then, that a number of accounts recognise a need to include feedback in some form or another. Moreover, there is an increasing body of empirical evidence supporting the notion of a linguistic influence on conceptualisation. This evidence comes largely from cross-linguistic studies such as that of Brown and Levinson mentioned above (these studies are discussed in detail in section 1.3.2.) The claim being emphasised here is that the availability of certain structures and lexical items in a language seems to influence the way a situation is conceptualised. Such a claim predicts that a damaged semantic system (the intermediary processes, in Bierwisch’s account) could have an effect not only on the formulation of semantic structures but also on conceptual structure. For example, an inability to identify the HAVE component of a verb’s semantic structure could affect the information that is incorporated into the conceptual representation of an associated event; it could lead to the conceptual structure also lacking the information necessary to distinguish HAVE from e.g. BE whether that event was being described in language or not.

This introduction of feedback also has the consequent effect of making semantic accounts (such as those of Pinker and Bierwisch) more like the conceptual account of Jackendoff. In fact all three accounts of conceptualisation discussed in this section (Jackendoff, Pinker & Bierwisch) have more similarities than has been suggested so far. For example, in order to account for grammatically relevant aspects of meaning, Pinker proposes an interface processing between conceptualisation and language; this semantic system has knowledge of what elements are available in the lexicon and so can pick out relevant aspects of the conceptual structure. Similarly, Jackendoff uses intermediary correspondence rules. More important still, is Jackendoff’s assertion that only certain aspects of conceptualisation and syntax, are ‘visible’ to those correspondence rules. This ‘visible’ area of conceptualisation is the “syntax interface level” and seems to be comparable to Pinker’s link between conceptual and semantic representation. For example, it is these two components (the conceptual-syntax interface and the conceptual-syntax correspondence rules) that organise conceptualisation into language relevant structures such as participant entities and relationships and link them to inherently linguistic notions such as EVENT, HAVE and BE. Similarly, Bierwisch’s account includes an intermediate processing component that performs all the complex organising and ‘matching’ needed to move from conceptualisation to language.
In order to extract both the commonalities and differences between these account - and to assess those that would have an effect on the characterisation of event processing in non-fluent aphasia - the three theories are represented in diagrammatic form on the next page. In these diagrams an attempt has been made to factor out any purely terminological differences without changing the spirit of the account:
The main difference between these accounts, at least in terms of characterising event processing, is that Bierwisch distinguishes input and output in the link between semantics and syntax. This account seems to be the only one to have considered the possibility of a difference between input and output conceptual processing. This is largely because other accounts concentrate on showing the knowledge store component of conceptual processing (see for example Levelt, 1989; in section 1.2.2) or simply do not address this issue (Pinker, 1989; Jackendoff, 1997). It is particularly important to consider this potential difference in the context of non-fluent aphasia, in that an impairment may affect output processing and not input (or vice versa).

This separation of input and output seems to arise largely from the nature of conceptual information. As noted by all the theorist discussed in this section, conceptualisation is a complex and enriched representation of meaning, combining information from a wide range of sources. The organisation of this information into a structure suitable for language must involve a process of paring-down this complex meaning into the more refined structure of semantic meaning. That is, language production requires a refinement of conceptualisation. Moreover, as the result of the refinement must be acceptable to the linguistic system, this process must be accomplished by a set of principled procedures (an important aspect of which is the identification of grammatically relevant aspects of meaning). The important thing is that the full detail of conceptualisation cannot be expressed in language; accordingly conceptualisation must be pared-down into a ‘skeletal’ structure of language-appropriate elements: this is the output linking process.

In comprehension, the reversal of the principled refinement procedures, in itself, would not result in a fully enriched conceptual structure. The reason is that the enrichment of the ‘skeletal’ structure requires additional information: the additional aspects of ‘full-meaning’ discussed earlier in terms of Jackendoff’s theory. In order to access this more complex meaning there must be some sort of ‘matching’ procedure between the concepts that are stored in conceptual representation and the ‘skeletal’ structure of the language (embodied in the input sentence). This ‘matching’ procedure is much like that used to check which lexico-semantic representations are available in the lexicon, when producing a sentence; however, there needs to an additional process of integrating the meaning of the ‘skeletal’ structure and the meaning of the conceptual information to form a coherent conceptualisation.
In summary:

- integration in comprehension is an enrichment process;
- in production, integration of the same meaning elements, is a refinement process.

Bierwisch and Schreuder (op cit.) say,

> "the value of the [comprehension] mapping . . . will be a conceptual structure that modifies [the conceptualisation] by the particular contribution that [the input sentence] makes under the condition of [the conceptualisation]." (my emphasis)

In other words, the conceptual system will already contain a conceptualisation of an event but the structure of the language in the input sentence influences the particular conceptual representation created by hearing that sentence.

There are two important entailments from such an analysis of comprehension:

1. Language encodes information in its structure that constrains the conceptualisation of a particular event.

   Both visually-depicted events and linguistically-described events must be constrained in a particular way to achieve comprehension. A person with a language impairment affecting the structure of their conceptual representation will use the stimulus material to aid their processing, however the information encoded in the visual depiction will be visual and that contained in a sentence will be linguistic. In other words, the sentence itself contains linguistic guides to constraint. This analysis gives rise to the, seemingly paradoxical, claim that the comprehension of sentences may be easier that the comprehension of pictures for people with non-fluent aphasia. This claim is addressed by the inclusion of both visual and linguistic tasks in the experimental set (see chapter 2) and is pursued in more detail in the Discussion (chapter 6). In addition the different processing required by picture-tasks is examined in section 1.3.3 below.

2. The Bierwisch and Schreuder (op cit.) model also emphasises that comprehension is a processes of integration. However, there is a possibility that the relative contribution of language information and
conceptual knowledge in the integration, may well differ from sentence to sentence. This idea is explored in detail below.

As an example of an event requiring complex integration for its comprehension, consider leaving. The conceptual system will contain a representation of a leaving event that is a manifold representation, incorporating all aspects of meaning including semantic, situational, encyclopaedic and 'fuzzy' components. The semantic structure of the verb leaving and the sentence in which it appears also provides information about meaning, although this information is ‘skeletal’ and incomplete. Consequently, neither the general conceptual representation nor the information from the language structure will be enough to achieve an interpretation of the particular leaving event being described.

For example, consider sentences a) and b) below:

a) *He left the company last year*

b) *She left the library 10 minutes ago.*

In sentence a) the meaning of leave is interpreted as a change in employment, in b) as a change of location.

In both cases, neither the general conceptual representation nor the information from the language structure will be enough to comprehend the sentence.

i. The full conceptualisation of leaving, unconstrained by the structure of the language in the sentence, would result in too many alternative interpretations of the event.

ii. The language information, on its own, would not provide enough detail:

- the semantic structure of leave would simply provide the information that there was a MOTION event in which someone moved from one PLACE to another,
- the semantic content of he or she would provide information about the possible movements of animate entities, but this information would not be enough to point to a specific movement,
- the content of company and library would provide information about possible ways of leaving but would not disambiguate the particular interpretation,
- the time phrases would only specify when the leaving occurred, on their own they do not indicate the kind of leaving that occurred.
However, the combination of i and ii guides the interpretation into a fully enriched comprehension of the particular leaving event being described. The different interpretations of the two sentences rely on the integration of conceptualisation, semantic and syntactic structure.

However, the relative contribution of each component in the integration process is not equally important in comprehending all sentences. The comprehension of some sentences will depend on one aspect of meaning more than the other.

For example:

c) *The boy ate the sweets*

In sentence c), recognition of the noun phrases *boy* and *sweets* would be enough to achieve a relatively constrained interpretation. That is, making use of the ‘core’ meaning of the concepts associated with *boy* and *sweets* provides enough information because the likely events involving *the boy* and *the sweets* are relatively few. An *eating* event is the most likely so it is even possible to comprehend this sentence, at least broadly, without recognising the ‘core’ meaning of the verb itself. If the ‘core’ meaning of the verb is also comprehended then the sentence is even more easily understood. This analysis indicates that the comprehension of sentence c) relies more heavily on conceptual information than sentence structure. This sentence may even be comprehended without interpreting the information encoded in the sentence structure. As a result, people with non-fluent aphasia who have difficulty interpreting the information encoded in sentence structure can usually understand sentences like sentence c).

People with non-fluent aphasia may also be able to understand sentences such as a) and b) quite easily too, however these sentences have not been separately identified in assessment or experimental tasks and so this possibility would need to be evaluated empirically. If people with non-fluent aphasia are able to comprehend such sentences then it should be noted that they are performing a relatively complex combinatorial process. The processing required for sentences a) and b) is more complex that that required for c) because it is necessary to interpret the ‘core’ meaning of the verb in the context of the items with which it appears. For example, it would be necessary to interpret *leaving* in terms of an animate Theme and either the *library* or the *company*. 
The combination of *leaving* and *the library* results in a different event than that resulting from the combination of *leaving* and *the company*.

When sentences are included in a sentence judgement task, requiring a judgement of semantic acceptability, the comprehension processes differ from those described above. The main difference is that word order becomes important as a measure of acceptability. The language comprehension task included in the Experimental Tasks in this study is a semantic judgement task and so the focus of the remainder of this section will be on this kind of task. The importance of word order in such a task can be appreciated by consideration of the following:

*The boy ate the sweets* (this is sentence c), repeated from the previous page)

*The boy left the library*

These sentences are both acceptable, but when the NPs are reversed the sentences are not acceptable:

*The sweets ate the boy*

*The library left the boy*

In a judgement task, both conceptual information and structural (i.e. word order) information are important because one NP is animate and the other is not. The relative importance of conceptual and structural information in comprehension is not the same in a sentence judgement task. In a comprehension task, sentence c) requires no structural information but in a sentence judgement task structural information is needed to ascertain that the arguments have not been reversed.

Structural information is not essential for all sentences in a sentence judgement task however. For example, compare the sentences in Set A with those in Set B, below:

Set A

d) *Helen fell the ball.*

e) *The ball fell Helen.*

f) *Helen fell.*

g) *The ball fell.*

To judge all these sentences, structural information is relatively unimportant; it is enough to know the meaning of *fall* coupled with the number of arguments in the sentence. In other words:
• Fall only requires one arguments (ruling out d) and e) on this basis alone).

• The nature of the THING that can fall is not restricted; all people and objects can fall.

Consequently, it is enough to simply recognise that fall is in a sentence frame containing only one argument to judge its acceptability. Compare this to Set B:

Set B

h) Helen threw the box.
i) *The box threw Helen.
j) *Helen threw.
k) *The box threw.

In Set B, the judgement of the last two sentences, j) and k), can also be carried out on the basis of the number of arguments in the sentence. However, the judgement of the first two sentences in Set B differs: this is because it is not enough to recognise that there are two arguments; it is also necessary to analyse the word-order so that the combinatorial effect of the verb and the arguments in those particular positions can be assessed. This processing is more complex than that necessary to assess Set A and sentences j) and k) in this Set.

This more complex processing can also be seen in Set C below:

Set C

l) Helen opened the box.
m) *The box opened Helen.
n) *Helen opened.
o) The box opened.

In this Set, complex processing involving the integration of information from all sources (linguistic and conceptual) is needed for all four sentences.
That is, it is necessary to integrate:

- the semantic and syntactic properties of open, particularly the information in the word order and syntactic frame;
- the core meaning of the verb and the NPs;
- the effect of the combination of these ‘core’ meanings, particularly the effect of open on the box.

This analysis shows how structural and conceptual information can have varying importance, depending on the verb used; this is true of both sentence comprehension and sentence judgement tasks, albeit in different ways. Taken as a whole, this analysis suggests that there are separable layers of processing in comprehending or judging a sentence and it raises the possibility that these processes may be separably impaired; the relative importance of each processing layer differs from sentence to sentence and from task to task and so impairment in a particular process will have differing effects. To summarise the above analysis in terms of a sentence judgement task:

1. To judge some sentences [Set C and the transitive sentences in Set B] it is necessary to integrate:
   - the semantic and syntactic properties of the sentence, particularly the information in the word order and syntactic frame;
   - the core meaning of the verb and the NPs;
   - the effect of the combination of these ‘core’ meanings, particularly the effect of the verb in combination with its internal argument.

2. In other cases [Set A and the intransitive sentences in Set B] this complex combination is not as important:
   - some sentences can be judged on the basis of the ‘core’ meaning of the verb and the number of arguments alone.

Consequently, this analysis has important ramifications for the sentence processing difficulties of people with non-fluent aphasia. It predicts that an impairment in the language system will affect interpretation to varying degrees, depending on the nature of the event and the predicate that expresses it as well as on the task requirements.
Moreover, in terms of a sentence judgement task, it predicts the following:

1. Some sentences require complex processing and so will be more difficult [e.g. Set C].
2. Other sentences can be judged on the basis of less information and so will be relatively easier [e.g. Set A].

These proposals will be considered again in the context of the design of the Sentence Judgement Task (see Methodology, section 2.3.6) and in the Discussion (6.3).

The procedures organising conceptualisation in production are characterised differently in the Bierwisch and Schreuder (1992) model. They say,

> “Although [the organisational procedure in production] is the inverse of [the organisational procedure in comprehension], it cannot be defined as its mirror image, because it must assign values in [semantic structure], rather than pairs of [semantic structure] and [conceptualisation].”

In other words, the ability to access semantic structure is of paramount importance in production; it is never enough to use conceptualisation to access ‘core’ meaning alone. Therefore, the processing differences seen for comprehension above, will not hold for production.

There may well be differences in terms of the ease with which some events are structured conceptually, and thereby expressed in language, however these will not be the same differences as listed above for comprehension. This account is consistent with those already discussed in this section: in order to access the language system for production, conceptualisation is organised to indicate certain language-relevant aspects of information such as identifying participant entities and relational information, consequently, the nature of the refinement process in production will not be considered further here, rather it is the aim of this chapter as a whole. For particular examples, see the task design and Discussion for the Objects and Actions Video (sections 2.3.1 & 6.3).
So far, this section has compared Jackendoff’s account of the conceptual system with two others. Both of these account postulate a separate semantic system in which the grammatically relevant components of meaning are highlighted. It is also useful to bring in one further account for comparison, this time an account that assumes an even more inclusive conceptual system. Langacker (1987, 1991, 1997) argues that grammatical patterns are essentially symbolic patterns; in other words they are form-meaning correspondences just like lexical items. In Langacker’s model, the form-meaning correspondence in both cases (i.e. for lexical items and for sentences) is located in the conceptual system and consequently there is no autonomous semantic component and, furthermore, no autonomous syntactic component.

Form-meaning correspondences (both lexical items and syntactic frames) are acquired through exposure to the language until they become ‘entrenched’ (Langacker, 1997). Such an acquisition involves the consistent recurrence of certain features of language such as particular syntactic frames, word-orderings and lexical items. The idea is that the features that recur - structures and labels - are reinforced and those that don’t recur are ‘cancelled out’. Langacker calls this “abstraction”. Moreover, these established units are necessarily standardised representations, consisting of the common elements of all experiences of a particular unit. As Langacker puts it,

“Expressions are learned by being encountered on multiple occasions, engendering contextual understandings that are similar in certain respects and diverge in others.

Consistently recurrent features of these understandings are reinforced and progressively ‘entrenched’, whereas features that do not recur simply ‘cancel out’...

‘Linguistic knowledge’ resides in structures that become cognitively entrenched ...

such units are necessarily schematic.” (op cit.: 236)

This approach places the processing burden on schematising the conceptualisation of an event in a particular way; so as to recognise an event as an instance of an established unit. This characterisation of conceptual processing resembles those discussed above, in as much as it suggests that conceptualisation must be organised in a language-appropriate, or language-‘reinforced’ way. However, Langacker’s account also provides a useful framework for integrating ‘core’ meaning, semantic structure and other aspects of a fully enriched
conceptualisation. The reason is that, the recurrent units discussed above involve all aspects of the recurrent situation not just the language. That is, the form-meaning correspondences that are reinforced include features of the language and the context:

“Specifications of this nature [that is, contextual details] are therefore part of the conceptual semantic value of linguistic elements to the extent that they survive the process of cancellation and abstraction. . .” (op cit.; 236)

In comprehending an event from language, this account predicts that the recognition of lexical items and syntactic frames entails the full interpretation of their associated concepts; lexical items and syntactic frames are ‘entrenched’ units embodying all aspects of meaning, albeit in a schematised form. Accordingly, lexical items and syntactic frames might be considered to be ‘keys’ that access meaning; ‘keys’ to the store containing details of their associated, fully enriched, conceptualisations. As Langacker argues, a lexical item gives access “to a large inventory of cognitive domains.” In comprehension, therefore, conceptualisation is a process of access and enrichment.

In production, conceptualisation is slightly different, in that it is defined as “the ability to construe the scene in alternate ways for the purposes of expression” (Langacker, 1991: Glossary). This notion of ‘construal’ is considered in detail below. However, it should be noted that Langacker’s account might usefully be considered compatible with the input/output distinction made by Bierwisch and Schreuder. Both accounts suggest that:

• in language production, the mapping between conceptualisation and language is a process of paring-down information, or construing it in a particular way; access to language is achieved by constraining the selection of certain aspect of the conceptualisation;
• in comprehending an event from language the starting point is already constrained by language form; the mapping is effected by links between various aspects of the linguistic input and conceptualisation.

This portrayal of the processing mechanisms involved in the conceptual-linguistic interface, makes predictions about the abilities of people with non-fluent aphasia.
Specifically this account predicts that:

- The production of sentences (and verbs) requires the principles for constraining the conceptualisation of an event to be intact. The most important constraining principles come from the grammatically relevant semantic structure of the predicates that express those events and so impairment to these semantic representations will have an adverse effects on production.

- The comprehension of sentences involves links from more than the grammatically relevant aspects of semantic structure. There are also links to conceptualisation from the ‘core’ meaning of predicates and their arguments and so impairment to the grammatically relevant components of semantic structure alone will not prevent comprehension in all cases.

Langacker’s characterisation of conceptualisation in production is worth considering in more detail. He argues that the description of an event requires the ability to ‘construe’ that event in a particular way; crucial to this notion of ‘construal’ are the notions of ’scanning' and ‘profiling’. Consequently, people with difficulty processing verb and event information are likely to have problems with one or both of these processes.

Scanning is a notion derived from our underlying ability to effect comparisons; an example from vision is the process of comparing the body of an object to the background to detect the edges. Similarly in conceptualising events, the sub-component actions may be compared in order to detect changes in motion; in other words to distinguish one action from another. Profiling is the ability to find connections between components; for instance, visually relating the handle to the body of a cup in order to perceive the cup as a whole, or relating one stage of a throwing event with another in order to conceptualise it as a sequential action.

- Events must be scanned sequentially and profiled relationally: for example, a throwing event should be scanned sequentially to identify the successive stages of the action and profiled to relate the participants (e.g., relating a ball to the action of the boy);

- States must be scanned in summary and profiled relationally: for example, in an on state a scan of the temporal shape should indicate a constant, static shape that can be summarised as a whole and the participants (e.g. a cup and a table) should be related;
• Entities must be scanned in summary and profiled collectively: for example, a cup does not have successive temporal stages nor does in have participant entities that can be related, rather they should be analysed as part of the cup.

Such scanning and profiling would be carried out in the construal of any situation; including one being viewed in a picture, on video, in reality or imagined. However, these different stimuli involve subtle processing differences which may relate to Langacker's processing mechanisms. In analysing a static picture of an event, the relational profiling can occur unhindered if all the necessary participants involved in the relationship are depicted, although the sequential scanning seems to require something more than just analysis of visual information. For example:

The processing involved in judging which of these pictures are events, would be something like the following:

• If the conceptual system contains a single constituent that 'describes' the various black & white elements as a whole, it can be collectively profiled and the picture is of a single entity [B only].
• If not, the system must delineate which of the elements can be profiled collectively and identify how many entities there are [two entities in both A & C]. On this basis a 'profile' of the scene is created. If the system can find a conceptual constituent which relates the two entities as participants in some sort of relationship, it can begin to analyse the type of situation depicted.
• If the relationship between the entities can be scanned sequentially, it is an event [A only], and further event analysis can be carried out.
• If the relationship cannot be scanned sequentially [C only] it is a state.
Scanning seems to be more complex than profiling in static pictures, because the picture can only provide a snapshot of the full event leaving the rest to be supplied by the conceptual system. Judging whether the picture is of an event involves a complex process of not only analysing the picture in the correct way but also filling in the missing sequential steps. Consider the examples given: the 2 potential events (indicated by the profiling) are A and C; if they are depictions of events then they must only be snapshots because the full temporal profile is not shown; if A is analysed as reading, the missing steps can be ‘filled-in’ by the conceptual system, analysing C harder because although this may be a state it could also be a step in a falling event (i.e. *the mop fell against the bucket*).

The theory of ‘basic’ event types can also be used to illuminate the role of these processes in conceptualisation as these concepts seems to provide a mechanism for relating components of the situation. So, once the decision is made that a scene can be profiled relationally, it is then possible to make explicit the type of relationship (having, being going or acting) that is encoded by the event in question. A decision as to whether the event is, for example, ACT or GO also makes the integration of other components (THINGS, PATHS, PLACES etc) easier. Another example of ‘construing’ a scene in a language-appropriate way, is the process of perspective taking. The process of perspective-taking can be most easily seen in experiments where speakers are asked to give route directions or describe a visual stimulus (Levell 1989; ch.4). The findings of these experiments highlight the freedom of choice in assigning perspective; in giving route directions, for example, speakers can:

- choose a deictic perspective (with the speaker as the reference location);
  
  *The church is to the left*  
  (i.e. to my left)

  *The church is on the left of the library*  
  (i.e. from my point of view)

- choose an intrinsic perspective (with some other object/person as reference location);
  
  *The post-box is in front of the church*  
  (i.e. from any viewpoint)

- choose an absolute perspective (form example, using points of the compass);
  
  *The bank is north of the library*. 

91
There is no single necessary way of assigning perspective but the choice of perspective results in different ways of describing a scene, even though what is being described is visually constant. This is only a relatively free choice, however; perceptual factors can be seen to have some influence on perspective-taking in that there are a number of observed tendencies:

1. in figure/ground relations there is a preference for the ground to be the reference location;

   The cup is on the table
   \textit{?}The table is under the cup

2. smaller objects are preferentially located with respect to larger ones;

   The bike is in front of the house
   \textit{?}The house is behind the bike

3. in a scene with a moving object and a static one, the static object is the reference location;

   The ball rolled past the dog
   \textit{??}The dog was still as the ball rolled past

4. a contained object is preferentially located with respect to its container.

   The pegs are in the bag
   \textit{??}The bag is around the pegs.

Language-specific tendencies have also been found to constrain how perspective is taken: some cultures have only absolute perspective encoded in their language and this tendency to take an absolute perspective can also be seen in non verbal tasks (Brown and Levinson 1997). This finding is discussed in detail in section 1.3.2 along with other evidence from cross-linguistic studies that helps to characterise the nature of conceptualisation.

Language also causes some forced-choices with respect to perspective. In describing the position of two objects, although there is a choice as to which object to locate with reference to which, some sort of perspective must be taken (Levinson 1997) there is no perspective-free way to describe those objects. In a similar way, it is difficult to describe a motion event without taking a perspective.
For example, you have to say either:

*He came to my office*

or

*He went to my office.*

This is due to the kinds of meanings that are encoded in a verb; the kinds of semantic and conceptual constituents language tends to use. In English there are two related sets of events that have such directional perspective encoded in their meaning: inherent direction events, and events of transaction. For example, motion verbs like:

*come/go, enter/leave and fall/rise*

and transaction verbs like

*give/take, buy/sell, and send receive.*

In the both sets of verb there are path components; the former set tends to encode a single path only whereas the latter encodes the initial and final points of that path. For example:

*He fell*

(Theme) (V)

& downward direction encoded in the V

*He went away*

(Theme) (V) (Path)

& away from referent encoded in the V

*She sent me the books*

(Source) (V) (Goal) (Theme)

As the examples show, there is a complex interaction between those aspects of an event that are encoded in the verb, those that are encoded in obligatory arguments, and those that are optionally encoded. There are some general tendencies, such as verbs of transaction encoding both source and goal (and optionally path), but many aspects of encoding seem to be idiosyncratic and stored as verb information. This complex interaction of different aspects of meaning means that an impairment to the perspective-taking processes could be caused by a range of factors, including impaired lexico-semantic verb knowledge or impaired conceptual structuring.
It is important at this stage, to consolidate all the information discussed above, particularly in order to highlight the **separable layers** of conceptualisation that have been identified so far. These are:

1. The distinguishing of events from non-events; this involves conceptualising the temporal profile of a situation (potentially by a process of scanning).

2. Identifying/expressing relational information; this involves
   - selecting one aspect of the relational information encoded by an event (potentially involving the identification of conceptual constituents, such as HAVE, BE, ACT and GO),
   - identifying the entities that are participant in the event,
   - identifying the roles that these participant entities play in the event.

3. Identifying/expressing perspective.

These layers of processing are motivated by the theoretical accounts discussed above and in the next section, various cross-linguistic studies will be considered in order to provide support for these claims. In the final section, the discussion of event comprehension will be extended to include not only conceptualisation as it is accessed from language form but also conceptualisation of situations more generally. In particular, the conceptualisation of visually encoded events will be considered.
1.3.2 Cross-Linguistic Language Differences as Evidence for Conceptual Organisation

Slobin (1996a, b) attempts to investigate the conceptualisation necessary for formulating an utterance, using the comparison of narratives produced by speakers of various languages. This approach is motivated by the observation that experiences have to be “filtered through language into verbalised events” (op cit.: ). Most theorists agree that although a particular language provides a set of ways in which a situation can be conceived, this is not the same as saying that a particular language provides a set of ways in which one must think about a situation. Slobin (1996a) devises the useful phrase ‘thinking for speaking’ in order to clarify this position. That is to say, thought in itself is not constrained by a particular language, nevertheless if a thought is intended for expression (‘thought for language’) then it must be organised in a language-appropriate way. Such organisation will be influenced by a particular linguistic system: that is, it will be constrained by the particular language spoken by the ‘thinker’.

Pinker (1989) makes the same point, when he says,

“The meaning of a sentence is not a rich knowledge structure for a particular event or state or for a typical kind of event or state. Rather, it is a highly schematic construal of an event or state... The same situation ... must first be mapped onto one of the many possible idealisations of it before it can be described in words ... One’s particular language spells out which of those possible idealisations are available for linguistic encoding. Whorf was surely wrong when he said that one’s language determines how one conceptualises reality in general. But he was probably correct in a much weaker sense: one’s language does determine how one must conceptualise reality when one has to talk about it.” (op cit.: 360)

The distinction between thought and ‘thought for language’ can be illustrated by consideration of the following sentence:
The man is sick

This sentence is written in English and so represents a particular conceptualisation of the situation, other languages would represent slightly different conceptualisations of the same situation: in the Sioux language it would also be necessary to indicate whether the man in question was moving or at rest, in Kwakiutl it would be necessary to indicate both whether the man was visible and his distance from the speaker. By contrast, a speaker of Eskimo would describe the situation more like the following:

Man sick

so that there is no indication of definiteness (signalled in the English version by the use of the) nor tense or aspect (indicated in English by the form of the verb). The important point, is that a persons language does not restrict their means of thought per se; an English speaker can still conceptualise aspects of the situation that are irrelevant to the English linguistic system, such as whether the man is moving or not, whether the man is visible and how far away he is.

Slobin compared narratives from speakers of English, Spanish, German and Hebrew and looked at the differences in terms of temporal and spatial descriptions. He found that English speakers tend to:

- use a large set of motion verbs;
- describe those motion events with various sub-parts;
- mention many ground elements (such as Source and Goal arguments);
- use few static descriptions.

For example, English speakers produced descriptions such as:

- *The boy climbed the tree* (motion event & Goal)
- *He threw him over a cliff into a pond* (motion event, Source & Goal)

whereas a Spanish speaker would say something like:

- *The boy was up the tree* (static description)
- *He threw him from a cliff at the bottom of which was water.* (motion & state)

Slobin suggests that English speakers devote more attention to “the dynamics of movement along a path.” (Slobin, 1996b), and Spanish speakers to, “static descriptions of settings “ (op cit.). The reason seems to be
that English verbs encode change of location in a particular manner (*climb*) leaving the encoding of directionality to prepositional phrases (*up the tree*). In Spanish the directionality is encoded in the verb itself:

- *subir* to go up

with manner left to be encoded by other means or not at all:

- *salió corriendo* he left running (*he ran out*)
- *salió* he left.

Slobin suggests that in acquiring language we learn to conceptualise situations in a way that reflects the structures in our language. This account is much like that given by Langacker (1987, 1991, 1997: see previous section), for explaining how learning language involves learning how to ‘schematise’ events in conceptualisation.

Slobin explains the process in these terms,

"... learning the available options for describing motion events in a particular language pushes the child to attend to particular features of such events. The lexicalisation patterns lead not only to the development of a range of syntactic devices, but also to a sort of “thinking for speaking” that is characteristic of the input language.” (op cit.; 31)

In other words this is the same point as that argued in previous section: the linguistic system constrains the organisational procedures of the conceptual system. Slobin’s account also helps make more precise the claim that people with non-fluent aphasia may be at a disadvantage because their linguistic system is not supplying information about the “available options” for describing events. Further, Slobin suggests that the grammaticalised categories that are learned through exposure to language have something in common: “...they cannot be experienced directly in our perceptual, sensorimotor and practical dealings with the world” (op cit.).

These categories include the notion of movement, as exemplified by the comparison between English and Spanish above. The English conceptualisation seems to be based on the conceptual constituents GO and PATH, whereas the Spanish places more emphasis on BE and PLACE. The suggestion that these are just the sorts of conceptualisation that are not directly perceived implies that they are the sort of features that are
conceptualised because of the influence from language. The loss of a linguistic influence on conceptualisation would, therefore, be doubly impeding.

The reason for this is that:

1. the information about ‘available options’ serves to constrain conceptualisation so as to include information that is not supported by much direct evidence (e.g. information that is not visually apparent);
2. the loss of information about ‘available options’ would make the choices inherent in conceptualisation more unconstrained.

As a result, the relative lack of constraint would be particularly problematic. Consider, for example, the conceptualisation of the temporal structure of a climbing event; the choice about how to conceptualise the temporal profile is not one that can be constrained by visual means - the evidence for this is in the different approaches taken by the English and Spanish speakers above - the climbing scene could not have contained any visual features directing the speaker to describe a motion event because a number of Spanish speakers chose to use a static predicate. If an English speaker suffered an impairment to their semantic system such that it no longer supplied the information that English contains a number of ‘manner-of-motion’ verbs, then that speaker would have an unconstrained choice as to how to describe the climbing scene. Such a lack of constraint means that there is no language-mediated procedure for organising the conceptualisation.

Another of the tendencies of English speakers observed by Slobin was a tendency to mark durativity more than termination. That is, they used more instances of the structure, is [verb]-ing, e.g.

The boy is falling out of the tree and ..

than speakers of other languages. The discussion above suggests that, in language impairment, an English speaker would lose this tendency. In practice this is not the case. One of the characteristics of non-fluent aphasia is an increased use of the progressive form - ing, along with a reduction of other inflectional morphology. The following discussion presents a possible framework for characterising the over-use of -ing by people with non-fluent aphasia. The intention is to outline a possibility for further exploration, although there is no data in this study that clearly supports this framework; accordingly the intention is not to provide an explanation of this phenomena so much as to suggest a potential approach. The overall aim is to pursue an
account that is compatible with the characterisation of conceptualisation developed in this thesis as well as to provide a basis for theoretical and clinical consideration.

There are a number of theories about why -ing is over-used in non-fluent aphasia, but they fall into two main groups:

1. Some accounts (Goodglass and Geschwind, 1976; Saffran, Schwartz and Marin 1980) claim that the -ing represents an inability to signal the dynamic aspect of events in a verbal expression. In English, this idea coincides with the fact that there is another -ing form, the gerundive that allows verb stems to be used as nouns. For example:
   
   a) She is **singing** loudly

   In sentence a) **singing** is the progressive form of the verb **sing**.
   
   b) She goes to church because she likes the **singing**

   In sentence b) **singing** is a noun.

   However, there is no evidence that unequivocally shows that the -ing form used by people with aphasia is the nominal form rather than the verb. For instance, the -ing form is often produced with suitable arguments:

   **The chair ... sitting there**

   (R.K.: this study)

   **The stool falling down**

   (B.B.: Jones, 1986)

2. The best-known account in which the -ing form was identified as a progressive marker, is that of Lapointe (1985). In order to account for the over-use of the progressive -ing, Lapointe suggests that it is stored differently from other grammatical morphemes.

   It is possible however, to account for the use of -ing by people with non-fluent aphasia within the conceptual/semantic approach used in this thesis. That is, to account for the use of -ing in a similar way to that which is used to account for the other language difficulties found in non-fluent aphasia, such as a
problem accessing verbs from conceptualisation. Consider the effect the progressive aspect has on the temporal structure of an event:

*He kissed her*

*He was kissing her*

As can be seen from these examples, *-ing* has the effect of extending the event so that the predicate refers to a longer period of time. There are other means of extending events in language, including other aspectual markers and time phrases (*all day*); however the particular effect of *-ing* is to extend the event ‘from the inside’ so that other features of the temporal profile are obliterated. For example

*She finished the chapter*

refers to the accomplishment of the event, but when *-ing* is added:

*She was finishing the chapter*

The focus on the accomplishment disappears in favour of the extendedness of the event. For this reason, Frawley (1992) refers to the progressive as an “all-purpose event extender”. In other words, the detail of the temporal structure of a particular event does not matter, *-ing* will extend all events in a similar way. It was claimed above, that identification of the temporal structure of events is particularly difficult for people with non-fluent aphasia so perhaps it is the case that an “all-purpose event extender” would be useful in an impaired system precisely because it obviates the need to characterise the temporal profile in more detail.

Moreover, 'extendedness' is a conceptual notion that can be seen to have a role in language more generally as it is a notion most often used to denote one property of entities: they occupy physical space and can therefore be characterised in terms of their extendedness. A number of languages categorise objects on the basis of extendedness; for example Japanese has numeral classifiers that signal extension in one, two or three dimensions. These are exemplified below (examples taken from Frawley 1992):

*Banana ni-hon* Two bananas (lit: two long thin bananas)

*Syatu ni-mai* Two shirts (lit: two flat thin shirts)

*Ringo ni-ko* Two apples (lit: two round small apples)

Extendedness can also be applied to events: they occupy temporal space and so they have extendedness in time.
There are three traditional ways to characterise the temporal profile of events:

- **in terms of their ‘boundedness or ‘unitization’: the perfective/imperfective distinction, e.g.**
  
  \[
  \text{I wrote the letter} \quad \text{vs.} \quad \text{I was writing the letter}
  \]

- **in terms of ‘goal-directedness’: the telic/atelic or process/accomplishment distinction, e.g.**
  
  \[
  \text{He drove home} \quad \text{vs.} \quad \text{He reached home}
  \]

- **in terms of temporal duration: the punctual/durative distinction, e.g.**
  
  \[
  \text{She kissed him} \quad \text{vs.} \quad \text{She spoke to him}
  \]

However, this three-way classification may hide the similarity between the notions. For example, ‘bounded’ ‘accomplishment and ‘punctual’ events are all events that have a temporal profile with marked boundaries so that their temporal extendedness is restricted. The converse events are also similar: ‘imperfect’, ‘process’ and ‘durative’ all have profiles that are extended in time although the particular extending effect of the progressive is to neutralise of details of the temporal profile. Referring to the difference between forms such as \textit{finished the book/ was finishing the book}, Jackendoff says the effect is to,

> "... conceptually 'zoom in' on the action, so that the endpoint disappears from view" (Jackendoff, 1997: 51)

Jackendoff also refers to ‘extendedness’ in his componential analysis of events. For example, the constituent parts of a PATH (such as SOURCE, and GOAL) result from a concept of direction being extended so that its beginning and end may be identified; only by extending an event can certain sub-parts of its temporal structure be identified. For example, consider a situation in which a birthday card moves from one person to another (a \textit{giving} event): in order to describe the situation as an event, the situation must be conceptualised as a whole, yielding a conceptualisation in which the card and the two people were all in some relation to each other (Langacker’s relational profiling); the movement aspect must also be conceptualised (Langacker’s successive scanning). These two aspects of the event are not enough however, they may result in the conceptualisation of a scene where the card and the two people are all related and they all move, but the key aspects of the movement are ignored (that is, the direction of the motion). Consequently the event must be categorised as extending over more than one component movement: the movement must start with the card in the possession of one person and end with the card in the possession of the other. In between are various
sub movements. The key point is that only by extending the conceptualisation to include more than one sub-
movement can the characteristic concepts of Source and Goal be identified. Jackendoff says:

"The part-whole distinction and the treatment of boundaries . . . makes it possible,
for instance, to formalise the parallelisms between the count-mass distinction . . the
event-process distinction [and] . . the part-structure of an event. Using this
notation it proves possible to relate motion formally to extension." (1996; 108)

An account developed on this basis, would have two main benefits:

1. It might explain why people with non-fluent aphasia may be able to use -ing even when they are not able to
   express temporal structure in any other way; it may be that -ing is an ‘all-purpose event extender’ that does
   not require detailed analysis of the shape of the temporal profile.

2. It might allow the use of -ing to be characterised as an instance of a general conceptual tendency to
   ‘extendedness’.

Significantly, the notion of a conceptual tendency to ‘extendedness’ links with a similar claim made earlier: the
claim derived from Talmy’s notion of ‘fictive motion’ that there is a conceptual preference for dynamism. In
both accounts, the notion of the temporal structure of an event is crucial: they both emphasise that the profile is
a construct rather than an observable property; and both accounts point to phenomena that indicate that there
may be a ‘default’ temporal profile. In other words, in the absence of a particular choice as to the kind of
temporal profile in which to describe a situation it may be that situations are conceptualised as dynamic and
extended. In this way, a progressive event may be thought of as the unmarked conceptualisation of a situation.

For example sentence a) below presents the unmarked descriptions, with sentences b)-e) being used if a
particular effect is required:

a) She was reading the newspaper

b) She read the newspaper

c) She read the newspaper all day

d) The newspaper was in her hands
Moreover, it is useful to view dynamism and extendedness as two accounts of a similar effect because they both relate to conceptualising separate subparts of a situation as part of a continuous whole (successive scanning); for example the component actions and entities involved in the giving event described above. The two accounts both relate to the way conceptualisation is structured but they are independently motivated: 'fictive motion' is a feature of event comprehension seen to affect vision and language in a similar way (see section 1.3.1, part 1, section C), 'extendedness' is a phenomenon encoded in language in many different ways (see above).

It is important to add that, although -ing might obviate the need to be more specific about an event's temporal profile, the need to structure relational information remains. This fact raises the possibility that the process of relational structuring is separable from temporal scanning and predicts that there may be people with non-fluent aphasia who cannot signal temporal information in their output (and who may over-use -ing) but who can signal relational information. It should also be noted that the man is VERB - ing type constructions are commonly used in clinical tasks for both assessment and treatment of sentence production. In the light of the above discussion, it would be important to take into account that the use of -ing has various effects on conceptualisation. This point is discussed further in section 6.2.

In the previous section, it was noted that perspective-taking can be seen in language and non-language tasks. Levinson and colleagues (Brown and Levinson, 1993; Baayen and Danziger 1994; Levinson 1997) devised a range of tasks to explore the means of encoding spatial arrays for memory. The aim was to discover whether the particular frame of references used in language was also used for non-linguistic processing. One such task is outlined below.

A participant stands in front of a table on top of which is an array of objects (see diagram):
The objects are removed and given to the participant, who has to then reconstruct the array on the table. Once the memory of the array has been established, the participant is then rotated 180° to face a second table. They then have to reconstruct the array on this table, i.e.:

![Diagram](image1)

This task was carried out by 25 Dutch and 24 Tenejapan participants. The Dutch perspective system, like the English, relies heavily on a deictic (speaker-centred) perspective: left/right/front/back. The Tzeltal language spoken by the Tenejapan participants, on the other hand, offers only an absolute frame of reference: North/South/East/West. The use of these different perspective systems to carry out the spatial memory task would have differing results. Use of a deictic perspective would result in this pattern:

![Diagram](image2)

Use of an absolute perspective, on the other hand, would result in the array depicted here:

![Diagram](image3)
The results showed that these participants used their language-mediated perspective system in this non-verbal task:

- the majority of Dutch speakers used a deictic perspective to re-make the array (95%);
- the majority of the Tzeltal speakers used an absolute perspective (60%).

There were other tasks testing different arrays, in which the same pattern of result was achieved.

Levinson (1997) concludes,

"...the frame of reference dominant in the language, whether relative or absolute, comes to bias the choice of frame of reference in various kinds of nonlinguistic conceptual representations." (op cit.: 125)

These findings support the claim that the linguistic system has an affect on perspective-taking in conceptualisation; even in non-linguistic tasks.

Bowerman (1996) examines the ways in which spatial terms are expressed in different languages and looks for related differences in conceptualisation. She observes that children speaking English, Dutch and Korean first start describing spatial relationships at around the same age (16 months) and in response to similar situations. For example, spatial terms are used for: putting things in and taking them out; attaching things; climbing up and down; putting on and taking off clothing. However, in their categorisation of different events into various subtypes, the children differ and furthermore these differences are aligned with the semantic categories particular to their language. For example, in one study English speaking children were observed to use in for all instances of putting things into containers and on for all instances of putting onto surfaces (Choi and Bowerman, 1991), i.e.:

- *in* both for climbing into the bath and for putting magnetic letters into a small box.
- *on* for putting the magnetic letters onto the fridge door and onto the table.

The Korean speakers, at the same stage were making the further distinctions necessary in their language: these children were distinguishing tight containment from loose containment and distinguishing setting things on a
surface from attaching things to a surface, i.e.:

- **kkita** (‘tightly on’) for putting a top on a pen,
- **neha** (‘loosely on’) for putting the magnetic letters into a box,
- **kkita** for attaching the magnetic letters to the fridge,
- **nohta** (‘on horizontal surface’) for the letters onto a table.

The children in both groups were observed to use the spatial terms largely correctly, even in novel situations, suggesting that they were understanding the underlying semantic structure of their language. However, certain errors were also evident. As Bowerman suggests, this might mean that language learners find some of the categorisation of their language unclear. On the basis of the preceding discussion, it is likely that certain categorisations will be unclear because the grouping is not visually based or it is not homogenous. For example, some of the children in both the English and Dutch groups overextended the use of the word *open*: they used *open* for taking off a shoe, separating two bits of Lego and removing a piece of a jigsaw. On the other hand, none of the Korean speakers overextended their use of the spatial terms. This could be explained by the wide scope of the *open* category in English and Dutch; as discussed in section 1.2.2, this label covers a diverse range of objects, perhaps inviting a rather abstract conceptualisation of the meaning of the term. In Korean, on the other hand, the range of objects that can be ‘opened’ is more restricted.

These errors suggest that the categorisation of spatial representation for language is the outcome of a complex interaction of non-linguistic and linguistic influences. Linguistic patterns cause speakers to categorise spatial relationships differently depending on which language they speak, and this can be seen even in very early stages of language acquisition. However, non-linguistic categorisation, such as the visual perception of similarities and difference, can lead to over-extension of terms. This means that non-linguistic spatial understanding is not enough to provide the necessary conceptual packaging that must occur before spatial situations can be expressed.

This dual influence of linguistic and non-linguistic processing can also be assumed to be true for adult speakers. Furthermore, as the above results suggest that non-linguistic information would not be sufficient to
drive lexical selection, an impairment in the linguistic system would affect categorisation per se. This study therefore supports the idea that conceptualisation itself may be impaired by damage to the linguistic system.

So, to recall the previously mentioned example, consider the following situations:

a) b) c) 

In viewing states as visually diverse as these, the influence of an English (or Dutch) linguistic system is needed in order to conceptualise them as instances of the same sort of situation. Not categorising these states together could not necessarily be put down to a problem with visual perception: a Korean speaker (with an intact linguistic and visual system) would not categorise these states together. Rather, for a Korean speaker, each state would have a different lexical label.

The complex interactions between linguistic and non-linguistic processes in learning to categorise can be related back to the models of language production and comprehension reviewed in previous sections. In particular, these results provide support for feedback between the linguistic and conceptual systems. Some of the English and Dutch children in the above study used *open* for states that cannot be described in this way but, crucially, the Korean children did not. Three consequences follow from this:

a) it is unlikely that these are particularly difficult states to describe;

b) the states labelled *open* in error were not visually similar to states correctly labelled *open*;

c) it is unlikely that the English and Dutch children had no word for the incorrectly labelled states.

The most likely explanation is that these states were perceived and conceptualised as *open* states by some of the children because of the influence from their linguistic system: these states were not conceptualised as *open* by those children whose linguistic system did not exert the same influence. This conclusion can only be understood in the context of feedback from language to conceptualisation and it indicates that, even if the
question of a separable semantic component cannot be fully answered, the strong influence of language on conceptualisation must be acknowledged.

Mandler (1996), also considers the language of young children in order to gain an insight into conceptual representation. She points out that many of the earliest meanings that language expresses are based on spatial notions and so conceptual representation might be best understood in terms of image schemas. For example, the first verbs learnt by children describe paths of various sorts (Golinkoff, Hirsh-Pasek, Mervis, Frawley, & Parillo, 1995); these are verbs such as fall where the specific direction of the path is what matters. An image schema that represents this directionality allows similarities to be observed across ostensibly different events (and for non-crucial differences to be disregarded) for the purpose of describing such events. As Bowerman (1996) notes, although this observation about first verbs is true for English speaking children and children speaking some other languages, it is not necessarily so for all languages: this is a matter for empirical investigation. The important point is that at least some of these first conceptualisations seem to be influenced by the particular language being learnt rather than universal image schemas.

Mandler counters Bowerman’s argument with the suggestion that there are probably image schemas that are used in conceptualisation but that are not expressed in a particular language: for example, image schemas for the spatial terms used by Korean that might be used by English speakers in conceptualisation but to expressed. The idea is that children have the same pre-verbal image schemas regardless of the language they are learning but that they only use those required by their linguistic system. To support this suggestion Mandler points out that many of the errors made by the children in the Choi and Bowerman studies involved semantic categorisation that would have been correct in another language. This account coincides with the notion of a universal form of conceptual representation (as assumed by Pinker and Jackendoff). The discussion in section 1.2.2 also sought to identify aspects of conceptualisation that were not mediated by language. Because the conceptual system, by definition, draws on manifold processing systems it is highly likely that only part of conceptual structure is language-mediated and that certain structures are common across languages. As conceptualisation includes visuo-spatial representations it is possible that these universal aspects of conceptual structure are image-based.
This cross-linguistic research provides support for the notion of both language and non-language mediated conceptualisation. Consequently people with non fluent aphasia might still have access to non-language mediated conceptualisation, or universal concepts; one such concept, identified earlier, is a cognitive preference for dynamism. The additional claim being made is that other image-based concepts may remain unaffected by language impairment. These concepts include image-schemas such as MOTION, END-POINT, and CAUSATION. It is important to test this claim further by looking for retained ability to structure in these terms when language-mediated structures are unavailable.

Another approach to the characterisation of conceptual representation is the observation of the gestures that accompany language. It is useful to consider such studies in this thesis for two main reasons:
1. gesture can provide evidence about the nature of conceptualisation without being directly associated with language; and
2. such studies have also been carried out cross-linguistically.

McNeill (1997) observed the gestures used by a number of speakers recalling the narrative of a cartoon; speakers of various languages including English, Georgian, Spanish and Swahili. An overall tendency was for the gestures to mark foregrounded information: this was not necessarily linguistically foregrounded information but a more intentional choice by the speaker to emphasise information that was new, in terms of the local context of the narrative. For example a Georgian speaker, who had just described someone holding a ball, produced the following (the underlining indicates where the gesture occurred):

\[ da \ uzarmazar \ \textit{rk`in-is \ burt-s} \ \textit{ch-a-gdeb-s} \]

\[ \text{and enormous} \quad \text{ball} \quad \textit{throw-down} \]

In this sentence, the new information is that the person is now throwing the ball as opposed to holding it and so this is the information that is marked by the gesture.

McNeill found a high degree of similarity in the co-ordination of gesture and language: similar gestures occurred with similar language segments, even though the languages themselves show major lexical and

109
grammatical differences. However, although all speakers marked the semantic category most closely resembling the gesture they used, the semantic categories the speakers chose to mark differed across languages. In other words, the gestures were also highly influenced by linguistic patterns which indicates that conceptualisation, even when encoded in non-linguistic processing, is language mediated.

The language-specific patterns that emerged resemble those in the Slobin study (1996a: see above): English speakers tended to mark contrasts in direction-of-motion, whilst speakers of other languages (e.g. Swahili, Georgian, Spanish) marked contrast of manner-of-motion. For example, an English speaker produced the following (the site of the gestures is marked by underlining):

... but it rolls him out, down the drain-pipe, out into the sidewalk, into the bowling alley.

In this sentence, the speaker has chosen to contrast the different directions of the path-of-movement; each new direction is marked by a gesture and the path is presented as a sequence of successive stages. In contrast, a Spanish speaker described a similar scene like this:

... y sale volando

and exited flying

In this sentence, the speaker chose to describe both the path and the manner of movement and they marked both of these components with a gesture. The gesture itself incorporated aspects of both direction and manner (the fingers moving to indicate flying) and it constituted a single, complex path (looping right, down, left and up in a smooth continuous movement).

These elements of the gesture reflect the patterns of conceptualisation observed by Slobin in language descriptions. The choice made by English speakers, to gesture path in separate chunks, might reflect the items available in linguistic system: because a path is not incorporated into the verb in English it must be expressed in separate prepositional phrases. This encoding into prepositions necessarily entails conceptualising a potentially continuous path into separate chunks because English does not have a single preposition that encodes the concepts out, down and into.
In Spanish, manner must be lexicalised as a separate item, e.g. *volando*, whereas the path component is integrated with the verb. The dual influence on Spanish speakers to conceptualise a motion with a particular direction might lead to the conceptualisation of the whole event as a single continuous movement. In English, by comparison, the linguistic fact that path must be expressed outside the verb provides the opportunity to express a complex path without making the resulting sentence too complicated. In other words, in English there is a structurally easy way to express *out down* and *into*, whereas in Spanish there is not. The linguistic facts seem to influence the Spanish speaker to conceptualise the event as one continuous movement but the English speaker is free to express a more complex path (albeit in successive chunks). These constraints on conceptualisation derive from the linguistic system and can be seen to be reflected in the gesture.

In addition, the particular details of the cross-linguistic differences suggest further predictions. If the semantic component were impaired, this would result in a loss of language-mediated constraint on conceptualisation. As an example of the consequences of such a loss, consider an English speaker attempting to describe ‘something flying out, down and into somewhere’. She would be faced with a choice of constructions including a description of a single continuous movement or a series of successive steps; if she chose to attempt the first description, she would soon run into difficulties as there is no provision for such a description in the English linguistic system.

There is a single conceptual system underlying language and gesture and furthermore the linguistic system is one of the main influences on conceptualisation; for these reasons, co-verbal gesture is also constrained by language means. Consequently, an impairment to the linguistic system should adversely affect gesture in much the same way as it is purported to affect both language and event comprehension. This claim can be examined further in terms of research into co-verbal gesture in aphasia, such as Hadar, Burstein, Krauss and Soroker (1998). In this investigation the use of co-verbal gesture by various participants with brain-damage was observed.
The participants formed two groups:

- those with a language impairment (noun-naming difficulties stemming from either semantic or phonological problems).
- those with visuo-spatial difficulties manifesting as gestural difficulty but no language impairment.

Participants were shown complex action pictures and were asked to describe them so that their co-verbal gestures could be analysed. Gestures were categorised into the following types:

- emblematic - those with a conventional meaning in the speaker’s culture (an Israeli culture, in this experiment);
- deictic - those which involved pointing to a referent;
- iconic - those whose “form dynamics or configuration showed a clear semantic or pragmatic relation to a word or an idea in the accompanying speech”;
- indefinite - those gestures that fell outside the other three categories.

The authors found that the ‘aphasic’ participants produced a larger number of co-verbal gestures overall; more than both the visuo-spatial and the control participants. This was true both when gesture was measured relative to visual input and relative to verbal output. For example, the aphasic participants produced an average of 26 gestures per picture whereas the visuo-spatial participants produced an average of 5 gestures per picture (controls: 14 gestures per picture). Similarly, the aphasic participants produced a gesture every 4 words, on average, whereas the visuo-spatial participants produced a gesture every 13 words on average (controls produced a gesture for every 10 words). The language was not analysed in any more detail than this simple word count.

The authors attempt to explain the underlying mechanism causing the inhibition of gesture in the visuo-spatial participants and the increased gesture in the aphasic participants: they suggest that gesture cannot reflect conceptualisation because of the language abilities of the visuo-spatial participants.
“In the visuo-spatial subjects, conceptual processes were not affected by brain-damage: their comprehension and picture description were good. Therefore, conceptual processes are not in themselves a likely source of gesture inhibition.” (op cit.: 72)

As a consequence of this conclusion the authors have to posit a visuo-spatial representation that is separate from the conceptual system. Such an account is problematic for the characterisation of conceptualisation presented in this thesis because here it is claimed that conceptualisation is influenced by both language and visuo-spatial processing: this characterisation is represented in the diagram below:

![Conceptualisation Diagram]

In this account, a visuo-spatial difficulty would be part of conceptualisation and would be the cause of the gesture inhibition in the visuo-spatial participants. To account for their retained abilities on the comprehension and picture description tasks, it is important to recall the role of the linguistic system in conceptualisation. In these participants, it is only the visuo-spatial aspects of conceptualisation that are thought to be impaired - language-mediated aspect of conceptual processing would be intact - consequently, their ability on the language tasks is unimpaired. Nevertheless, the linguistically mediated information is not enough to structure conceptualisation in such as way as to drive gesture.

To examine this claim further, another of the gesture investigations carried out by Hadar and colleagues must be considered. Hadar, Wenkert-Olenik, Krauss and Soroker, 1998 used the same task to investigate the gestural abilities of three further groups of participants. These participants had various kinds of language impairment:
• ‘semantic’: classified by a difficulty in naming nouns (with semantic errors) and in carrying-out Pyramids and Palm Trees Test (Howard and Patterson, 1992);
• ‘phonological’: classified largely by difficulty naming nouns (with phonological errors) and reading aloud;
• ‘conceptual’: classified largely by difficulty with sentence comprehension and some difficulty in naming (producing semantic rather than phonological errors).

The ‘conceptual’ group classification suggests that these were the participants who most resemble the people with non-fluent aphasia participating in the present study, who make reversal errors in comprehension and whose verb naming is problematic. Consequently it is the gestural performance of the ‘conceptual’ group that is of most significance in the present context. The ‘conceptual’ group:

• produced few iconic gesture (relative to the controls and other language-impaired participants); but
• they produced a similar number of gestures overall; this was due to a high number of indefinite gestures.

As in the previously discussed paper, the authors argue that gestures are not driven by conceptual processing. This appears to be largely due to their conclusions in the previously discussed paper (Hadar et al., 1998 a).

However, the account outlined in this thesis would predict that the gestural problems of the ‘conceptual’ participants stem from the same source as their language problems: from conceptualisation. If the conceptual system is taken to be constrained by visuo-spatial and language principles, then the gestural difficulties of both the ‘conceptual’ and the ‘visuo-spatial’ participants can be attributed to difficulties organising conceptualisation. The reason is that conceptualisation is thought to be constrained by influence from both linguistic and visual processing.

This predicts the following:
1. Difficulty with conceptualisation can be caused by either a language or a visuo-spatial impairment.
2. Difficulty with conceptualisation can result in:
   a impaired gestural ability,
   b impaired language ability, or
   c both a) and b).
3. Moreover, the resulting impairment will depend on the cause of the conceptual difficulty:

- a visually-mediated impairment will result in impaired gesture but retained language ability,
- a linguistically-mediated impairment will result in impaired language and impaired co-verbal gesture.

The precise detail of such a distinction needs to be considered in the light of a full explanation of the relative role of visual and linguistic constraint in conceptualisation. This explanation will be the subject of the next section (section 1.3.3). Before this, it is important to summarise the claims that have been made so far in this section.

A number of cross-linguistic language differences have been reviewed and considered in terms of the evidence they provide for the characterisation of the conceptual system detailed in section 1.3.1. One of the main conclusions is that these studies clearly reinforce the notion of language influences on the organisation of conceptualisation. Consequently an impairment in the linguistic system is likely to lead to:

- a difficulty in comprehending language, such that the linguistic system does not constrain conceptualisation; and
- a difficulty in producing event descriptions, such that conceptualisation is not constrained and so lacks the language-appropriate structure necessary to access the linguistic system.

Slobin’s investigations suggest that such a loss of linguistically-mediated constraint will be doubly impeding:

- it entails the loss of one of the means of constraining conceptualisation; and
- the aspects of conceptualisation that are normally constrained by language principles are those that are hard to perceive by other means, e.g. they are not visually apparent.

This section also contained cross-linguistic findings on developmental language which serve to emphasise the influence of non-linguistic constraint on conceptualisation, as well as reinforcing the notions detailed above. One of the most likely sources of non-linguistic constraint on conceptualisation is the visuo-spatial system, accordingly, visually-mediated constraint is the subject of the next section.
1.3.3 Visually-mediated Language effects as evidence for Conceptual Organisation

In this section, the following areas are covered:

1. The effect on language of certain visual manipulations; such manipulations are thought to affect language by guiding attention to a specific part of the visual scene.

2. The notion of attention; this includes both visually mediated and linguistically-mediated attention.

3. The role of attention in language-impairment; this is considered to be crucial in two distinct ways:
   - visually-mediated attention has a role in constraining language production;
   - linguistically-mediated attention has a role in constraining visual perception.

The Effect on Language of Visual Manipulation

Another approach to the characterisation of conceptual representation can be seen in studies of language production in which salience is manipulated: various aspects of visual salience are manipulated in the stimulus material and any changes in the structure or content of the resulting language is observed. One such study is that of Sridhar (1988), in which a number of video scenes are manipulated visually, so as to alter the salience of the entities in them. Speakers of a wide range of languages are then asked to describe those scenes and their responses are examined for the reflection of those manipulations.

Analysis of the responses showed that aspects of the structure and content of language could be influenced by manipulating salience. This result reveals something about conceptualisation, in that the altered salience of the input scenes resulted in the speakers altering their conceptualisation of the scenes and so altering the structure and content of their descriptions. The perceptual features that were manipulated included:

- size of a particular entity in the scene;
- increased ‘animacy’ of a particular entity in the scene;
- the speaker’s viewpoint (altered by highlighting one of the entities, using close-up).

All of these features can usefully be considered as aspects of salience. These features should also be considered to reflect some of the crucial components of conceptual representation because they are the kinds of manipulations that affect conceptualisation and consequently effect language. In other words, by asking ‘what
kinds of external features affect conceptualisation?’, an insight into the organisation of conceptualisation can be gained, and this in turn should provide information about the kinds of conceptual organisation people with non fluent aphasia find problematic and which affect their ability to produce sentential descriptions.

Sridhar’s answer to the question ‘what kinds of external features affect conceptualisation?’ would be:

- size of a particular entity;
- increased ‘animacy’ of a particular entity;
- the speaker’s viewpoint.

However, another similar experiment, carried out by Tomlin (1997), suggests that the cause of these alterations in conceptualisation is in fact locus of attention. The participants in Tomlin’s study viewed computer animated sequences of situations: one set of situations depicted events (e.g. a fish swallowing another fish) and another depicted locative states (e.g. a star above a heart). They were told to keep an eye on the object identified by an arrow (one of the fish or the top area of the screen) and to give an on-line description of the situation; the arrow has the effect of cueing the timing of the output as well as explicitly directing attention.

Tomlin found that the focussed object was always mentioned first by 10 out of the 12 participants; resulting in passive as well as active structures. The other 2 participants did this in most cases. These results suggest that the saliency features in the Sridhar research are confounded with attention. In other words, increasing the size or animacy of a participant simply serves to focus attention on this entity and it is the locus of attention that is represented in conceptualisation; in consequence it would be the locus of attention that is mapped onto language.

Taken together then, these studies suggest that there are certain visual manipulations that affect attention, which in turn affects conceptualisation. Furthermore, this visually-mediated attention seems to affect conceptualisation in a way that resembles the kinds of processing decision that are required by language because the visually-mediated attention affects the structure and content of language in various predictable ways. If people with non fluent aphasia are having difficulty in conceptualisation for language, then the effect of visually-mediated attention may reflect some of the components of conceptualisation that cause their problems. Conversely, given that conceptualisation may be composed of both visually-mediated and language-
mediated organisation, these visually-mediated effects may reflect those aspects of conceptualisation that are intact in language impairment.

This is a matter for empirical investigation and so a task was devised for the present study, based on Sridhar’s task. This task assessed the effect of visually-mediated attention on the production of people with non-fluent aphasia. Certain aspects of Sridhar’s task were considered to be particularly relevant to the language of people with non-fluent aphasia; these aspects were those that focussed on the resulting sentence structure or predicate choice because the participants with non-fluent aphasia in this study all had problems with predicate-argument structure and verb naming. Accordingly, only the following factors were considered in the revised task:

- the ability to react, in terms of language, to manipulated salience;
- the separation of production into ability with word order and ability to choose appropriate predicates;
- the comparison of these two aspects of performance across states and events.

The notion of visually-mediated attention, and its role in conceptualisation also raises a number of questions, in particular:

- How does visually-mediated attention affect conceptual organisation?
- Are there other processing systems (i.e. language) that can also direct attention in the conceptual system?

These two questions are pursued in the next section.

**Visually-Mediated Attention**

It is far beyond the scope of this thesis to review the huge body of research on attentive processes, visual or otherwise. However, it is important to briefly characterise the processing involved in order to further understand the organisation of the conceptual system. There is much recent work into pre-attentive, attentive and post-attentive visual processing in terms of carrying out a visual search and the work of Wolfe and colleagues (Wolfe, 1993, 1994, 1996a, 1996b; Wolfe and Bennett, 1997; Chun and Wolfe, 1994) serves as an overview of this field. There are various competing theories (Grossberg, Mingolla and Ross, 1994; Treisman, 1988), however these accounts do not differ greatly in terms of the aspects that will be of relevance to this thesis.
Visual search tasks are used to investigate the visual processes necessary to search for a particular object amongst an array of other objects. A visual search is not the same process as viewing a situation to talk about it, however the pre-attentive processing is likely to be very similar, if not identical, in both cases. The reason is that the pre-attentive stage is the stage before attention has been guided toward a particular task: in other words, it is a task-independent stage. In the context of this thesis, it is important to consider the kinds of organisation inherent in the conceptual system per se - those aspects of conceptualisation that are unlikely to be affected by language principles - and the pre-attentive process seems to be an extremely useful means of characterising these inherent organisational processes.

Pre-attentively, the visual system processes a limited set of features of a visual scene and there is an object-bias, so the majority of these features are the attributes of objects. The results of the pre-attentive process can be thought of as a set of “pre-attentive object files: these files act as holders for a collection of attributes that inform subsequent processing” (Wolfe and Bennett op cit.; 41). It is likely that when a scene is visually processed in order to describe it, the pre-attentive object files form the basis of the subsequent processing. The set of features that are perceived is very limited, “perhaps a dozen or so”, according to Wolfe (1993): they include information about a number of part-whole aspects of an object; for example, it is possible to process the information that an object has curves and intersecting lines but not to perceive the shape of the object in any detail. On being presented with this scene:

![Image of a cup on a table]

the pre-attentive process may only result in the following, partial set of feature information:
The idea is that attention is required to perceive any more than this and, crucially, that attention must be guided by a representational system. The example shows how much processing is left for the guided attentive process, as Wolfe and Bennett (op cit; 41) put it:

"Pre-attentive vision can represent many attributes of a visual stimulus but attention is required to appreciate the relationship between attributes.”

This lack of relational detail is important for an understanding of conceptualisation for language because both events and states are notions that are dependent on relational information for their instantiation. It may be that a useful way of viewing the language difficulties of people with non-fluent aphasia is in terms of a conceptual system that has lost some of the procedures that guide attention. As discussed in section 1.3.1 and 1.3.2, ‘event’ and ‘state’ are inherently linguistic notions; consequently, it is possible that linguistically-mediated attention is required to guide the conceptual system to represent the components of a scene that are important to the linguistic system: one such linguistically-relevant component is relational information.

It is also important to consider how these pre-attentive features form the basis for further processing. The visual search findings show that some, but not necessarily all, of the pre-attentive analysis is deployed in the next stage of processing (Chun and Wolfe, 1994). Some kind of representational system must guide the use of the basic information yielded by pre-attentive analysis:

“... to be useful, these [pre-attentive] processors of basic features must be “spoken to” by other higher processes.” (Wolfe, 1993; 245)

In other words, for the visual system to pay attention to some particular aspect of the structure of a situation, some ‘higher process’ must guide the visual system. The aspect of vision being addressed here is exclusively the processing system; the representational component of vision is being distinguished as a separate component and is a ‘higher process’, referred to as visuo-spatial representation. The linguistic system is also a ‘higher’ representational process.
For the visual system to pay attention to relational information, or to details of the temporal structure of a situation, one of these ‘higher processes’ would be invoked as a guide. Furthermore, as relational information and temporal structure are important to the linguistic system, then it is possible that it is the linguistic system that must “speak to” the pre-attentive process. Consider the following picture:

The visual system will deliver information such that this picture is conceptualised as a cup, there is no visual reason why it should be perceived as a cup, however. On a purely visual basis, it could just as easily be perceived as a black line, an abstract pattern, or even an overhead view of someone in bed! You see this picture as a cup because this is the most probable construction; that is, “your visual system renders the verdict that [a cup] is the most plausible interpretation.” (Wolfe, 1996a; 588). This can be considered to be an instance of visually-mediated attention.

Now consider this picture:

In this case the set of black lines will be conceptualised as a falling event. Given that falling is a linguistic notion (see section 1.3.1), it is likely that the linguistic system had some part in guiding this interpretation. This can be considered an instance of linguistically-mediated attention.

Attention can be guided by more than just the visuo-spatial system and so it is likely that the linguistic system will exert some influence on conceptual organisation; one means of doing this would be to guide attention to language-relevant aspects of a situation. It is important to the linguistic system, that a series of movements is perceived as a whole so that it can be given an event label: similarly, it is important that attention is guided towards one relationship in a scene, as the visual search findings suggest that relation information is not
perceived pre-attentively. This is not to say that language is the only representational system that can guide attention towards information like this: Talmy’s account of ‘fictive motion’ suggests that the conceptual system itself has a bias toward representing motion and there are also many relational constructs that are important to visuo-spatial representation per se - even if the intention is not to describe the cup, the relation between the body and the handle must be perceived in order to represent the visual input as a cup.

For the present purpose, attention can be understood as comprising “a set of related processes directed at reducing or constraining overall input to [conceptualisation]” (Tomlin 97; 172). On this basis, it is possible to suggest that conceptualisation will be subject to at least the following:

• language-mediated constraint; and
• visually-mediated constraint.

Both of these processes should affect conceptualisation for language: the discussion in sections 1.3.1 and 1.3.2 has strongly indicated that concepts such as on, falling and open are linguistically-mediated ways of constraining conceptualisation; the Sridhar and Tomlin experiment’s (see above) reveal ways in which visually-mediated constraint on conceptualisation can also affect language. As a result of this, both aspects of constraint were explored by the tasks designed for the present study. The details are first outlined briefly below, in the context of an elaboration of these two aspects of constraint, the tasks are then presented in detail in chapter 2.

As an example of the importance of constraint, consider the experience of being at a crowded, noisy party (example taken and developed from Tomlin, 1997). Pre-attentively you will simply hear an undifferentiated mass of noise. However, it is possible to guide your auditory attention to one particular conversation within the mass of noise. The process that allows this is likely to be a combination of the auditory features of the voices you are listening to and the linguistic content of the conversation. In other words, you are able to conceptualise the conversation by means of auditorily-mediated attention as well as linguistically-mediated attention. However, if all the guests at the party were speaking a language that you did not understand, it may be possible to guide your auditory attention based on features of the voices alone but without the linguistically-mediated constraint, you would not follow the conversation; you would have to conceptualise the conversation by means
of auditorily-mediated attention alone. In this instance, the lack of language constraint would lead to the loss of a good deal of information and a consequent lack of detail in the conceptualisation.

People with non-fluent aphasia have problems with linguistically-mediated attention. Consequently, they are thought to have lost certain means by which to constrain conceptualisation but are hypothesised to have retained others. It is possible that these other means of guiding attention, through their effect on conceptualisation, might affect language processing. This complex interweaving of influences and processes means that there are two important effects to be disentangled:

1. visually-mediated attention and its effect on language production (this is discussed below);
2. linguistically-mediated attention and its effect on conceptualisation (this is discussed at the end of the section).

As the party example shows, there will be other systems exerting constraint on conceptualisation but they may not constrain conceptualisation in such a way as to provide the necessary input to the linguistic system. This is a matter for empirical investigation and so one of the video tasks in the present study was designed to explore this idea. The video scenes were based on the Sridhar and Tomlin experiments in order to investigate the effect on language of visually-mediated constraint; for the participants with non-fluent aphasia, the aim was to see whether visually-mediated constraint could inform the structure and content of their language in the context of reduced linguistically-mediated constraint.

The effect of linguistically-mediated attention on conceptualisation is likely to mean that the linguistic system influences the conceptualisation of event from pictures. This notion is crucial for understanding the problems of people with non-fluent aphasia, not least because of the prevalence of picture tasks in clinical assessment and therapy. The impact on clinical practice, of the account being developed, is considered further in sections 1.4 and 6.2. However, there are some further findings from visual research that are relevant here. Wolfe (1996b, 1998) has also considered post-attentive processing and found, surprisingly, that none of the preceding processing is retained by the visual system itself: the memory of what has been seen is not stored by the visual system and so must be stored by a representational system. Wolfe terms this the 'forgetful eye'. This finding
comes from an experiment in which subjects were asked to search for an object in a repeatedly presented array of other objects; they had to ascertain whether the target object was present and then answer 'yes' or 'no'. The target object changed from presentation to presentation although the context, or search space, remained the same, for example:

![Image of objects changing from display to display](image)

The shape in the circle is the target; it changes from display to display whilst the context remains the same.

The results of this experiment showed that subjects searched through the display in the same way each time it was presented. This was true even after 400 searches. The conclusion drawn by the authors was that there is no visual memory for the scene,

"... subjects do learn the content (as tested on a memory trial). However, knowing a scene is not the same as seeing it . . . Attention may bind an object's features together but only while it is deployed to that object. When attention is withdrawn, the visual representation reverts to the pre-attentive state." (op cit.: 214)

This conclusion has further ramifications for picture-analysis by people with a linguistic impairment because not only does the initial analysis of a scene for description require guided attention, the principles used in that guiding process are also those used to store the representation of the scene. So for example, to perceive a *falling* event it is likely that linguistically-guided attention is required. Moreover, this linguistic influence is also required to have a memory of the scene as a *falling* scene. If the linguistically-guided attention is impaired, as is hypothesised to be the case in non-fluent aphasia, the following patterns are predicted:
• when viewing the scene, attention will not be guided toward the linguistically-relevant features such as the falling movement and the Source-Goal relationship and as a result,

1. these features will not be comprehended; and

2. they will not be stored as part of the memory of the scene.

There are two tasks in this study designed to test this claim directly. The linguistically-relevant analysis of temporal structure is tested by a video task (Event Video) and the linguistically-relevant analysis of relational information is tested by a photograph task (Event Photographs) Both tasks are non-verbal, so that these features are tested in terms of visual perception and conceptualisation alone; there is no requirement for the involvement of the linguistic system other than to constrain conceptualisation. In addition, there are two further tasks in which the structured memory of a visual scene is required: in one, this memory is used to select a lexical label for the scene (Perspective Video); in the other the memory is compared to a set of outcome photographs (Role Video). All four of these tasks are outlined in detail in chapter 2.
1.3.4 Summary

The previous section reviewed a broad range of linguistic and psycholinguistic accounts of the relationship between conceptualisation and language. A number of issues relevant to the verb and sentence processing problems of people with non-fluent aphasia were raised:

- Most accounts postulate a linguistic semantic system separate from conceptualisation. This separation is intended to handle certain aspects of processing that seem to be particularly relevant to syntax. In those accounts where there is no separate system, there is still a means of identifying linguistically-relevant aspects of meaning.

- These aspects include:
  - identification of participant entities;
  - identification of the nature of the relationship between the entities;
  - characterisation of the temporal profile of the event/state;
  - perspective taking;
  - syntactically relevant components, such as [CAUSE], [MOTION], [CONTACT] etc.; and
  - components other than word-like concepts, for example, image schemas;

- There is also some suggestion that the focus on syntactically relevant aspects of conceptual/semantic structure is too narrow. It is likely that aspects of the fuller meaning of concepts can have some effect on the rest of the language system.

- There may be a cognitive bias toward dynamism or ‘extension’ that has certain effects on conceptualisation in the context of a damaged linguistic system:
  - in production, there may be a difficulty indicating the temporal profile of an event in anything other than broad terms (such as by use of -ing)
  - in comprehension, situations may be conceptualised as dynamic by default.

- Another aspect of conceptual structure that might be influenced by specific language constraints is the categorisation of events into types. Events that are categorised together would not necessarily be considered alike without influence from the linguistic system: many events would not be categorised alike on the basis of visual attributes alone, indeed such events are often not considered alike in other languages.
- The event types influenced by English might include Pinker's basic event types: HAVE, BE, ACT & GO.

- Slobin suggests that these language-influenced aspects of conceptualisation are just those that are not easily identified by other systems, such as vision.

- The means of constraining conceptualisation are likely to include:
  - visually-mediated attention; and
  - linguistically-mediated attention.

- Accordingly, the loss of aspects of linguistically-mediated attention will have various ramifications, including:
  - an increased reliance of visually-mediated constraint in language production tasks; and
  - a problem conceptualising events even in non-language picture tasks.
1.4 CLINICAL INVESTIGATIONS OF VERB AND SENTENCE PROCESSING

Historically research in the area of acquired language impairment has been concerned with describing and classifying various syndromes within aphasia. Standardised tests based on this approach are used widely in clinics and research, for example the Western Aphasia Battery (Kertesz, 1982) and the Boston Diagnostic Aphasia Examination (Goodglass and Kaplan, 1983) which use quantitative criteria to classify symptoms into syndromes and to correlate them with lesion sites. However more recently the adequacy of a syndrome-based approach has been questioned because its focus is on surface symptoms rather than the processing difficulties causing the impaired language. Moreover, the severity and type of difficulties vary widely but the syndrome-based approach does allow for individual differences.

In part this is a consequence of the complexity of the language processing system. It is not sufficient to say that one person has a problem with, for example, comprehension of verb-meaning and another with sentence production, for various reasons:

1. Because either of these problems might have an impact on the other:
2. Because each aspect of processing is internally complex, so that for example, a problem with semantic processing could mean:
   a) a problem with knowledge about the ‘core’ component of a lexico-semantic representation;
   b) a problem with the semantic profile and/or associated predicate-argument structure of an item; or
   c) a problem mapping semantic information onto syntactic structure.
3. Because often there are 2 or more aspects of processing that are separately affected, obscuring the effects of each single problem.

There main reason for rejecting a syndrome-based characterisation of language impairment however, is that it does not allow for individual differences (Caramazza and Badecker, 1989).

Once individual differences and the complexity of the language processing system are recognised, the most useful approach to the characterisation of impairment seems to be the single-case investigation. The single-case approach is the means of investigation most commonly used in research influenced by cognitive...
neuropsychology, stemming from the nature of psycholinguistic and cognitive neuropsychological modelling. As all aspects of processing and all potential impairments should be accounted for, the resulting model is a complex architecture but this complexity also means that one model should be able to account for all individual patterns of processing and impairment. There may be similarities in these patterns from individual to individual because of an overlap in the aspects of the model that are impaired; but there is no necessity for the patterns to be identical. This approach is the one taken in this thesis. Participants were selected because they had certain impairments in common: a problem somewhere in the conceptual and/or semantic system affecting verb and sentence processing. Selection criteria were devised to reveal these shared impairments (details in chapter 3) rather than selecting purely on the basis of a clinical classification of non-fluent aphasia.

Despite these reservations about syndrome-based accounts, the historical classifications are still widely used in clinics and research, largely due to the bias of the standardised tests. Moreover, the classifications are well known and so provide a universal short-hand label for communicating the general nature of an impairment. For this reason, all the participants in this study are classified as having non-fluent aphasia. The important point about their inclusion in this thesis is that, in addition, they also all have a specific pattern of impairment; this pattern is consonant with problems processing the conceptual structure of events or the predicates that express them.

The label 'non-fluent aphasia' is used throughout this thesis to indicate the general characteristics commonly attributed to this classification: slow effortful speech, agrammatism and asyntactic comprehension (these terms are discussed in more detail below). More specifically though, there are two aspects of language impairment commonly found in non-fluent aphasia that are of particular importance to an investigation of events: verb and sentence processing. It is useful to separately describe each of these impairments and explain their theoretical relevance.
1.4.1 Sentence Processing

A: Asyntactic Comprehension

In sentence-picture matching task, people with non-fluent aphasia have been found to have trouble comprehending reversible sentences such as:

\[ \text{The cat that the dog is biting is black} \]

often matching this sentence to the picture of a black dog biting a cat.

Non-reversible sentences often cause no difficulties, probably due to the fact that pictures are used in this task; consider for example:

\[ \text{The apple that the boy is eating is red} \]

In this sentence, the reversed sentence would be depicted as a red boy being eaten by an apple.

It should be noted however, that the second sentence is easier to process even without pictures because of the presence of an adjective: it is more plausible that the apple is red than the boy.

Schwartz, Saffran and Marin. (1980) found that these comprehension difficulties emerged with structurally simple reversible sentences, such as:

\[ \text{The cat chases the dog} \]

This suggested that the difficulty was with the interpretation of word order rather than difficulty with syntactic complexity. This hypothesis was investigated in a second study by the same authors (Linebarger, Schwartz and Saffran, 1983; Schwartz et al., 1985) this time, using a sentence judgement task. The participants with non-fluent aphasia were shown to be quite accurate in detecting grammatical violations in spoken sentences, such as the violation of phrase structure rules:

\[ \text{*The gift my mother is very nice.} \]

The participants in the 1980 study were said to have a lexical mapping problem. This term was used to mean that in processing the sentence:

\[ \text{The cat chases the dog.} \]
They could analyse the syntactic structure:

NP [V NP]

However, their semantic knowledge of the verb was impoverished: they might know the core meaning of the verb (something like ‘to pursue rapidly’) but not the information necessary to link the verb meaning to the sentence structure. This is the thematic information associated with the verb; the knowledge that *chase* necessarily involves a ‘chaser’ and a ‘chasee’. Consequently, the information about who is *chasing* whom could not be interpreted and the sentence could not be matched with a picture.

As the review of the sentence comprehension literature in section 1.2.2 highlighted, this is a difficulty with the semantic (or conceptual) representation of the sentence. They key point, whether the problem is conceptual or semantic, is that semantic structure and its constituent parts are assumed to have a special status in the linguistic system. This pattern of comprehension impairment in non-fluent aphasia provides evidence to support this claim.

In a further investigation (Schwartz, Linebarger, Saffran and Pate, 1987) the same authors found that some people with non-fluent aphasia could interpret the word-order information in basic SVO sentences. They were able to reject sentences such as:

*The worm swallowed the bird*

They could also exploit this ability when the basic structure was padded with additional background detail, such as:

*As the sun rose the worm in the cool wet grass swallowed the bird and quickly went away.*

However, when the verb’s arguments were moved from their canonical position in the syntax, such as in passive structures, errors were made:

*The bird was swallowed by the worm*

In these cases, it was argued that the verb’s lexical entry was still supplying information from its semantic structure (such as thematic information) but that the procedures by which the arguments are mapped into the syntactic structure had been lost: the basic SVO structure could be interpreted but not other structures where the argument information had to be translated. This was termed a procedural mapping problem.
The lexical-procedural distinction may not be as clear as these papers suggest, however. Consider the following sentence:

*The worm swallowed the bird*

This sentence requires some integration of word order information with meaning because birds can swallow worms but worms cannot swallow birds. The integration of word order information in sentences like this does not necessarily require a full set of mapping rules however; this sentence can be rejected using an 'agent first' strategy. This would involve:

- comprehending the core meaning of the verb (an aspect of meaning which people with non-fluent aphasia seem to be able to process) - a swallowing event;
- comprehending the meaning of the NPs - a swallowing event involving a worm and a bird; and
- interpreting the first NP as the agent - the worm.

Moreover, a number of linguists (Pinker, 1989; Jackendoff, 1983, 1990) suggest that there is a difference between general mapping procedures and lexically determined mapping procedures. General procedures apply to all verbs that describe a certain event type, e.g. there is a rule that links the first argument of ACT events into subject position. Lexically determined procedures, on the other hand, are particular to certain verbs. Consider, for example, the verbs give and take;

*Hamsa gave a birthday card to Steve*

*Hamsa took the money from Walide’s piggy bank*

The two verbs have very similar semantic representations: in both cases an object (the card or the money) moves from one place to another. However in the case of give the Source argument is mapped to the subject position and in the case of take it is the Goal that is mapped to that position. These are mappings that depend on the particular verb, consequently it may be that people with non-fluent aphasia can used general mapping procedures when they cannot use verb-specific ones. This could still be considered to be a distinction between lexical and procedural abilities but these verb differences were not something explored by the experiments discussed above.
There were also other sentences in the task that could be interpreted by means other than the use of mapping rules. For example:

*The spoon ate the table*

This sentence could be rejected without mapping procedures or role information, because there is no *eating* event involving only a *spoon* and a *table* that is plausible. The participants with non-fluent aphasia, in that study, performed these judgements with few errors.

On the basis of the results in the tasks outlined above, Schwartz and colleagues conclude that some participants had a problem with semantic representations and some with mapping procedures. For this reason they turned their attention to sentence frames that appeared to require particularly complex mapping, such as passive structures. These sentence frames are held to be more complex because they involve moved-arguments, an account that derives from transformational theories of grammar in their more recent versions such as Government and Binding Theory (Chomsky 1981). Such theories posit two theoretical levels of syntactic structure: an underlying D structure and a derived S(surface) structure. For example:

The small boy was kicked by the donkey

is derived from this underlying structure:

\[\text{Was kicked by the donkey the small boy.}\]

The final, surface, structure is therefore held to be the result of one of the words moving from its original position. In Government and Binding Theory, the moved item leaves behind a hypothetical marker, or ‘trace’ to indicate its original position.

Schwartz and colleagues propose that in comprehension, the process of interpreting thematic roles is made more complex by the movement of an NP out of its original position.
"Active declarative sentences . . . involve direct transmission of thematic roles . . . For sentence types which involve movement of an NP out of a theta position (e.g. passives, relative clauses and the like) transmission of thematic roles is indirect."

(Schwartz, Saffran, Fink, Myers and Martin, 1994)

However, this formulation of the lexical-procedural distinction overlooks important inter-verb differences in terms of semantic representation. One example is the mapping difference between the related verbs give and take, a difference found between a number of verb pairs: such as pour/fill, buy/sell, chase/flee. The Black et al. (1991) investigation of the comprehension of passives is also a clear illustration of this point (see section 1.2.2). Recall that their results, for people with no language impairment, showed an interaction of sentence frame and predicate-type: the passive structure caused difficulties only when the main predicate assigned a causal weighting that conflicted with that associated with the passive frame. The group of predicates found to cause such a conflict was the Stimulus-Experiencer group, predicates such as admire, hear and see. For example:

_The queen admired the nun_

_The nun was admired by the queen_

This analysis predicts that comprehension complexity, in this kind of task, has more to do with predicate-type and the interaction between predicate meaning and sentence meaning than with a particular sentence frame. In other words, the complexity difference may not be best illustrated by the comparison of active (easy) and passive (difficult) sentence frames - as in Schwartz et al. (1987) - it is as important to compare the mapping required by one predicate type (for example motion verbs) with another group (for example, verbs of transaction). This is the approach taken by a number of other mapping studies (e.g. Byng, 1988; Nickels, Byng and Black, 1991; Marshall, Chiat and Pring, 1997).

In their most recent research into sentence comprehension, Saffran, Schwartz and Linebarger (1998) explore both the effect of different syntactic frames and lexicosemantic effects.
There were four syntactic variables (4 sentence frames):

1. active, e.g. *The car followed the bus*;
2. passive, e.g. *The bus was followed by the car*;
3. subject cleft, e.g. *It was the car that followed the bus*; and
4. object cleft, e.g. *It was the bus that the car followed*.

There were also three semantic variables:

1. reversible, e.g. *The car followed the bus*;
2. non-reversible, divided into two types,
   a) one argument semantically constrained (a selectional restriction), e.g. *The dog barked at the kitten*
   b) both arguments pragmatically constrained, e.g. *The robin ate the insect*.

The idea behind these last two variables was that in 2a) sentences, one noun was a plausible filler of only one role (*dogs can bark* but *kittens cannot*) but in 2b) sentences, both nouns are plausible fillers of both slots (*robins and insects can both eat and can both be eaten*). 2b) sentences are not unconstrained though, there is a pragmatic constraint in that when both nouns are involved, only one of them can plausibly act on the other (*robins can eat insects but insects cannot eat robins*).

As this outline shows, the variables being tested formed a complex interaction and to make things more complicated, the non-reversible sentences further subdivided into sentences where the constraint centred on the subject position and those where it centred on the object position. For example:

a) *The dog barked at the kitten*

b) *The crash frightened the children*

In a), the constrained position is the subject position because *bark* only constrains its agent argument: in b), it is the object position.

As this was a sentence judgement task, all the sentences described above were presented both plausibly (as in the examples given) and implausibly; the implausible sentences were as follows:
• the reversible sentences were given either one or two unlikely nouns, e.g. *The cat divorced the man* or
  
  *The truck is cooking the road.*

• the non-reversible sentences had their constraints violated, e.g.

  a) *The cat barked at the puppy*
  
  b) *The fly swallowed the frog*

The results were complex, but the most important ones are detailed below:

1. The participants with non-fluent aphasia made more errors on the non-reversible sentences.

   Given the outline of non-fluent aphasia at the beginning of this section, this is a surprising result, however it is largely a non-serious consequence of the difficulty these people had with implausible, reversible sentences (this is discussed below).

2. There was no effect of syntactic frame across the reversible sentences, but there was a syntactic effect across the non-reversible sentences.

   The effect on the non-reversible sentences can again be seen to be a consequence of the difficulty of the implausible sentences. However, the main source of syntactic difficulty was the object-cleft sentences and not the passives which, in the light of the comments on moved-arguments considered above, deserves further consideration. Of the 7 conditions in which a passive frame was used, only one (implausible semantically constrained sentences) caused difficulty⁴; Schwartz et al. (1998) say,

   "We have no explanation for the patients’ unexpectedly good performance on passives, particularly since four of the seven subjects had participated in the earlier experiment.” (285)

---

⁴ The mean error rate across all seven conditions, including the problematic one, was 0.18. In the 1987 study the mean error rate for passives was 0.4.
The important conclusion to draw from these findings is that the passive frame per se does not seem to cause particular difficulty for people with non-fluent aphasia. Other aspects of integration in sentence processing seem to cause more difficulty; the next two sets of results provide a good demonstration of this kind of difficulty.

3. There is evidence in these results for a particular difficulty with Experiencer predicates. This possibility is considered but rejected by the authors, largely because Experiencer predicates were included across a number of conditions. Nonetheless, it is not an easy possibility to reject because some conditions contained more Experiencer predicates than others; this was an unintended effect, as predicate type was not an aspect of sentence processing explored by this investigation. The most pertinent result was that within the semantically constrained sentences, those which constrained the subject position were performed better than those which constrained the object position; the majority of which contained Experiencer predicates. E.g.:

*The crash frightened the children*

was more difficult than

*The scientist is photographing the birds.*

This effect was even more marked for implausible sentences, in particular in passive and subject cleft frames. E.g.:

*The idea was surprised by the professor* and

*It was the policeman that annoyed the remark*

caused more errors than

*The mouse was eaten by the cheese* and

*It was the deer that shot the hunter*

These results support the idea that, in certain frames, Experiencer predicates are more difficult; results which clearly support the conclusions of Black et al. (1991).
The main effect in the Saffran et al (1998) investigation was that implausible sentences were more difficult for people with non-fluent aphasia than were plausible sentences (excluding the reversible sentences).

This result suggests that people with non-fluent aphasia, although unable to reliably use word order information, can use other aspects of semantic and pragmatic information: they are sensitive to the semantic and pragmatic constraints in the plausible sentences; and the violation of these constraints causes significantly more errors. Another way to look at this effect, is to say that in the implausible, non-reversible sentences, the semantic/pragmatic information conflicts with the syntactic information. This would mean that these participants were unable to use the syntactic information and so relied more heavily on the semantic or pragmatic information. When semantic/pragmatic information was consonant with the syntactic information the judgements were reliable: when semantic/pragmatic information was in conflict with the syntactic information they made errors.

There have been a number of other explanations put forward for the comprehension problems seen in non-fluent aphasia, many of which minimise the role of semantic information. Three of the most prevalent are considered below:

1. The Parsing Account;

As syntactic comprehension acquired its label because it was originally thought that such problems reflected a syntactic impairment (Caplan, 1987; Berndt & Caramazza, 1980; Caplan and Hildebrant, 1988) and this problem was also aligned with an insensitivity to function words and inflections (Bradley, Garrett and Zurif, 1980). This view was challenged largely by Schwartz and her colleagues the series of influential papers in which they show that:

- people with agrammatism had difficulty comprehending simple reversible sentences (e.g. Schwartz et al., 1980); but
• they were well above chance in detecting syntactic anomalies (e.g. Linebarger et al., 1983).

Other findings also support the claim that the parsing component of syntactic analysis is intact in at least in some non-fluent aphasia; for example B.B. (Jones, 1986: see section 1.2.1) was able to parse a written sentence into phrases, a striking ability in the context of his other difficulties which was exploited in Jones’ therapy programme. Other syntactic abilities are shown by the ability to judge syntactic anomaly, demonstrated by the participants in the Linebarger et al. (1983) study. For example, participants were able to detected phrase structure violations, such as the missing preposition in:

* Helen burned the photograph Max.

They could also detect the use of the wrong pronoun case in:

* Mabel drove he to the station.

These tasks also included sentences that would be characterised as having moved-arguments, for example in the following sentence:

Max closed the door that was open

But participants were able to detect anomalies like the following;

Max closed the door that the window was open.

These results clearly show the retention of parsing skills.

2. The Short Term Memory (STM) account;

The theory that sentence comprehension difficulties could reflect a problem with STM was developed to account for the claimed effect of syntactic frame on sentence comprehension (Just and Carpenter, 1992). This approach suggests that memory capacity affects structural aspects of comprehension. It is an approach that has been tested largely on people with unimpaired language ability, by subjecting them to a heavy processing load such as asking them to repeat aloud a word whilst also judging written sentences. Their memory performance is thereby ‘degraded’ to mimic impaired processing. (Miyake, Caplan and Just, 1994). Such an account predicts that certain syntactic frames require more processing than others and so more liable to disruption when STM is compromised: the vulnerable sentences include passives and other so
called 'moved-argument' structures, and sentences with more than one clause (such as embedded sentences).

In one such study (Waters et al., op cit.), participants were asked to judge the semantic acceptability of a number of sentences, containing either one or two clauses:

It was the gangsters that broke into the warehouse

The man hit the landlord that requested the money

Participants carried out this task under three conditions:

a) with no concurrent activity;

b) while tapping the table; and

c) while repeatedly uttering an unrelated word.

Reaction times were recorded and it was found that this last condition impaired performance because, it is argued, the processing load disrupts the 'phonological loop' in STM (Baddely, 1982). Findings like these suggest that STM is also implicated in the comprehension of people with non-fluent aphasia. Support for this idea comes from research which shows that people with STM impairments can have comprehension impairments much like those detailed above for asyntactic comprehension (Vallar and Baddeley, 1984).

There are a number of problems with this account, however:

- Experiments strongly suggest that much of the work of comprehending a sentence is carried out on-line (Tyler, 1992). This would mean that analysis is carried out directly on the input sentence, reducing the need for the record provided by the 'phonological loop'.

- Some subjects with developmental STM deficits, have been found to have no comprehension problems (Butterworth, Campbell and Howard 1986); and

- Schwartz et al. (1987) found that increasing the length of a sentence did not affect the intact grammaticality judgements of people with non-fluent aphasia.

The suggestion that the comprehension problems of people with non-fluent aphasia are due to a STM deficit is specifically investigated by Berndt et al. (1997a).
They conclude that it cannot be the only cause for this pattern of impairment, for three main reasons:

- the findings, mentioned above, that phrase and sentence length does not always affect comprehension;
- truncated passives (*the boy was kicked*) are just as difficult as full passives (*the boy was kicked by the donkey*); and
- there are subjects who find passives easier than actives (Druks and Marshall, 1995).

These findings notwithstanding, it is reasonable to assume that people with non-fluent aphasia may have an additional STM problem and that this may interact with their language problem. In this thesis, one of the criterial tasks was aimed at selecting participants who did not have severe STM problems.

The point that people with non-fluent aphasia often do not have particular difficulties with passives is worth emphasising because it is only recently that this body of research has had widespread acknowledgement. There are now a number of studies (including Druks and Marshall, 1995; Black et al., 1991; Saffran et al., 1998) in which people with non-fluent aphasia have been shown to be able to interpret passive structures. Moreover, in many studies such participants have difficulties with simple active declaratives; for example in reviewing findings about comprehension in non-fluent aphasia, Berndt, Mitchum and Haediges (1996) found that a difficulty with reversible active declaratives was apparent in the majority of cases. In commenting on their own results, Saffran et al. 1998 say:

"These results demonstrate once again that "asynctactic" comprehension is not, as is often claimed, a disorder in which performance is nearly perfect on active structures and random on passive and other structures that involve moved arguments." (op cit.: 288)

For this reason, it is particularly important to turn research attention to those aspects of sentence comprehension that are particularly difficult in non-fluent aphasia; to analyse what it is about simple active declaratives that causes problems. Only when this has been reliably established can the effect of other syntactic frames be clearly understood. For this reason, the sentence comprehension task included in the
present study includes only simple active declarative frames, whilst varying other aspects of syntactic and semantic structure (details in chapter 2).

The findings about the passive frame have particular ramifications for the following account.

3. The trace deletion hypothesis;

This account was originally developed by Grodzinski (1986) based on the Government and Binding Framework (op cit.). The general idea, outlined above, is that sentence structure is derived from an underlying D structure and in some sentences (such as the passive and those with embedded clauses) the transformation to surface structure entails moving elements of the sentence. Those moved elements leave behind a ‘trace’ to mark their original position in D structure and the trace deletion hypothesis suggests that people with non-fluent aphasia fail to represent this trace. These views have been vigorously attacked for two main reasons:

- they fail to give a full account of the comprehension problems of people with non-fluent aphasia, since most are also impaired at understanding simple ‘traceless’ sentences;
- they are challenged by cross-linguistic evidence, since some languages (such as Hebrew) permit the formation of passives both with and without ‘trace’ and people with non-fluent aphasia have been found to be equally impaired for both types of passive in these languages (Druks and Marshall, 1991);

In the light of the preceding discussion, then, the most inclusive account of sentence comprehension problems involves the consideration of syntactic processing in the context of lexico-semantic, conceptual and pragmatic information, and such an approach would be in line with the majority of psycholinguistic models (see section 1.2.2). The comprehension problems of people with non-fluent aphasia should be explored within a framework of interactive and integrative processing; consideration should be given to problems integrating all sources of information contained in a sentence including syntactic, semantic, conceptual and pragmatic; consideration should also be given to the mapping between these sources.
Such a framework allows for sentence processing difficulty to have a number of causes, including:

- using syntactic information to map onto lexico-semantic structure;
- processing role information or argument structure - the semantic information associated with a verb; or
- relating the lexico-semantic structure of a verb to the event it describes - the conceptualisation.

**B: Agrammatism**

Problems with sentences manifest in a number of ways, including:

- problems composing word order, e.g.:

  *Pouring glass ... man ... jug ... water*


  *The roll ... ball fell table*

  (J.D.: this study)

- problems producing the correct verb or verb-form, e.g. :

  *and hurry-up Cinderella*

  (B.R.B.: Byng, 1988)

  *The girl is pushed the box*

  (L.H.: this study)

- or omitting verbs altogether, e.g.:

  *The aunties is ball*

  (A.R.: Nickels, Byng and Black, 1991)

  *Woman is ... boy and er piggy-back.*

  (J.F.: this study)

Such problems may co-occur so that some people with non-fluent aphasia produce a list of single nouns, e.g.:

*Man ... chicken*

(M.G. - Le Dorze, Jacob and Coderre, 1990)

*Woman ... dog ... window*

(L.S. - this study)
Saffran et al. (1980) also asked a group of people with agrammatism to describe a set of action pictures. Response accuracy seemed to be influenced by the type of event depicted: those involving a person acting on an object were relatively well described; those depicting reversible sentences caused more problems. Errors included reversals:

\[ \text{The ball hitting the boy} \quad (a \ \text{boy hitting a ball}) \]

and problems with word order overall:

\[ \text{the man's running .. no .. the little girl's running in her arms .. her father} \quad (a \ \text{girl running into her father's arms}) \]

This pattern was repeated when the participants were given the various elements of the sentence (the verb and its argument phrases) and asked to put them in the correct order.

As with the comprehension problems, these difficulties cannot be accounted for by a syntactic deficit; some of the participants were shown to be able to generate syntactic frames for the sentences that they could not describe. An explanation that takes into account processes other than syntactic are better able to account for the full profile of (dis)ability. In the light of the literature reviewed in section 1.2, and the most inclusive account of the associated sentence comprehension difficulties, these production patterns might be cause by any of the following:

- problems structuring conceptualisation may lead to an inability to select a verb or its associated semantic structure;
- there may be problems with the procedures that map between conceptualisation and language;
- conceptualisation may be intact, but there may be a problem constructing a semantic structure for the sentence, possibly because verbs no longer supply the required information;
- semantic structure may be constructed but the rules linking it to syntax may be impaired; or
- there may be a combination of these problems.

These possibilities have something in common however, in that they all relate to either the event or the predicate that expresses it which suggests that there is a strong link between sentence processing problems (in
both comprehension and production) and the associated verb problems. This co-occurrence of difficulties could be a simple association or the two problems could interrelate; a possibility that is considered in the next section.

1.4.2 Verb Processing

People with non-fluent aphasia have long been observed to have a particular difficulty with verb production (Fillenbaum, Jones & Wepman, 1961; Myerson & Goodglass, 1972; Saffran, Schwartz and Marin, 1980; McCarthy and Warrington, 1985). There are several findings that might lead to the expectation that verbs are particularly vulnerable in language impairment, including the following observations:

- verbs are routinely acquired later than nouns in first language acquisition (Bowerman, 1976; Fisher, Hall Rakowitz and Gleitman, 1996);
- verbs are more variable in meaning across languages than verbs (Gentner, 1981);
- under conditions of degraded processing, unimpaired ‘comprehenders’ find verbs more difficult to recognise than nouns (Reyna, 1987); and
- several studies have reported greater difficulty with verb production across all classifications of aphasia (Kohn, Lorch and Rearsin, 1989; Williams and Canter, 1987; Berndt et al., 1997).

This last finding provides evidence that contradicts a syntactic account of verb problems, as findings like that of Kohn et al. (1989) show that verb problems can appear without ‘agrammatic’ production. Other findings also argue against the syntactic account. As Berndt et al (1997 a) point out, such an account would have difficulty explaining why verb problems appear in single word tasks and they also present evidence to show that verb problems need not be influenced by the complexity of the syntactic frame in which they appear. A related account refers to the morphological impairment often found in the language of people with non-fluent aphasia; in this account, verbs are more difficult to produce than nouns because of their greater morphological complexity. However, verb problems can also be found in speakers of uninflected languages, for example Bates, Chen, Tzeng, Li and Opie, (1991) found that Chinese speakers with non-fluent aphasia also found verbs more problematic than nouns.
A consideration of all the findings listed above, has lead to the hypothesis that verbs are inherently more complex than nouns. In other words, people with aphasia have most difficulty with complex items and structure, verbs are more complex than nouns and therefore people with aphasia have most difficulty with them. Stated in these broad terms, the complexity account is unsatisfactory for a number of reasons, including the following findings:

- people with anomia show the complementary naming profile (Zingeser and Berndt, 1988), that is they find the naming of verbs easier than that of nouns;
- people with verb problems often have a noun/verb difference of such magnitude that is strongly suggests that they have more than just a problem with complex words, for example, the person described by McCarthy and Warington (1985);
- the noun/verb pattern is robust across a range of tasks that themselves vary in complexity, for example: picture naming, naming from definition and connected narratives (Miceli, Silveri, Villa and Caramazza, 1984; Bates et al., 1991; Berndt et al, 1997a)

Rather than ascribe the verb difficulty to an effect of complexity per se, it is more useful to explore in detail the processing required by verbs; in this way it is possible to be explicit about the specific aspect of processing causing the verb problem such as semantic/conceptual structuring or accessing verbs from the lexicon.

Specifically identifying a particular process is the aim of the accounts outlined below. However, this aim has resulted in a number of different hypothesised sources of processing difficulty:

1. Frequency effects;

Other theorists have speculated that the noun/verb difference is an artefact of a failure to adequately match frequency across nouns and verbs in such tasks (Kohn et al., 1989; Williams and Canter, 1987). However since these papers, there have been a number of studies where this theory has been taken into account and frequency differences have been minimised: the noun/verb difference remains. As part of their battery of noun/verb tasks, Berndt et al. (1997a) investigated frequency effects and found that people with verb problems consistently named the lowest frequency nouns better than the highest frequency verbs.
2. **Action/Object effects**;

It has been argued (McCarthy & Warrington, op cit.) that investigations of verbs have tended to rely on materials that necessarily use imageable nouns and verbs and that this results in the use of only a subsection of them. These materials almost exclusively rely on actions and objects and so any impairment may not indicate a selective difficulty with a particular syntactic class, but with a particular conceptual category. Berndt et al. (1997a) specifically investigated this possibility. They used an oral reading paradigm so that abstract items, which could not be depicted in a picture naming task, were included. So, for example:

- the verbs used comprised actions such as *fill, shut* and *announce* as well as non-actions such as *fail, owe* and *respond*, and
- the nouns used comprised objects such as *bird, gift* and *magazine* as well as abstract nouns such as *ego, joy* and *democracy*.

It should be emphasised that this experiment does not necessarily address an action/object difference in all naming problems as it is not clear whether the results would hold for impairments that are not linked to phonological processing. Nevertheless these results show that it is possible to have a noun/verb difference in phonological processing over and above an imageable/abstract one.

These results were not the same for all participants:

- two participants - one classified as non-fluent the other fluent - were better at producing nouns than verbs in all conditions, and
- one other participants was better at reading concrete nouns than both action and non-action verbs, although he was also impaired at reading abstract nouns,
- a fourth showed an actions/objects effect in that he found the imageable items easier to read aloud than the abstract ones.

The findings suggest that in some participants there will be a noun/verb difference across all tasks but that such a problem might be due to a problem accessing phonological form; without repetition tasks or non-word-reading tasks, it is difficult to be more precise about the locus of difficulty.
In the present study, the aim was to explore conceptual and semantic processing without regard to the effect of phonological processing: the majority of tasks were non-verbal and of the two that addressed access to phonological/orthographic form, one required selection from a provided set of verbs and the other was a task requiring description of video scenes. By analysing performance across all tasks, verbal and non-verbal, any representational difficulties thought to cause problems with verb production or sentence structure will not be confounded with an impairment in phonological/orthographic processing.

3. Semantic/Conceptual representation;

In this account, events and states are represented differently from entities in conceptual structure and the predicates that express them are also represented separately as nouns and verbs: this is not the same as claiming that the problem is an action/object difference because an event can be expressed by either nouns or verbs:

Nouns: destruction, (the) escape
Verbs: destroyed, escaped.

These variables were not tested by Berndt et al. (op cit.).

The separation of entities and events in conceptual representation can account for the selectivity seen in naming impairments, including the pattern seen in both non-fluent aphasia and anomia. This explanation posits that the meaning structure of the verb or event is not detailed enough to allow access to phonological form. Such an account is also compatible with the mapping account of sentence processing, whether the deficit is in structuring the semantic or conceptual level, accordingly it provides a principled means of relating verb naming problems to sentences processing difficulties (see section 1.4.3.)

As part of their investigation, Berndt et al. (op cit.) attempt to specifically test the hypothesis that verb naming problems are the result of problems with conceptualisation. To do this they consider whether the problem is one of identifying the action component of an event from a static picture.
They say,

“One possible functional locus of selective verb retrieval impairments is ... placed very early in the conceptualisation of the information to be lexicalised, as the action is distinguished from other elements (e.g. actors and objects) of the message” (op cit.; 71).

They attempt to test this hypothesis by comparing verb naming from a static picture to verb naming from a video scene, and they found no statistical difference between the two conditions across all their participants; they conclude:

“This set of experiments on single-word production yielded no evidence to suggest that diminished ability to produce verbs relative to nouns occurs because patients have difficulty extracting the nameable ‘action’ component from a picture...Although it is possible that other sorts of problems at the ‘message level’ could undermine the production of verbs selectively, these results seem to rule-out the most obvious candidate for a message level source of selective verb production impairment...” (op cit.: 85)

However, it is not clear from their discussion why the use of static pictures should be the “most obvious candidate” for a conceptual problem: specifically, it raises questions about that kind of conceptual problem would manifest as a difficulty recognising events in static pictures but not in video scenes? Given the research considered in section 1.3, one of the main components of event perception from a visual input is likely to be the identification the temporal profile of a scene; so presumably Berndt et al. (op cit.) were intending to supply as much information as possible about the temporal sequence of an event by using video scenes. As noted earlier, a video scene would provide some extra temporal information.
Recall this picture:

In a static picture it is impossible to conceptualise whether this is a *leaning* state or a sub-part of an event such as:

*the mop fell against the bucket*, or

*the bucket slid towards the mop*

The video scene would provide enough information to disambiguate choices like these, and so from this point of view it would make the event processing easier. However, the discussion in section 1.3 also suggests that it is not the visual system alone that guides conceptualisation toward the perception of an event; it is likely that an intact linguistic system is needed to perceive an event from either the static picture or video format. The requirement for linguistically-mediated constraint would be even stronger in a naming task because of the necessity to conceptualise the information needed to access a lexical label; section 1.3 also stresses that there is more to conceptualising an event than just identifying temporal information such as conceptualising the relational information and taking a perspective. It is not clear that the use of video would aid these aspects of processing.

The Berndt et al. (op cit.) results do emphasise that difficulty naming events is not the result of a simple problem inferring movement from a static picture: what these results do not explore in greater detail is the possibility of a conceptual problem. A more detailed investigation of event processing is provided by the present study.
1.4.3 Relationship between verb and sentence processing

The previous section reviewed a number of hypotheses about the cause of verb problems; many of which note a co-occurrence of verb naming and sentence processing difficulties (Saffran, Schwartz and Marin, 1980; McCarthy and Warrington, 1985; Zingeser and Berndt, 1990; Bates, Chen, Tzeng, Li and Opie, 1991; Mitchum and Berndt, 1994). In the McCarthy and Warrington (op cit.) study, for example, sentence production seemed to show many features that could be attributed to verb problems, e.g.:

\[ \text{The man is a sack of potatoes} \quad \text{(The man is carrying a sack of potatoes)} \]

In this sentence, the description of the picture is incomplete because the verb is omitted. In other sentences there were different problems, e.g.:

\[ \text{The daughter was chairing} \quad \text{(The girl is sitting on the chair)} \]

In this sentence, the meaning of the state has been combined with the location to produce the non-word (in this context) chairing.

It seems likely that problems structuring the conceptual/semantic representation of the verb would lead to such problems: if the semantic structure does not provide details about predicate-argument structure then these sub-components of meaning will not be mapped onto sentence structure; and if the conceptual system is not organised in such a way as to separately identify the action and its participants then access to language will be affected in a number of ways. This effect will include: selecting an available lexico-semantic item (such as sitting); accessing the arguments required by this verb; structuring the relationship between these elements so as to access syntactic structure. It is likely that the most inclusive account of verb problems appeals to their conceptual/semantic representation which should be structured in enough detail, and in the correct way, to allow access to the rest of the linguistic system: either to phonological form or to syntactic structure. In this way, verb problems can be explain in a way that is also compatible with the mapping account of sentence processing difficulties.

It is not possible to explicitly show that verb/event problems cause sentence problems, nonetheless the association and co-occurrence of these two patterns of impairment is very strong.
This association works four ways:

• verb production and sentence production;
• verb comprehension and sentence comprehension;
• verb production and sentence comprehension;
• verb comprehension and sentence production.

Berndt et al. (1997a, 1997b) attempt to explore these relationships by comparing a range of single word tasks with sentence tasks. Both the single-word tasks and the sentence tasks included comprehension and production, so all four of the associations listed above can be considered. The participants included those with verb problems at the single word level and those who had greatest difficulty with nouns at this level (or who showed no difference). Performance on the single word tasks, in both comprehension and production, was shown to be significantly correlated with sentence processing.

The findings are summarised below:

• Patterns of noun/verb difficulty were not entirely predictable from the participant’s clinical classification; there was one fluent participant who was better with nouns than verbs on single word tasks and one non-fluent participant who showed no noun/verb difference, thus supporting the claim that a syndrome-based account is not adequate (see section 1.4.1).

• A particular problem with verbs on both the production and comprehension versions of the single-word tasks was found to correlate significantly with several structural indices of sentence production, including:
  ◦ narrative descriptions

  The output of the verb-impaired participants contained a high number of semantically ‘light’ verbs (such as make, have and be); the narratives were also structurally impoverished, in that there was a lack of verbs with a corresponding high number of single noun phrases; when verbs were produced they were often produced alone or in V+ NP structures and there were few more elaborated

---

5All these findings are taken into account in the selection tasks for the present study - see chapter 2.
predicate-argument structures.

◊ static picture and video scene descriptions

(n.b. in this task, the use of ‘light’ verbs would have been scored incorrect as the pictures required specific verbs) The verb-impaired participants showed the same problems of verb omission structure on this task and although the pictures attempt to elicit active and passive structures, there was no difference in performance between these two picture types.

• Verb problems (comprehension and production) were found to correlate significantly with:

◊ failure to comprehend semantically reversible sentences.

The authors conclude:

“Although there is a strong correlation between verb retrieval impairment and sentence production difficulties, there are only a few indications in the data that the verb retrieval problem is the cause of these difficulties with sentence production.”

(Bemdt et al., op cit.: 131)

The participants that were thought to show a causal effect were those who the authors classified as having a problem accessing phonological form; however the data is not as clear as this conclusion might suggest. In particular, it is important to emphasise that there were participants other than those phonological participants whose pattern of performance showed a strong association between single-word and sentence tasks; these participants had a particular difficulty with verbs across most of the single-word tasks and had problems with verbs and structure in the sentence tasks.

The authors also emphasise the different processing impairments that lead to similar symptoms,

“This detailed characterisation of the sentence production of five patients with selective difficulty producing verbs in naming tasks, when contrasted with the sentence production of five other patients who produce verbs either better than nouns, or who show no difference between the two, indicates that sentence production can break down in a number of ways.” (op cit.)
In other words, accounting for verb and sentence problems under the ‘mapping’ hypothesis, in it widest sense, cannot precisely site the impairment: within this hypothesis the precise aspect of processing that causes problems must be identified by a series of precisely targeted tasks. An example of this is the set of non-verbal event tasks used in the present study, which were designed to require visual analysis of an event that would rely on linguistic information; in this way conceptualisation can be assessed relatively precisely. As a comparison there is also a task that is effected by analysis of language form; the presumption is that both tasks require conceptualisation mediated by language, but that the difference in the input material would have certain specific ramifications. These tasks are mentioned here as an example of the use of a set of precisely targeted tasks; they are outlined in detail in chapter 2.

The review in this section has identified a number of processing impairments which nevertheless cause similar verb and sentence problems; these hypothetical impairments are:

- a problem accessing conceptualisation in input from linguistic stimuli;
- a related problem accessing conceptualisation from visual input, due to of a lack of linguistically-mediate constraint;
- a production problem involving an impairment to lexico-semantic structure which has two main ramifications;
  - the impaired lexico-semantic representation fails to provide the required linguistically-mediated constraint on conceptual organisation, with the result that information from conceptualisation is reduced, and
  - the impaired lexico-semantic representation makes access to other aspect of the linguistic system problematic (this may implicate access to both phonology and sentence structure)
- a problem with the phonological/orthographic form of a lexical item, an impairment that is not clearly distinguished in the papers reviewed above and it is not addressed by this thesis.
1.4.4 Summary

The previous section reviewed the clinical literature dealing with verb and sentence processing problems, focussing in particular on those impairments of non-fluent aphasia that have been characterised as ‘mapping’ problems.

A common feature of the language of people with non-fluent aphasia is so called ‘asynaptic’ comprehension. The literature reviewed pointed to a particular pattern of impairment that includes:

• reversal errors in comprehension of SVO sentences;
• retained ability to detect purely syntactic anomalies; and
• in some people, a greater difficulty with passive structures.

This section also reviewed various theories about the cause of such difficulties, which accounted for the data to varying degrees; the most inclusive account introduced conceptual/semantic aspects of sentence comprehension. Along with the literature reviewed in the early sections, this pattern of impairment suggests a problem integrating information from a number of sources: syntactic, semantic conceptual and pragmatic.

Such problems with comprehending sentences often co-occur with similar problems with production; this pattern of impairment is commonly called agrammatism which, among other symptoms, is characterised by:

• reversal errors in comprehension;
• retained ability to detect syntactic anomaly in sentence comprehension;
• word-order errors;
• verb-form errors or verb omission; and/or
• reduced predicate-argument structure.

Again, the account that most fully explains this pattern refers to the integration of conceptual/semantic and syntactic processing. These sentence production difficulties commonly occur with a difficulty in producing verbs in isolation, a pattern that is also likely to be due to problems with the lexico-semantic representation of verbs or the conceptual representation of the associated event.
The main claim is that there are many layers of processing involved in verb and sentence processing and so a problem with the production and comprehension of verbs and sentences may be caused by and impairment to any layer in this complex system. The 'mapping' account does not specifically pinpoint one processing impairment; rather it is a term used to refer to impairment with a number of potential causes. The various processing impairments covered by this term are outlined in the next section.
1.5 MAPPING THERAPY STUDIES

There have been a number of papers describing treatment programmes based on the ‘mapping’ hypothesis (Jones, 1986; Byng, 1988; Le Dorze, Jacob and Coderre, 1990; Schwartz et al, 1989; Nickels, Byng and Black, 1991; Marshall, Pring and Chiat, 1993; Marshall, Chiat and Pring, 1997). These treatment programmes have produced encouraging results that are broadly explicable within the ‘mapping’ hypothesis, however the individual patterns of impairment and improvement are harder to characterise in simple mapping terms. The reason is that ‘mapping’ is a term used to cover a range of impairments with broadly similar symptoms (see previous section) and the effect of similar therapy programmes differed from participant to participant.

Moreover, the target of ‘mapping’ therapy programmes has also differed in significant ways: there are three main processing components that have been targeted, all of which could give rise to similar language symptoms. These components are:

1. The procedures linking syntax to predicate-argument structure (Schwartz et al., 1989).
   This approach concentrates on general procedures linking the semantic system with particular sentence frames, rather than verb-specific procedures; as a result the focus has been on sentence frames other than the simple active declarative.

2. Lexically specified structural information.
   Here the information about predicate-argument structure and thematic information is no longer accessible, preventing mapping to/from syntax (Jones, 1986; Byng, 1988; Le Dorze et al., 1990; Nickels et al., 1991).

3. Conceptualisation, or event processing.
   An impairment to the lexicosemantic system may also mean that information in conceptual representation is not specified in enough detail to be mapped to/from semantic representation (Nickels et al., 1991; Marshall et al., 1993).

In the discussion below, the aim is to highlight those aspects of the mapping hypothesis addressed by this thesis. However, the attention will be directed toward the therapy process itself rather than any other aspects of these papers because it is in the therapy process that some of the assumptions about processing are most
explicit. The review of the literature presented in the previous sections has been aimed at characterising in
more detail the relationship between conceptualisation and language, consequently it most directly affects the
last two aspects of ‘mapping’ impairment listed above. Nonetheless, any clarification of the processing that
links conceptualisation with language will have some relevance for the description of form-meaning relations,
including the mapping between semantics and syntax. The review of research into the conceptual system
presented in this thesis allows for a more detailed characterisation of event processing than was possible when
the above accounts were proposed. Consequently the distinction and interactions between the semantic and
conceptual system can now be drawn more clearly.

Given these aims, there are aspects of the ‘mapping’ therapy papers that deserve particular reconsideration in
the context of this thesis. The main areas of clarification are as follows:

- It is likely that impaired event processing is due to an impairment in the interaction between lexico-
  semantic representation and conceptualisation: an impairment in the linguistic system resulting in a lack of
  linguistically-mediated constraint on conceptualisation.

- Conceptualisation is also subject to constraint from other processing systems, in particular from the visual
  system, which means that the role of visually-mediated constraint in language processing should be
  considered.

- There are a number of key aspects of event processing that are particularly important to language and that
  are also likely to be impaired in aphasia. These are:
  - the identification of the temporal profile of an event;
  - the identification of entities participant in an event, and the characterisation of the relationship
    between them; and
  - the taking of a particular perspective.

- It is possible to distinguish event processing in input from event processing in output, in terms of a
difference in the kind of integration required.
Output requires the refinement of information into a semantic structure, which initially involves attending to certain aspects (see above) of a situation and then involves processing them in such a way as to make them functional in the semantic system.

Input requires the enrichment of semantic structure into a full conceptualisation, which requires recognising aspects of the structure and content of language as 'keys' to concepts in conceptualisation; the language form provides a 'skeletal' structure for the conceptualisation so that information from other sources, such as situational and encyclopaedic knowledge, can be integrated in a structured way.

The recasting of event processing in these terms provides a number of ways in which the 'mapping' therapy programmes may be re-considered. The most important issues raised by such a re-consideration concern both the stated aims and methodology of the 'mapping' therapy programmes, in particular it is important to ask the following questions:

- which aspects of processing were targeted?
- did the materials used accomplish this aim?

The use of non-linguistic materials to constrain conceptualisation is the first issue that will be addressed below (section 1.5.1); following this (section 1.5.2) there will be a review of the only therapy programme to be designed specifically to target event processing (Marshall et al., 1993).
1.5.1 Constraining Conceptualisation through Therapy materials

A: Pictures

Byng (1988) reports on a programme of therapy carried out with J.G, whose language impairments included severe sentence comprehension problems characterised by reversal errors and production largely consisting of single nouns and verbs. J.G.'s problems were characterised as a difficulty processing "sentences in which the mapping of thematic relations is crucial" (op cit.; 631).

At the input stage of Byng's therapy, J.G. was presented with:

- a picture of an event;
- a written description that was separated into individual phrases;
- a colour-coded card on which the coloured lines referred to different components of the sentence (red for NPs green for the verb) - this aspect of the therapy will be discussed separately below.

J.G.'s attention was directed to the participants in the event by questions, such as:

"In the picture, can you point to the one that is doing something?"

On this basis, the identification of participants and the role they play in the event was identified before the sentence fragments were brought in. The use of pictures to focus attention on conceptualisation is not explicitly addressed in the paper or other related papers that used this method (Nickels at al, 1991; Byng et al., 1994), however the following comments about the therapy design as a whole serves to explain the motivation:

"This [the matching of entities in the picture with lexical labels] should facilitate imposing a structure on the event - that is, labelling the component entities of the event and the action" (Byng et al., op cit.: 324)

"In the course of therapy, contrasts between change of Agent, action and Theme/Patient were introduced, so that throughout this stage the emphasis was on how an event can be structured and expressed linguistically" (op cit.:324)
Pictures were used to focus attention on the event itself and to emphasise the relationship between aspects of the visually-presented event and the structure of the linguistically-expressed event. Overall, the aim was to establish the importance of the structure of conceptualisation and the therapy was designed to effect this by reinforcing the analysis of certain roles in the event. Each picture in the programme was paired with another than contrasted in terms of one component; for example, Stan washes the dishes / Mary washes the dishes. After the participant had fully analysed one of the photographs they then had to repeat the process with the other. In the course of therapy, contrasts between different agents, actions, and Themes were introduced. As the authors say,

“We consider that this process is underlining to the patient the roles played by the different participants in the event... throughout this stage the emphasis was on how an event can be structured and expressed linguistically.” (op cit.: 324)

Byng et al. (1994) outline the component parts of the structuring process, as they saw them:

“The component processes of this stage of therapy seem to require the development of (i) a conceptual representation of an event from a picture; (ii) a ‘labelling’ of the component entities of the event, [this includes] a conceptual specification of the roles of the participants and the action involved in the event…”

The outline above makes it clear that the authors were targeting both the entities and event type: two of the layers of conceptual structure identified in this thesis. This therapy is also consistent with the present account in that both pictures and sentence fragments are provided as indicators of the structure of events.

However, there is potential for misunderstanding the use of pictures in this kind of therapy. It is important to emphasise that the visually-presented events do not symbolise conceptual structure any more directly than does language: the research reviewed earlier indicates that both the sentence and the picture would require semantic information to fully construe the event. Consequently, although pictures are appropriate for the aims of this therapy, their use requires a full understanding of the processing they require. Most importantly, the account developed in this thesis raises the possibility that the conceptualisation of events from pictures may also be affected by language impairment. Of direct relevance to this point is that fact that J.G. was given a non-verbal
visual task as part of the pre- (and post) therapy assessment. In the Verb Video task, J.G. was shown a number of scenes depicting verb pairs, these were of three types: reverse role pairs (such as *buy* and *sell*), reverse direction pairs (such as *lift* and *drop*) and reverse action pairs (such as *crease* and *smooth*). The scenes were presented in pairs on a split screen. There were two different conditions:

1. related, where a verb and its partner were both depicted (e.g. *buy* & *sell*);
2. unrelated, where a verb was presented with an unrelated verb from another pair (e.g. *buy* & *drop*)

The task is to match a written verb with one of the scenes presented.

As Byng says,

> “For the reverse-role verbs, when the related pair are depicted together, in order to chose between the two scenes, the observer must (1) retrieve the thematic role information from the lexical entry of the target verb; (2) analyse the two scenes to determine for which scene the focus is the source of the action and for which scene it is the goal of the action; and finally (3) map the thematic information onto the information derived from analysing the scenes. Hence mapping of thematic roles is involved in performing this picture-word matching task, just as it is involved in performing the task of sentence comprehension.”

(Byng, 1988: 640 - my emphasis)

In other words, in the unrelated condition the correct verb is easy to spot whereas in the related condition, the processing necessary to identify the correct verb varies depending on the event type: the reverse direction and reverse action verbs can be distinguished by visual means, *lift* can be distinguished from *drop* because it has an upwards motion and *crease* can be distinguished from *smooth* because of the resulting appearance of the Theme; the reverse role verb pairs, by contrast, are not distinguishable by visually apparent semantic features because they describe the same event. The way these verbs are distinguished is by identifying the focus taken by the verb: either the focus is on the source of the action (*sell* for example) or on the goal (e.g. *buy*). This means that it is necessary to carry out a thematic analysis of the verb and to map this information onto its visual depiction in order to select the correct scene.
The part of the quote emphasised in bold (overleaf) claims that mapping in involved in picture-word tasks "just as it is involved" in sentence comprehension, which can be interpreted in two ways: it is likely that the aim was to stress that it is not just sentence task that involve thematic analysis but that single-word tasks require it too, but this phrase can also be interpreted to mean that the mapping between pictures and thematic roles is the same as the mapping between language and thematic roles. The latter interpretation makes the claim untrue: conceptualisation from pictorial input differs from that required by language input. In the verb video, the visual analysis of the scene and the semantic structure of the verb both serve to constrain the conceptualisation, which means that the verb video task requires the comparison and integration of the visual information with the lexico-semantic structure of the verb. In sentence comprehension, by contrast, there is only the linguistically-mediated constraint.

On this task, J.G. made significantly more errors in the related condition of the reverse role verbs, suggesting that J.G. had difficulty relating the thematic features of an event to its visual depiction. As J.G.’s sentence comprehension errors were largely reversal errors, it can be seen that he had difficulty interpreting thematic information from both linguistic and visual material, which quite strongly suggests that J.G. had an impairment affecting conceptualisation. This raises questions about how J.G. was carrying out the therapy task. It seems that J.G. had an impairment in lexico-semantic representation that was preventing him from conceptualising an event in a fully structured way; both conceptualisation from language input and conceptualisation from pictures. To carry-out the therapy, he would have had to integrate his visual analysis of the picture with his linguistic analysis of the sentence fragments, to form a conceptualisation of the event itself. As both the linguistic and visual analyses were likely to have been impaired, the conceptualisation is unlikely to be a full one. Of importance to this claim are the on-line investigations of J.G.’s language carried out by Tyler (1992). His performance on a wide range of sentence judgement tasks led Tyler to suggest that J.G. is able,

"to construct higher-level representations ... [but] the process of constructing representations is slowed down in some way." (op cit: 230)

This proposal is consistent with the analysis presented here because it suggests that the timing of the various sources of information to be integrated into a conceptualisation was impaired. That is, each source of information processing may have been slowed and may have not been accomplished concurrently. Without
such concurrent processing the integration of information may have been difficult, leading to an impoverished conceptualisation of the event.

In the light of this proposal, it is important to consider how the therapy programme might have improved J.G.'s conceptualisation. The contrasting elements in the picture pairs seem to have constrained his conceptualisation in important ways:

- contrasting the thematic roles would have emphasised the importance of identifying participants and characterising the role they play;
- contrasting the type of actions shown would have emphasised the importance of identifying event type.

However, it is possible that this last contrast compounded two separable aspects of event analysis: the action and the relational information associated with it. Contrasting the action (whilst the participants remain the same) would not necessarily have emphasised the relationship between the participants. This claim depends on the kinds of events that were contrasted, consider this contrast:

\[ \text{The girl kicks the ball} \]
\[ \text{The girl throws the ball} \]

In this pair the two event are both ACTS with a specified manner, so the only relational difference to emphasise is the manner. Compare this with these two events:

\[ \text{Sam saws the tree} \]
\[ \text{Sam climbs the tree} \]

In this pair, there are two very different relationships between Sam and the tree. The difference may be best characterised in terms the aspects of the tree's 'qualia' that is referred to by each event: saw refers specifically to the trunk of the tree and makes use of the fact that it is made of wood; climb refers to the whole tree and makes use of the fact that the tree has branches that can be used to effect the climbing. The different 'quale' of the tree that are referred to by the verbs makes the relationships different in each case and there are other relational differences in the full set of sentence pairs, for example scratches/blows her nose, and other pairs differ because they involve different instruments to effect the event, for example, toasts/cuts the bread.
It is useful to compare this therapy with another therapy programme that used pictures. Le Dorze et al. (1990) carried out a partial replication of the Jones’ therapy, using pictures to replace the written sentences that she used because the participant, M.G., could not read. M.G. was presented with a spoken sentence and three pictures representing elements of the event it described, for example the pictures would represent Agent-action-Theme. He was asked to identify the action and then asked Wh-questions: Who? for the Agent and What? for the Theme (the rationale for using WH-questions is considered below). Identification meant pointing to the correct component of the pictorial stimulus. Following therapy, M.G.’s production of verbs and predicate-argument structure improved. Much like J.G., it seems that M.G. was invited to conceptualise the event and then to relate the conceptual structure to a visual depiction of the event; what is not clear in this case is how this also enabled M.G. to map thematic information onto linguistic structure. There are two main possibilities:

1. M.G. learnt to map conceptual structure onto the picture elements in terms of linear order, and he used this same technique to order the elements of spoken sentences; or

2. The therapy targeted the conceptualisation process itself, encouraging M.G. to conceptualise the event in a more structured way.

M.G.’s therapy may be characterised much like that of J.G. as both tasks require the integration of structural information from both pictures and linguistic-material. In combining and integrating these sources, the two participants may have been able to construct a conceptualisation in more detail than they would have been able to from either the pictures or the language alone. The pictorial material in these two tasks differs in important ways however:

- In Byng’s therapy study, J.G. was given a picture of the whole event, from which it was necessary identify the following information:
  - the action type
  - the participant entities;
  - the relation between them;
  - a perspective.
Some of these aspects of structure were highlighted by contrast with the other picture in the pair (see above).

However, the action type and relational information may have been confounded by the contrast method, and perspective was not addressed.

- In the Le Dorze et al. (1990) therapy on the other hand, M.G. was given material from a teaching resource called ‘Fokes Sentence Builders’. As the authors say,

  “actors are represented as realistic line drawings; verbs are represented as solid stylized outlines of figures executing an action; while objects are represented as realistic line drawings” (op cit.; 251)

In addition, M.G. was also given a picture of the whole event (like those given to J.G.) to facilitate an understanding of what the other pictures represented. In this way, certain key aspects of conceptualisation were separately identified for M.G. These are:

- the participant entities; and
- the action type

The separation of entities from each other and from the action may well have been very helpful because they must be separated like this in a linguistic description. Similarly the separate identification and stylisation of the action type would also have constrained conceptualisation. The key aspect that does not seem to have been emphasised by either of these methods is the relational information.

There is some support for this analysis of M.G.’s therapy in the following features of his post-therapy output:

- he always managed to name either a participant entity or the event label, often producing both.

<table>
<thead>
<tr>
<th>Target</th>
<th>M.G.</th>
</tr>
</thead>
<tbody>
<tr>
<td>The boy saws wood</td>
<td>A man saws</td>
</tr>
<tr>
<td>The man paints the fence</td>
<td>Construction</td>
</tr>
</tbody>
</table>

- he sometimes made order errors with respect to verbs,

<table>
<thead>
<tr>
<th>Target</th>
<th>M.G.</th>
</tr>
</thead>
<tbody>
<tr>
<td>The girl opens the window</td>
<td>A woman ...... a window opens</td>
</tr>
</tbody>
</table>
A useful contrast to M.G.’s therapy is that given to P.B. (Marshall, Chiat and Pring, 1997). They also use separately pictured elements but they use them specifically to isolate one aspect of relational information: the direction of transfer inherent in events such as buy/sell, give/take and borrow/lend. P.B. suffered a stroke that resulted in severe aphasia but in contrast to the other people discussed in this section, P.B.’s production was fluent. Nevertheless, verbs were particularly difficult for P.B. in both comprehension and production, and pre-therapy assessment led the authors to conclude that he had problems with the assignment of thematic roles, although other aspects of the verb’s lexico-semantic information seemed to be retained.

The therapy programme concentrated on three-argument verbs (such as give and take, buy and sell), highlighting the movement information they encode. P.B. was presented with picture cards representing people and objects along with a colour coded written sentence, such as:

*Bob gives a pen to John*

He was then required to ‘act-out’ the event using the picture cards. In this case, he would have to line up the cards for Bob, the pen and John in that order and make the pen move from Bob to John. Help was provided by explanations from the therapist emphasising the need to identify a ‘giver’ and a ‘receiver’, and P.B.’s attention was drawn to the colour coding. In this way, P.B. was encouraged to conceptualise the event in a structured way, just as in the other mapping therapies; the additional factor in this case was the possibility of acting out the meaning of the verb. This approach seems to isolate one aspect of relational information, the transfer, and re-interpreting this method in the light of sections 1.2 - 1.4 suggests that it served to constrain the relational information in conceptual structure. This constraint visually and motorically mediated but it has the effect of constraining conceptualisation in a language-appropriate way; more importantly, the influence of any linguistically-mediated constraints is minimised because other sources are sufficient in constraining conceptualisation. The use of other sources of constraint also obviates the need to establish conceptual structure using only language concepts, such as ‘Agent’.

This idea that essential conceptual notions may be established without recourse to linguistically described concepts is important; given the language problems of the participants in these therapy programmes, it would seem to be crucial to attempt to find non-linguistic means of reinforcing conceptual structuring such as acting-
out. The next section considers colour coding, which is another example of such a method, and also considers the use of the questions that are often used alongside colour-coding.

B: Colour-Coding and WH-Questions

All the therapy programmes mentioned in this section (except Jones, 1986), use colour coding and linguistic material presented together to emphasise the relationship of meaning to form. For example, in the output stage of Byng’s therapy, J.G. had to order the written sentence fragments into a structured sentence and he was initially aided in this by colour coding that linked each phrase to a position on a structural cue card: the Agent NP was coloured red, the verb blue, the Theme green; and the structural cue card had three horizontal lines in the order red-blue-green. As far as can be assessed, colour-coding seemed to be a useful cue for all the participants in these studies, consequently it is important to attempt to explain this finding in the light of this account of conceptualisation. In particular, an attempt should be made to explain how colour can help to constrain conceptualisation.

Some of the findings in the Schwartz et al. (1989) study might shed some light on this question as they also used colour coding, albeit slightly differently from the other studies in this section. In their programme, participants were presented with a written sentence about which they were asked a set of probe questions. For example:

"what is the verb in this sentence?",

"which one is doing the V-ing?",

"what is he/she V-ing?".

Participants were asked to underline the relevant lexical items using coloured pens, in order to emphasise that these probe questions were asking for the identification of different elements of the sentence. The most interesting result of this adaptation of the therapy was the discovery that subjects often made one choice when asked the question alone and then self-corrected when given the coloured pen. This discovery indicates that colour-coding was an aid to conceptualisation and that the aid it provided was distinct from the aid provided by the questions. The issue of the effect of Wh-question is discussed below, however it is important to also hypothesise about the processing engendered by the colour-coding. The previous sections in this chapter have
argued that both linguistic and visual processing can serve to constrain conceptualisation, these two aspects have both been considered in essentially the same terms, i.e. how they help select language-relevant elements such as participant entities; by contrast, there is nothing about colour per se that would make a particular entity or temporal profile more salient. Nevertheless, colour clearly provided some kind of constraint in these studies, and the best explanation seems to be that it allowed for some kind of un-planned constraint that may be affected by the conceptual system itself; colour-coding may even allow for an idiosyncratic constraint procedure. By somehow abstracting away from specifically targeted means of conceptualisation, the participant may be allowed to constrain their conceptualisation as they want or as they are able. This idea is considered again in section 6.2 in the light of the results from the present study.

The Schwartz et al. (op cit.) and Jones (1986) studies both used wh-questions such as those presented above and is important to emphasise how these questions differ from those used in the other studies (e.g. Byng, 1988; Nickels et al., 1991). The point is made by Byng and Black (1995), in assessing the important parameters of therapeutic intervention in aphasia, where they review the differences between the therapy programmes that come under the ‘mapping’ label. They say that in the Schwartz et al. programme, participants have to,

"... process a sentence in relation to a question. Then she or he has to underline the appropriate word or constituent in the sentence... [T]he sentence has to be analysed structurally to arrive at the appropriate identification of the subject or object. Thematic role interpretation is likely to be carried out, give the manner in which the task was introduced in the pre-training, although it is not strictly necessary in order to give a correct response." (op cit.: 309)

The important point being made, is that wh-words, such as who and what, are linguistic expressions for animate and inanimate entities but they do not uniquely identify a particular thematic role in semantic structure nor a particular grammatical relation. Consider, for example:

*Hamsa kissed Steve*

*Hamsa liked Steve*

*Hamsa received a letter*
For these sentences, who? would identify Hamsa in each case but in each event Hamsa plays a different role: Agent, Experiencer and Goal respectively. Similarly, consider the following sentences:

Crump opened the cupboard

The tin of beans hit Crump

In these two sentences, the question who? identifies Crump although in each sentence who? refers to a different grammatical relation: subject and object respectively.

The previous two sections have dealt with the effect of therapy materials on conceptualisation although the programmes in which these materials were used were designed for people who were assessed on the basis of their language problems per se, rather than any associated conceptual difficulty. The next section considers two further studies in which conceptual difficulty was specifically considered.

1.5.2 Event Processing Impairments

In another mapping therapy study (Nickels et al., 1991; Byng et al., 1994) three participants with verb and sentence processing problems are presented: L.C., A.E.R. and E.M. in the initial assessment battery. There was a non-verbal event processing task in which the participants had to sort pictures into two piles: one set depicted events, such as a baby crying, a window shattering; in the other there was no event, a dustpan and brush, a room with various items of furniture in it. The participants had to sort them into their respective piles; an event pile and a non-event pile.

L.C., was not able to sort the pictures reliably although other tasks suggested that she did not have a problem at the perceptual stage of picture interpretation. It seemed that she was unable to conceptualise the pictures in such a way as to distinguish events from states: even when no linguistic processing was required, L.C. "seemed to have a limited ability to identify and conceptualise events" (op cit.: 330). L.C. participated in a therapy programme similar to that described for J.G. (see section A, above), using pictures, written phrases and colour-coding to emphasise the thematic information encoded in sentence structure but she did not respond to therapy as well as other participants (for example, A.E.R. in this study and J.G. in the related study), which was
probably due to her severe event processing problems. However, her language production did improve in specific ways\(^6\) which suggests that therapy had some effect. The authors suggest that for L.C., after therapy, “the verb is now more salient, because as she is aware now that an event is occurring, so she is more likely to attempt to name the event.” (op cit.: 330).

As this therapy was not specifically designed for L.C.’s conceptual problems, the authors are not able to make any further claims about the way in which the therapy materials affected her conceptualisation. By contrast, Marshall, Pring and Chiat (1994) describe a therapy programme that was specifically aimed at event level processing; this paper is discussed below.

M.M. was another patient who, like L.C., seemed to have difficulties in processing events and who had typical ‘mapping symptoms’: reduced predicate-argument structure in production; few verbs; reversal errors in sentence comprehension. A number of non-verbal assessment tasks were devised to assess her conceptual processing difficulties more precisely, including:

- an odd-one out verb picture task, where two representations of the same verb (e.g. *pour*) had to be distinguished from a semantically related distractor (e.g. *drip*); and
- a ‘role video’, where event scenes were presented along with three photographs from which the ‘outcome’ photograph had to be selected;  

In the role video, the scenes were of three types:

- One non-reversible scene type,
  - people acting on objects (e.g. a woman washing a plate.).
- Two reversible scene types
  - people acting on people (e.g. a woman hitting a man.);
  - change of possession scenes (e.g. a man selling a camera to a woman.).

\(^6\) verb naming improved and there was a decrease in the number of single-phrase utterances in narrative production (along with a trend towards a greater number of verb-and-one-argument phrases)
For each of these scene types there were three ‘outcome’ photographs: an event distractor, a role distractor and the correct outcome. For the hitting scene these photographs would be: the man soaking wet, the woman with a black-eye and the man with a black-eye (respectively).

M.M. made a number of errors on both tasks. On the role video task she made more errors on the reversible scenes (the ones where there is a change of possession or where someone acts on someone else), in each case choosing the role distractor. These results suggested that M.M could broadly identify the type of event depicted but she was less able to make judgements requiring more detailed analysis; in the photograph task this involved specific semantic features of events, and in the video task this involved processing role information. The therapy programme was therefore designed to concentrate specifically on conceptual processing. M.M. was shown a number of two-argument events on video and was asked to identify the agent, the theme and then the nature of the action. Judgements were made by selecting a photograph from a pair, for example when asked to identify the Agent, M.M. might be offered a choice between a photograph depicting a man and a photograph depicting a woman. Similar choices were then made by selecting from a pair of ‘Theme’ photographs and then a pair of ‘outcome’ photographs. Again, the authors suggest that therapy encouraged M.M. to translate the visual representation of an event into a structured representation compatible with semantic structure.

M.M.’s therapy differed from others described above in that it was designed to concentrate on conceptual processing, however in terms of methodology and materials it closely resembled other programmes, for example:

- pictures were used in both the presentation of the event and in the selections made by participants in the therapy designed for M.M, L.C., M.G, and J.G.
- the means of conceptualising the event was communicated in a similar way in all the papers discussed above, using questions and cues from the therapist that emphasise, for example, how to identify an Agent.

Nonetheless, there are some important differences specifically to do with separating-out certain of the layers of conceptualisation identified in this chapter: on being asked to identify an Agent, M.M. would be offered separate pictures of the participant entities, thereby separating this aspect of identification from other aspects of
conceptualisation; similarly, an aspect of the event type was also isolated, in this case it was the ‘outcome’ or affected entity. This separation process differs from that identified for M.G.’s therapy above in which the questions and explanations were presented alongside the visually separated elements; components of the event were therefore separated in language and in visual processing. It is difficult to explain which aspect of the conceptualisation would be constrained by the separate presentation of the ‘outcome’ photograph used in the Marshall et al (op cit.) study; it is more likely that this part of the therapy helped to characterise the event in more detail. It is worth pointing out however, that the outcome photograph entails the conceptualisation of a distinct state; although this is the resultant state, it is not clear that it is a subpart of the event being targeted. It is unlikely that the man with the black eye is part of the hitting event although in other cases the outcome photograph probably does show a sub-part of the videoed event; for example in an event where a banana is mashed, the resultant state is the mashed banana and this is likely to be the final sub-part of the mashing event.

The Event Video is a useful means of highlighting the layer of conceptual processing that involves the identification of participant entities (see section 1.2.1). In a scene depicting a woman mashing a banana, it is not possible to confuse the roles played by the participant entities because of selectional restrictions: the banana cannot mash the woman. However, the task was carefully designed so that another potential Theme (i.e. an avocado) was present in the scene, although in the background and so not part of the mashing event. To conceptualise the event it is necessary distinguish between entities that participate in the event and those in the background which is the process usefully characterised by Langacker’s notion of ‘profiling’: a scene must be conceptualised in such a way as to find a relationship that relates the entities in some way. As there is no event or state that relates the fork, the woman, the banana and the avocado, one of these entities must be dismissed in the profile. An inability to profile relationally would lead to the selection of the background entity.

An alternative explanation for role errors on the ‘object’ scenes is raised by the authors of the task when they propose that M.M made role errors only on the reversible scenes because she was able to make “broad decisions about cause and effect and show basic sequencing skills” (Marshall et al., op cit). The relative merits
of these two analyses can only be assessed in the context of other aspects of a person's processing profile, and so this would be a matter for empirical investigation. The possibility of distinguishing a further layer of conceptual processing is theoretically motivated and empirically assessed, in part, by the inclusion of the Role Video in the battery of conceptual processing tasks in the present study; however, as the video was not designed to assess this particular issue and because of the small number of errors on the 'object' scenes, this issue requires further empirical investigation. The results of the participants on this video and the other conceptual tasks are detailed in chapter 4, and implications about the processing targeted by each task are discussed in chapter 6.

The above review of the 'mapping' therapy studies reveals that the 'mapping' hypothesis covers a heterogeneous set of therapy aims which, when reanalysed in the context of this thesis, may be addressing the conceptual system. The distinction between procedural and lexical impairments does not seem to be clinically useful and so it may be of greater therapeutic value to consider the interaction between language and conceptualisation, and to assess how therapy materials may aid the constraining process in conceptual structure. Although two of the papers reviewed above specifically address conceptual impairments, they seem to focus on assessments that would only identify a particularly severe problem; the tasks used in the present thesis are designed to be more sensitive tools for assessing conceptual impairments.
1.6 SUMMARY

The first part of this chapter reviewed the major models of both language production and language comprehension that relate to the semantic and conceptual elements of sentence processing. The focus then moved to more detailed accounts of the relationship between language and conceptualisation. A detailed consideration of this literature revealed the components of meaning that are required by the linguistic system and consequently lead to a characterisation of the fundamental components of conceptualisation. These conceptual components are:

- a categorisation of event type, particularly relationship information (such as HAVE, BE, ACT and GO);
- an indication of the main participants;
- a characterisation of the temporal profile of the event;
- a choice of perspective;
- elements of the full, 'encyclopaedic' meaning of events and entities, beyond their syntactically relevant aspects; and
- a reflection of visual salience features, such as the relative size of the participants.

The second part of this review considered the findings of investigations of event, verb and sentence processing impairments. There were a number of problems associated with non-fluent aphasia that characterise so-called 'mapping' impairments. These are:

- reversal errors in comprehension;
- retained ability to detect syntactic anomaly in sentence comprehension;
- word-order errors;
- verb-form errors or verb omission; and/or
- reduced predicate-argument structure.

These symptoms served as the basis for the selection of the participants in this thesis.

The final section considered those therapy studies motivated by the 'mapping' hypothesis. The patterns of impairment and improvement presented in this literature highlights the complexity of the conceptual and
A number of distinct impairments were suggested by these papers, including:

- a lexical impairment;
- a procedural impairment;
- an event processing impairment.

However, these distinctions are hard to verify in practice, for example some of the patterns of performance assigned to a procedural impairment can also be accounted for in terms of impaired lexicosemantic representation and in many cases where an impairment is attributed to semantic processing an analysis in terms of conceptual processing would also suffice. Overall, this three-way distinction of impairment may be too broad to be of much use clinically. In some of the papers the possibility of a conceptual problem was explicitly addressed and pre-therapy event processing tasks were administered. However, these event/non-event distinction tasks may only indicate a severe conceptual problem, leaving more selective impairments undetected. Conceptualisation seems to be a composite process and so it is likely that individual elements may be selectively impaired. Conceptualisation needs to be further explored to both characterise the process in more detail and to develop more selective assessment, and ultimately treatment, tasks. This is the aim of the research presented in this thesis.
2. METHODOLOGY

2.1 SELECTION TASKS

The participants with non-fluent aphasia in this study were initially assessed with a battery of tasks designed to assess broad patterns of language impairment in aphasia. This ‘Language Battery’ consisted of:

1. The Western Aphasia Battery (WAB) - short version (Kertesz 1982);
2. The Test for the Reception of Grammar (TROG: Bishop, 1982);
3. The word-picture section of the PALPA (Kay, Lesser and Coltheart 1992);

The WAB gave an indication of the level of severity of the participant’s language difficulty and a broad clinical classification (all the participants with aphasia in this study were classified ‘non-fluent’). The other three tasks were used for two reasons:

1. To rule out a broad semantic deficit as the source of the verb and sentence problems. The participants with aphasia in this study did not have problems with ‘core’ meaning, they were able to match single nouns to pictures, to identify and associate pictured objects, and to match sentences to pictures based on the ‘core’ meaning of the verb (e.g. by distinguishing between sitting and jumping in the TROG).

2. As a baseline for the Experimental tasks (see below). Both sets of tasks require picture-to-language matching and picture-to-picture language so that the non-linguistic differences between Language Battery tasks (on which the participants with aphasia performed well) and Experimental tasks (on which the participants with aphasia made more errors) is minimised.

In addition, the findings reviewed in section 1.4 suggested that there is a particular pattern of impairment that can be characterised as a ‘mapping’ impairment. These findings are as follows:

- reduced verb naming relative to noun naming;
- reversal errors in comprehension and/or production;
- reduced predicate-argument structure;
- verb-form errors or verb omission; and/or
- retained ability to detect syntactic anomaly in sentence comprehension.
These findings were used to devise a further set of tasks - the Selection Tasks - for the participants with non-fluent aphasia in this study. This set of tasks can be used to identify those people classified as non-fluent who have an impairment that is best analysed under the ‘mapping’ hypothesis (see section 1.4). Moreover, these tasks will select those people whose language impairment may be affecting their conceptualisation which ensures that the Experimental tasks devised for this study (see section 2.3, below) will be effectively targeted at specifically characterising the nature and extent of their language and conceptual problems. The clinical implications of various patterns of ability and disability on these tasks are considered in section 6.4.

The Selection Tasks are described in detail overleaf:

This task includes 90 photographs of various objects and actions: 45 of which depict nouns and 45 of which depict phonologically identical verbs (e.g. shampoo, shampoo). The participants were asked to name each picture. The expectation was that those with verb problems would be able to name significantly more noun pictures than verb pictures. A full list of these photographs is in Annex 1.

B: Narrative Task (see storyboard in Annex 2)
In this task, participants were shown an extract from a ‘Wallace and Gromit’ video which lasted for one minute. The video is an animated film involving 4 characters and various events - such as knitting, looking and entering - and locative states - such as in and on. The participants were asked to watch the video segment twice and were then shown the same segment once more; this time in 5 separate subsections, each containing 1, 2 or 3 events (and/or 1, 2 or 3 states). The participants were asked to describe what they saw. Their responses were analysed in terms of sentence structure, using the descriptive framework devised by Byng and Black (1989). The expectation was that those participants with verb problems would produce structurally impoverished descriptions - isolated phrases, few complete predicate-argument structures and more nouns than verbs.

---

1 For all output tasks, participants chose whether to respond in writing, speech or a combination of the two - their choice is indicated in section 2.3

178
C: Syntax Judgement Task

People with ‘mapping’ symptoms have been shown to be relatively sensitive to syntactic anomaly (see section 1.4.1, A.). Linebarger (1995) summarises the evidence from various papers and lists the constructions on which participants performed well - scores of 83% or above. Nine of these constructions were used to create the 40 sentences used in this task. These nine constructions were:

1. Subjects-aux inversion;
2. Passive;
3. Incomplete extraction;
4. Empty elements;
5. Gapless relatives;
6. Wh-moved subcategorization;
7. Particle movement;
8. Phrase structure; and
9. Pronoun case; (Annex 3 contains examples of these constructions)

This task consists of 40 sentences; 20 of which are unacceptable syntactically. The participants were asked to judge the acceptability of each sentence.

The ideal participant with aphasia for this study would have had relatively intact syntactic knowledge, so that their verb problems were independent of any difficulty with syntactic processing. However, the sentences used in the Sentence Judgement task - designed to distinguish between mapping processes and lexicosemantic knowledge (see section 2.3.5) - were syntactically very simple. It was therefore considered sufficient for participants to be able to retain order information; the next task addresses this.

D: NP Pointing Task (adapted from Nickels et al., 1991; Byng et al., 1994)

This task includes 3 stages.

1. The participant was asked to listen to (or read) 2 proper names which were then covered-up. They then heard (or were shown) a list of 3 proper names (2 targets and a distractor) and were asked to point to the 2 they had heard in the order they had heard them. The interval between hearing/reading the list and seeing the ‘choice’ card was minimal.
2. At this stage, the stimulus was a list of 2 proper names and one object name, again the participant was asked to identify the 2 proper names (in the correct order) from a list of 3.

   e.g. Stimulus - Mike, Helen. Choice - Helen
        Bob
        Mike

   e.g. Stimulus - Sue, cup, Steve. Choice - Mike
        Sue
        Steve

3. Finally, the participant heard a stimulus sentence consisting of 2 proper names and a verb. They were asked to identify the 2 proper names in the correct order from a list of 3.

   e.g. Stimulus - Kate saw Bob Choice - Kate
        Bill
        Bob

The results from tasks C & D were considered in conjunction. In order to qualify for inclusion in the study the participant should have scored over 75% on at least one of these tasks (preferably on both) - that is less than 10 errors on the syntax judgement task and less than 8 errors on the NP pointing tasks.

E: Summary

Here is a summary of the Selection Tasks and the pattern of performance the participants with aphasia were expected to show.

1. The Noun / Verb Naming Task: significantly more nouns named than verbs.

2. Narrative Task: reduced predicate argument structure; few verbs; word order errors; single nouns.

3. Syntax Judgement Task: less than 25% errors; and/or

4. NP Pointing Task: less than 25% errors.
2.2 CONTROL PARTICIPANTS

2.2.1 Selection of Control Group

The control group contained 12 participants with no language problems. This group is a subset of those people who took part in the pilot study; they were selected from the pilot group on the basis of their match with the six participants with aphasia. Each participant with aphasia was matched with two control participants. Participants were closely matched, in terms of age, gender and occupational experience. A list of the control participants and the information used for matching is in Annex 4.

2.2.2 Use of Control Group

In the majority of the experimental tasks the whole of the control group was at ceiling; and where this was the case the rest of the pilot group was also at ceiling (26 people in total). This is to be expected with non-verbal and language tasks that have been designed to investigate aspects of conceptual processing rather than to be cognitively challenging. On this basis it is reasonable to assume an expected score of 100% for statistical analysis (Pring, personal communication). The precedent for such an approach comes from a number of standardised language assessment batteries such as the PALPA (Kay et al 1992), where the analysis of errors is based on an expectation that someone with no language problems would be error free.

The controls were not error free on all the experimental tasks in the present study; where this was the case, the individual scores of the control participants are reported in the Results chapter. Moreover, in order to be cautious in analysing the data and to avoid errors of overgeneralisation, where the control participants make errors the following procedures were used:

- the scores of the participants with aphasia are not compared to an expected score of 100% but are compared individually with the score of their matched controls; and
  - where the scores of both control participants is the same, the average of the two scores is the basis for comparison, or
  - where the scores of the control participants differ, the lowest of the two scores is the basis for comparison.
2.2.3. Rationale for Statistical Analysis

In the majority of experimental tasks in this study there is more than one variable under investigation. As a consequence, there are tasks whose analysis requires comparison to an expected value of less than 5, making the use of the chi-square test unreliable (Howell, 1992). As an alternative, the Fisher’s Exact Test has been used. For consistency, the following procedure was used (Pring, op cit):

- the Fisher’s Exact Test has been used for all comparisons between the scores of the participants with aphasia and an expected score (regardless of the value of the expected score); this means that any comparison involving an expected value greater than 5 has been subjected to an analysis that is more cautious than it need be, increasing the reliability of those analyses that have shown a participant with aphasia to be performing significantly differently than the controls;

- the chi-square test has been used in comparisons of linguistic (or conceptual) variables, where the pattern under analysis is not an individual participant’s performance but a pattern in the effect of a linguistic variable on the performance of all the participants, in these cases the expected values are greater than 5 but are often not whole numbers.

In line with the convention for the rejection level for significance (Howell 1992) a value was considered to be significant if the probability is less than 0.05. Different probability values will also be reported according to their magnitude, so that: < 0.05 & < 0.01 is ‘significant’; < 0.005 is ‘very significant’; < 0.001 is ‘highly significant’.
2.3 PARTICIPANTS WITH APHASIA

A brief summary of the background and language profile of each of the experimental participants is given here, along with details of their performance on the Language Battery and Selection Tasks. Annexes 5 and 6 contain a summary of results for these two sets of tasks.

1. J.D. - J.D. had been a taxi driver for 24 years before suffering a CVA in 1992 at the age of 47. This left him with severe aphasia and anoma. Apart from his language deficit he had no residual problems. The WAB gave J.D. an aphasia quotient of 58% and classified him as non-fluent. The other Language Battery tasks did not cause too many problems for J.D., although there was some evidence for a slight semantic problem on the Pyramids and Palm Trees test. In addition the more complex comprehension in the TROG caused errors.

<table>
<thead>
<tr>
<th>TASK</th>
<th>SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Noun / Verb Naming Task</td>
<td>Nouns: 38/45</td>
</tr>
<tr>
<td></td>
<td>Verbs: 6/45</td>
</tr>
<tr>
<td>Narrative</td>
<td>No. of utterances = 8</td>
</tr>
<tr>
<td></td>
<td>8 single NPs</td>
</tr>
<tr>
<td></td>
<td>0 verbs</td>
</tr>
<tr>
<td>Syntax Judgement</td>
<td>78%</td>
</tr>
<tr>
<td>NP Pointing Task (STM)</td>
<td>77%</td>
</tr>
</tbody>
</table>

In the Selection Tasks J.D. showed the expected pattern of performance: problems with verb naming in both the Naming Task and the Narrative, but fairly good comprehension and retention of surface syntax. The difference between his verb score and his noun score on the Naming task was highly significant ($\chi^2 = 25, p<0.001$).

2. J.F. - J.F. is a machinist by trade, but he has not worked since his stroke in 1992, when he was 49. He was left with severe expressive aphasia, mild dyspraxia and a slight right-sided hemiplegia. The WAB gave J.F. an aphasia quotient of 64% and classified him as non-fluent. In the other Language Battery tasks, his results were excellent, suggesting that he had no visual language-picture problems, and that his comprehension was generally very good.
In the Selection Tasks, J.F. was the least successful on the syntax task, however he was able to retain surface order information in the STM task. His Narrative output showed a large proportion of single nouns and a lack of sentence structure, and the difference between his noun and verb scores on the Naming task was significant ($\chi^2 = 4.7, p<0.05$).

3. L. H. - L.H. suffered a CVA in 1993 at the age of 24, when she was in the final stages of qualifying as a midwife. At the time, she was pregnant with her first child. Her stroke resulted in a dense right hemiplegia and a moderate to severe expressive aphasia. At the time of testing the severity of her aphasia had decreased somewhat, particularly in spoken output, however she still produced few verbs which meant that her output remained structurally impoverished. In spontaneous conversation, L.H. continued to generate very little. Language problems in reading and writing were more debilitating, and L.H.'s verb problems were at their most noticeable in written output. Reading and writing were, therefore, the modalities used throughout testing for this study. L.H.'s auditory comprehension was very good, her Western Aphasia Battery results give her an aphasia quotient of 70% and classified her as non-fluent.
L.H.'s performance on the Selection Tasks was as predicted: the difference between her noun and verb scores on the Naming task was highly significant ($\chi^2 = 25$, $p<0.001$); her production for the Narrative task contained little in the way of predicate-argument structure; whereas her judgement of syntax and her STM skills were good.

4. L.S. - L.S. is a retired Headteacher. He suffered a CVA in 1994 at the age of 63, leaving him with a dense right hemiplegia, some dyspraxia and a severe expressive aphasia. These output difficulties were apparent in both speech and writing although his comprehension of both spoken and written language was relatively good. L.S. preferred to respond in writing and so the whole of the testing was carried out in this way - where appropriate, the material was presented in both the written and the spoken modality. The WAB gives L.S. an aphasia quotient of 64%, classifying him as non-fluent.

<table>
<thead>
<tr>
<th>TASK</th>
<th>SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Noun / Verb Naming Task</td>
<td>Nouns: 35/45</td>
</tr>
<tr>
<td></td>
<td>Verbs: 1/10 (unable to continue)</td>
</tr>
<tr>
<td>Narrative</td>
<td>No. of utterances = 5</td>
</tr>
<tr>
<td></td>
<td>1 single NP</td>
</tr>
<tr>
<td></td>
<td>1 other item</td>
</tr>
<tr>
<td></td>
<td>0 single verb</td>
</tr>
<tr>
<td></td>
<td>3 V + 1 argument</td>
</tr>
<tr>
<td>Syntax Judgement</td>
<td>85%</td>
</tr>
<tr>
<td>NP Pointing Task (STM)</td>
<td>93%</td>
</tr>
</tbody>
</table>

The Selection Tasks revealed the L.S. had enormous difficulty in naming verbs, both in the Naming Task and in the Narrative Task. The difference between noun and verb naming in the Naming task was highly significant ($\chi^2 = 11.17$, $p<0.001$). His surface syntactic processing was good and short term memory was virtually unimpaired.

5. R.B. - R.B. was a car mechanic and salesman before his stroke in 1993, at which time he was 41. This left him with a mild right hemiplegia, some dyspraxia and a severe expressive aphasia. R.B.'s output consisted almost exclusively of single nouns (and a few adjectives), although this was compensated for by his great desire to communicate and his effective use of gesture and other non-verbal strategies. His comprehension was good. The WAB gave R.B. an aphasia quotient of 61% and classified him as non-fluent.
The selection tasks showed R.B. to have considerable verb problems; in the Naming task the noun/verb difference was highly significant ($\chi^2 = 23.4, p<0.001$), and in the Narrative task he produced hardly any output at all. His syntax judgement was relatively good and his performance on the NP pointing task was very good.

6. R.K. - R.K. is a full time mother with 2 children, she suffered a CVA 10 years ago whilst pregnant with her 1st child at the age of 27. This resulted in a mild right hemiplegia and severe expressive aphasia.

Before her children were born, she was a secretary. The difference between R.K.’s spontaneous output and her test performance is particularly noticeable, nevertheless the Language Battery revealed a pattern of ability and difficulty consistent with the other participants in this study, which suggested that verb processing was a particular problem: the W.A.B. gave her a quotient of 64%, classifying her as non-fluent, on the word-picture matching and the Pyramids & Palm Trees test she was unimpaired, and on the TROG she made only 10 errors.

The Selection Task results revealed the expected pattern of ability and difficulty, although R.K. was the only participant with aphasia for whom the noun/verb naming difference was not significant ($\chi^2 = 3.61, p=0.057$).
26 participants with no language problems were also recruited to carry out the experimental tasks as a pilot study (see chapter 3) and the performance of 12 of these subjects was then used as control data (see section 2.2.1 above). The control participants did not carry out the Language Battery tasks as these are standardised tests, but they did carry out the Selection Tasks - their results are in Annex 7.

2.4 EXPERIMENTAL TASKS

In order to explore the conceptual and semantic aspects of verb and sentence processing, and to elaborate on the accounts reviewed in the Literature Review, five new experimental tasks were devised. These tasks used a range of stimulus materials, including video and photography as well as written sentences. Their creation required:

• devising a set of theoretically motivated test items, such as event pairs that differed in terms of the focused participant entity (Perspective Video task) or sets of events and states exemplifying the four basic conceptual constituents HAVE, BE, ACT and GO (Event Photograph task);

• filming the video sequences, in which variables such as movement and number of participant entities were controlled;

• photographing scenes, with regard to similar variables; and

• creating sets of sentences with the required structural and semantic properties.

The range of tasks is intended to extend the understanding of conceptualisation and its relationship to language processing. In pursuing this goal, there are two further aims:

1. to characterise in more detail the processing involved in the interaction between language and conceptualisation - both in production (accessing language from conceptualisation) and comprehension (from pictures and/or language);

2. to provide principled methods for investigating specific points in the process, in order to characterise patterns of impairment more precisely.
2.4.1 Event Video

This task is an adaptation of the photograph sorting task in Nickels, Byng & Black (1991: see section 1.5). The motivation for the adaptation was to explore the kinds of processing necessary to distinguish events from non-events. More specifically, this task used Langacker’s notion of ‘scanning’ (see section 1.3.1 for full details). The idea was that, in order to distinguish between events and non-events in this task, the temporal profile of each scene would have to be conceptualised. The event scenes contained various sub-component movements that would have to be conceptualised as part of the action, that is a successive stages of movement. For example, the eating scene contained various movements such as: the movement of the arm to bring the apple to the mouth; the biting action; the chewing and swallowing. These visually separable movements should be conceptualised as sub-component parts of eating.

20 scenes were filmed: 10 of which were events, 5 of which were static scenes and 5 of which were isolated participant entities (objects or people). In general, events scenes have more movement (visually) than non-events so this was taken into account and the task was designed to ensure that subjects were not merely distinguishing movement and non-movement. The scenes were controlled so that the movement in each was as similar as possible; this was achieved by filming each scene using either:

- ‘zoom’, where the camera moves from a broad shot to a close-up on one entity; or
- ‘panning’, where the camera moves slowly from right to left across the scene.

10 scenes used zoom and 10 panning, assigned at random. This means that, for both event and non-event scenes the control movement would have to be disregarded in the conceptualisation. For the event scenes the additional movement associated with the action would then have to be conceptualised as successive stages of an action: for the non-event scenes the control movement would have to be factored-out of the conceptualisation so that the scene would then be analysed in summary. The subjects viewed each scene twice, in a random order and they were asked to indicate whether “something was happening” in each scene.

There is a list of scenes filmed and a copy of the answer-sheet in Annex 8:
2.4.2 Event Photographs

The accounts reviewed in chapter one suggest that conceptual processing must involve some form of analysis of situation type; and a common way for the theoretical accounts to achieve this was to invoke a set of ‘basic’ conceptual constituents, such as HAVE, BE, ACT and GO. The aim of the Event Photograph task was to see whether such constituents are available as a means of conscious categorisation; in this case, as a means of selecting and odd-one-out. This is not to say that the constituents themselves would be conscious, but that the categorisation processes would be. The task was designed so that the error patterns would reveal whether the constituents were used in the odd-one-out selection.

The conceptual constituents seem to provide a mechanism for relating aspects of the scene; in Langacker’s terms, a way to effect the relational profiling necessary for analysing events and states. So once the decision is made that a scene can be profiled relationally, it is then possible to make explicit the type of relationship (having, being, going or acting) and the components being related (THINGS, PATHS, PLACES etc).

There is very little evidence in the psycholinguistic literature for representation in terms of such conceptual constituents, although Jackendoff (1983), in acknowledging this argument, claims that this lack of evidence is not surprising as the expectation would be for words to be the preferred unit of processing. This does not mean that conceptual constituents are not used and represented. This task does not explore the relative preference for words and conceptual categories nor is the conscious use of conceptual categories expected. Essentially, the task asks the same question as the event/state sorting tasks (Nickels et al 1991, and the Event Video described in the previous section):

'in which photo is something happening, in which photo is nothing happening, on this basis which photo is the odd-one-out?'

However, Pinker’s basic predicates provide a principled way of analysing any errors that may be made. They allow us to ask whether the participant is failing:

1. because of a general inability to distinguish events from states, or
2. because of an inability to distinguish types of relationship (i.e. HAVE, BE, ACT, GO).
The first would suggest that the problem is with scanning (or conceptually filling-in scanning steps; see discussion in the previous section) because an event must be scanned sequentially in order to appreciate the successive steps in the action, whereas a state is scanned in summary in order to appreciate its constant nature.

The second would suggest that the problem is with relational profiling, because it is by relating the various components of a scene to each other that the nature of the relationship becomes apparent. Consider, for example, this event photograph:

![Event Photograph](image)

In this falling scene, the THING (the shorts) must be related to the PATH (down) and possibly also the SOURCE (the washing-line), before it can be conceptualised as a GO event.

For the Event Photograph task, 16 photographs were taken; 8 depicting events and 8 non-events. Half of the events were GO events and the other half ACT events and similarly half of the non-events were HAVE predicates and the other half BE predicates (the full set of photographs is listed in Annex 9). The participants were told that there were 2 sets of photographs: in one set “something is happening” and in the other “nothing is happening”. They were then shown 3 photographs and had to choose the odd-one-out and it was re-emphasised that the choice should be based on the event/state categorisation of each photo: in other words, the task was to pair the 2 photographs that belonged to the same group in order to reject the non-member as the odd-one-out.
Each presentation contained 2 members of Pinker’s 4 event types, paired at random and the odd-one-out was chosen at random from an opposite group (i.e. if the group is static [BE or HAVE] the odd-one-out is from the non-static group [ACT or GO]):

e.g.  

- he is sad - it is on the table - he jumps
- he has a broken arm - he has toothache - it falls
- they kiss - she eats - it is a cat
- he enters - he leaves - he has a bike

The full set of 40 photograph triads is in Annex 9.

2.4.3 Role Video (Marshall, Pring and Chiat 1993)

This task is not one of those devised especially for this thesis but was designed originally for M.M. by Marshall et al (op cit). The task is aimed at distinguishing those aspects of conceptualisation that identify the role information encoded by the event. As this thesis is aimed primarily at separating the various layers of processing involved in conceptualising events for language, it was crucial that this task be included in the experimental battery.

The Role Video is composed of three types of event;

1. 16 events with people acting on objects, e.g. a woman mashes a banana (non-reversible ‘object’ scenes);
2. 8 events with people acting on people, e.g. a man trips a woman (reversible ‘people’ scenes);
3. 8 events with a change of possession, e.g. a woman sells a camera to a man (reversible ‘change-of-possession’ scenes).

The participants were shown each scene twice, after the first presentation they were given three photographs and after the second presentation they were asked to select the one which showed the outcome of the event.
The photographs consisted of:

a. the target;

b. an event distractor, in which the target theme is involved in a different action;

c. a role distractor, in which the target action has been performed on a different theme or with a different goal.

For example:

1. A woman mashes a banana:
   - photographs; mashed banana (target)
   - sliced banana (event distractor)
   - mashed avocado (role distractor)

   N.B. In the role distractor, avocado is an object visible in the background of the scene but uninvolved in the event.

2. A man trips a woman:
   - photographs; the woman on the floor (target)
   - the woman with a black-eye (event distractor)
   - the man on the floor (role distractor)

   N.B. the role distractor transposes the agent and the theme.

3. A woman sells a camera to a man:
   - photographs; the man has the camera (target)
   - the man has some flowers (event distractor)
   - the woman has the camera (role distractor)

   N.B. the role distractor transposes source and goal.

The intention is that people with difficulty conceptualising role information would make role errors on the reversible events, that is those where the role distractor transposes two of the roles (2. & 3.). The events in 1. should not be problematic for such people as they were intended by Marshall et al (op cit) to require “broad decision about cause and effect and show basic sequencing skills”. The expectation in the present investigation was that the participants with non-fluent aphasia may make both event and role errors on any of the three event types.
The reasons for this were:

1. if conceptualisation was problematic the participant may not be able to distinguish event types, yielding event errors on all three types of scene;

2. another aspect of conceptualisation that may have been impaired was identification of the relationship encoded by the event, yielding role errors on the ‘object’ scenes;

3. impaired conceptualisation may have included a problem identifying role information, yielding role errors on the reversible scenes;

2.4.4 Perspective Video

This task also taps into conceptual processing, although it involves the characterisation of situations in greater detail because a perspective is taken. Perspective is a requirement of the linguistic system (Levelt 1989 and 1996) and cross-linguistic studies such as that by Brown and Levinson 1993 (see section 1.3.2) show that it is a linguistically-mediated means of refining conceptualisation.

The aim in the Perspective task was to bias a scene in order to predict the perspective choice. This was done by specifically indicating, by visual means, where the focus of the scene was. As an example, the scene might be explicitly focussed on one of the people participating in the action so that the verb chosen should describe the scene in terms of that actor (either from their perspective, or with the speakers perspective placing that actor in particular prominence).

18 scenes were devised, using actions that could be described by more than one verb;

e.g.  *Pour / Fill.*

These scenes were either filmed in an unbiased way so that either of the verbs fitted or the verb choice was biased by the camera angle; for instance, in order to elicit *fill*, the camera zoomed in on the *glass* to bias the scene and consequently the verb choice.
The full set of verb pairs used was as follows:

1. Source / goal verbs
   - POUR  CHASE
   - FILL  FLEE
   - BUY  GIVE
   - SELL  TAKE

2. Agent / theme verbs
   - RIDE  PUSH
   - CARRY  PULL

Each pair was filmed 3 times,

i.e.

a) unbiased  e.g.  POUR / FILL
b) biased to source or agent  e.g.  POUR
c) biased to goal or theme  e.g.  FILL

Each of the 18 scenes was shown twice.

The subjects were given a choice of verbs: target, perspective error and distractor. The distractor was designed to be an action involving the same participants as the target; for example, if the target verb assigned the roles Agent and Patient so would the distractor. In addition, the type of event encoded by the distractor would be as similar as possible to the target event and moreover would be an action that could be carried out with the same entities participant in the scene; for example, in the push/pull scene where 2 people are moving a desk the options are as follows: PUSH, PULL, LIFT
She is lifting the desk and She is pushing the desk encode similar events, in that:

- they have the same participant entities (the girl and the desk)
- the verbs assign the same thematic roles (agent-theme); and
- the event type is similar; movement of an object in a particular direction ('away from the agent' PUSH, 'upwards' LIFT).

This multiple-choice method was chosen in favour of a free response because of the difficulties of analysing a free response. The full set of scenes, with multiple-choice options shown is in Annex 10.

B: Language Comprehension

2.4.5 Sentence Judgement - using [CAUSE]

The analysis of the performance of participants in the mapping therapy papers (see section 1.5) sought to identify various sub-types of mapping deficit. One distinction made was that between lexical and procedural deficits in which one group of participants seemed to have impaired lexicosemantic representations - which meant that a verb's representation was no longer supplying information about its semantic structure - and another group were hypothesised to have lost the rules which map semantic structure on to syntax. An analysis of this distinction (1.5.2) raised the possibility that it was not fully justified by the data.

The Sentence Judgement task is designed to investigate this potential differentiation further. The kind of lexicosemantic information that the first group of participants may have lost can be exemplified by Pinker's analysis of lexical causatives. A lexical causative is a transitive verb signifying causation that is identical in form to an intransitive verb signifying the caused event:

\[ \text{e.g. burn} \]

\[ \text{Sheila burned the paper. (Sheila acts, causing an event)} \]

\[ \text{The paper burned. (the caused event)} \]
Not all intransitive verbs can be transformed into causative transitives:

e. g. cry

The baby cried.

*Alex cried the baby.

And, not all causative transitives can be transformed into anti-causative intransitives:

e. g. throw

Lee threw the ball.

*The ball threw.

These patterns are syntactic facts about certain verbs, motivated by their semantic specification and it is this kind of lexicosemantic information that some people with aphasia have trouble with. The patterns are semantically motivated because there seems to be a meaning-based classification of the verbs involved (Pinker 1989):

1. some events have meanings that do not allow the possibility of external causation because internal causation is implied - these are the non-causatives like cry;
2. some events cannot occur spontaneously in the absence of an external cause - these are the anti-causatives like throw; and
3. some events seem to be grouped together as exemplars of the same kind, the difference is simply the presence or absence of the CAUSE concept - these are the lexical causatives like burn.

In this task, all 3 types of verbs are forced into both transitive and intransitive frames, causing various violations of sentence structure. It is the lexicosemantic information detailed above that allows the identification of these violations. In order to investigate a potential mapping deficit, each verb is also forced into reverse role frames. As most of the verbs are not reversible, this produces further violations - these can only be detected by processing word-order information and relating it to semantic structure (mapping).

The purpose of this task was to distinguish between those participants with difficulties using mapping procedures to interpret canonical structures and those with difficulties using lexicosemantic information.
136 sentences were devised using 34 different verbs. The verbs were of three different types - non causative, anti-causative and causative.

**A. Non causative Verbs**

These verbs have an intransitive structure (type 1 (above) - i.e. causation is internal):

i.e. X acts

The intransitive construction has more than one thematic core associated with it, but in the particular case of non causative (or unergative) verbs the external argument has the thematic role of agent. This means that the implication in the verb meaning is that the direct cause of the act is due to some internal force or mechanism:

* e.g. *The student hops.*

**B. Anti-causative Verbs**

These verbs have a transitive structure (type 2 (above) - i.e. the events they express cannot occur without an external cause):

i.e. X acts on Y

In the associated thematic core X is an agent and Y is a theme:

* e.g. *The gardener cuts the cloth.*

In this example the cloth is a theme because it must have a cut in it (change of state) which is effected by the action of the agent (the gardener).

**C. Causative**

These verbs have both transitive and intransitive structures (type 3 (above) - i.e. the different structures are exemplars of the same kind of situation, although the focus is different):

i.e. Y changes state/position & X acts on Y, causing Y to change state/position.

In thematic terms the predicate can be expressed with the single external argument as a theme (e.g. something changes state/position) and with an external agent causing the change of state/position (so that the thing affected is still the theme). This is most easily illustrated with an example like the following:

* e.g. *The butter melts & The dustman melts the butter.*
Each of the verbs in Sets A-C was put in both a transitive and an intransitive sentence frame: i.e.

a) X acts on Y;

b) Y acts on X;

c) X acts; and

d) Y acts;

As only the verbs in set C can appear in both structures, this yielded various ill-formed sentences:

e.g. *The dancer waits the nun.

* The actor throws.

These sentences are ill-formed for lexicosemantic reasons; in other words their associated argument structures have not been respected. **This is a lexicosemantic error.**

In addition half of the verbs in each set were put into a reversible sentence frame;

e.g. The policeman tickles the lawyer.

The lawyer tickles the policeman.

And half were put in a non-reversible sentence frame;

e.g. The student closes the door.

*The door closes the student.

Although the lexicosemantic requirements of the verb in the last sentence have been met (the argument structure is acceptable), the arguments have been mapped into the wrong positions in the syntax. **This is a mapping error.**

Each participant was presented with the 136 written (and / or if necessary spoken) sentences - the full set of verbs and sentences is in Annex 11. Their task was to decide whether the sentences sound sensible. The expectation was that participants who had difficulties using lexicosemantic information could make mistakes judging any of the sentences whereas if a participant had only mapping problems - that is they had no additional lexicosemantic difficulty - they would tend to incorrectly judge the mapping errors to be acceptable sentences.
Another important facet of this task was that the mapping errors in set B could be judged by attending only to
the first part of the sentence (i.e. not using mapping procedures) and using information about selectional
restrictions. For example, the following sentence:

*The vase brings the Queen. (set B)

could be correctly judged on the basis that *vases* do not *bring*. That is, the verb *bring* requires an animate agent
(at least in this context, the agent can be inanimate in certain restricted cases such as *the letter brought bad
news, or the clouds bring the rain*). The mapping errors in set C could not be correctly judged in the same
way. For example:

*The box opens the nurse. (set C)

In this case, assessment of only the first argument and the verb would lead to an incorrect acceptance of this
sentence as *boxes do open*.

The hypothesised patterns of performance on this task can be summarised as follows:

1) Mapping difficulty;

   C b) marked ✓.

   e.g.  *The box opens the nurse

   B b) marked ✓.

   *The vase brings the Queen

2) Lexicosemantic difficulty;

   chance pattern of judgements.

3) Processing 1st argument + predicate only

   A a) & b) marked ✓.

   e.g.  *The vase dies the flower

   *The flower dies the vase

   B c) marked ✓.

   e.g.  *The Queen brings

   C b) & c) marked ✓.

   e.g.  *The box opens the nurse

   *The nurse opens

These are the main predications for this task but it also provided an opportunity to assess the claims made in
section 1.3.1 (Part 2) about potential processing differences across sentences in a Sentence Judgement Task.

199
Recall that the claims were that:

1. To judge some sentences it is necessary to integrate a range of information, including:
   - the semantic and syntactic properties of the sentence, particularly the information in the word order and syntactic frame;
   - the core meaning of the verb and the NPs;
   - the effect of the combination of these ‘core’ meanings, particularly the effect of the verb in combination with its internal argument.
   
   e.g. \[ \text{The Queen brings the vase} \quad \text{v.} \quad \ast \text{The vase brings the Queen} \]

   These sentences [Sets B & C] should be relatively difficult for people with non-fluent aphasia.

2. In other cases this complex combination is not as important; some sentences can be judged on the basis of the ‘core’ meaning of the verb and the number of arguments alone.

   e.g. \[ \text{The nurse falls the queen} \quad \& \quad \text{v.} \quad \text{The nurse falls} \quad \& \quad \text{The queen falls} \]

   These sentences should be easier for people with non-fluent aphasia [Set A].

The evaluation of these claims is not the main aim of this task, nonetheless it is important to consider these ideas in more detail. For this reason, these proposals are discussed in the Discussion (6.3) in the light of the results for this Task.
C: Production

2.4.6 Objects and Actions Video

The Objects and Actions video is an adapted version of the task used by Sridhar (1989: see section 1.3.3). Its purpose was to see whether the language of participants with aphasia would be affected by the manipulation of various aspects of visual salience.

The variables of Sridhar’s research which were relevant to this study were the following:

- the ability to react, in terms of language, to visually manipulated salience;
- the separation of production into ability with word order and ability to choose appropriate predicates; and
- the comparison of these two aspects of performance across states and events;

In order to look at these factors, the following scenes were filmed:

1. On States:
   a) A ball is on a table.
   b) A large ball is on a table. (size manipulated)
   c) Close-up on a ball, zoom out to the ball is on a table. (viewpoint manipulated)
   d) A doll is on a table. (‘animacy’ manipulated)

2. Rolling Events:
   a) A man rolls a ball along a table.
   b) Close-up on man, zoom to the man rolling the ball along the table. (viewpoint)

3. Hitting Events:
   a) A ball is on the table, another ball hits it.
   b) A big ball is on the table, a small ball hits it. (size)
   c) Close up of ball on the table, zoom out to a ball hits the ball. (viewpoint)
   d) A doll is on the table, she is hit by a ball. (‘animacy’)

201
In all the states, following Sridhar’s results, the participants with non-fluent aphasia were expected to produce descriptions with the following features:

1. The ball mentioned before the table - e.g. *the ball is on the table*.
2. A predicate with *ball* as theme - e.g. *the ball is sitting on the table*.

Similarly in the *hitting* scenes, the participants with non-fluent aphasia were expected to produce descriptions with the following features:

1. The man mentioned before the ball - e.g. *the man rolled the ball*.
2. A predicate with *man* as source.

In addition, the rolling scene were intended to elicit description with the following features:

1. The control scene described with a canonical active structure - e.g. *a ball hits another ball*
2. The visually manipulated scenes described with either:
   a) A 2 sentence description; e.g. *a ball is on the table (and) another ball hits it.*; or
   b) A passive sentence; e.g. *The big ball is hit by the small ball*.

The participants with non-fluent aphasia viewed each scene twice, in random order. They were asked to describe each scene as clearly and simply as possible. There was no expectation that the participants with aphasia would have produced full sentences; all responses, whether single words, single phrases or truncated sentences were analysed (in so far as this was possible) in terms of:

a) word-order,
b) the choice of predicate; and
c) sentence structure.

The full set of scenes and the answer-sheet is in Annex 12.
2.5 TASK ORDERING

The tasks were presented to each participant with non-fluent aphasia in a number of short sessions. The majority could not cope with sessions longer than an hour and so the sessions were designed to include no more than 40 minutes of task-time (the other 20 minutes being reserved for discussion and explanation). Each session included a mixture of processing requirements; a production task would be grouped with a picture selection task and a task requiring event processing would be grouped (where possible) with one requiring language processing. The reason for this was to counteract any practice effects, such as the production in the Naming tasks effecting what was produced in the Narrative. In addition, the mixing of task-types also meant that any effects of tiredness on those tasks at the end of a session would not effect one type of processing exclusively (such as production) and the same is true for any potential effects due to a particular type of processing being the first presented in any session. The sessions, and the tasks in them, were carried out in the same order for each participant:

**Session One** - Selection Tasks
- narrative
- syntax anomaly

**Session Two** - Selection Tasks
- NP pointing (STM)
- Noun / Verb Naming task

**Session Three** - Lang. Battery & Expt. Tasks
- Role Video
- W.A.B.
- Pyramids and Palm Trees

**Session Four** - Lang. Battery & Expt. Tasks
- TROG
- Objects and Actions Video
- Word -Picture matching (PALPA)

**Session Five** - Experimental Tasks
- Event Photographs
- Sentence Judgement Task

**Session Six** - Experimental Tasks
- Event Video
- Perspective Video
2.6 SUMMARY OF EXPERIMENTAL TASK

These tasks were designed to explore several of the theoretical possibilities raised in the Literature Review.

Each task can be analysed individually to assess performance on a particular layer of processing (e.g. distinguishing events from non-events, identifying relational information) or a particular modality (e.g. sentence production vs. sentence comprehension).

More importantly, the tasks were designed to be considered together in order to provide a profile of verb/event processing. Toward this aim, the event comprehension tasks were designed to form a hierarchy, not of complexity per se, but in terms of the kind of conceptual processing required. This means that difficulty with the first task (Event Video) would preclude error free performance on all the other tasks, difficulty with task 2 would preclude an error free performance on tasks 3-5 (but not on task 1), and so on. As an example, it was hypothesised that someone having difficulty with task 4 would also have difficulty with task 5 but not necessarily with tasks 1,2 and 3. The tasks are individually summarised below:

A: Event Comprehension

1. Event Video

To investigate whether people with non fluent aphasia could distinguish between events and non events in video scenes (where unrelated movement differences had been controlled).

Expected outcome:

• There would be some participants with conceptual difficulties who could not do this.

2. Odd-One-Out Event Photo task

To investigate whether people with non fluent aphasia could distinguish between events and non events in photographed scenes.

Expected outcomes:

• There would be some participants with conceptual (scanning) difficulties who could not do this at all; and
• There would be some participants with conceptual (profiling) difficulties who had problems analysing certain situation types (for example, GO situations).
3. Role Video

To investigate whether conceptualisation includes various separable aspects of processing: identification of event type; identification of the relationship encoded by the event; and identification of role information.

Expected outcomes:
- a problem conceptualising event types would yield event errors on all three types of scene;
- a problem conceptualising the relationship encoded by the event would yield role errors on the ‘object’ scenes; and
- a problem conceptualising role information would yield role errors on the reversible scenes.

4. Perspective Video

To investigate whether people with non fluent aphasia could use perspective to select a lexical item.

Expected outcome:
- There would be some participants with conceptual/verb problems who could not do this.

B: Language Comprehension

5. Sentence Judgement Task

To investigate whether people with non fluent aphasia could identify sentences which violate restrictions imposed by the verb.

Expected outcomes:
- There would be some participants with difficulty using the lexicosemantic information from the verb who would have difficulty judging any of the sentences; and
- There would be some participants with mapping problems who would find specific sentences (B b) & C b) hard to judge; and
- There may have been participants with aphasia who were using a strategy of analysing only the 1st argument and the verb, who would have difficulty judging other specific sentences (A a) & b); B c); C b) & c))
C: Production

6. Objects and Actions Video

To investigate whether the language of people with non fluent aphasia was affected by the manipulation of visual salience features in the stimulus.

Expected outcomes:

The language of these participants would be affected by the manipulation of visual salience;

- in most cases, in the same way as that of the participants who do not have aphasia;
- in some specified cases the language of the participants with aphasia would be affected differently, in the sense that an inability to produce verbs would lead to a different means of highlighting certain aspects made salient visually, for example a visually salient theme.
3. PILOT STUDY

The full set of experimental tasks were piloted twice:

- Pilot 1: 10 participants aged 18-35; and
- Pilot 2: 6 participants aged 40-65.

In addition, the Sentence Judgement task and the Objects and Actions video were piloted a 3rd time;

- Pilot 3: 10 participants 40-60.

The results did not differ across the groups\(^1\), suggesting that age is not a factor affecting performance on these tasks; the results for all 3 studies can therefore be combined where appropriate. In some cases, the results have been kept separate because stimulus material has been altered so that each pilot study was testing slightly different material.

A: EVENT COMPREHENSION

3.1 EVENT VIDEO

The Event Video task was performed without error by all participants. This meant that they were all able to analyse the video scenes to identify which contained action components and which did not, even though all the scenes contained some visual movement.

3.2 EVENT PHOTOS

All participants successfully identified the odd-one-out in all 40 triads. This suggested that all the participants could scan and profile static pictures in such a way as to distinguish events from states and furthermore, they could use this information in order to select the 'odd-one'.

3.3 PERSPECTIVE VIDEO

Some of the participants in the first pilot study (involving 10 people) had difficulty with one, two or all of the give/take scenes, the details are included in the table on the next page:

\(^1\) Except in the case of the Sentence Judgement task, where the younger age group (mainly Speech Sciences students) made more errors rejecting acceptable sentences. This is very likely to be because these students are regularly asked to judge the acceptability of sentences and consequently are more likely not to accept a sentence that is acceptable to the majority of speakers.
The errors seemed to be caused by the way the scenes were filmed and edited and so the scenes were re-edited and then piloted on 6 more subjects. This time the scenes were correctly recognised by all of the subjects. This meant that all participants could:

1. identify the perspective intended by the biased filming of the scene; and
2. use this information to select a lexical item from a choice of 3.

**B: LANGUAGE COMPREHENSION**

**3.4 SENTENCE JUDGEMENT**

Of the 16 people in the 1st two pilot studies, 10 people made errors on this task. Consequently, this task was completely redesigned; full details of the redesign and the results of the ensuing pilot study are detailed in section 3.4.2. The results of the first two pilot studies are detailed below.

**3.4.1 Results**

**A. Non causative Verbs**

No errors were made for these verbs.²

²This excludes the results of one participant, who made 6 errors in this set. Her results have not been included in the analysis because they appear idiosyncratic as they were not matched by any of the other 25 participants.
B. Anti-causative

Errors were made on 8 of the verbs in this group:

<table>
<thead>
<tr>
<th>SENTENCE</th>
<th>No. of people making errors</th>
<th>SENTENCE</th>
<th>No. of people making errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>The gardener cuts the cloth</td>
<td>0</td>
<td>The gardener cuts</td>
<td>1</td>
</tr>
<tr>
<td>The cloth cuts the gardener</td>
<td>1</td>
<td>The cloth cuts</td>
<td>0</td>
</tr>
<tr>
<td>The actor hits the farmer</td>
<td>0</td>
<td>The actor hits</td>
<td>2</td>
</tr>
<tr>
<td>The farmer hits the actor</td>
<td>0</td>
<td>The farmer hits</td>
<td>3</td>
</tr>
<tr>
<td>The pilot drops the airman</td>
<td>0</td>
<td>The pilot drops</td>
<td>6</td>
</tr>
<tr>
<td>The airman drops the pilot</td>
<td>0</td>
<td>The airman drops</td>
<td>7</td>
</tr>
<tr>
<td>The policeman tickles the lawyer</td>
<td>0</td>
<td>The policeman tickles</td>
<td>6</td>
</tr>
<tr>
<td>The lawyer tickles the policeman</td>
<td>0</td>
<td>The lawyer tickles</td>
<td>4</td>
</tr>
<tr>
<td>The nurse pulls the teacher</td>
<td>0</td>
<td>The nurse pulls</td>
<td>3</td>
</tr>
<tr>
<td>The teacher pulls the nurse</td>
<td>0</td>
<td>The teacher pulls</td>
<td>3</td>
</tr>
<tr>
<td>The judge takes the pen</td>
<td>0</td>
<td>The judge takes</td>
<td>4</td>
</tr>
<tr>
<td>The pen takes the judge</td>
<td>0</td>
<td>The pen takes</td>
<td>0</td>
</tr>
<tr>
<td>The actor throws the pen</td>
<td>0</td>
<td>The actor throws</td>
<td>3</td>
</tr>
<tr>
<td>The pen throws the actor</td>
<td>0</td>
<td>The pen throws</td>
<td>0</td>
</tr>
<tr>
<td>The king raises the flag</td>
<td>0</td>
<td>The king raises</td>
<td>0</td>
</tr>
<tr>
<td>The flag raises the king</td>
<td>0</td>
<td>The flag raises</td>
<td>5</td>
</tr>
</tbody>
</table>
C. Causative

Nine of the verbs in this group caused errors:

<table>
<thead>
<tr>
<th>SENTENCE</th>
<th>No. of people making errors</th>
<th>SENTENCE</th>
<th>No. of people making errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>The pilot flies the airman</td>
<td>1</td>
<td>The pilot flies</td>
<td>0</td>
</tr>
<tr>
<td>The airman flies the pilot</td>
<td>1</td>
<td>The airman flies</td>
<td>0</td>
</tr>
<tr>
<td>The queen burns the box</td>
<td>0</td>
<td>The queen burns</td>
<td>1</td>
</tr>
<tr>
<td>The box burns the queen</td>
<td>0</td>
<td>The box burns</td>
<td>0</td>
</tr>
<tr>
<td>The box opens the nurse</td>
<td>0</td>
<td>The box opens</td>
<td>1</td>
</tr>
<tr>
<td>The nurse opens the box</td>
<td>0</td>
<td>The nurse opens</td>
<td>2</td>
</tr>
<tr>
<td>The butter melts the dustman</td>
<td>1</td>
<td>The butter melts</td>
<td>0</td>
</tr>
<tr>
<td>The dustman melts the butter</td>
<td>0</td>
<td>The dustman melts</td>
<td>1</td>
</tr>
<tr>
<td>The nun breaks the cup</td>
<td>0</td>
<td>The nun breaks</td>
<td>1</td>
</tr>
<tr>
<td>The cup breaks the nun</td>
<td>0</td>
<td>The cup breaks</td>
<td>1</td>
</tr>
<tr>
<td>The gardener boils the water</td>
<td>0</td>
<td>The gardener boils</td>
<td>1</td>
</tr>
<tr>
<td>The water boils the gardener</td>
<td>0</td>
<td>The water boils</td>
<td>0</td>
</tr>
<tr>
<td>The judge shrinks the king</td>
<td>4</td>
<td>The judge shrinks</td>
<td>1</td>
</tr>
<tr>
<td>The king shrinks the judge</td>
<td>4</td>
<td>The king shrinks</td>
<td>4</td>
</tr>
<tr>
<td>The lawyer drives the teacher</td>
<td>1</td>
<td>The lawyer drives</td>
<td>0</td>
</tr>
<tr>
<td>The teacher drives the lawyer</td>
<td>1</td>
<td>The teacher drives</td>
<td>0</td>
</tr>
<tr>
<td>The policeman marches the soldier</td>
<td>10</td>
<td>The policeman marches</td>
<td>0</td>
</tr>
<tr>
<td>The soldier marches the policeman</td>
<td>9</td>
<td>The soldier marches</td>
<td>0</td>
</tr>
</tbody>
</table>
3.4.2 Revision of the Sentence Judgement Task

Because of the number of unexpected responses from the pilot, the following changes were made:

1. In sets B & C those sentences on which more than 4 errors were made, were replaced. The verb forms involved were *march, shrink, pull, tickle* and *drop*; and these were replaced with *tear, roast, lift, hold, and trim*. *(Raise was not replaced as the cause of the error seemed to be the object *flag*', instead *flag* was replaced with *glass)*.

2. Then, those sentences on which only a few errors were made were considered: some of the errors did not seem to reflect a problem with the verb so much as with the agent and the verb together, e.g. *the king shrinks* was accepted more often than *the judge shrinks*: this fact, coupled with the fact that some of the pairings of participants were distractingly bizarre (e.g. *the policeman tickles the lawyer*), meant that these verbs were not replaced.

3. The bizarre nature of some of the scenes suggested that all the sentences might be usefully redrafted using proper names, the set of proper names used is in Annex 13. This helped improve the plausibility of the correct sentences, although they still seemed unnatural.

4. The tense of the verb seemed to have a major role to play in plausibility judgements which was attributable to the fact that all the sentences depicted events: the temporal structure of an event in the present tense can be misleading in that it suggested a habitual interpretation of the sentence, consider for example:

   *Mike shatters the glass*

   Consequently, all the sentences in the task were rewritten in the past tense, and the temporal structure of the verbs seemed to fit more naturally with the completed nature of the scenes; consider:

   *Mike shattered the glass.*

5. The choice of new verbs (necessitated by no. 1) led to a reconsideration of the reversible condition: it appeared to be unnecessary in all 3 sets of verbs, as it did not help differentiate the 2 types of processing.
under assessment. So, for sets B & C the sentences were re-created using a pool of 10 proper names and 8 object names (see Annex 13), which meant that none of the sentences in these 2 sets were reversible. The nature of 7 of the 10 verbs in set A meant that these sentences had to remain reversible.

6. The scale of the changes also allowed reconsideration of all of the verbs used, and the replacement of more of those which caused errors in the first 2 pilots: a further 4 of these verbs were replaced, these were hit, burn, drive and fly which were replaced with catch, crack and smash. To make the number of verbs in each set equal, 1 verb from set A had to be deleted (die) and 1 verb had to be added to set B (collect). The revised set of sentences is in Annex 13.

Because of the extent of these amendments this task was re-piloted on a new group of 10 participants. The results were:

A. Non-Causative Verbs

None of the sentences in this set caused errors.

B. Anti-Causative Verbs

One person incorrectly accepted the following:

The glass lifted John.

Because this was only one occurrence, and the other 3 sentences using this verb were need for the hypothesised error patterns, the verb was also left in the task.

C. Causative Verbs

<table>
<thead>
<tr>
<th>SENTENCE</th>
<th>NO. OF ERRORS (out of 10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sue broke.</td>
<td>5</td>
</tr>
<tr>
<td>Helen roasted.</td>
<td>5</td>
</tr>
<tr>
<td>Jane melted.</td>
<td>8</td>
</tr>
<tr>
<td>Steve boiled.</td>
<td>3</td>
</tr>
<tr>
<td>Sue cracked.</td>
<td>5</td>
</tr>
</tbody>
</table>
These 5 verbs produced mixed results because they can be used figuratively and so can sometimes be combined with a single human argument. The sentences were originally included in the task as their acceptability with 2 arguments was crucial in detecting a mapping deficit, however in the intransitive frame their effect was not crucial to the hypothesised differentiation of processing; consequently they were left in the task.

All the sentences which caused errors in this last pilot (1 from Set B and 5 from Set C) were left in the task, however the participants with non-fluent aphasia would not have their answers marked incorrect, whatever their response.

C: PRODUCTION

3.5 OBJECTS AND EVENTS VIDEO

The aim of this task was to assess the effect of the manipulation of visual salience on language, using the following three measures:

1. word-order (for the on and rolling scenes)

2. predicate choice (for the on and rolling scenes)

3. sentence structure (for the hitting scenes only)

A: Word-order and predicate-choice

On States and Rolling events

All of the pilot participants responded as expected to the word-order and choice-of-predicate scenes as expected, i.e.:

Word Order,

- the ball mentioned before the table in on states,

- the man mentioned before the ball in rolling events.

Choice of predicate,

- a predicate with the ball as a theme for on states,

- a predicate with the man as an agent for the rolling events).
B: Sentence structure

_Hitting scenes_

All the pilot participants responded to the control scene as expected, using a single active sentence. There were two possible responses to the scenes in which visual salience was manipulated:

a) a two-sentence description
   
   e.g. _A ball is on the table. Another ball hits it._

b) a passive structure

   e.g. _The doll is hit by the ball_

The pilot participant’s did not respond as expected in response to each of these scenes, these responses are detailed below:

1. Increased size of the Theme;

   - 21/26 responded by using a two-sentence description,
   - 5 responded with an active sentence
   - none responded with a passive structure

2. Increased focus via a ‘close-up’ on the Theme;
   - none of the participants responded in the expected way (i.e. all used active sentences);

3. Increased ‘animacy’ of the Theme;

   - 9/26 responded by using a passive structure,
   - 17 responded with an active sentence
   - none responded with a two-sentence description.

These results do not unequivocally support the claim that manipulations of visual salience can affect language structure; however this is perhaps to be expected for people with unimpaired language because, for describing a scene, the system that should constrain conceptual structure most strongly is the language system. For people with impaired language systems however, the constraining influences from language is hypothesised to be reduced thereby increasing the importance of constraint from other systems; one of which would be the visual system. In consequence, it is hypothesised that the manipulations of visual salience in this video may well have more of an effect on language for the participants with aphasia; the following hypotheses therefore remain:
The language of these participants would be affected by the manipulation of visual salience;

- in most cases, in the same way as that of the participants who do not have aphasia;
- in some specified cases the language of the participants with aphasia would be affected
differently, in the sense that an inability to produce verbs would lead to a different means of
highlighting certain aspects made salient visually, for example a visually salient theme.

For a summary of all the hypothesised outcomes, see section 2.5.
4. RESULTS

4.1 GROUP RESULTS

A: Event Comprehension

4.1.1 Event Video

This task taps into one aspect of conceptual processing for language, the necessity to distinguish between events and non-events. The control group were at ceiling on this task and 5 of the participants with aphasia also had no difficulties - scores of 19 and 20 - see table 1.

Table 1:  

<table>
<thead>
<tr>
<th>Expt. Participants</th>
<th>Score (n=20)</th>
<th>%</th>
<th>Error breakdown</th>
</tr>
</thead>
<tbody>
<tr>
<td>J.D.</td>
<td>20</td>
<td>100</td>
<td>-</td>
</tr>
<tr>
<td>J.F.</td>
<td>19</td>
<td>95</td>
<td>1 event marked as a non-event</td>
</tr>
<tr>
<td>L.H.</td>
<td>20</td>
<td>100</td>
<td>-</td>
</tr>
<tr>
<td>L.S.</td>
<td>16</td>
<td>80</td>
<td>4 non-events marked as events</td>
</tr>
<tr>
<td>R.B.</td>
<td>20</td>
<td>100</td>
<td>-</td>
</tr>
<tr>
<td>R.K.</td>
<td>20</td>
<td>100</td>
<td>-</td>
</tr>
</tbody>
</table>

In the context of the other scores, the performance of the one participant (LS) who had difficulties is particularly noteworthy. The expected score was 20, this is derived from the control scores but is also in line with the good performance of the other participants with aphasia. In comparison with this expected score, L.S.'s score of 16 is significantly worse (Fisher's exact test; p < 0.05).

4.1.2 Event Photos

This odd-one-out task assess another aspect of the analysis of events and states, the necessity to characterise the kind of relationship encoded by an event/state label: participants were shown three photographs (either EVENT-EVENT-STATE or STATE-STATE-EVENT) and were asked to choose the odd-one-out. The control group were at ceiling on this task but only one of the participants with aphasia performed without error; the scores of the experimental group are in table 2.
Table 2:

<table>
<thead>
<tr>
<th>Expt. Participants</th>
<th>Score (n=40)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>J.D.</td>
<td>29</td>
<td>73</td>
</tr>
<tr>
<td>J.F.</td>
<td>39</td>
<td>98</td>
</tr>
<tr>
<td>L.H.</td>
<td>40</td>
<td>100</td>
</tr>
<tr>
<td>L.S.</td>
<td>20</td>
<td>50</td>
</tr>
<tr>
<td>R.B.</td>
<td>36</td>
<td>90</td>
</tr>
<tr>
<td>R.K.</td>
<td>38</td>
<td>95</td>
</tr>
</tbody>
</table>

As table 2 shows, two of the participants (J.F and R.K) experienced only slight difficulty, making 1 or 2 errors. The errors of the other three participants are more consequential, and require further analysis: a comparison of these scores with an expected score (40, derived from the control group) reveals that the low scores of L.S. and J.D. are highly significant (Fisher’s exact test; p < 0.0001 & p < 0.001). R.B.’s score was not significantly different from the expected score (Fisher’s exact test, p = 0.057).

It is also important to analyse the pattern of errors produced by all five participants. The task was designed to reveal whether a particular event type was more difficult to identify as the ‘odd-one’ than another; there were:

- two event types (GO and ACT) and
- two state types (HAVE and BE)

yielding eight different odd-one-out triads

- GO-GO-HAVE, GO-GO-BE
- ACT-ACT-HAVE, ACT-ACT-BE,
- HAVE-HAVE-GO, HAVE-HAVE-ACT
- BE-BE-GO, BE-BE-ACT

In such a design, the pattern of errors can be looked at in two ways, as shown in tables 3 and 4:

- Table 3 shows, for each participant, the number of times each event type was the target ‘odd-one’ but was not chosen; these items have been labelled target-errors. For example, if the array of photographs was jumps-leaves-has a cold, this would be a GO-GO-HAVE triad where the target ‘odd-one’ is a HAVE state; if a participant instead chose one of the GO events as the ‘odd-one’, this would be a HAVE target-error.

- Table 4 shows, for each participant, the number of times each event was not an ‘odd-one’ but was chosen as such; these items have been labelled context-errors. In the example above, where a participant chooses one of the GO photographs, this is analysed as a HAVE target-error and also a GO context-error.
Table 3: (also see Graph 1)

<table>
<thead>
<tr>
<th>Expt. Participants</th>
<th>Target-error breakdown: The n° times each event type was the target 'odd-one' but was not chosen.</th>
<th>HAVE</th>
<th>BE</th>
<th>ACT</th>
<th>GO</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>J.D.</td>
<td></td>
<td>4</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>J.F.</td>
<td></td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>L.S.</td>
<td></td>
<td>10</td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>R.B.</td>
<td></td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>R.K.</td>
<td></td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>20</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>38</td>
</tr>
</tbody>
</table>

As table 3 shows, HAVE is the most common target-error: this trend is illustrated most clearly in L.S.'s pattern of performance, as he makes an error on every occasion that HAVE is the target 'odd-one'. This performance with HAVE targets is significantly below chance (p < 0.05), whereas with the other event types L.S. is either at chance (GO events; p = 0.15) or above chance (BE states; p < 0.05, ACT events; p < 0.005).

If all event types were equally problematic for L.S. then the pattern that would be expected would be 5 errors of each event type. The difference between the pattern L.S. produced and this expected pattern is not quite significant ($\chi^2 = 7.6$ (3); p = 0.055), however both the fact that L.S. makes an error with all HAVE targets and the fact that the other participants also have particular difficulty with this state suggests that HAVE states are particularly problematic. To explore this possibility further, the errors of all the participants were considered together; this approach was considered to be appropriate because the pattern that is under investigation is one involving event types, not a pattern in a particular individual’s performance (Pring 1999, personal communication). As the total number of errors is 38, the expected pattern would be to have 9.5 errors of each event type; when this is compared to the actual pattern, there is a very significant difference ($\chi^2 = 15.68$ (3); p < 0.005).

There is also a pattern in the contexts for these errors, which is shown in table 4.
GRAPH 1
Event Photographs - target-errors

NO. OF ERRORS

PARTICIPANTS

J.D.  J.F.  L.S.  R.B.  R.K.
Table 4 (see also graph 2):

<table>
<thead>
<tr>
<th>Expt. Participants</th>
<th>Context-error breakdown:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HAVE</td>
</tr>
<tr>
<td>J.D.</td>
<td>3</td>
</tr>
<tr>
<td>J.F.</td>
<td>0</td>
</tr>
<tr>
<td>L.S.</td>
<td>6</td>
</tr>
<tr>
<td>R.B.</td>
<td>0</td>
</tr>
<tr>
<td>R.K.</td>
<td>0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>9</td>
</tr>
</tbody>
</table>

These figures show that the wrong 'odd-one' is most commonly selected when the context photographs depict a GO event. It should be remembered that GO appears as the context in two types of triad: GO-GO-HAVE and GO-GO-BE (see graph 3). As the HAVE photographs have been identified as particularly problematic 'odd-ones', it is likely that the combination of HAVE targets and GO contexts is problematic, in other words the GO-GO-HAVE triads.

In order to investigate the latter possibility, the HAVE target-errors have been considered in isolation. The number of errors involving HAVE 'odd-ones' in GO contexts is compared with the number involving HAVE ‘odd-ones’ in ACT contexts; these figures are shown in table 5.

Table 5:

<table>
<thead>
<tr>
<th>Expt. Participants</th>
<th>Triads</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GO-GO-HAVE</td>
</tr>
<tr>
<td>J.D.</td>
<td>4</td>
</tr>
<tr>
<td>J.F.</td>
<td>1</td>
</tr>
<tr>
<td>L.S.</td>
<td>5</td>
</tr>
<tr>
<td>R.B.</td>
<td>2</td>
</tr>
<tr>
<td>R.K.</td>
<td>2</td>
</tr>
<tr>
<td>TOTAL</td>
<td>14</td>
</tr>
</tbody>
</table>
GRAPH 3
Event Photographs - pattern of errors
in triads where the context is composed of two events

NO. OF ERRORS

PARTICIPANTS

J.D.  J.F.  L.S.  R.B.  R.K.

GO-GO-HAVE
GO-GO-BE
ACT-ACT-HAVE
ACT-ACT-BE
Table 5 shows that the total number of HAVE target-errors is 20; if both triads were equally likely to cause error, the expected pattern would be 10 errors of each type. When compared to the actual pattern (14 and 6 errors) the difference is significant ($\chi^2 = 3.8 (1); p = 0.05$).

In summary, it seems that:

- HAVE states are particularly difficult to identify as ‘odd-ones’;
- GO events are particularly likely to be identified as ‘odd-ones’ when they are not; and
- GO-GO-HAVE triads are the most problematic.

The possible reasons for this pattern are considered in chapter 6.

To investigate the possibility that there were non-linguistic features of the photographs that could have been used to carry out this task, the following non-linguistic features were considered:

1. animacy of participant entities (i.e. animate vs. inanimate);
2. number of animate entities (i.e. 1 vs. 2);
3. whether animate entity was human (vs. a cat)

The results yielded by using these non-linguistic features to carry out the task have been combined, to allow the comparison with the participants’ performance to be as cautious as possible. The results yielded by the use of the non-linguistic features is shown in table 6.

Table 6:

<table>
<thead>
<tr>
<th>No. which could be judged using non-linguistic features</th>
<th>31</th>
<th>Correct = 16</th>
<th>Errors = 15</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. which could not be judged using the non-linguistic features</td>
<td>9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The pattern of errors yielded by the use of the non-linguistic features is shown in table 7 (overleaf).
Table 7:

<table>
<thead>
<tr>
<th>Target-error breakdown:</th>
<th>Context-error breakdown:</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAVE BE ACT GO TOTAL</td>
<td>HAVE BE ACT GO TOTAL</td>
</tr>
<tr>
<td>6 2 2 6 16</td>
<td>1 7 4 4 16</td>
</tr>
</tbody>
</table>

A superficial observation of table 6 indicates that the non-linguistics features did not yield the same error pattern as the results of the participants with aphasia, nonetheless further analysis was carried out to check this: the results of each participant with aphasia were compared with the results yielded by the non-linguistic features on an item-by-item basis (Pring, personal communication). After discarding those 9 items for which the non-linguistic features do not yield any answer, the total number of items that was considered is 31; the full analysis is shown in Annex 14 and the results are in table 8.

For each participant with aphasia, the following was calculated:

1. the number of correct items for which use of the non-linguistics features yields a correct response (✓ ✓);
2. the number of correct items for which use of the non-linguistics features yields an error (✓ ×);
3. the number of errors for which use of the non-linguistics features yields an error (× ×);
4. the number of errors for which use of the non-linguistics features yields a correct response (× ✓);

The following totals were also calculated:

5. the total number of judgements that were the same (✓ ✓ + × ×)
6. the total number of judgements that were different (✓ × + × ✓)

Table 8:

<table>
<thead>
<tr>
<th>Participants</th>
<th>✓ ✓</th>
<th>✓ ×</th>
<th>× ×</th>
<th>× ✓</th>
<th>SAME total</th>
<th>DIFFERENT total</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>L.S.</td>
<td>9</td>
<td>7</td>
<td>8</td>
<td>7</td>
<td>17</td>
<td>14</td>
<td>31</td>
</tr>
<tr>
<td>J.D.</td>
<td>13</td>
<td>11</td>
<td>4</td>
<td>3</td>
<td>17</td>
<td>14</td>
<td>31</td>
</tr>
<tr>
<td>R.B.</td>
<td>14</td>
<td>14</td>
<td>1</td>
<td>2</td>
<td>15</td>
<td>16</td>
<td>31</td>
</tr>
</tbody>
</table>

224
The number of items that would, by chance, be judged in the same way by both the participants and by using the non-linguistic features is 15 and the SAME totals for all three participants with aphasia does not differ significantly from chance (L.S. & J.D. p = 0.12; R.B. p = 0.14 - Binomial distribution).

In summary, the strategies did not consistently produce errors on those triads that caused errors for the participants with aphasia; it is therefore unlikely that the error patterns produced by the participants with aphasia could have been caused by use of these non-linguistic strategies. Because of this, the analysis of their errors in terms of the conceptual/semantic structures HAVE, BE, ACT and GO seems to be the most appropriate analysis; this analysis is discussed in more detail in section 6.2.2.

4.1.3 Perspective Video

This task assesses the ability to interpret visually-manipulated perspective so that it can be used to select a lexical label. The control group was at ceiling on this task but none of the six participants with aphasia was error-free. The scores of the participants with aphasia are shown in table 6.

Table 6 (see graph 4):

<table>
<thead>
<tr>
<th>Participants</th>
<th>Score (n=18)</th>
<th>%</th>
<th>Error breakdown</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Perspective error</td>
</tr>
<tr>
<td>J.D.</td>
<td>14</td>
<td>78</td>
<td>2</td>
</tr>
<tr>
<td>J.F.</td>
<td>15</td>
<td>83</td>
<td>3</td>
</tr>
<tr>
<td>L.H.</td>
<td>17</td>
<td>94</td>
<td>1</td>
</tr>
<tr>
<td>L.S.</td>
<td>13</td>
<td>72</td>
<td>3</td>
</tr>
<tr>
<td>R.B.</td>
<td>14</td>
<td>78</td>
<td>4</td>
</tr>
<tr>
<td>R.K.</td>
<td>11</td>
<td>61</td>
<td>6</td>
</tr>
</tbody>
</table>

In comparison with the expected score of 18, the scores of L.S. and R.K. are significant (Fisher’s exact test; p< 0.05 & p< 0.01 respectively).
GRAPH 4
Perspective Video - error breakdown

- Perspective error
- Distractor
- No response

NO. OF ERRORS

PARTICIPANTS

J.D.  J.F.  L.H.  L.S.  R.B.  R.K.

226
4.1.4 Role Video

Table 7:

<table>
<thead>
<tr>
<th>Participants</th>
<th>Score (n=28)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>J.D.</td>
<td>28</td>
<td>100</td>
</tr>
<tr>
<td>J.F.</td>
<td>28</td>
<td>100</td>
</tr>
<tr>
<td>L.H.</td>
<td>28</td>
<td>100</td>
</tr>
<tr>
<td>L.S.</td>
<td>19</td>
<td>68</td>
</tr>
<tr>
<td>R.B.</td>
<td>18</td>
<td>64</td>
</tr>
<tr>
<td>R.K.</td>
<td>19</td>
<td>68</td>
</tr>
</tbody>
</table>

The control group in this study were not given this task to do and there is no control data in the study for which the task was originally devised (Marshall et al 1993). However, the scores of the participants with aphasia in the present study form a striking pattern: three performed without error whereas the other three made a considerable number of errors (9 or 10). The errors made by L.S., R.B. and R.K. represent a performance that is significantly above chance (all p < 0.001), nonetheless, in the context of three error-free performances, these scores appear noteworthy.

Further analysis of the errors is shown in tables 8 and 9.

Table 8: (also see Graph 5)

<table>
<thead>
<tr>
<th>Participants</th>
<th>Error breakdown (by scene type)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Person-object scenes (NON-REV)</td>
<td>Two-person action scenes (REV.)</td>
</tr>
<tr>
<td>L.S.</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>R.B.</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>R.K.</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>TOTAL</td>
<td>6</td>
<td>14</td>
</tr>
</tbody>
</table>

Table 9: (also see Graph 6)

<table>
<thead>
<tr>
<th>Participants</th>
<th>Error breakdown (by scene &amp; error type)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Person-object scenes (NON-REV)</td>
<td>Two-person action scenes (REV.)</td>
</tr>
<tr>
<td></td>
<td>ROLE</td>
<td>EVENT</td>
</tr>
<tr>
<td>L.S.</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>R.B.</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>R.K.</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>24</td>
<td>6</td>
</tr>
</tbody>
</table>
GRAPH 5
Role Video - pattern of errors by scene type

NO. OF ERRORS

- Person-object scenes
- Two-person action scenes
- Change of possession scenes

PARTICIPANTS

L.S.  R.B.  R.K.

228
There are two patterns of particular interest here:

1. all three of these participants made errors on all three scene types;

2. L.S. and R.B. chose event distractors as well as role distractors.

Both these patterns differ from the pattern of performance of M.M., for whom the task was originally devised (Marshall et al 1993). Marshall et al (op cit) propose that M.M. was able to make “broad decisions about cause and effect and show basic sequencing skills”, because she did not make any errors on the non-reversible scenes and did not make event errors on any of the scenes. This raises the possibility that L.S., R.B. and R.K. made their errors because of non-linguistic difficulties such as these. Such a possibility can be argued against if each participant is considered individually, based on the distribution of errors and the pattern of performance across all the event comprehension tasks - this claim is pursued in detail in section 6.2.3.

The pattern of performance of the participants with aphasia in this study seems to point conceptual difficulties that are distinct from the problems exhibited by M.M. It is therefore likely that the task taps more than one aspect of processing: identifying event type, identifying role information and possibly also identifying the basic relationship type encoded by the event; these ideas are pursued in more detail in chapter 6.
B: Language Comprehension

4.1.5 Sentence Judgement Task

After the first pilot study, this task was modified and re-piloted (see chapter 4) so that the final version of the task was piloted on ten participants. To make individual comparisons possible, only the scores of six of these pilot participants were used as the control scores; these six control participants form half of the matched control group used in the other tasks (see section 2.2.1). As a result, this task design differs from the others only in that there is one matched control for each experimental participant rather than two.

On this task the control participants made some errors and so their scores are individually compared to the scores of the participants with aphasia; see table 10

(M.S. is the matched control for J.D., P.S. for J.F. and so on).

Table 10 (see also graph 7):

<table>
<thead>
<tr>
<th>Expt. Participants</th>
<th>Score (n=120)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>J.D.</td>
<td>93</td>
<td>78</td>
</tr>
<tr>
<td>J.F.</td>
<td>101</td>
<td>84</td>
</tr>
<tr>
<td>L.H.</td>
<td>108</td>
<td>90</td>
</tr>
<tr>
<td>L.S.</td>
<td>106</td>
<td>88</td>
</tr>
<tr>
<td>R.B.</td>
<td>95</td>
<td>79</td>
</tr>
<tr>
<td>R.K.</td>
<td>90</td>
<td>75</td>
</tr>
<tr>
<td>Matched Controls</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M.S.</td>
<td>120</td>
<td>100</td>
</tr>
<tr>
<td>P.S.</td>
<td>117</td>
<td>98</td>
</tr>
<tr>
<td>S.T.</td>
<td>119</td>
<td>99</td>
</tr>
<tr>
<td>G.D.</td>
<td>114</td>
<td>95</td>
</tr>
<tr>
<td>S.M.</td>
<td>115</td>
<td>96</td>
</tr>
<tr>
<td>B.V.</td>
<td>117</td>
<td>98</td>
</tr>
</tbody>
</table>

These results are interesting for two reasons:

1. The experimental participants performance was not significantly different from the control performance;

2. In the context of their production problems, the experimental participants scored very highly. The task was comparable to the other tasks on semantic and conceptual grounds, so this relatively good performance cannot be attributed to the ease of the task.
GRAPH 7
Sentence Judgement Task - scores of participants with aphasia with the score of their matched control (behind)
The error breakdown for each verb type was also of interest here because of the different semantic and conceptual properties between them. This analysis is shown in table 11.

Table 11:

<table>
<thead>
<tr>
<th>Participants</th>
<th>Error breakdown</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Set A</td>
</tr>
<tr>
<td>J.D.</td>
<td>2</td>
</tr>
<tr>
<td>J.F.</td>
<td>0</td>
</tr>
<tr>
<td>L.H.</td>
<td>0</td>
</tr>
<tr>
<td>L.S.</td>
<td>2</td>
</tr>
<tr>
<td>R.B.</td>
<td>0</td>
</tr>
<tr>
<td>R.K.</td>
<td>2</td>
</tr>
</tbody>
</table>

Matched Controls

<table>
<thead>
<tr>
<th>Participants</th>
<th>Error breakdown</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Set A</td>
</tr>
<tr>
<td>M.S.</td>
<td>0</td>
</tr>
<tr>
<td>P.S.</td>
<td>0</td>
</tr>
<tr>
<td>S.T.</td>
<td>0</td>
</tr>
<tr>
<td>G.D.</td>
<td>0</td>
</tr>
<tr>
<td>S.M.</td>
<td>0</td>
</tr>
<tr>
<td>B.V.</td>
<td>0</td>
</tr>
</tbody>
</table>

Note that the sentences provoking most errors in the control group was set C c) (the cross-hatched column in the table); these were sentences such as *Jane melted*, which are acceptable if considered in a metaphorical sense. Any errors made by the participants with aphasia on this set have been disregarded.

There are 3 patterns in the results for this task that deserve further comment:

1. None of the participants produce any of the patterns hypothesised in Methodology (see the Summary of Experimental Tasks, section 2.3.8):
   a) none of the participants with aphasia made errors that indicated a simple mapping problem; e.g. incorrectly accepting sentences such as *The water brought Helen*.
   b) none of the participants were judging the sentences simply by analysing part of the sentences; e.g. incorrectly accepting sentences such as *Steve fell the ball* (using V+ 1st argument only)
c) the random pattern of the errors seems to suggest that all these participants had some
difficulty using the lexico-semantic information from the verb to judge the sentence structure.
e.g. incorrectly rejecting The water rose.

2. The results of three of the participants were subject to biases which would have confounded any other
pattern:

- R.K.’s score showed a significant ‘no’ bias ($\chi^2 = 16.59, p< 0.001$).
- R.B. and J.D.’s scores showed a significant ‘yes’ bias ($\chi^2 = 16.59, p< 0.001$ and $\chi^2 = 7.71, 0.01$);

Nearly all the errors made by these three participants with aphasia are consistent with their biases;

- In the case of R.K this involved wrongly rejecting acceptable sentences, a pattern that was spread
  proportionally across all three sets of sentences. In consequence, R.K.’s performance could not be
  examined for further patterns;
- In the case of R.B. and J.D., their bias involved wrongly accepting an unacceptable sentence (*) in
  the table. R.B.’s scores showed this bias proportionally across all three sets, so that his error
  pattern was not analysed further. J.D.’s bias did not affect all three sets proportionally, so his
  errors were examined in more detail (this analysis is included below in section 4.2.1).

3. The results of the other three participants (L.H., L.S. AND J.F.) were inspected for patterns, which are
discussed in the individual results sections (4.2., below)

Various other ways of analysing the data were considered in order to characterise either the error-causing or
correctly-judged sentences. None of these analyses proved to be explanatory, neither in terms of individual
responses nor overall; the factors analysed are detailed in Annex 15.
C: Production

4.1.6 Objects and Action Video
(The responses are reported in full in Annex 16)

The aim of this task was to assess the effect of the manipulation of visual salience on language, using the following three measures:

1. word-order (for the on and rolling scenes)
   
e.g. The ball is on the table The ball is sitting on the table (ball mentioned before the table)

2. predicate choice (for the on and rolling scenes)
   
e.g. The man is rolling/throwing/bowling the ball The ball is on/sitting on/rests on the table

3. sentence structure (for the hitting scenes only)
   
e.g. A ball is on the table. Another ball hits it (2 sentences)
           The big ball is hit by the small ball (passive)

For the on and rolling scenes, all the controls responded as expected on the word-order and predicate-choice measures (they used the order and predicates exemplified above); as this was the case for both the unbiased scenes and the visually manipulated scenes, it cannot be claimed that the control participants were responding to visually manipulated salience by altering their language. However, it was expected that the participants with aphasia would have more difficulty on these two measures because of the nature of their language difficulties - difficulty structuring sentences and producing verbs - and so it was expected that some of the participants with aphasia would not perform as expected on the unbiased scenes. As a result of this expectation the responses of the participants with aphasia to the visually manipulated scenes may have shown some effects that could be analysed as a response to the manipulation.

For the hitting scenes, the control participants all produced the expected single active sentences in response to the unbiased scene. For the visually manipulated scenes, however, the structure of the responses varied:

increased size of the Theme provoked an expected response - 2 sentences - from nearly all participants (21/26);
increased ‘animacy’ of the Theme provoked an expected response - passive - from only 9 of the participants;
and increased focus on the Theme had no effect at all (all 26 produced a single active sentence). These mixed results notwithstanding, it was decided that this set of scenes should be presented to the participants with aphasia in order to assess their ability to alter their language in response to visual manipulations. This decision was made because of the possibility that these participants may have been more responsive than the control participants, due to the fact that their language impairments may have resulted in reduced linguistically-mediate constraint on the conceptual system and a consequent increased reliance on other sources of constraint (such as visual information).

The hypotheses detailed above are summarised below along with an overview of the results:

A: For the *on* and *rolling* scenes, it was hypothesised that word-order and predicate-choice would be more accurate in response to the visually manipulated scenes for the participants with aphasia. The results did not support this hypothesis:

- visual manipulation did not improve production on these two measures for the participants with aphasia as a group;
- neither did visual manipulation improve production on these two measures for an individual participant across all 6 scenes (3 *on* states and 3 *rolling* events);

however

- there were some instances of improved production on these two measures for four of the six participants with aphasia;

B: For the *hitting* scenes, it was hypothesised that all of the participants with aphasia would alter the structure of their sentences in response to the visually manipulated scenes. The results do support this hypothesis:

- all six of the participants with aphasia altered the structure of their response in some way for at least one of the visually manipulated scenes;
- three of the participants with aphasia altered the structure of their responses for all three visually manipulated scenes.
C: Overall, the language produced in this task tended to be structurally more complex, in the sense of the Byng and Black (1989) framework, than the language produced in the Narrative Task.

A: Word-order and predicate-choice

On States
Before examining the effect of the visual manipulation of salience it is important to look the language produced in the response to the control scene. If the word-order and predicate choice is as expected in the control scene, then the effect of the visual manipulations cannot be assessed in terms of these variables. This information is shown in table 13. The control participants produced the expected word-order and predicate choice in both control and manipulated scenes.

Table 13:

<table>
<thead>
<tr>
<th>Participant</th>
<th>Word-order correct in control scene?</th>
<th>Predicate choice correct in control scene?</th>
</tr>
</thead>
<tbody>
<tr>
<td>J.D.</td>
<td>✗</td>
<td>? ✓ (use of still in place of predicate)</td>
</tr>
<tr>
<td>J.F.</td>
<td>✗</td>
<td>✓</td>
</tr>
<tr>
<td>L.H.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>L.S.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>R.B.</td>
<td>✓</td>
<td>? ✓ (use of static in place of predicate)</td>
</tr>
<tr>
<td>R.K.</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

Three of the participants with aphasia (L.H., L.S. and R.K.) achieved the expected word-order and predicate choice in the control scene and so their response will not be looked at for salience effects in the other scenes.

The responses of the other three participants are analysed further in table 14.

The intention here is to see whether increased visual salience elicits the expected responses.

See table 14 overleaf.
As the table shows, the visual manipulations were not particularly helpful overall. However, J.D. produced an appropriate predicate when the ‘animacy’ of the theme was manipulated and J.F. produced the expected word order in response to both the ‘close-up’ and ‘animacy’ manipulations.

**Rolling Events**

As above, the responses were first analysed in terms of the language produced to describe the control scene (table 15). The control participants produced the expected patterns in both control and manipulated scenes.

For the rolling scenes, only two of the participants (L.H. and J.F.) produced the expected word order and predicate choice for the control scene. The language of the other four participants with aphasia was analysed.
further (table 16). For this event there was only one manipulated scene, in which there is a close-up on the agent of rolling. The intention here was to increase the visual saliency of the agent in order to see if this affected the language used to describe the scene.

Table 16:

<table>
<thead>
<tr>
<th>Participants</th>
<th>Visual manipulation (CLOSE-UP)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Word-order</td>
</tr>
<tr>
<td>J.D.</td>
<td>X</td>
</tr>
<tr>
<td>L.S.</td>
<td>X</td>
</tr>
<tr>
<td>R.B.</td>
<td>X</td>
</tr>
<tr>
<td>R.K.</td>
<td>✓ (roll)</td>
</tr>
</tbody>
</table>

The table shows that this visual manipulation was not helpful overall. Two of the participants did respond to the manipulation, although only in terms of one of the variables in each case.

B: Sentence structure

*Hitting scenes*

In these scenes the expected patterns differ from those above: the control scene is expected to provoke a single active sentence in response; the visually manipulated salience in the other scenes is intended to provoke the use of either a passive structure or a two-sentence response (one stative - *the ball is on the table*, the other active - *another ball hits it*). Anything other than a single active sentence in response to the control scene was marked wrong: on this scene all the control participants produced the expected response, the responses of the participants with aphasia are reported in table 17.
Table 17:

<table>
<thead>
<tr>
<th>Participant</th>
<th>Do the participants produced a single active sentence?</th>
</tr>
</thead>
<tbody>
<tr>
<td>J.D.</td>
<td>✓</td>
</tr>
<tr>
<td>J.F.</td>
<td>✓</td>
</tr>
<tr>
<td>L.H.</td>
<td>× &lt;i&gt;The ball is on the table. The man is throwing it and he hits it.&lt;/i&gt;</td>
</tr>
<tr>
<td>L.S.</td>
<td>✓</td>
</tr>
<tr>
<td>R.B.</td>
<td>× &lt;i&gt;Ball and the (gesture) and then (gesture).&lt;/i&gt;</td>
</tr>
<tr>
<td>R.K.</td>
<td>× &lt;i&gt;Two balls and popping and ... er ... on the floor.&lt;/i&gt;</td>
</tr>
</tbody>
</table>

The responses to the manipulated scenes were then analysed to see whether the participants with aphasia could reflect manipulated salience in their language (table 18); the responses of the control participants are reproduced for comparison (table 19).

Table 18:

<table>
<thead>
<tr>
<th>Participants with aphasia</th>
<th>Responds to visual manipulation?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SIZE</td>
</tr>
<tr>
<td>J.D.</td>
<td>×</td>
</tr>
<tr>
<td>J.F.</td>
<td>✓ (&lt;2 sentences)</td>
</tr>
<tr>
<td>L.H.</td>
<td>✓ (passive)</td>
</tr>
<tr>
<td>L.S.</td>
<td>×</td>
</tr>
<tr>
<td>R.B.</td>
<td>✓ (&lt;2 sentences)</td>
</tr>
<tr>
<td>R.K.</td>
<td>✓ (&lt;2 sentences)</td>
</tr>
</tbody>
</table>
Table 19:

<table>
<thead>
<tr>
<th>Participants</th>
<th>Responds to visual manipulation?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>control</td>
</tr>
<tr>
<td>V.M.</td>
<td>J.D.</td>
</tr>
<tr>
<td>M.S</td>
<td>J.D.</td>
</tr>
<tr>
<td>P.S.</td>
<td>J.F.</td>
</tr>
<tr>
<td>A.M.</td>
<td>J.F.</td>
</tr>
<tr>
<td>C.P</td>
<td>L.H.</td>
</tr>
<tr>
<td>S.T.</td>
<td>L.H.</td>
</tr>
<tr>
<td>D.G.</td>
<td>L.S.</td>
</tr>
<tr>
<td>G.D.</td>
<td>L.S.</td>
</tr>
<tr>
<td>S.M.</td>
<td>R.B.</td>
</tr>
<tr>
<td>R.G.</td>
<td>R.B.</td>
</tr>
<tr>
<td>E.T.</td>
<td>R.K.</td>
</tr>
<tr>
<td>B.V.</td>
<td>R.K.</td>
</tr>
</tbody>
</table>

In these *hitting* scenes the visual manipulation was relatively effective for the participants with aphasia:

- 3 of the participants with aphasia (J.F., L.H. and R.K.) altered the structure of their language in response to all three manipulations, whereas only size and ‘animacy’ had an effect on the language of the controls;
- the participants with aphasia all produced at least one response that was classifiable as an improvement of their response to the control scene.
C: Description of the structure of the language produced

Table 12:

<table>
<thead>
<tr>
<th>Participants</th>
<th>Structural description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>single NP</td>
</tr>
<tr>
<td>J.D.</td>
<td>9</td>
</tr>
<tr>
<td>J.F.</td>
<td>7</td>
</tr>
<tr>
<td>L.H.</td>
<td>0</td>
</tr>
<tr>
<td>L.S.</td>
<td>8</td>
</tr>
<tr>
<td>R.B.</td>
<td>16</td>
</tr>
<tr>
<td>R.K.</td>
<td>16</td>
</tr>
</tbody>
</table>

There are two aspects of this analysis that should be emphasised.

1. It reveals a number of similarities and differences in the language produced by these participants, including:
   - the use of a high proportion of single NPs by R.B. and R.K.;
   - the use of a high proportion of ‘other’ items such as the use of *then, and then* by R.B.;
   - the high proportion of V+2 structures used by L.H., L.S. and J.F.,
     e.g. L.H. *A tennis ball is sitting on the table*
     L.S. *The man hits the doll*
     J.F. *Ball is sitting on the table*
   - the V+3 structures used by L.H. and J.F.,
     e.g. L.H. *The man hits both balls on the floor*
     J.F. *Man is rolling the ball on the table*
   - the lack of single verbs in both the language of those using a high proportion of predicate argument structures (L.H. and J.F.) and those relying more on single NPs (R.B. and L.S.);

2. This analysis allows a direct comparison of the language produced in the Narrative task and the language produced here (see individual sections for further discussion).
4.2 INDIVIDUAL PERFORMANCES

4.2.1 J.D

<table>
<thead>
<tr>
<th>PROCESSING</th>
<th>TASK</th>
<th>SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Event Comprehension</td>
<td>EVENT VIDEO</td>
<td>20/20</td>
</tr>
<tr>
<td></td>
<td>EVENT PHOTOGRAPHS</td>
<td>29/40</td>
</tr>
<tr>
<td></td>
<td>PERSPECTIVE VIDEO</td>
<td>14/18</td>
</tr>
<tr>
<td></td>
<td>ROLE VIDEO</td>
<td>28/28</td>
</tr>
<tr>
<td>Language Comprehension</td>
<td>SENTENCE JUDGEMENT</td>
<td>93/120</td>
</tr>
<tr>
<td>Production</td>
<td>OBJECTS &amp; ACTIONS</td>
<td></td>
</tr>
</tbody>
</table>

High proportion of single lexical items
Predicate choice > word order

A: Event Comprehension

These tasks revealed that J.D.'s event comprehension was relatively intact, his scores here were very high in comparison with his production scores. He made no errors on the Event Video and Role Video. On the Event Photograph task he made 11 errors, which is significantly worse than the expected score (Fisher's, p< 0.001). This task was designed to indicate which of the participants had difficulty analysing events in such a way as to categories the event type. The results for all of the participants with aphasia suggested that there was a particular problem with HAVE states (and a less marked problem with GO events), a pattern which was also apparent in J.D.'s individual performance.

Because of the nature of the processing required by the Event photographs, any participant having difficulty here would have been likely to also have difficulty with the Role Video. This is because the Role video also requires analysis of the event type and the role played by the participants in the event. However, J.D. carried out the Role Video task without error. The most likely explanation for this finding is that J.D had particular difficulty with odd-one-out tasks. This problem is manifested in his performance on both the Event Photograph task and the Pyramids and Palm Trees task (see Selection Tasks). A full discussion of this account is provided in chapter 6 along with a consideration of other possibilities.
On the Perspective Video task, J.D. made 4 errors; 2 perspective errors, 1 distractor and 1 non-response. Interestingly, all three *GIVE / TAKE* scene caused J.D. problems: on one occasion he chose the event distractor *FEED*; on another he did not respond at all; and on the final occasion he named the event *walking* \(^1\). In the original task shown to the first pilot participants, this scene also caused problems. The scene was redone and the second pilot participants performed the tasks without error. However, it would not be unreasonable to assume that the event involved was the hardest to depict. The remaining 2 perspective errors that J.D. made both related to *CARRY / RIDE* scenes; this event is filmed clearly and did not cause the pilot participants problems at either stage, it seems then the errors J.D. made here can be reliably analysed as a problem interpreting perspective information.

**B: Language Comprehension**

J.D.’s performance on this task showed a significant ‘yes’ bias. However, there is also a pattern within J.D.’s ‘yes’ bias that is noteworthy. If the response to the transitive sentence frames is considered in isolation, there is evidence that J.D. was having little difficulty; he made only 8 errors in 60 sentences. On the 60 intransitive sentences, J.D. made 19 errors. This difference is even more marked in the light of the fact that there were more unacceptable transitive than intransitive sentences (40/60 and 30/60 respectively).

J.D.’s problems with intransitive sentences therefore deserve further analysis. Because of the ‘yes’ bias it is not possible to consider all 6 sets of intransitive sentences as 3 sets are acceptable and 3 sets unacceptable. However the acceptable sets can be considered separately from the unacceptable ones. J.D. had little problem accepting the acceptable intransitive sentences (making only 3 errors in 30 sentences) and made more errors involving his acceptance of the unacceptable sentences (making 16 errors in 30 sentences) - both of these findings are to be expected in the context of his ‘yes’ bias. However, the 16 errors accepting unacceptable intransitive sentences were not spread equally across all three sets (Bc, Bd) and Cc) - J.D. made 8, 3 and 5

\(^1\) On this occasion, his response was analysed as correct even though he did not select the intended verb. This was because *walking* is the final action carried out by the focused individual in the scene (the scene is a *GIVE* scene, and the individual *gives* someone else a cup of tea and then walks away). This response was considered correct as it applied to the focussed individual just as much as did the intended verb.
errors respectively. This is not a significant difference but may be worth considering further. The two sets causing the most difficulty, Bc) and Cc), had animate NPs and the set causing the least difficulty, Bd), had an inanimate NP, e.g.:

- animate NPs
  
  Bc)  *Steve raised  *Mike cut  *Bill caught
  
  Cc)  *John opened  *Mike smashed  *Mary closed

- inanimate NPs
  
  Bd)  *The ball held  *The glass lifted  *The cloth trimmed

J.D. was more likely to accept an unacceptable intransitive sentences if the first NP was animate. His errors therefore show an effect of animacy.

There are other tasks in this study in which animacy may have influenced J.D.'s errors, these tasks are:

A: Production Tasks

If J.D.'s production had been affected by animacy, both the Narrative Selection task and the Objects and Actions Video task would have resulted in the production of more descriptions involving animate NPs than inanimate ones. This was not the case, both tasks resulted in a number of inanimate-theme descriptions.

B: Event Comprehension Tasks

In this set, J.D. made errors on the Event Photograph and Perspective Video tasks. The Perspective Video had only one event pair without an animate entity (POUR/FILL) and J.D. made no errors with these scenes. The Role Video scenes all involved animate agents, however the other roles were taken by both animate and inanimate entities. Nevertheless, J.D. errors could not be accounted for in terms of animacy in this case.

This analysis suggests that the animacy effect apparent in the Sentence Judgement Task was an effect that occurred in language comprehension but not event comprehension. In production, it may be that J.D. had such problems that scenes involving both animate and inanimate entities were problematic.
C: Production

J.D. found the descriptions required by the Objects and Actions Video very hard, although his scores show that in comparison with the production tasks in the set of Selection Tasks he did relatively well. His descriptions for the Objects and Actions video contained a high proportion of single lexical items (mostly NPs, but also PPs, ‘other’ items and verbs). In the Narrative selection task, J.D. produced 7 single nouns.

One of the reasons that the language in the Objects and Actions task was an improvement on his Narrative and verb naming performance was that J.D. repeatedly used a small set of suitable predicates:

- *On* states; *still, sitting*,
- *Roll* events; *roll, fell, throw*, and
- *Hit* events; *hit, threw, fell*.

An important aspect of this ability with predicate labels, is that J.D. produced only event-labels for the event scenes and only state-labels for the state scenes. In this way he was also demonstrating his ability to interpret and signal event type. There is some evidence in his responses on this task that he found word order harder than selecting a predicate label.

A second aspect of this improvement was that in the Objects and Actions task J.D. also produced 3 predicate-argument structures, suggesting that there was something about this video (in comparison to that used for the Narrative task) that aided his production. The Objections and Actions video also provoked improved production in the other participants with aphasia in this study. The possibility that the structure of the Objects and Actions scenes somehow aids production is discussed further in chapter 6.
### 4.2.2 J.F.

<table>
<thead>
<tr>
<th>PROCESSING</th>
<th>TASK</th>
<th>SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Event Comprehension</td>
<td>EVENT VIDEO</td>
<td>19/20</td>
</tr>
<tr>
<td></td>
<td>EVENT PHOTOGRAPHS</td>
<td>39/40</td>
</tr>
<tr>
<td></td>
<td>PERSPECTIVE VIDEO</td>
<td>15/18</td>
</tr>
<tr>
<td></td>
<td>ROLE VIDEO</td>
<td>28/28</td>
</tr>
<tr>
<td>Language Comprehension</td>
<td>SENTENCE JUDGEMENT</td>
<td>101/120</td>
</tr>
<tr>
<td>Production</td>
<td>OBJECTS &amp; ACTIONS</td>
<td>High number of V+2 and V+3 structures</td>
</tr>
<tr>
<td></td>
<td></td>
<td>High number of single NPs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Evidence of ability to respond to salience</td>
</tr>
</tbody>
</table>

**A: Event Comprehension**

J.F. had little difficulty with most of these tasks: one error on the Event Video, one on the Event Photographs and none on the Role Video. This shows that J.F.'s conceptual processing was intact (at least in terms of the aspects tested here). The Perspective Video was harder for him. This task differs from the other tasks in this set in that it involves lexical selection. J.F.'s excellent performance on the other event tasks suggests that some aspects of conceptual analysis were preserved for J.F., but that he had difficulty analysing perspective information in such a way as to select a lexical item congruent with this analysis. All J.F.'s errors on this task were perspective errors; J.F. was able to access a closely related predicate, but some aspect processing was preventing access to the correct item. A similar problem is in evidence in his descriptions for the Objects and Actions video, where he often could not access an appropriate predicate, and in his verb score in the Naming task. Furthermore, in the naming task J.F.'s score was partly due to his use of 'light' predicates; that is, verbs whose meaning is fairly non-specific and so can be used to describe a wide range of events. For example, J.F.'s use of *putting* for a number of the events in the Naming task:

- putting the clothes on (dress)
- putting water on face (soap)
- putting the - (thread)
All these responses (except that for thread) were appropriate and so were marked correct. Interestingly these light verbs never appeared in isolation, once he had used putting to describe a photograph he also used it for at least the next photograph (and once for three photographs in a row). There is a possibility, then, that use of such non-specific predicates caused a kind of perseveration. It would be very important clinically to take into account this perseverative tendency, and it would be necessary to find some means of ‘clearing’ the conceptual and linguistic system before presentation of a new item to be processed. The clinical implications of perseveration are discussed in more detail in section 6.4.

It is difficult to discover the precise underlying impairment that would cause perseveration like this. However, it is possible to speculate that J.F.’s difficulty getting to lexical labels is due to a lack of semantic specification so that the detailed information needed to access a predicate such as dressing is not available. There seems to be some information about the event available, enough for J.F. to describe an action involving clothes moving to an endpoint. Not enough information, however, to get to the predicate that has all these meaning elements in its semantic structure. A similar problem getting to fully specified labels can be detected in J.F.’s descriptions for the Objects and Actions Video:

\[
\text{e.g. } \quad \text{Man is . . . ball} \quad \text{(the man rolls the ball)}
\]

\[
\text{Little ball come over the top the little ball} \quad \text{(a ball hits another ball)}
\]

J.F.’s difficulties can be described as a problem accessing language from conceptualisation and, in his case, this problem can be defined quite explicitly in terms of the selection of lexical labels. The results of the Perspective Video task, the Naming task and the Objects and Actions Video task all provide evidence for this account and furthermore they suggest that the problem is a lack of specification in the information provided to the lexicon. Lack of specification in the Perspective task resulted in the selection of labels that were incorrect but that differed from the target only in terms of the perspective taken on the event. In the Naming tasks, as the
above examples show, lack of specification sometimes lead to the use of a non-specific action label, *putting*. A similar use of under-specified predicates occurred in the Objects and Actions Video tasks.

**B: Language Comprehension**

J.F.’s errors were found to indicate a particular problem with Set A sentences. The control participant matched with J.F. was P.S. He made 3 errors on this task, all of which involved Set C sentences. The scores of P.S. and J.F. were compared set by set, which revealed their performance on Sets B and C were compatible but the difference in their respective performances on Set A was highly significant (Fisher’s exact test; \(p < 0.001\)). This difference is largely due to the difficulty J.F. experienced with Set A verbs in acceptable sentence frames (Ac and Ad) on Graph 8). These were transitive non-causative sentences, such as:

- *Mary went*  
- *Bill went*  
- *Bill came*  
- *Bob came*  
- *Sue waited*  
- *Mary waited*

As a direct comparison, there were also acceptable intransitive sentences in Set C which J.F. had little difficulty with (making only 4 errors). This analysis suggest two possible explanations for J.F.’s difficulties:

1. he had a particular problem with non-causative verbs in intransitive frames; or
2. he had a particular problem judging acceptable intransitive sentences involving animate NPs.

Unfortunately this task does not allow for a choice between these two possibilities.

**C: Production**

J.F.’s performance on the Objects and Actions task was particularly striking in then light of his difficulties with the production tasks in the set of Selection Tasks. On the Objects and Actions tasks J.F. chose an appropriate predicate 54% of the time which is consistent with his verb score on the Naming task (25/45) and the number of verbs (6) he produced in the Narrative. However, the number of predicate-argument structures in the Objects and Actions task is an improvement on the same measure in the Narrative task. This improvement is reflected in his ability to produce the expected word order in the Objects and Actions task. In both tasks J.F. also produced a high number of single NPs but no single verbs. It is possible that this reflects a problem accessing
GRAPH 8
PATTERN OF ERRORS - J.F.
SENTENCE JUDGEMENT TASK

NO OF ERRORS

Set A  Set B  Set C

a  b  c  d
predicate labels; when the label is accessed he is able to put it into a predicate-argument structure but if the label is inaccessible he has to rely on single nouns. This explanation is in line with his difficulty accessing lexical labels in the Perspective video.

Most striking of all, however, was that J.F. attempted to alter the structure of his sentences in response to the increased salience of the theme on all four occasions. This attempt did not result in complete predicate argument structures, but nevertheless J.F. was showing an ability to reflect increased salience structurally.

For example, in response to the increased size of the theme of a hitting event, J.F. produced the following two-sentence description:

\[ \text{Ball is sitting on the table. Another ball knocks it off.} \]

In response to a similar scene, where this time the salience of the theme was increased by making it more 'animate', J.F. attempted another two-sentence description:

\[ \text{Woman. Ball hitting woman and (gesture)} \]

This example shows that even when he was not able to produce complete predicate-argument structures, J.F. was able to manipulate his production in response to the increased salience. His strategy of emphasising the theme entity (a doll) with one word - \textit{woman} - before his \textit{hitting} sentence is a very effective way of signalling the salience of the doll.
### 4.2.3 L.H.

<table>
<thead>
<tr>
<th>PROCESSING</th>
<th>TASK</th>
<th>SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Event Comprehension</td>
<td>EVENT VIDEO</td>
<td>20/20</td>
</tr>
<tr>
<td></td>
<td>EVENT PHOTOGRAPHS</td>
<td>40/40</td>
</tr>
<tr>
<td></td>
<td>PERSPECTIVE VIDEO</td>
<td>17/18</td>
</tr>
<tr>
<td></td>
<td>ROLE VIDEO</td>
<td>28/28</td>
</tr>
<tr>
<td>Language Comprehension</td>
<td>SENTENCE JUDGEMENT</td>
<td>108/120</td>
</tr>
<tr>
<td>Production</td>
<td>OBJECTS &amp; ACTIONS</td>
<td></td>
</tr>
</tbody>
</table>

- High proportion of pred.-arg. structures
- 0 single lexical items
- Ability to respond to visual salience

### A: Event Comprehension

L.H.’s comprehension in these tasks was virtually intact; with just 1 error on the Perspective Video, where a *take* scene was identified as *give*.

### B: Language Comprehension

L.H. made only 12/120 errors on the Sentence Judgement task.

(see Graph 14)

Any patterns suggested by the shape of this graph are not significant because of the small number of errors.

Nevertheless, the existent of some errors suggests a problem with lexico-semantic information, although this is minimal.

L.H.’s overall performance profile reveals a distinct difference between comprehension (language and conceptual) and production. This finding was investigated in the further tasks reported in chapter 5 and its relevance is discussed in chapter 6. Details of L.H.’s production is below.
C: Production

The most striking aspect of L.H.'s performance was the difference between her production in the Selection Tasks and her more structured production on the Objects and Actions Video. L.H. performed well on all 3 of the Objects and Actions task measures. Her word order score represents an improvement on the few predicate-argument structures produced in the Narrative (2 single verbs and 2 verbs with 1 argument). The high number of predicates produced for the Objects and Actions task is also an improvement on her Narrative score, potentially because in the Objects and Actions task she was able to use the same verbs more than once. In addition L.H. showed an ability to respond to increased salience by altering sentence structure; on one such occasion she produced a passive structure.

Interestingly, L.H.'s verb score on the Naming task (19/45) was relatively high; both in comparison with the scores of other participants and in comparison with her verb production in the Narrative task. The Narrative task revealed that L.H. had a number of different problems with verbs: a problem producing appropriate labels (she produced only 4 verbs), a problem combining verbs with arguments appropriately, and a problem with grammatical morphology. This last problem also caused L.H. problems during the Naming task, she often wrote the root of the verb and then had difficulty deciding between -ed and -ing as an ending. For example, she would write:

\[
\text{paint ing, eat -ing,}
\]

and once decided to use both endings:

\[
\text{dail -ed -ing}
\]

L.H.'s therapist had done a lot of work with her on verb endings and had decided on -ed and -ing as the two endings that would prove to be of the most use functionally. However, the way L.H. used the endings in this task strongly suggests that she saw these morphemes as an arbitrary set of letters that she was required to add. They seemed to have no meaning for her.

The disconnection, for L.H., between the verb-root and its ending also raises the possibility that she was not producing verbs at all. It may have been that L.H. chose a noun label and added -ed or -ing. This is an extremely difficult suggestion to verify because of the nature of the photographs used. The task is specifically
designed so that the verb and its related noun have the same lexical label (e.g. oil/oil, dust/dust, paint/paint).

L.H. also produced a number of responses to the verb pictures that lacked any verb morphology and which consequently were ambiguous between the noun or the verb form (e.g. glue, flour, powder, zip). These are correct response to the verb pictures. While she may have been naming the action there is also a possibility that she was naming the most prominent object in the photograph, due to her omission of -ed or -ing in these cases. L.H. had been taught to use these endings and had attempted to use them on 19 occasions in the Naming task. This makes her failure to use them on other occasion particularly noticeable.

This is not a firm conclusion, for the reasons outlined above. In addition, there were no instances were a noun-form was combined with an ending inappropriately (e.g. flowering, for ‘watering the flower’, or pan-ing for ‘boiling the egg in a pan’) which would have been expected if this was a ‘noun + ending’ strategy.

Another possibility is that difficulty accessing language from conceptualisation, for L.H., means a problem accessing argument structure. Her performance on the experimental tasks suggest that constraining the conceptualisation helps her access language. This seems to have an effect in two ways:

1. The kind of processing involved in the Naming task is constrained per se, as it focussing the processing mainly on identifying the type of event depicted, on only one aspect of an event’s conceptual structure. This is in contrast with the kind of naming required by the Perspective video, where focussing on the event type alone is not enough to get to a lexical label. That is, the event type is the same in both buying and selling, it is the perspective that differs. In the Naming task, however, there are no photographs of this type so that all the actions can be identified by event type alone.

2. The structure of the stimulus material can be manipulated to constrain the conceptualisation required to describe it. For example, the Objects and Actions video differs in structure from the Narrative video and seems to aid L.H.’s language production. The Objects and Action scenes can be understood as constraining the information to be conceptualised in a way that is compatible with the language system; it ‘signals’ or perhaps ‘boosts’ event structuring in some way. This idea is pursued in chapter 6.
### A: Event Comprehension

L.S. had problems with all of the tasks in this set, clearly showing that he had a problem with the conceptualisation of events and states. It is interesting that all 4 errors were non-events marked as events. In two cases, the scene showed an object on an otherwise empty tabletop. The other two scenes show a person (or two people) sitting on a chair simply looking at the camera (i.e. not moving or smiling etc.). In order to make the event / non-event choice, L.S. would have had to analyse each scene in such a way as to analyse its temporal profile. A useful way to consider such an analysis is in terms of what Langacker (1987, 1991) calls ‘scanning’ (see section 1.3.1, part 2 in the Literature Review). That is, the scenes would be scanned to detect connections and differences, both in terms of finding objects and their edges and also in terms of distinguishing one movement from another. In each of these 4 scenes the scanning should have indicated that there was at least one continuous movement (either panning or zooming - the control movement). In the event scenes there would also be other movement associated with the action that would have to be conceptualised as successive stages of movement in one sequence. In other words, the movement would have to be conceptualised as delineating the action. For example, the movements associated with *dancing* or *eating* are sets of different movements but are all considered together to delineate *dancing* or *eating.*
Events are thereby distinguished from non-events in that events are successively scanned whereas non-events are scanned in summary. In each of his errors, L.S. was not analysing the scenes in summary as he should have. Possible reason for this are discussed in chapter 6. This problem with visually depicted material was not a sight problem- L.S.'s eyesight was normal (with his glasses) and he showed no signs of hemispheric neglect - nor was it a more general problem with visually presented material. This fact is emphasised, for example, by his high score on noun naming where the stimuli were detailed photographs of real objects (he was able to pick out and name part of a picture or part of a pictured object, such as the dial, of a telephone) and his other visual abilities, such as his ability to change focus and his spatial awareness. For example, changing focus from the T.V. screen to a piece of paper on which he was writing and the spatial awareness apparent from his navigation of unfamiliar rooms and manipulation of a variety of objects.

In the Event Photograph task L.S. also made significantly more errors than expected (Fisher's exact test; p < 0.0001 based on the control scores). The errors he made showed an interesting pattern, in that:

- L.S. made an error each time a HAVE state was the target 'odd-one';
- HAVE was also a problematic context for event 'odd-ones';
- the event chosen as 'odd' in error (the context event) was more likely to be GO than ACT;
- consequently, the most problematic photograph triads for L.S. were GO-GO-HAVE and ACT-ACT-HAVE

This task revealed that HAVE and GO were the most problematic photographs for the participants with aphasia as a group. Consequently, their properties are discussed in more detail in chapter 6. However, for L.S. HAVE was markedly the most problematic photograph type.

This indicates that the difficulty L.S. had with this task was not due to a general problem distinguishing events from non-events (as suggested by his results on the Event Video task) but that he was having a particular problem conceptualising specific event and state types. Moreover, he had this particular problem conceptualising events and states when they were presented visually. The pattern in L.S.'s errors on the Event Photograph Task is an important finding, emphasising the influence of the linguistic system on non-linguistic processing. As noted above, L.S. did not have a general visual impairment. The difficulty he was displaying in
this task was due to an inability to categorise visual material on the basis of linguistic notions (such as HAVE states and GO events). The notion that a linguistic impairment can have ramifications in non-linguistic processing has important clinical and theoretical implications, and is discussed further in chapter 6.

In the Perspective Video task L.S. made significantly more errors than expected (Fisher’s; p < 0.05). In these errors he chose as many event distractors as perspective distractors. There are two likely causes for L.S.’s difficulties here:

1. L.S. had a profound difficulty conceptualising events presented visually. His conceptual analysis of the scenes may not have provided enough information for him to access the relevant lexical label. In some cases this resulted in him choosing a related label (perspective error) but in others the conceptualisation was so difficult he selected a label that was incorrect (the distractor);

2. This task involves both conceptual processing and lexical selection. L.S.’s difficulty could therefore reflect an additional problem with lexical access.

L.S. also made a number of errors on the Role Video task, which was particularly noteworthy because three of the participants with aphasia were error free on this task. L.S. made errors on all three scene types. Mostly he made role errors (6/9), but in the scenes involving people acting on people, such as *splashing* and *hitting* he also made event errors (see Graph 9). This suggests that, on the ‘object’ and ‘transfer’ scenes at least, L.S. was conceptualising the scenes in enough detail to recognise the type of event depicted. The ‘people’ scenes were not so reliably conceptualised in terms of event type. All three scene types caused problems in terms of analysing the relationship depicted and/or the role of the participants. This finding strongly suggests that the layers of conceptualisation required by this task are separable. There is also a clear indication of the nature of such separable processing; i.e. there is a difference between identifying event type and identifying the relationship encoded by an event. These layers of conceptualisation are discussed further in chapter 6 in the light of the performance of the other participants with non-fluent aphasia.
B: Language Comprehension

L.S. made very few errors on the Sentence Judgement Task, suggesting that when a predicate is provided he is able to access the associated lexico-semantic information. He made so few errors that any other patterns indicated by the graph cannot be significant. The excellent performance on this task is particularly striking in the light of L.S.'s obvious problems with conceptualisation. It seems that when the stimulus material is language, comprehension is easier than when the stimulus material is visual.

C: Production

A striking aspect of L.S.'s results was that he managed to produce so much output in the Objects and Actions video task in comparison to his Narrative performance. He was successful in terms of both the choice of predicate and word order measures, most of the time. He was using a template to structure his descriptions, and in the absence of a predicate, to indicate where the predicate should be. L.S. produced all his responses in written form, so that these templates looked like the following:

The ball ___ the tables  (for The man rolls the ball along the table)

This was a strategy taught to L.S. by his speech and language therapist. Sometimes L.S. appeared to be using this strategy but without leaving a space for the predicate, e.g.:

The doll the tables.  (for The doll is on the table)

This use of templates is also reflected in the finding that he produced both a high number of single NPs and 6 V+1 structures although he never used single verbs, that is:

- he used a NP-V-NP template, which was successful in a number of cases The ball rests the tables
- sometimes he could not access the verb but continued to use the template The ball the tables
- sometimes the verb selected did not coincide with the template The ball hits on the table

The effect of a visual manipulation of salience is interesting in L.S.'s case because of his difficulty structuring visually presented material (e.g. his problems of the Event Video and Event Photographs). There is no evidence from the Objects and Actions Video task that L.S. did respond to any of the visual manipulations in
his written responses. However, it is by no means clear whether the visual demarcation of events from non-
events (the Event Video) and the visual identification of event types (the Event Photograph task) requires the
same processing as the perception and conceptualisation of increased salience. Moreover, there is not enough
evidence in this task to clarify this issue.
### 4.2.5 R.B.

<table>
<thead>
<tr>
<th>PROCESSING</th>
<th>TASK</th>
<th>SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Event Comprehension</td>
<td>EVENT VIDEO</td>
<td>20/20</td>
</tr>
<tr>
<td></td>
<td>EVENT PHOTOGRAPHS</td>
<td>36/40</td>
</tr>
<tr>
<td></td>
<td>PERSPECTIVE VIDEO</td>
<td>14/18</td>
</tr>
<tr>
<td></td>
<td>ROLE VIDEO</td>
<td>18/28</td>
</tr>
<tr>
<td>Language Comprehension</td>
<td>SENTENCE JUDGEMENT</td>
<td>95/120</td>
</tr>
<tr>
<td>Production</td>
<td>OBJECTS &amp; ACTIONS</td>
<td>Produced only single NPs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Problems with word order</td>
</tr>
</tbody>
</table>

**A: Event Comprehension**

R.B. made no errors on the Event Video, suggesting that he could perform the basic scanning and profiling necessary to distinguish events from non-events.

R.B. made only 4 errors on the Event Photograph task. Nevertheless it is interesting to note that there is the same trend in R.B.'s errors as in those of L.S. (see previous section). That is:

- **HAVE** is the most difficult odd-one-out to identify;
- **GO** is most likely to be erroneously identified as odd; and
- **HAVE & GO** is the combination most likely to cause error.

These two tasks show that, in comprehension, R.B. had little difficulty conceptualising information about the nature of a depicted event. That is, he could conceptualise visual material in order to:

1. distinguish events from non-events; and
2. categorise event types in order to make 'odd-one-out' judgements.

The Perspective Video and the Role Video caused more problems for R.B., providing support for the claim that these tasks involve a different element of processing from the other conceptual tasks. On the Perspective Video task R.B. made 4 errors; not significantly different from the expected score but in the light of his ability on the
other tasks this is noteworthy. All of these errors were perspective errors. This shows that when a task involves lexical selection, R.B. has some difficulty. In the light of R.B.'s score on the Event Photograph task it is difficult to judge whether the errors on this task reflect a conceptual or lexical difficulty.

Of all the conceptual tasks, the Role video caused the most difficulty. His errors occurred across all scene types scenes and the distractors selected were both role and event distractors (although they were mostly role errors, 7/10). This result indicates that, at times R.B. was not conceptualising the video scenes in such a way as to identify the event type (hence the event errors). More frequently he was conceptualising the event type, but not the relationship depicted and/or the roles of the participant entities (the role errors).

B: Language Comprehension
On the Sentence Judgement task R.B made a large proportion of errors, but unfortunately his results showed a significant 'yes bias' ($\chi^2 = 16.59, p < 0.001$). This means that any other pattern that may be apparent is confounded by his tendency to accept ungrammatical sentences, and so cannot be taken as an indication of his underlying processing problems. He made 23 erroneous judgements of unacceptable sentences, only 1 of which involved a Set A verb. This pattern is in line with L.S., L.H. and J.D. who also found Set A, non-causative, sentences easier to judge.

C: Production
R.B. had a great deal of trouble describing both the event and state scenes in the Objects and Actions Video task, using only single NPs. At times these NPs were in the expected order but more often they were not. For the events and states that were compared, R.B. produced more NPs in response to the states. Moreover, all the cases where the NPs were in the correct order were state descriptions.

On the Naming task R.B. scored 2/22 and in the Narrative he only managed to produce 1 verb, in the Objects and Actions task, on the other hand, he used a number of appropriate alternative labels for the verbs required. For example, the adjective *static* for *on* states and his use of *bang* instead of *hitting.*
The relatively good score for word order on the Objects and Actions task reflects the fact that R.B. usually tried very hard to structure his output, even when he had produced no predicate and few object names. This is true of the state descriptions where the word order is as expected and in event descriptions where the word order is not as expected but where there is evidence of some other structure. For example, in attempting to describe a scene which begins with the state *a ball is on the table* and then shows the event *a ball hits the ball*, R.B. produced:

Ball . . and then (gesture) . and then (gesture)

This is useful ability for communicating meaning, at least in terms of temporal structure. However, there seems to be certain essential aspects of conceptualisation missing from R.B.’s descriptions. There was often no indication of the type of event being described. In the above example R.B. attempts to provide this information through gesture but it is not clear that he has analysed the scene enough to pick-out the single defining characteristic of the main event, that is the *hitting* event. In addition, there is very little evidence in the data that word order is ever used to signal relationship, or role, information. It seems that word order is used solely to indicate the temporal structure of what is being described, for instance the temporal profile of an event.

Even this characterisation of the structure of R.B.’s output may be claiming too much, as a similar structuring was often used for states, e.g.:

Ball and then table  (for the close-up version of *the ball is on the table*)

This is a particularly revealing example because it clearly shows that R.B. was reflecting the temporal structure of the whole video scene rather than the state itself; this is the ‘close-up’ version of the state and so begins with a close-up on the ball and then a gradual widening of the view to reveal that the ball is on a table. In other words, what the viewer literally sees is the ball and then the ball on the table. It is possible then that R.B. was not conceptualising all the scenes as either events or states but was simply describing what he saw, as he saw it.
### 4.2.6 R.K.

<table>
<thead>
<tr>
<th>PROCESSING</th>
<th>TASK</th>
<th>SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Event Comprehension</td>
<td>EVENT VIDEO</td>
<td>20/20</td>
</tr>
<tr>
<td></td>
<td>EVENT PHOTOGRAPHS</td>
<td>38/40</td>
</tr>
<tr>
<td></td>
<td>PERSPECTIVE VIDEO</td>
<td>11/18</td>
</tr>
<tr>
<td></td>
<td>ROLE VIDEO</td>
<td>19/28</td>
</tr>
<tr>
<td>Language Comprehension</td>
<td>SENTENCE JUDGEMENT</td>
<td>90/120</td>
</tr>
<tr>
<td>Production</td>
<td>OBJECTS &amp; ACTIONS</td>
<td>High proportion of single NPs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 V+1 and 3 V+3 structures</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Some evidence of ability to respond to salience</td>
</tr>
</tbody>
</table>

**A: Event Comprehension**

The comprehension side of conceptual processing was relatively intact for R.K.: she made no errors on Event Video and only 2 on the Event Photo task. On the Perspective Video task R.K. made 6 perspective errors and 1 distractor, a significantly greater number than expected (Fisher’s; p< 0.01). This indicates that R.K. had some difficulty with lexical selection. In the light of her score on the other tasks involving conceptualisation, it is difficult to judge whether the errors on this task reflect a conceptual or lexical difficulty.

On the Role Video R.K. made 9 errors across all three scene types. All of these errors were role errors. This result indicates that R.K. was able to conceptualise the video scenes in such a way as to comprehend the event type. She was unable to conceptualise the relationship depicted and/or roles of the participant entities.

This result may also shed light on R.K.'s performance on the Perspective Video. In order to select the correct label for the scenes in this task the roles of the participant entities must be conceptualised. On the 6 occasions in which she made an error she was selecting a label which assigned incorrect roles to the participant entities. For example, for the scene focussed on a hand pouring water from jug she choose the label *fill* and for the scene focussed on someone carrying someone else she chose *ride*.

**B: Language Comprehension**
On the Sentence Judgement task R.K.'s responses showed a significant 'no bias' ($\chi^2 = 16.59, P < 0.001$) masking any other pattern which may have emerged to give information about the underlying problem. R.K. was the only participant with aphasia whose pattern of errors does not show a differential performance on Set A. Her difficulty comprehending all the information encoded by the verbs and structure in this task may well have been overwhelming. In the absence of any clues to help her make the necessary judgements it is conceivable that she simply adopted a strategy of rejecting most of the sentences, thereby creating the 'no' bias. During the task R.K. seemed to find nearly all the sentences extremely funny, indicating that they were mostly unacceptable for her. Her reaction might also suggest that she was attempting to evaluate the sentences in some way, but that her method of evaluation was not successful.

It is important to emphasise here that the notation of such qualitative data can shed some light on underlying processing. In this case, it is not possible to explain the mechanism by which R.K. was making her judgements. However, the fact that she found these sentences so funny suggests that some kind of evaluation of the sentences was being carried out. It was only by noting this qualitative data that the claim for possible processing could be made. In the absence of such qualitative information it would seem just as likely that R.K. was attempting no evaluation at all. This clearly has implications for both the theoretical and clinical characterisation of R.K.'s abilities.

C: Production

In the Objects and Actions Video task R.K. used a high proportion of single NPs along with some predicate argument structures and 4 single verbs. This pattern suggests that sometimes there is difficulty getting to the predicate label and sometimes difficulty structuring the event description and that neither of these problems seems to be the cause of the other. This performance is comparable to her verb score in the Naming task (15/45), and her output in the Narrative task where she produced five predicates, two combined with a single argument and one predicate combined with two arguments.

It is also notable that she attempted to respond to increased visual salience twice, by attempting to first describe a state and then an event in order to foreground the theme:
The doll is . . .

and the ball . . . er . . . hits the ball. (for the doll is on the table and the ball hits it.)

The big ball

A small one . . . er . . . the big ball and er hitting (for the big ball is on the table and a small ball hits it)
5. ADDITIONAL TESTING & SUMMARY OF FINDINGS

Two additional tasks were carried out to further explore certain aspects of the results of three of the participants with aphasia:

1. The first was a verbal version of the Event Photograph task: this task was devised solely for L.S., who was the only participant to have a significant difficulty with the photograph version. The original Event Photograph task was designed to access that aspect of conceptualisation that identifies the event-type, an aspect of conceptualisation that requires the identification of relationship information and may be best understood as a process of ‘relational profiling’. Such profiling conceptualises individual participant entities as related to each other by the event or state and this contrasts with the collective profiling of objects (where the individual parts are conceptualised as a whole). The stimuli were based on four basic conceptual constituents - HAVE, BE, ACT and GO - in order that any particular difficult with a specific type of event or state might be identified.

1. The second additional task was designed for L.H. and J.F., both of whom performed extremely well on all the comprehension tasks but had problems with production. Nevertheless, their production varied depending on the task used to test it: for both participants the score on the Objects and Actions Video task represented an improvement on the production tasks in the Selection set. This performance profile raised two questions;

   a) what is the relationship between the comprehension and production of sentences for these two participants?

   b) what is it about the Objects and Actions Video that improved production for these two participants (and all of the other 4 participants with non-fluent aphasia, in varying ways)?

In order to answer the first question and gain some insight into an answer for the second, J.F. and L.H. were shown the Perspective Video a second time and were asked to describe the scenes. This provided a means of direct comparison of comprehension and production.

The methodologies for these two additional tasks are outlined in the next two sections:
### 5.1 VERBAL VERSION OF THE EVENT PHOTOGRAPH TASK

On the Event Photograph odd-one-out task L.S. performed at chance level, suggesting that he had a particular problem categorising events and states in enough detail to identify both instances of the same type of scene and scenes that do not match: the task reliably indicated only that this was the case for visually presented scenes and not that this problem would also affect other conceptualisation of events. For this reason a verbal version of the task was developed.

This task used verb phrases that described the same set of event as those depicted in the photographed version; verb phrases were used instead of whole sentences because of the additional problems L.S. had with comprehending sentences, particularly with word-order, for example:

- **HAVE states**, such as: *has a toothache*
- **BE states**, such as: *rests on the table*
- **ACT events**, such as: *drinks some tea*
- **GO events**, such as: *falls off the table*

Half the sentences were in the present tense and the other half in the past.

#### 5.1.1 L.S. Results

There was no difference between L.S.'s scores on the verbal and visual versions of this task: for the verbal version, L.S. scored 24/40 which is only four less errors than on the photographed version. This meant that he was also unable to categorise events in such a way as to distinguish an 'odd-one' when processing both visually depicted and verbally described events. More importantly, the pattern of errors on the verbal version of the task matched that of the photographed version:

<table>
<thead>
<tr>
<th>Participants</th>
<th>Score (n=40)</th>
<th>Error breakdown</th>
<th>error</th>
<th>pairs involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>L.S.</td>
<td>24</td>
<td>HAVE 8, BE 2, ACT 2, GO 4</td>
<td>HAVE 5, BE 1, ACT 4, GO 6</td>
<td>HAVE-ACT 2, HAVE-GO 8, BE-ACT 1, BE-GO 5</td>
</tr>
</tbody>
</table>

The relationship between the two tasks is discussed in detail in chapter 6.
5.2 PRODUCTION VERSION OF THE PERSPECTIVE VIDEO

Two of the participants, L.H. and J.F., performed at a very high level on all the comprehension tasks although they both made at least one error on the perspective task; this is not a high number of errors, but in the context of their other scores it is particularly significant. In addition, both of these participants showed an interesting pattern of performance on the production tasks, that is the Objects and Actions Video and the Narrative Task from the Selection Tasks. L.H.’s production in the Narrative contained a few verbs but little predicate-argument structure and many single nouns, in contrast her performance on the Objects and Actions Video showed a good deal of predicate-argument structure. J.F.’s pattern of production was much the same, albeit with more word order errors remaining in the Objects and Actions descriptions. This suggested that there was something about the Objects and Actions scenes that aided production; in particular the data suggests that these scenes help to structure the description in such a way that both word order and production of suitable predicates improves.

This task was developed for two reasons;
1. In order to further explore the perspective taking problems indicated by the results of the comprehension version of the Perspective Video; and
2. In order to gather some more evidence about what kinds scenes improve production, for these two participants.

5.2.1 L.H. and J.F. Results

<table>
<thead>
<tr>
<th>Target verbs produced</th>
<th>Acceptable alternative verbs</th>
<th>1st arguments produced</th>
<th>2nd arguments produced</th>
<th>1st arguments in correct position</th>
<th>2nd arguments in correct position</th>
</tr>
</thead>
<tbody>
<tr>
<td>L.H.</td>
<td>62%</td>
<td>92%</td>
<td>100%</td>
<td>100%</td>
<td>93%</td>
</tr>
<tr>
<td>J.F.</td>
<td>39%</td>
<td>83%</td>
<td>71%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>
1. On the comprehension version of this task, the scores for selection of the appropriate predicate were: L.H. 94% and J.F. 83%. These additional results reinforce the pattern of better comprehension of events than production of predicates.

2. Much like their performance on the Objects and Actions Video task, the production here represents an improvement on the production measures in the Selection set:

   - **Predicate Production**
     - L.H. produced an acceptable verb more often than J.F., reflecting the Objects and Actions results;
     - these results were an improvement on the Narrative production for both of them;
     - the scores for predicate choice were lower here than for the Objects and Actions Video, however in that task it was possible to get a high score by re-using a small set of suitable verbs.

   - **Word Order**
     - L.H.'s production of arguments and their ordering was a slight improvement on her Objects and Actions performance, this is particularly important because a number of the verbs required for the Perspective Video have 3 arguments;
     - J.F.'s production of arguments and their ordering was an improvement on his Objects and Actions performance.

These results are also discussed further in the next chapter.
5.3 SUMMARY OF THE FINDING OF THE EXPERIMENTAL TASKS

A: Production

The Objects and Actions Video task revealed a good deal of ability not apparent in the production tasks in the Selection set. There were two main findings that are important for an understanding of sentence production in people with non-fluent aphasia:

1. all 6 participants with non-fluent aphasia were able to reflect the increased salience of one of the participant entities in the event, at least some of the time; and

2. in so far as these tasks can be compared, the performance on the Objects and Actions task represented an improvement on the production tasks in the Selection set; that is
   a) all participants with non-fluent aphasia (except R.K.) improved on the Objects and Actions task in terms of word order, and
   b) all participants with aphasia (except R.B.) improved on the Objects and Actions task in terms of choice of predicate.

B: Event Comprehension

The main finding here was that the pattern of performance of the participants with non-fluent aphasia varied in a principled way across (and within) the 4 tasks. This strongly suggests that conceptual processing for language is composed of a number of subcomponent processes; the 5 component processes highlighted by these tasks were as follows:

1. Situations must be conceptualised in order to distinguish events from states;

2. Situations must be conceptualised in order to identify event-types. This is a ‘general’ analysis of the type of action encoded by the event such as:
   a) the characteristic movement,
   b) the ‘typical’ kinds of entities involved (animate agent and foodstuff),
   c) the cause/effect, and so on.

So, for example, the conceptualisation of eating involves:
   a) analysing the hand-to-mouth movement,
• identifying participants that fit the requirements (one animate one a type of food) and
• analysing the effect on both participants.

It seems likely that it is not necessary to conceptualise all these characteristics in order to distinguish one event from another;

3. Situations must be analysed (or profiled) to identify the relationship encoded by the event. To take the same example, the conceptualisation of eating requires that the agent and the foodstuff are profiled in relation to each other, perhaps by identifying the event as an instance of an ACT relationship;

4. Situations must also be analysed to identify the roles played by the participant entities. In an ACT event like eating, this involves interpreting the agent and theme roles; and

5. The perspective taken by the event must also be conceptualised, in order that the correct lexical label (and associated argument structure) may be accessed.

C: Language Comprehension

The most striking result of the Sentence Judgement task was that, despite their problems in sentence production and event comprehension, all 6 participants with non-fluent aphasia performed extremely well on this task. This finding indicates that a good deal of information about meaning can be gained from language - both lexical items and their combination into phrase and sentence structure - even in the context of a language impairment that affects conceptualisation. Moreover, this finding shows that the presence of language improves comprehension for all the participants who had difficulties conceptualising visually presented events: the most likely reason for this would be that the information encoded in the language serves to constrain the conceptualisation, or 'fix' the scope of the event/state being described so that the many choices inherent in conceptual processing are constrained (this claim is pursued in detail in the next chapter).
The review of the literature in chapter 1 revealed three main questions that need to be resolved in order to understand the language processing problems of people with non-fluent aphasia:

A) What is the relationship between language and conceptual processing?

B) What kinds of processing are involved in conceptualisation?

C) How does impaired language affect conceptualisation,
   i) when processing visual input?
   ii) when processing language input?
   iii) for producing language?

The research presented in this thesis revealed a number of important findings that help characterise conceptualisation and which can provide initial answers to all of the questions above- see end of chapter 5 for a summary of findings. In particular, these findings suggest that:

1. The conceptual system requires certain organising principles to structure information so that the information it processes can be used by other systems. What is of interest in this thesis is the structure required by language.
   
   a) Some of those principles may be characteristic of the conceptual system itself, such as a bias toward dynamism.
   
   b) Many other principles are heavily influenced by the requirements of language. Of these, the most important seem to be:
   
   i) distinguishing events from non-events;
   
   ii) identifying event type;
   
   iii) identifying relational information¹;
   
   iv) identifying role information;
   
   v) identifying perspective.

¹ Relational information and role information have been separated here on theoretical grounds: the data from this study do not unequivocally support this distinction, but the potential remains and requires further investigation.
2. The findings also support the claim that conceptualisation in input differs from conceptualisation in output in important ways:

a) the comprehension of language is a process of enriching the information contained in language form to create a full conceptualisation;

b) the process of accessing the language system from conceptualisation requires that the conceptualisation be refined into a structure appropriate for language.

The discussion below begins with a section on the relationship between language and conceptualisation, emphasising the effect of language-mediated constraint in both verbal and visual tasks. This section concentrates on the performance of L.S. because of his particular problem with conceptualisation. The main issues are considered in terms of three types of task: comprehension of pictures; comprehension of language; production. This analysis has a number of clinical implications that are dealt with in detail in section 6.4.

Section 6.2 brings in the performance of all the participants, so that the characterisation of conceptualisation into 5 processing layers can be fully illustrated. This analysis allows specific processing profiles to be outlined for each participant, clearly indicating the range of processing impairments causing difficulty for each of them. A comparison of these profiles shows how different combinations of impairment can lead to broadly similar symptoms, as evidenced by the performance of these participants on the Selection Tasks. The implications for assessment are considered in section 6.4.

Section 6.3 returns to the crucial claim that language impairment reduces the means of constraining conceptual organisation. This point is re-considered in terms of the effect of unconstrained conceptualisation on language processing. Specific predictions are made about the patterns of difficulty that would be expected in both comprehension and production. More importantly, the different effect on these two processes is considered in more detail. This is important because it reveals specific indications about how impaired conceptualisation might be improved by constraining the stimulus in specific ways. This idea is then developed in the next section in terms of clinical implications.
6.1 THE RELATIONSHIP BETWEEN LINGUISTIC AND CONCEPTUAL PROCESSING

Various accounts of conceptual processing were reviewed in section 1.3. In so far as they concur, these accounts emphasised two particularly important characteristics of the relationship between linguistic and conceptual processing:

1. there are similarities between processing modalities (such as spatial and linguistic processing) that are best accounted for by the nature of the conceptual system mediating between them; and

2. the linguistic system seems to have a particular influence on conceptualisation.

One of the participants in this study, L.S., had particular difficulty with conceptualisation and language, making errors on each of the tasks. The comparison of L.S.'s performance across the visual and verbal modalities provides strong evidence that the organising principles driving conceptualisation are linguistic principles. That is, principles such as distinguishing events from states in terms of their temporal profile and the relationship information that they encode. These principles are required for structuring conceptualisation even when the task requires no overt involvement of language.

Two such organising principles are those emphasised by Langacker (1989, 1991, 1997): 'scanning' and 'profiling'. Consider, for example, the following scenes:

a)

![Diagram of a cup on a table]

b)

![Diagram of a bag on a table with a wave symbol]
Visual processing of both of these scenes involves:

- scanning to identify the component entities and to perceive the temporal structure of the scene;
- profiling to relate components to each other: both to perceive the handle as part of the cup and to identify the relationship between the cup and the table.

Similarly, the linguistic system requires:

- a description identifying the participant entities and the temporal structure of the situation;
- the relationship involved and the roles played by the participants.

The research into pre-attentive and attentive visual processing outlined in section 1.3.3 provided for a number of predictions that have been borne out by L.S.’s performance on these tasks. Wolfe and Bennett (1997: 41) argue that,

"Pre-attentive vision can represent many attributes of a visual stimulus but attention is required to appreciate the relationship between attributes."

This raises questions as to what constitutes attention, and how that attention is directed. Tomlin (1997: 172) defines attention as,

"... a set of related processes directed at reducing or constraining overall input to [conceptualisation]"

In other words, the process of directing attention is the same as the process of constraint that has been invoked in this thesis to account for the influence of language on conceptualisation.

The visuo-spatial system can guide attention to some relational attributes; enough to conceptualise the black lines in diagram a) (above) as a cup and a table. However, in order to process situations in the way that language requires, attention must be guided by the linguistic system. As Slobin (1997) puts it, situations do not occur ready-packaged for encoding into language, "they have to be filtered through language into verbalised events". This is illustrated in diagram b) (above) in which the falling event is only conceptualised as such because there is a falling label in the lexico-semantic system.

This dual influence on conceptualisation is symbolised in the diagram (adapted from Jackendoff 1996) on the next page:
L.S. is hypothesised to have an impairment in his lexico-semantic system so that it is no longer exerting the required constraining influence on conceptualisation. For this reason, the linguistic notions of event and non-event are not available to him (or are available in an incomplete way) as a means of analysing a visual scene.

The exact requirements of the task become important to this claim. It is crucial to assess whether, in practice, linguistic principles are used to constrain conceptualisation. For this reason the Event video was designed so that the purely visual factor of movement was a feature of each of the scenes: in half of them the movement was a right-to-left ‘panning’ movement; in the other half it was a wide-to-narrow zooming movement. The participants were directed to attend to the temporal profile of the scene itself rather than the overall visual movement. In other words, they were instructed to attend to the linguistically relevant features of movement and to disregard the visually-apparent movement.

This was achieved by the question asked of the participants:

"You should decide whether something is happening. You need to decide whether the scene shows an EVENT or NO EVENT".

This question directs attention to what is 'happening', the inherently linguistic notion of an event. It is because we need to apply a label to an event that we analyse it as such. As L.S. was not reliably able to use linguistic information from the lexico-semantic system, he is not reliably able to distinguish between events and non-events when they are visually presented.

It is worth emphasising that the events included in the Event video cannot be conceptualised by visual means alone. There is nothing inherent in the visual appearance of diagram b) (above) that would reveal it to be an event. This is true not just of the static picture of the event but of the event itself: whether on video, happening
in real-time or just as a thought. Consider, as an example, the specific falling event resulting from the cup being on the edge of the table when an earthquake occurs. The earthquake would cause various movements but only some of them would be perceived together as sub-components of falling. The other movements would be perceived as separate from that event. That is, the vibrating of the cup and table before the cup falls, as well as the movement of the cup hitting the floor and breaking, are not perceived as subcomponents of one event.

There is no visual reason for this; rather the reason is that there are separate linguistic labels for vibrating, falling, hitting and breaking and there is no single label to describe the whole scene.

It is also important to emphasise that L.S. did not have a general visual problem: his sight was normal with glasses, he had no hemispheric neglect and he had no problems with visual material depicting nouns.

For example, the stimuli in the Naming task were detailed photographs of real objects and situations. L.S. scored well for the noun pictures showing that he was able to pick out and name part of the picture or part of the pictured object (such as the dial, of a telephone). He also showed retained visual ability in other ways across the tasks, examples include: changing focus from the T.V. screen to a piece of paper on which he was writing; selectively focussing on a piece of paper when writing in a printed table; selectively focussing on segments of the T.V. screen when naming objects in the Wallace and Gromit video; and the spatial awareness apparent from his navigation of unfamiliar rooms. Nevertheless L.S. was not reliably able to distinguish events from non-events when they were visually depicted. In the light of the above discussion, this means that he was not always able to conceptualise the videoed scenes in the required way: to conceptualise the event scenes as composed of successive stages of movement and to conceptualise the non-event scenes as a static whole.

Also of interest here is the observation that all four of L.S.'s errors on the Event Video task involved the categorisation of non-events as events. This finding supports a claim made by Talmy (1996) that there may be a cognitive bias toward dynamism (see section 1.3.1). He discusses a cognitive phenomenon shared by the linguistic and visual systems, such that a factually static situation is conceptualised as motion, for example the visually perceived 'motion' when a chain of lights switches on and off in sequence and the linguistic encoding of motion in the following description of a static situation;

This road runs all the way to Paris.

These phenomena strongly suggest that there is a cognitive preference for dynamism.
The fact that such phenomena are apparent in vision and language suggests that this is a preference that is not mediated by either the visuo-spatial system or by the language system. The preference for dynamism seems to be a feature of the conceptual system itself. This claim for a cognitive bias toward dynamism is supported by L.S.'s performance on the Event Video task. On each occasion that he could not successfully categorise the scene (as evidenced by his errors) he chose to identify that scene as dynamic. Bringing Talmy's theory to bear on L.S.'s performance suggests that, in the absence of directions from the linguistic system as to how to distinguish events from non-events, an underlying cognitive preference for dynamism takes over. This led L.S. to categorise four of the static scenes as dynamic.

Looking in detail at the scenes L.S. had difficulty with, it is possible to hypothesise about how they may have been conceptualised as dynamic. Two of them involved people: in one there is a person sitting on a chair not moving, and in another there are two people in the same pose. These scenes could easily be described in terms of fictive motion, e.g.:

They are facing towards / looking into the camera.

The other two error scenes showed an object (in one case a camera and in the other a cup) on a table. A linguistic representation of fictive motion is harder in this case, but still possible:

The camera is facing towards me   ?The cup is pointing at the camera.

Such an account can thereby provide a principled explanation for L.S.'s pattern of error.

More importantly, it is possible to characterise these errors as an example of a cognitive phenomenon generally apparent in language and vision. In this way, L.S.'s impairment can be seen to have caused the application of a general cognitive process to inappropriate material, rather than having caused 'abnormal' processing. This is an important point, for two reasons:

1. It precisely describes the impairment that L.S. has suffered and explains how the impairment relates to his pattern of performance on this task.

279
2. It also characterises the impaired performance in terms of retained processing. The preference for
dynamism is a manifestation of a retained conceptual process; although conceptualisation is not
constrained as adequately as it would have been had the language exerted an influence, it is being
constrained in some way.

This analysis suggests possible approaches for therapy: attempting to capitalise on this existing constraint and
develop it to include linguistically-mediated information. This idea is pursued in section 6.4

The intention of this analysis is not to suggest that these are ‘either/or’ alternatives; constraint on
conceptualisation is not either language-mediated or (in language impairment) subject to cognitive
preferences. It is better to consider these effects as a continuum ranging from a cognitive preference for
dynamism, through language-general constraints to language-specific constraints. The language-general
constraints would include the five layers of processing discussed in detail in the next section. These are:
1. distinguishing events from non-events;
2. identifying event type;
3. identifying relationships;
4. identifying role information;
5. identifying perspective.

Language-specific constraints would govern how a scene was categorised and would be affected by the lexical
labels available in a particular language. This distinction between language-general and language-specific
constraints can be understood by a consideration of the cross-linguistic studies of categorisation reviewed in
section 1.3.2 (McNeill 1997; Slobin 1996a, b; Mandler 1996; Bowerman 1996). Mandler (op cit.) and
Bowerman (op cit.) both discuss the process of learning some spatial terms, such as on. In English this
situation is represented as a state but in Korean such as situation would be represented as a verb (e.g. put onto).

As children acquire their language, they learn which aspects of a situation their particular language requires
them to attend to. So, for example, English speaking children have to learn to attend to the static aspects of
situations which they are learning to describe as on states, as well as the relationship that this particular state
encodes. Children learning Korean also learn to attend to the relationship encoded but they do not learn to
conceptualise the static aspects of the situation. Instead they learn to attend to the dynamic event that brings about the relationship, e.g. the *putting* that leads to something being *on*.

As this is a process of acquisition, children make mistakes. In one study (Choi and Bowerman, 1991: see section 1.3.2), the English speaking children overextended the event *open* to various other events, such as *taking off a shoe*. Adults speaking these languages do not make such mistakes, which indicates that these tendencies have been learnt or have become automatic. A reconsideration of this research into the acquisition of event/state differences, in the light of L.S.'s performance on the Event Video task, suggests that the static aspect of states, such as English *on*, might be particularly vulnerable to impairment. Some languages treat the static aspect of *on* situations as less important than the supporting relationship itself: languages like Korean simply do not require this static aspect to be conceptualised. Consequently, it is simply a fact of English that the static aspect of the scene should also be represented in language. This is not to say that *on the table* is not a static relationship, but that the static element of the situation is not always an aspect that must be identified and signalled in language, consequently it is not necessarily a feature that must be represented in the linguistic system.

Similarly, Slobin (1996a), notes that these language-specific tendencies are particularly vulnerable to impairment because they require the conceptualisation of features that are not visually apparent. For example, such language-specific features often require a choice between attending to a static feature of a scene or packaging a number of sub-components of the scene together to be represented as an event. This choice depends on the lexical labels available in the language system. Slobin (op cit.) found that English speakers tend to attend to the dynamic aspects of a scene in comparison to Spanish speakers, who tended to attend to static features. A similar tendency was found by McNeill (op cit.) in the co-verbal gestures of English and Spanish speaking participants. The fact that these language-specific tendencies also show-up in gesture emphasises the claim that language can be used to constrain conceptualisation for non-verbal processes. Moreover, this task-independent, linguistically-mediated, constraint involves both those features that are common to all languages and those that are specific to a particular language.
These cross-linguistic observations point to the fact that both the static nature of spatial states in English and the dynamic nature of motion events in English are an artefact of that language. These are not perceptually verifiable facts. Consequently, L.S.’s performance on the Event Video can be described as a difficulty receiving reliable information from the lexico-semantic representations of English events and states. What is more, he would not have been able to conceptualise this information from the video scenes themselves, as these features are not visually verifiable.

The processing of events and states is also compared in the Objects and Actions Video task, in a limited way (2 event scenes are compared to 2 state scenes). This is a production task and so the difficulties shown by L.S. in the event comprehension tasks would not necessarily be reflected here. L.S.’s scores on the production task show a tendency toward more difficulty with states (see table 20 in ch. 4). More interesting is the particular means by which he was describing these states. In each instance of an on state, L.S. was producing sentences that could be characterised as dynamic descriptions. As noted in the results chapter, scores were given for predicates that appropriately described scenes even where these items were not completely correct and this is the case for L.S.’s description of the on states where he uses the predicate rests, e.g.

2 The ball rests the tables  (for the ball is on the table)

In addition, L.S.’s production in the Narrative task concentrated solely on event descriptions even though there were a number of relatively prominent states (e.g. Gromit is in bed, the cup of tea is on the bedside table).

There is some evidence then, that the tendency toward dynamism noted in the Event Video task was also apparent in production. There is no evidence for this tendency in the output of the other participants with aphasia. However, this is to be expected because they are all able to make the event/non-event distinction required by the Event Video. The suggestion being made here is that the language system directs attention to the demarcation of events, states and entities and when this influence is damaged in impairment a more general, language independent, cognitive tendency takes-over. That is, this cognitive tendency has some effect in unimpaired processing but here it is tempered by other, language-influenced, organising principles. In an

\[\text{2 The characterisation of rests as dynamic can be illustrated by the application of tests, used widely in the semantic literature (see Frawley 1992), to distinguish between events and states, e.g. :}\]

- Events can appear in the progressive but states cannot - \text{It is resting on the table;}
- Events can appear as imperatives - Rest there! 

282
impaired system, where the demarcation of events from non-events has been damaged, this cognitive tendency is no longer tempered in the same way.

L.S.’s conceptual difficulties were also evident in the Event Photograph task. However, this task was designed to reveal not only a difficulty distinguishing events from non-events but also to investigate the processing of the relationship information they encode. The task was designed so that the error patterns might reveal whether there were difficulties with particular types of relationship. This separation of event/non-event processing from the identification of the relationship encoded (and further layers of processing) is pursued in the next section. However, the fact that this task was given to L.S. in both a visual and linguistic format allows for further clarification of the interaction between language and conceptualisation. L.S. made the same pattern of errors on the visual and language versions of this task. This finding clearly supports the claim that language has an influence on conceptualisation in non-verbal tasks. Moreover, the pattern of his errors was analysable in terms of the inherently linguistic notion of relationship types (the conceptual constituents HAVE, BE, ACT and GO) in both the language and visual versions of the task. This strongly suggests that it is the same influence constraining conceptualisation in both tasks.

The particular pattern of errors made by L.S. in both modalities reveals the influence of the linguistic system on the conceptual system. It suggests that events and states are profiled relationally in terms of a set of conceptual constituents like HAVE, BE, ACT and GO. The use of such analysis in the linguistic system is evident: these constituents are associated with certain structures in the semantic and syntactic systems. There is nothing visual to distinguish these constituents however, and nothing in the visual appearance of such situations that requires them to be categorised in this way. The reason HAVE states are categorised as such in visual analysis is for the purpose of describing them. That is, this influence of language on conceptualisation is to ensure that conceptualisation is compatible with the linguistic system.

This section has emphasised the influence of the linguistic system in conceptualisation, suggesting that a language impairment is likely to manifest in both verbal and non-verbal tasks. The review of the literature and the results from this study also point to distinct layers of processing involved in this constraining process, which are considered in more detail in the next section.
6.2 LAYERS OF CONCEPTUAL PROCESSING

One of the main claims arising out of the literature and results presented here is the claim that conceptual processing is internally complex. Moreover, various layers of processing can be separated in the overall profile of performance of the participants with non-fluent aphasia. The basis of this claim is that the participants with aphasia performed differentially across the event comprehension tasks in this study. These participants were selected on the basis of the similarity of their performance on the Selection Tasks (see ch. 3); a set of tasks that was carefully chosen from the agrammatism literature to distinguish those people with non-fluent aphasia who had particular problems with verbs. In this context, the differences in their performance on the Experimental tasks is important. It could be argued that the differences in performance do not reflect separable layers of processing, but reflect the differential complexity of the tasks. This does not seem to be the most accurate account of the performance profiles presented in the following section (6.2.1-6.2.4).

There are three pieces of evidence that seem to argue against a simple ‘complexity account’:

1. The event comprehension tasks form a hierarchy in terms of the conceptual processing they require:
   - an error on the Event Video presupposes errors on all other event comprehension tasks (L.S.’s performance profile);
   - an error on the Event Photographs presupposes errors on all other tasks except the Event Video (R.B.’s performance profile);
   - an error on the Role Video presupposes only that errors will be made on the Perspective Video (R.K.’s performance profile); and
   - an error on the Perspective Video does not presuppose errors on any other task (the performance profiles of L.H. and J.F.).

This is not a hierarchy of general complexity: there is some evidence for this claim in J.D.’s performance profile, because he makes errors on the Event Photographs, but not the Role Video. The most likely explanation for J.D.’s profile is that he has STM problems, i.e. elements of his processing profile are unrelated to his conceptual and semantic processing. In consequence, J.D.’s performance supports the
claim that the above is not a hierarchy of general complexity reflecting the differential effect of each task on non-linguistics processing (such as STM).

2. The tasks were matched to each other, as far as possible, in terms of general cognitive load, this included controlling semantic and conceptual content, and controlling the language processing required by each task (in terms of the instructions given and the output required3);

3. The tasks were also matched to the Selection Tasks, as far as possible. For example, each set contained an odd-one out task; in the Selection set this was the Pyramids and Palm Trees test and in the Experimental set this was the Event Photograph task. Consequently, if performance on the Pyramids and Palm Trees test was unproblematic, any difficulty on the Event Photographs cannot be attributed to a particular problem with odd-one-out tasks.

The results of the participants with aphasia support the claim that there are layers of conceptual processing that may be distinguished. The layers identified by these tasks include the following: the distinguishing of events from non-events, identification of event type, relationship information, role information and perspective. These layers are discussed individually below.

### 6.2.1 Distinguishing Events from Non-events

The first of these layers, distinguishing events from non-events, was isolated by the Event Video task. It was designed on the basis of Langacker’s notion of scanning. This notion provides a useful way of characterising the process of distinguishing events from non-events, although it may be that scanning is not the mechanism used. What is clear from the results of the participants with non-fluent aphasia is that, whatever the mechanism used, there is a separable process of distinguishing events from non-events. The characterisation of the linguistic influence on conceptualisation, given in the previous section, also served to explicate this first layer in detail. For this reason, there is no need to discuss the nature of this processing further here.

---

3 The event comprehension tasks required no language output, except in the case of the Perspective Video - the effect of this difference is discussed in section 6.2.4.
However, it should be emphasised that this layer of processing can be individually targeted by the Event Video task. A separable impairment in just this aspect of processing would not be expected, however. The reason is that an inability to distinguish events from states would also mean that the other layers of processing could not be carried out: identifying participant entities, the relationship between them, and the role they play is largely contingent on distinguishing a situation as an event or state. These processes are certainly contingent on identifying the scene as something more than a collection of single entities. This prediction is borne out by the performances in this study, in that L.S. had particular difficulty with the Event Video and also had difficulty on all the other tasks. This is not to say that the process of distinguishing events from non-events cannot be separately targeted in therapy. This issue, and possible methods, are discussed further in section 6.4.

6.2.2 Interpreting Relationship Information

The Event Photograph task was designed to separate a further layer of conceptual processing: the identification of the relationship information encoded by an event or state. There are some participants who performed the Event Video without error but who had problems with this task. This finding supports the claim that the Event Photograph task targets a different layer of processing. The design of the task made it possible to analyse any errors made in order to see whether there was a particular pattern. The results showed that in all cases there was a pattern; a pattern that was most reliable in the case of L.S. who also made the largest number of errors. This pattern illuminates the means by which relational information might be identified, this possibility is considered in detail below.

It was important to also rule out the possibility that the error pattern for this task might be due to non-linguistic features of the stimuli: the following non-linguistic features were considered as strategies for selecting the 'odd' photograph:

1. whether the photograph shows an animate participant entity (as compared to those showing only inanimate entities),
2. whether the photograph shows a single animate entity (as compared to those that have more than one);
3. whether the photograph shows a human (as compared to those showing a cat).

The task was carried out using these strategies and the results were then compared to the results of the participants with aphasia both individually and as a group (see section 4.1.2). The strategies did not yield the
same pattern as that produced by the participants with aphasia. In support of this conclusion, it is useful to consider the language version of this task, because this change of modality has certain important effects on the potential for using these non-linguistic strategies. L.S. was given the language version of the Event Photograph task because, although he seemed to have a problem categorising relationship information for visually presented scenes, it was important to assess whether this problem would also affect the conceptualisation of events from language; the results showed that he had the same problem with events encoded in language, making the same pattern of errors. This version of the task provides a useful means of investigating the possible use of strategies because the events are encoded in verb phrases rather than sentences (see ch. 5). The effect on the strategies of this stimulus difference is twofold:

1. The animate / inanimate distinction disappears in most cases, for example consider this GO-GO-BE triad:

   \[
   \begin{align*}
   \text{falls off the table} & \quad \text{jumps in the air} & \quad \text{seems unhappy}
   \end{align*}
   \]

2. The difference between a one-person event and a two-participant event is lessened by the structure of the language, so that both appear in verb phrases with one internal argument. This structure seems to emphasise that both types of event involve two participant entities, for example consider this HAVE-HAVE-ACT triad:

   \[
   \begin{align*}
   \text{owns a bike} & \quad \text{has a toothache} & \quad \text{kicks the man}
   \end{align*}
   \]

The fact that L.S. made the same pattern of errors on both versions of this task, but could not have been using the non-linguistic features discussed above for the photograph version, strongly suggests that the pattern is due to the linguistic features of the task. These linguistic features are discussed in more detail below.

In the theoretical accounts reviewed in the first chapter, a common way of achieving the analysis of situation type was to invoke a set of 'basic' conceptual constituents. The aim of this task was to see whether such constituents are available as a means of conscious categorisation: in this case, as a means of selecting an odd-one-out. The constituents used in the task, HAVE, BE, ACT and GO, were taken from Pinker (1989: see
section 1.3.1) and are assumed by a number of others. These four predicate types consist of two events and two states; the two events are characterised as having the feature [+ dynamic] and the states [- dynamic]. There is also another feature distinguishing these constituents, which cuts across the event-state distinction so that both states and events can be [+control] and they can both be [-control]. This feature relates to whether the first arguments of the event/state is animate (or more precisely is human and in control).

Thus, the four categories of predicate are characterised as follows:

<table>
<thead>
<tr>
<th>Predicate</th>
<th>Dynamic</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAVE</td>
<td>[-dynamic]</td>
<td>[+control]</td>
</tr>
<tr>
<td>BE</td>
<td>[-dynamic]</td>
<td>[-control]</td>
</tr>
<tr>
<td>ACT</td>
<td>[+dynamic]</td>
<td>[+control]</td>
</tr>
<tr>
<td>GO</td>
<td>[+dynamic]</td>
<td>[-control]</td>
</tr>
</tbody>
</table>

As these features are important for patterns in the semantic and syntactic systems, they should be one of the important aspects of a scene that must be picked out during conceptual analysis of the scene. L.S. made more errors when the ‘odd’ photograph depicted a HAVE predicate ([-dynamic] [+control]). In addition, when he made an error, the photograph he chose instead of the target tended to be a GO predicate ([+dynamic] [-control]). Moreover, a HAVE predicate was more likely to be correctly identified as ‘odd’ if it was presented along with ACT (than if it was presented with a GO predicate) and a GO predicate was more likely to be mis-identified as ‘odd’ when it was presented with HAVE (than when it was presented with BE).

To account for this finding, it is necessary to look at what these two problematic conceptual constituents (HAVE and GO) have in common. These are the two constituents in the set that have conflicting features; that is, one + features and one - feature. This would suggest that if someone was having any difficulty identifying events and states, the most commonly misidentified scenes would be the ones with a conflict of features, i.e. GO and HAVE. It is likely that the easiest state to identify is [-dynamic] and [-control] and the easiest event is [+dynamic] and [+control]. In other words:

- BE is the most ‘state-like’ state, and
- ACT is the most ‘event-like’ event.

The participants with aphasia who had difficulties with this task, had a tendency to have more difficulty with the least prototypical conceptual constituents, that is those constituents with conflicting features.
R.B. was one of the participants with aphasia who had problems on the Event Photograph task, although the Event Video caused him no problems. This difference is due to the different processing requirements of the tasks: in the Event Video the scenes only have to be analysed in sufficient detail to distinguish events from non-events; the Event Photograph task requires further processing so that the scene depicted can be compared to two others and then categorised as either like or unlike them. R.B.'s conceptualisation allowed the identification of events from the video but was not always sufficient to accurately categorise the situations from the photographs. The conceptual constituents used in the Event Photograph task were intended to provide a mechanism for relating aspects of the scene: in Langacker's terms, a way to effect the relational profiling necessary for analysing events and states. So once the decision is made that a scene can be profiled relationally, it is then possible to make explicit the type of relationship (having, being, going or acting) and consequently the components being related (THINGS, PATHS, PLACES etc).

Any errors made on the task could have been due to two main problems:

1. a general inability to distinguish events from states; or
2. an inability to distinguish types of relationship (i.e. HAVE, BE, ACT, GO).

In R.B.'s case the first option is unlikely because of his intact performance on the Event Video. It is a possibility that he had a slight difficulty in this aspect of processing that did not show up in the video, but that this small difficulty was 'magnified' in the context of the extra processing required by the odd-one-out decision.

The extra processing would have been either:

- Short term memory: retaining the analysis of one photograph long enough to compare it with the others; or
- The 'odd-one' decision: this decision itself may be a problematic process.

However, both these possibilities seems unlikely for a number of reasons:

- R.B. successfully carried out the STM task;
- R.B. was successful on another odd-one-out task, the Pyramids and Palm Trees Test; and
- the distinct pattern of R.B.'s errors would be difficult to explain in either of these accounts.

It seems more likely that, in order to make 'likeness' judgements, R.B. had to process the photographs in such a way as to identify the type of relationship depicted. The errors were caused by event types that were
particularly difficult for him to characterise, probably because they were not the most 'typical' instances of their type.

The claim being made here is that there is a separable layer of conceptual processing that deals with the relationship information encoded by events and states. This process is not one that has been previously highlighted in discussions of conceptual processing. More commonly it is the role information encoded in events and states that is the focus of attention. The role assigned to a participant entity is closely linked to the relationship in which that entity is a participant. So, for example, the fact that an event is an instance of an ACT relationship will entail that the first participant entity has the role of Agent. However these processes, although interrelated, are potentially separable: the relational information encoded by events and states is the conceptual equivalent of identifying arguments in syntactic structure and distinguishing them from non-arguments. Moreover, just as assigning roles is a further semantic process, the assignment of roles in conceptual structure is potentially a distinct process. The literature reviewed in chapter 1 points to the separability of these two processes and there is some evidence in the results reported in chapter 4 that may be explicable in this light. This evidence is outlined in the next section.

6.2.3 Interpreting Role Information

The Role Video (see section 1.5) is a potential source of evidence for the claim that role and relationship information are separable. In this video there were three scene types: people acting on objects (non-reversible), people acting on people (reversible) and changes of possession (reversible). For each scene an outcome photograph had to be selected from a selection of three. This meant there were two types of error that could be made:

1. an event error, which involves the selection of a photograph depicting the correct participant entity in a different event; and

2. a role error, which involves the selection of a photograph depicting the correct event involving the wrong participant entity.

This design means that an inability to interpret role information would lead to role errors on the reversible scenes.
Consider, for example the following scene:

*A man trips a woman*

The selection of photographs in this case would be: the woman on the floor (target); the woman with a black-eye (event distractor); the man on the floor (role distractor). An inability to interpret role information would not preclude the identification of the event as an instance of *tripping* (thereby ruling out the ‘black-eye’ photograph) but would make it hard to decide between the two other photographs.

This task was originally designed for M.M. (Marshall et al 1996) who had problems interpreting role information from events and who made just such errors: she only made errors on the reversible scenes and these errors were all role errors. The participants with aphasia in this study also made role errors on the reversible scenes. In addition, they also made some errors on the non-reversible ‘object’ scenes, these were scenes like the following:

*A woman mashes a banana*

It is not possible to confuse the roles played by the participant entities in this event because of selectional restrictions; that is, *the banana cannot mash the woman*. However, the task was carefully designed so that another potential theme (in this case an avocado) was present in the scene, although in the background and so not part of the *mashing* event. An error due to the selection of the photograph of the avocado is not a role error in a straightforward way. This is because the avocado is not a participant entity. Errors on the non-reversible scenes therefore seem to indicate that there was some other aspect of conceptual processing causing difficulties here.

In order to conceptualise the event it would be necessary to distinguish between those entities participant in the event and those in the background. This is a process usefully characterised by Langacker’s notion of ‘profiling’. That is, the scene must be conceptualised in such a way as to find a relationship that relates the entities in some way. As there is no event or state that relates the *fork*, the *banana* and the *avocado*, one of these entities must be dismissed in the profile. An inability to profile relationally would lead to errors of the sort made by L.S., R.B. and R.K., that is, ‘role’ errors in non-reversible scenes.
An alternative explanation for role errors on the 'object' scenes is raised by the authors of the task. They propose that M.M. only made role errors on the reversible scenes because she was able to make, “broad decisions about cause and effect and show basic sequencing skills” (Marshall et al, op cit). It could be that the participants in the present study were unable to process cause and effect and sequencing information. This is unlikely however, as such a difficulty would (as the authors imply) cause both types of errors on all three scene types. R.K. made only role errors and L.S. made mostly role errors (the only event errors he made were on the two-people scenes - see below), suggesting that their problems need to be accounted for in a way that more precisely explains the particular pattern of errors they made.

A good way to account for the role errors on non-reversible scenes is to posit a problem with profiling the scenes relationally. This difficulty accounts for any ‘role’ errors on the ‘object’ scenes. It should be emphasised that the number of such errors produced by the participants in this study is relatively low (R.K. made 1 such error, R.B. made 1 and L.S. made 2), although their very presence provides some support to the predictions from the theoretical account in chapter 1. Such a small number of errors does not allow any conclusions to be draw about the existence of a separable layer of relational processing but the theoretical possibility remains.

If the ‘role’ errors on the ‘object’ scenes is explained in terms of difficulty with relational processing, there is a possibility that such difficulty would also account for role errors on the reversible scenes. Consider, for example, the following scene:

A man hits a woman

A difficulty processing the relational information here would mean that, although the scene would be conceptualised as two people involved in a hitting event, the information about how these two people are related - to each other and to the event - would not be conceptualised. When recast in these terms, the notion of interpreting relationship information seems to be the same as the notion of interpreting role information. However, the difficulty here is that the ‘role’ error in the non-reversible scene is not comparable with the role error in the reversible scene: there is no additional potential theme in the background of the reversible scenes. This fact makes it difficult to definitively argue that, in the case of reversible scenes, there are separable
problems interpreting role and relationship information. This possibility would need to be investigated further by a specifically designed task: for example,

- by including reversible scenes which also contained background items;
- by including non-reversible scenes with different types of background items (plausible and implausible)

It may be that the best way to understand the distinction between role and relationship information is to look at the profiling process in more detail. It is likely that, in order to identify the relationship encoded by an event, the profiling process must first identify the participant entities and then encode the relationship between them. This identification of participant entities is the conceptual equivalent of identifying arguments in semantic structure. Conceptualising the role taken by these participant entities is a further process, specifying the role of those participant entities in more detail. The identification of the roles taken by these participants is the conceptual equivalent of assigning a thematic role to an argument in semantic structure. The 'role' errors on the non-reversible scenes made by the participants in this study do not provide enough evidence for this distinction, a person who makes more errors of this type, or even only errors of this type, would be needed before any firm conclusions could be drawn. At the very least however, this analysis reveals that processing of role information may be more complex than it seems, and may involve the interpretation of different types of information for different event types.

R.K. also made errors on the Event Photograph task, which was designed to tap into relational processing. Her performance here is consistent with the above analysis of her Role Video errors. There is an alternative explanation for errors on the Event Photograph task, in that it is possible that this task simply involves the distinguishing of events from states. This is because each photograph triad on which the 'odd-one' decisions were made consisted of either state-state-event or event-event-state. This is unlikely to be the cause of error in R.K.'s case, however, because of her intact performance on the Event Video task. It seems more likely, then, that the Event Photograph task required the processing of relationship information.

The most coherent account of R.K.'s performance on the event tasks discussed so far, results in the following profile:

1. R.K. could distinguish events from non-events,
• she performed the Event Video task without error and made no event errors on the Role Video task;

2. R.K. had some difficulty with interpreting relationship information,
   • she made two errors on the Event Photograph task,
   • she made one ‘role’ error on an ‘object’ scene in the Role Video; and

3. R.K. also had difficulty interpreting role information,
   • she made role errors on the reversible scenes in the Role Video

As well as providing a coherent account of R.K.’s performance, this analysis is productive in that it also accounts for the performance of R.B. on the same tasks. R.B.’s processing can be profiled as follows:

1. R.B. could distinguish events from non-events,
   • he performed the Event Video task without error;

2. R.B. may have had difficulty with interpreting relationship information (but see comments about event errors below),
   • he made four errors on the Event Photograph task,
   • he also made one ‘role’ error on an ‘object’ scene in the Role Video; and

3. R.B. also had difficulty interpreting role information,
   • he made role errors on a number of the reversible scenes in the Role Video

In addition to the errors listed above, R.B. also made event errors on the Role Video task. This suggests a further separable layer of conceptual processing, namely the recognition of event type. This problem may well have caused all of R.B.’s problems on the Role Video. Recognising an event type is not the same as recognising the relationship encoded in an event, although the processes are related. Recognition of relationship types entails the identification of an underlying conceptual constituent (such as ACT) in the event’s conceptual structure. Such constituents underlie more than one event, such as mashing, hitting and tripping. Recognition of event type, on the other hand, is the more specific identification of a particular event. For example, recognising hitting as an event involving force and contact and being able to distinguish it from mashing or tripping. The claim that R.B. had difficulty recognising events in this task means that he was unable to analyse the scene in sufficient detail to categorise the event type. Such a problem would yield event
errors on both reversible and non-reversible scenes, as it did in R.B.'s case. The full profile of R.B.'s performance is as follows:

1. R.B. could distinguish events from non-events,
   - he performed the Event Video task without error;
2. R.B. had difficulty recognising event types,
   - he made event errors on all three types of scene in the Role Video;
3. R.B. may also have had difficulty with interpreting relationship information,
   - he made four errors on the Event Photograph task,
   - he also made one 'role' error on an 'object' scene in the Role Video;
4. R.B. also had difficulty interpreting role information,
   - he made role errors on a number of the reversible scenes in the Role Video.

Problems recognising event types were also apparent in L.S. performance on the Role Video. L.S. made a number of errors on this task, including event errors. Interestingly, in L.S.'s case the event errors were only made on the 'people' scenes, not on the scenes involving a combination of people and objects (the 'object' and 'change of possession' scenes). Such a finding can be accounted for by an analysis of the scope of the events involving objects and a comparison with the scope of those involving only people. It is likely that events involving an action on an object are easier to conceptualise because of the relative narrowness of their scope. Events involving actions on people, on the other hand, generally have a relatively wider scope.

As an example of scope differences, consider how the scope of the following event changes depending on its internal argument:

1a) Leo painted a picture
1b) Leo painted the bedroom

The action of painting varies widely from event 1a) to event 1b). The action necessary to paint a picture is probably more similar to that used for writing a letter than to the action necessary for painting a room. However, it is the two events painting a picture and painting a room that are conceptualised as alike because of the lexical label in English. In other languages, these two events may not be categorised alike. For example, in
Italian event 1a) is given the label *dipingere* whereas event 1b) is labelled *pitturare, decorare* or *imbiancare*. 5

Most predicates that combine with an object internal argument do not vary in this way however,
e.g. 2a)  *They ate the cakes*  2b)  *They ate a four course meal*
3a)  *Cellan threw the ball*  3b)  *Cellan threw the confetti*

Events involving an action on a person are generally more like the *paint* example, in that the scope of meaning varies relatively widely. Compare, for example, the relative scope of meaning the sentences below where *kick* combines with either objects or people.
e.g. 4a)  *The woman kicked the ball*  4b)  *The woman kicked the door*
4c)  *The woman kicked her husband*  4d)  *The woman kicked the mugger*

Also, consider how the meaning difference between 5a) and 5b) below:

5a)  *Azama pushed his father*  5b)  *Azama pushed his little brother*

It seems that humans do not constrain the meaning of the event as strongly as inanimate objects do, leaving a wide scope for meaning differences.

This is an example of Pustejovsky’s (1995) notion of ‘co-composition’, in that the event has a different interpretation depending on the meaning of the entity it combines with. As Bierwisch (1997) emphasises, this is not a simple matter of the combination of semantic structures of the predicate and its argument, ‘co-composition’ crucially involves the fully enriched meaning of the combined items. That is, comprehension is a processes of integrating information from a range of sources including semantic, conceptual and pragmatic.

This complex integration process is also stressed by other models of conceptual processing discussed in chapter 1. Bierwisch (op cit) compares the following:

*He left the institute an hour ago*

*He left the institute a year ago*

These two sentences require different interpretations of both the predicate and the NP *institute*. The different interpretations are reflected by the different adverbial phrases in each sentence, although the adverbial phrases are not the cause of the difference. As Bierwisch says,

---

4 This analysis was suggested to me by Maria Black (personal communication)
5 Thanks to Maria Black for the Italian examples.
“[the difference] has nothing to do with the meaning of [the adverbial phrases] as such, but with world knowledge about changes of location or institutional affiliation and their temporal frames.” (op cit.: pg.37).

When an event involves an action on a person, connotations other than the meaning encoded by the predicate are often conceptualised. These other aspects of conceptualisation include pragmatic inferences (such as the impression that the woman was angry in 2 b)), the reaction of the person in the theme role and also the conceptualisation of events leading up to and following the event encoded in the verb kicking. For example, in the Role video all the scenes involving people acting on people involved additional or 'contextual' action leading up to (and following) the central event, for example: the hitting scene also involved the anger of the 'hitter', the shock of the 'hittee' and the action of the 'hittee' falling on the floor; the tripping scene also involved the 'trippee' walking past the 'tripper' and the 'trippee' falling. The 'object' scenes did not usually involve such 'contextual' action, for example: the mashing event only involved the mashing action, the person did not perform any other action and the banana was not involved in any event independent of the mashing.

It is important to also examine L.S.'s performance on the other tasks, such as Noun/Verb naming, for differential processing of photographs showing inanimate or human arguments. However, his difficulty naming verbs was such that he named only 1 out of the first ten photographs and then was unable to continue. For this reason it was impossible to find any patterns. Similarly there were no patterns apparent in the Narrative task (L.S. never produced a verb with more than one argument) nor in his comprehension in the Sentence Judgement task (where there were too few errors).

In line with the conceptual processing profiles presented above, L.S.'s performance may be characterised as follows:
1. L.S. had problems distinguishing events from non-events,
   - he made four errors on the Event Video;

2. L.S. also had difficulty recognising event types, in events involving two people,
   - he made event errors on the ‘people’ scene in the Role Video.

3. L.S. had difficulty interpreting relationship information,
   - he made a number of errors on the Event Photograph task, in both the visual and verbal version,
   - he also made two ‘role’ errors on ‘object’ scenes in the Role Video;

4. L.S. had difficulty interpreting role information,
   - he made role errors on a number of the reversible scenes in the Role Video; and

It is possible to characterise the impairments of the participants with non-fluent aphasia with such processing profiles because of the way that the tasks were designed. This point will be discussed again in section 6.4, but it is important to emphasise here that these profiles provide a way to summarise the conceptual processing of each participant with aphasia in the same format and in the same detail. A major benefit of this approach is that it also allows precise comparisons to be made across participants. One useful comparison is between the respective performances of R.B. and L.S. There are two main ways in which the conceptualisation problems of these two participants differ:

1. R.B. could distinguish between events and non-events but L.S. could not; and

2. R.B. seemed to have difficulty identifying event type generally whereas L.S. only had such problems if the event involved people acting on people.

As discussed in chapter 4, R.B. had a very strong sense of temporal structure and was able to indicate this in his output. This is an aspect of conceptualisation that caused particular difficulty for L.S., who had a tendency to conceptualise all scenes as dynamic. This difference seems to be the underlying cause of their differential performance on the Event Video. It is a difference that can also be seen in their output for the Objects and Actions Video, for example:
a) for the close-up version of the ‘the ball is on the table’ scene (where the viewpoint begins on the
ball and then expands to the table)

R.B. - Ball and then table
L.S. - The ball rests the tables

b) for the close-up version of the ‘a ball is hit by another ball’ scene (close-up on the theme)

R.B. - Ball steady, then ball bang, and tennis ball
L.S. - The ball the hits the ball

These examples also illustrate the second difference between R.B. and L.S.: the fact that L.S. can identify
event type more often than R.B. In R.B.’s examples (and generally in the data) there is no clear indication as to
which word labels the main action, rather there is a list of sub-actions linked in terms of their temporal
sequence. L.S., on the other hand manages to identify one central action on which to focus his description.

6.2.4 Perspective Taking

The Perspective Task was part of the set of tasks investigating conceptual processing in the comprehension of
events. However, it is slightly different from the other tasks in this set because once the event processing was
carried out, the task required the selection of a matching lexical label, i.e. language processing is also involved.
The task was designed so that a conceptualisation of the event would be formed before presentation of the
lexical items, so that the lexical labels would not constrain, and so aid, the conceptualisation. In terms of the
event comprehension part of the task, the Perspective Video allows for the isolation of a further layer of
conceptualisation: the conceptualisation of information about the perspective from which to describe the scene.

Perspective-taking is a complex process for a number of reasons. The first is that there is no single necessary
way of assigning perspective and so there is a certain amount of freedom of choice. In this respect, this aspect
of conceptual processing differs from those discussed above. Event/non-event distinctions and interpretations
of relational and role information are processes constrained by various factors, the most important of which is
the structure of the language: perspective-taking is often subject to similar constraints, but not always.
However, although language does not often insist on which perspective to take it does insist that some sort of perspective is taken. There is no perspective-free way to describe a scene. For example, consider the following motion events:

\[
\text{He came to my office} \quad \text{or} \quad \text{He went to my office.}
\]

In English there are two related sets of events that have such directional perspective encoded in their meaning: inherent direction events (e.g. enter/leave) and events of transaction (e.g. buy/sell). In both sets of verbs there is a meaning component referring to the path of the motion; the former set tends to encode a single path only whereas the latter encodes the initial and final points of that path. For example, enter refers to an ‘inward’ or ‘toward’ path whereas buy specifies the movement from one person or place to the buyer.

However, the situations themselves do not signal which kind of path to specify, this is an aspect of choice in the conceptualisation. In other words, enter and leave can both describe the same situation but from different perspectives: the choice of perspective directs not only the kind of path to encode but also the lexical label to use.

Processing perspective information can thereby be seen to be a particularly complex aspect of event comprehension. The difficulty begins with the relatively unconstrained, although obligatory, choice in the conceptualisation process but also leads to a related choice in terms of lexicalisation. The complexity of processing involved might be best understood in terms of the following choices that are made during the process:

• which perspective should I take on this scene?
• am I free to choose or is there something constraining my choice, such as a particularly salient or important participant entity?
• do I have lexical labels for all the perspectives that may be taken?
• if I decide to describe the scene from the point of view of the source of the motion, do I need to mention the goal or just the general direction?

The scenes in the Perspective Video attempted to constrain some of these choices by biasing the perspective. For example, one of the videoed scenes focussed on the ‘giver’ in the give/take scene to bias the interpretation.
towards the selection of *give.* The ability to interpret perspective information is still required even when there is such a bias, that is, the impact on language of the visual bias must be conceptualised. In addition to this event comprehension process the participants were required to processes the perspective information encoded in the lexical labels that were presented to them in a multiple-choice format.

For these reasons the Perspective Video task was the most complex task in the Event Comprehension set. Indeed all 6 participants with non-fluent aphasia made errors on this task. Moreover, J.F. and L.H. made errors here although they showed no other conceptual processing difficulty. However, the complexity of the task also made the interpretation of these errors problematic. There are a number of alternative accounts:

1. identification of perspective encoded by the event is problematic and so cannot drive lexical selection;
2. perspective is correctly identified but there is an impaired representation of the associated verb at a separate semantic level; or
3. perspective is correctly identified and the semantic structure of the verb is adequate but the lexico-semantic representation is impaired.

This task does not provide enough evidence to choose between these possibilities in the case of L.H. and J.F. However, it is interesting to note that the two errors that J.F. made may have been due to perseveration. It was noted in the results chapter that J.F. had a tendency to perseverate in his production for the verb naming task (see section 4.2.2). This occurred when he could not name the verb specifically and had to produce a semantically ‘light’ verb. For example *putting the clothes on* for *dressing.* Once this ‘light’ verb had been produced for one picture it was always produced again for the next picture, i.e.:

```
putting the clothes on       (dressing)
putting water on the face    (soaping)
```

In the perspective video, there may have been a visual perseveration rather than one linked to lexico-semantic information. The reason for this is that scenes were in a randomised order so that an Agent-Theme event would not be followed by another event with the same thematic structure. Consequently it was not possible to perseverate in terms of repeatedly taking the perspective of a particular thematic role. However, the people performing the events were the same in a number of the scenes and so the perseveration seems to have manifested as a tendency to take the perspective of the same person from scene to scene.
For example, in the *carrying* scene the Agent was a girl called Tashuma and the Theme role was taken by a boy called Henry. For this scene, J.F. correctly chose *carry* as the label. In the next scene Tashuma *sold* a newspaper to Henry, although the perspective biased the scene so that the most appropriate label was *buy*. J.F. incorrectly chose the label *sell*, the label that describes the scene from Tashuma’s perspective. This same pattern occurred for the other perspective error. There are not enough errors here to fully justify this claim, however perseveration was also a feature of J.F.’s processing on another task. The possibility of perseveration in terms of the way a conceptualisation is structured could certainly be considered in assessment and therapy tasks. The issue is considered again in section 6.4.

In the case of L.S., R.B. and R.K., the combination of their performance on the other conceptual processing tasks and their performance here, on the Perspective Video, suggests that the first hypothesis is the most likely. That is, these three participants had other event processing difficulties (albeit with different aspects of such processing) so it is likely that some of their verb selection errors were caused by impaired conceptualisation of the associated event. Moreover, these three participants had a differing pattern to their errors, that could be interpreted along the same lines as their performance on the other conceptual tasks. That is:

- L.S. made perspective and distractor errors, reflecting his more profound conceptualisation difficulties;
- R.B. made only perspective errors, which supports the claim that some part of his conceptualisation was intact but that at times his analysis did not provide as much detail as was required;
- R.K. showed a similar pattern to R.B. (all but one of her errors was a perspective error) reflecting her partially intact conceptual processing.

The main claim in this section is that the pattern of performance of the participants with non-fluent aphasia indicates that conceptual processing for language is internally complex. There are a number of separable layers of processing that may be selectively impaired in comprehension and possibly also in production. The layers discussed were:
1. situations must be conceptualised (or scanned) in order to distinguish events from states;

2. situations must be conceptualised in order to identify event-types;

3. situations must be analysed (or profiled) to identify the relationship encoded by the event and to identify which participant entities are involved;

4. situations must also be analysed to identify the roles played by the participant entities; and

5. situations must be conceptualised from a particular perspective.

This analysis gives an outline of the kinds of processing involved in conceptualising and indicates separable layers of processing that may be impaired. Moreover some of these aspects of processing have not been emphasised before in accounts of conceptual processing, particularly in the clinical accounts of the language of people with non-fluent aphasia. Such an analysis can also predict the likely effect of an impairment of these layers of processing in comprehension (as in the discussion above) and in production. The effect on production is discussed in the next section.
6.3 THE EFFECT ON LANGUAGE OF IMPAIRMENT TO CONCEPTUALISATION

As noted in the introduction to this chapter, the conceptual system requires certain organising principles to structure information so that the information it processes can be used by language. The detail of the linguistically-mediated principles was outlined above. In this section, the focus is on the way in which this structured conceptual system affects language processing. It is important to separately consider input and output: the comprehension of language stimuli and language production.

The review in chapter one drew a precise distinction between comprehension and production in these terms:
1. the comprehension of language is a process of enriching the information contained in language form to create a full conceptualisation;
2. the process of accessing language from conceptualisation requires that the conceptualisation be refined into a structure appropriate for language.

Accordingly, predictions can be made about the effect on language of impaired conceptualisation. Broadly, such an impairment can be viewed as a loss of constraining principles although this loss will have different effects on input than output. It is important to emphasise that the site of the impairment is hypothesised to be the lexico-semantic system, an impairment that results in reduced influence on conceptualisation, which in turn affects language processing. Such an effect should be described separately for input and output:

- For describing an event, the impairment will result in a reduced ability to decide how to structure conceptualisation. This lack of structure prevents access to the language system.
- For comprehending an event encoded in language, the impairment will result in a reduced ability to enrich the information into a full conceptualisation.

These effects will be considered in more detail below.

Production requires the conceptualisation to both identify those aspects of a situation that language refers to and to structure this information so that it is compatible with the strict structural requirements of language.
The effect of impaired conceptualisation can, therefore, be expressed in more specific terms:

- reduced ability to decide how to structure information in order to express it in language;
- omission, in conceptual structure, of certain aspects of the situation that are crucial for expression in language; and
- reduced access to lexical labels and argument structure due to under-specification of conceptual information.

These predictions are borne out by the results of the participants with non-fluent aphasia on the Event Comprehension tasks, which also reveal those aspects of the encoded structure of an event that seem to be particularly problematic. There is further evidence for the first prediction, in the language produced for the Objects and Actions Video task: the most striking aspect of the descriptions produced for this task was that, for all the participants with non-fluent aphasia, they represented an improvement on the other production measures. It may be that the Objects and Actions scenes are constructed in a way that aids, or constrains, the structuring of conceptualisation.

The review of accounts of conceptual processing presented in the first chapter all emphasised the complexity of structuring and packaging information to make it accessible to the linguistic system. It is therefore likely that the removal of certain aspects of choice from the conceptualisation process would make that process less complex. This simplification of conceptualisation should make the translation of conceptual structure to linguistic structure easier. Scenes like those in the Objects and Actions video can be seen to simplify the conceptualisation process by removing some aspects of choice, thereby improving the production of participants who have difficulties structuring conceptualisation. For example, one of the choices that is reduced in the Objects and Action scenes is the choice of participant entities, as the scenes do not involve non-participants: i.e. scenes involve only those entities that are:

1. obligatory participants:
   
   e.g. on states - depict only the ball and the table,

2. obligatory and optional participants

   e.g. rolling events - depict only the man, the ball and the table.
In order to assess this claim, the Objects and Action Video should be compared with the 'Wallace and Gromit' video used for the Narrative task. The Narrative video was subdivided into 5 scenes (for details, see chapter on Selection Tasks) in order to make it as comparable as possible to the Objects and Actions Video. For any structural differences the scenes themselves must be considered. The Objects and Actions stimulus comprised short, clearly delineated scenes with only one completed action in each whereas the Wallace & Gromit video is a connected narrative with one scene leading into another and with actions leading on to other actions. This means that the Narrative scenes are internally more complex than those of the Objects and Actions Video. This complexity difference is specifically to do with the complexity of factors relevant to language - for instance number and type of events, the temporal sequence involved, involvement of non-participant entities - and not in the complexity of information presented per se.

As an example, compare the entities involved in the following scenes with those in the Objects and Actions scenes analysed above:

1. an on state - involved a cup, a ball of wool and the bedside table.

2. a knitting event - involved the whole bedroom scene, in which Gromit was knitting in bed.

In scene 1, all the objects are possible participant entities in the on state. However, structuring this information for describing the scene is relatively complex, either:

- all the entities can be mentioned by name - the cup and the ball of wool and the clock are on the table; or
- the entities can be collectively identified - there are some things on the table; or
- one particularly important entity can be selectively named - the ball of wool is on the table.

In scene 2, there are many objects included in the scene that are not participant in the knitting event, requiring the participant entities to be identified and distinguished from background entities.

At first sight, it may appear that the Narrative video presented a greater difficulty with general information processing, i.e. visual information, tasks demands or sequencing skills. This would imply that any difficulties were caused by a higher cognitive load, however the Objects and Actions Video required:

---

6 N.B. this entity is important because it is involved in a subsequent action - falling from the table - this connection between situations is itself a further complexity in the Wallace and Gromit video that is not part of the Objects and Actions video.
• a comparable amount of visual processing, e.g.,

the processing required to perceive: the position of the objects; the sequential movements of the objects; and the relative size of the objects; and

• a comparable amount of general cognitive processing, e.g.,

the sequencing required to perceive the scenes as a whole and the assess of cause and effect.

Any complexity difference between these videos is related to the processing necessary in order to structure a description of an event or state for language. That is, the structure of the Object and Actions Video is compatible with the requirements imposed on conceptualisation by the linguistic system, requirements such as those outlined in the previous sections. So, for example, the Objects and Actions Video provided clear unambiguous information about the entities that were participant in a particular situation (see above analysis). These two on states can be seen to be directly comparable in terms of their visual and cognitive processing requirements - they depict the same state and the objects involved are similar visually and in terms of their familiarity. However, the descriptions produced for the two on scenes differ widely:

• in the Narrative task, none of the participants with non-fluent aphasia managed a description of this state
  and only one participant mentioned a participant entity (the ball of wool);

• in the Objects and Actions Video, each of the six participants with aphasia produced at least one successful description of this state (successful both in terms of word order and predicate choice).

These results support the claim that there is something inherent in the structure of the Objects and Actions video scenes that is consistent with the structure required by language and, this being so, the Objects and Actions scenes aid or constrain the conceptualisation of the visual information and so provoke better production. In order to further assess this claim, J.F. and L.H. participated in a production version of the Perspective Video7. Their production in this task also represented a marked improvement on their Narrative descriptions, suggesting that the Perspective video scenes also constrained conceptualisation in some way. In this video, the most obvious form of constraint comes from the visual bias toward a particular perspective: the
choice as to which perspective to take, in the absence of the video scene, would require more constructional effort and the influence of other representational systems. As an illustration of the constraining effect of the Objects and Actions and Perspective videos, consider these examples of L.H.'s production:

- **Wallace & Gromit:**
  
  Knitting ----► Gromit

  Lady shake

  pushing the cat

- **Objects and Actions**
  
  The ball is sitting on the table

  The big ball is knocked of by the small ball

- **Perspective**
  
  The girl give the boy a drink

  The jug pour the water

  She chasing the boy

The claim being made here is that the videos designed for the Experimental Tasks removed certain aspects of choice from the conceptualisation process, making that process less complex. This simplification of conceptualisation appeared to make the translation between conceptual and linguistic structure easier. This notion is best understood if the processing is related back to Bierwisch's model (see section 1.3.1). In this model the production of a sentence requires that conceptualisation is organised into a particular structure by the process linking it to language. In output, this processes refines the full conceptualisation into the structure that the linguistic system requires.

---

7 These two participants were chosen because their performance showed the greatest input/output difference - their event comprehension was virtually intact but their production was very impoverished and comparable with the other 4 participants with aphasia.

8 Remember that L.H. wrote her responses - this explains the spelling errors, and the use of symbols.
This is a process with various sub-components, including the unpacking of the conceptualisation into linguistically-relevant units, this unpacking results in:

- an identification of the relationship encoded by the event, which can be used as input to semantic and syntactic structure, and
- 'matching' of these units with items and structures in the lexico-semantic system.

The participants with aphasia in this study all have some difficulty with the principled procedures that pare-down their conceptualisation. The precise nature of the difficulty varies from participant to participant: in L.S.'s case it seems that all these procedures are damaged - because he made errors on all the event comprehension tasks - whereas in the case of J.F., it seems that it is specifically the procedure for matching conceptual units to lexical items that is impaired - because the only event comprehension task with which he had marked difficulty was the Perspective Video.

The hypothesised constraint inherent in the Objects and Actions scenes can also be accounted for in this model. It is possible that the visual stimulus in this case provides information that is already pared-down in many respects. For example, the participant entities are clearly identified and the events and state often occur alone and so do not need to be distinguished from other aspects of the situation. Such a stimulus makes for a conceptualisation that has at least some intrinsic organisation so that, in the absence of procedures that impose linguistic structure, the conceptualisation is still of some use the linguistic system. The stimulus cannot do the whole job of an impaired linking procedure however.

- The relationship information must still be correctly communicated to the language system. If the stimulus is not able to provide this information clearly enough there may still be some difficulty with word order.
- The stimulus also may not provide specific enough information about the individual units in the conceptualisation, making 'matching' with lexico-semantic information problematic. This would result in problems accessing lexical items and associated argument structure.

This two aspects of processing are located on the Bierwisch model in the diagram on the next page:
- the route labelled A is the aspect of processing in which relationship information from the conceptualisation communicates with the word-order; and
- route B is the aspect of processing requiring a 'matching' of conceptual units and lexico-semantic information.

The effect of constraint on conceptualisation may also be apparent in the results for the Sentence Judgement Task. On this task all six participants with non-fluent aphasia scored highly, although the task was comparable to all the other tasks in semantic/conceptual terms. In the light of the extensive event comprehension problems of a number of these participants, these high scores are particularly striking. A likely explanation is that the language stimulus of the Sentence Judgement task was easier to process than the visual stimulus of the event comprehension tasks, indicating that there is something about the language stimulus that aids comprehension. As most of these participants had difficulty conceptualising certain important strands of information from the visual stimuli, it would appear that the linguistic stimulus was more useful to them in guiding interpretation.
That is, the information that has to be identified in the conceptualisation process is already constrained in language.

Bierwisch’s model may also be useful to elaborate on this claim, as here the input and output linking procedures are separated. But more importantly the kinds of procedures used differ in input and output:

• production involves the assignment of meaning in semantic (that is, linguistic) terms; but

• comprehension involves the assignment of meaning in terms that pair linguistic and conceptual information.

In other words, comprehension requires the ability to interpret the combination of linguistic and conceptual structure. This account suggests that comprehending events from linguistic material is a complex process of integration, and a difficulty may be due to a problem with this integration process. The production difficulties discussed above were accounted for by a loss of refining or constraining procedures, so that conceptual information was not in a structure compatible with language. There seem to be two possibilities for an impairment in comprehension:

1. the ‘matching’ procedures are lost; or

2. the linguistic aspect of ‘matching’ is impaired

The findings from this study provide evidence against the first possibility: it would not explain the good performance on the Sentence Judgement task. The second possibility suggests that the input linking procedure is only partly impaired. That is, the conceptual information is still available for ‘matching’, but without structured linguistic information to match with there is a problem. Of interest here are the proposals made in section 1.3.1 about the difference, in terms of ease of processing, across sentences in a Sentence Judgement task. It was claimed that

1. To judge some sentences it is necessary to integrate various sources of information, including: structural information, particularly word order and syntactic frame; the core meaning of the verb and the NPs; and the effect of the combination of these ‘core’ meanings.

2. In other cases this complex combination is not as important: some sentences can be judged on the basis of the ‘core’ meaning of the verb and the number of arguments alone.
Consequently:

- Some sentences require complex processing and so will be more difficult for people with non-fluent aphasia.
- Other sentences can be judged on the basis of less information and so will be relatively easier.

These claims were partly borne out in the Sentence Judgement task, where 4 of the participants with aphasia found the Set A sentences easier to judge than those in the other two Sets: these were sentences like the following:

*Steve fell the ball

Steve fell

To judge these sentences, it is sufficient to know about the core meaning of the verb and to identify how many arguments there are. Compare this with Set B sentences, such as:

Helen brought the water

*The water brought Helen

or Set C sentences, such as:

*John opened

The box opened

where the number of arguments does not, in itself, help the judgement. In these cases it is necessary to process the meaning of the combination of the verb and its arguments. In other words, Set B & C sentences are those identified in 1. above, that require complex processing to judge their acceptability and Set A sentences are those identified in 2. above that do not require such complex processing.

More generally though, the linguistic material in the Sentence Judgement task is clearly structured for all sentences and so it may be that some of this information can be used directly to match to the conceptual information. In other words, the stimulus is constrained enough to compensate for the processing impairment. This claim is similar to that made for the constraining influence of the visual information in the Objects and Actions Video.
The range of possible meanings is so constrained in language that the choices necessary in conceptualisation are reduced. This phenomena was apparent in L.S.’s performance on the language version of the Event Photograph task, in that although he made the same pattern of errors, he did not make as many. The language was constraining his interpretation and thereby reducing the processing demands on conceptualisation. A similar processes of constraining interpretation has also been discussed above in L.S.’s performance on the Role Video. Here L.S. was able to distinguish event types in those scenes where objects were involved. In those scenes involving only people, the interpretation was not so constrained and so lead to event errors.

The hypothesised impairment to the linguistic aspect of input linking would also account for a difficulty comprehending non-linguistic material. This is because input linking is also the most likely source of the linguistic feedback that is thought to help organise conceptualisation. The absence of such influence entails the absence of a linguistic means of organising information, leaving only language irrelevant means. Of crucial importance to this claim, is the finding that this impairment affects non-linguistic processing. The results presented in this study indicate that several of the organising principles structuring conceptualisation are linguistically-mediated. As they influence conceptualisation, these principles will also affect other non-linguistic processes, such as visual processing. This finding has clinical implications, particularly because the use of videos and pictures is widespread in assessment and therapy. These implications are discussed further in the next section.

Taken as whole, the findings presented in this thesis reveal a number of characteristics of conceptual processing for language. In particular, conceptualisation exhibits certain organising principles of its own such as a bias toward dynamism. However, other important principles are constrained by the requirements of language and these include: distinguishing events from non-events, identifying event type, relationships, role information and perspective. These processes are separable and may be selectively impaired in comprehension. The loss of the constraining influence from the language system will result in a lack of principles by which to constrain the information to conceptualise. Furthermore, the lack of such constraint may be seen to be compensated for, in some measure, by the structure and content of stimulus material. The clinical implications of these findings are discussed in the next section.
6.4 CLINICAL IMPLICATIONS

One proposal for therapy effects that recurred in the ‘mapping’ therapy papers reviewed in section 1.5 was that subjects had been encouraged to structure their conceptualisation of events more precisely and this in turn had facilitated the retrieval of verbs and their associated argument structure. For example,

Jones (1986)

“The concept of each question word seeking information about the activity - the verb - seemed to clarify for [B.B.] the central role of the verb in any sentence.”

Byng et al. (1994)

“[A.E.R.] is able to use this awareness [of linguistic structure] at a conscious level to impose a structure on a representation of an event.”


[M.M had] “acquired a more principled method of thinking about events, and hence a better stimulus for verb and argument production”.

The findings presented in this study support this proposal but they also extend the understanding of the notions of ‘event’ and ‘activity’ that are used in these papers. The present findings provide a more detailed analysis of the characteristics of conceptual processing and its relationship to language and language impairment than has been attempted before. Such an analysis revealed several distinct layers of processing and an indication of the effect on language of an impairment to any of these processes.

In the sections below, the clinical implications of this detailed analysis are discussed. Moreover, the implications are related first to an assessment of non-fluent impairments and then to their remediation.

6.4.1 Assessing Conceptual Difficulties

The Selection Task Set (detailed in section 2.1) was motivated by a review of the pattern of impairments observed in people with ‘mapping’ impairment (sections 1.4 & 1.5). All the participants selected by this set of tasks were found to have difficulty on at least one of the Event Processing Experimental Tasks and so this Set can be seen to be a useful clinical tool for identifying a particular group of people with non-fluent aphasia.
This group of people can be further assessed on the basis of the characterisation of conceptualisation presented in this thesis. Moreover, the Experimental Tasks revealed a number of separable processing layers in conceptualisation and so these task can be used to assess specific aspects of conceptual processing in isolation. This proposal is outlined in more detail in this section.

The first major claim made in the previous section was that there is a separate system of conceptualisation that exhibits certain organising principles of its own, such as a bias toward dynamism, but that other key aspects of structure depend on influence from language. This claim is important in terms of assessing the language of people with non-fluent aphasia for two reasons:

1. An individual’s language problems may be due to impaired conceptualisation caused by an impairment in the lexico-semantic system. Such an impairment means that conceptualisation is no longer structured in the way required by language.
   a) In production, language-relevant structure is required to refine the conceptualisation into a lexico-semantic structure. Loss of language-relevant structure in conceptualisation will lead to impaired access to language;
   b) In comprehension from language, this lack of language-relevant structure will impair the process of achieving a full conceptualisation. This is a process of enriching the information provided by language.

2. The loss of language-relevant structure in conceptualisation will affect ability to make use of stimulus materials other than language. Any non-language materials requiring conceptualisation for language, e.g. pictures, will need an influence from the linguistic system so that attention is paid to the relevant components.

The second possibility highlights the importance of selecting appropriate stimulus materials and the necessity to be clear about the processing such material requires, particularly as it relates to language and language impairments. This is discussed in terms of remediation strategies in the next section.

The first possibility (a) above) will require further investigation into which aspect of conceptual processing are causing difficulty. The main claims in the previous section related to organising principles which are
constrained by the linguistic system. This is of direct relevance to people with non-fluent aphasia, suggesting that they may have problems with using such organising principles. As these processes have been shown to be separable, it is reasonable to assume that they may be selectively impaired. The findings in this research support the suggestion that in comprehension, selective impairment to these 5 layers of processing may be detected. That is, there may be a separable impairment to any one of the following layers:

1. distinguishing events from non-events;
2. identifying event type;
3. identifying participants and relationships;
4. identifying role information;
5. identifying perspective.

Consequently, assessment should involve looking for an impairment in any one of these processes. This can be done with tasks such as those used in the Event Comprehension testing in the present research. That is:

- Event Video;
  The task requires the conceptualisation of events in broad terms, in order to distinguish them from states and entities. It seems to involve processing the temporal structure of a situation in order to conceptualise successive stages of movement (or to conceptualise the whole scene in summary for a non-event);

- Event Photographs;
  This task is related to the one above, in that it can be carried out in the same way. As the results presented here show however, it is likely that this task also encourages processing of the participant entities and relationships encoded by the event (or state). The task is designed so that the pattern of errors can reveal whether a particular relationship is problematic. Furthermore, the results from this study suggest that the most likely cause of problems would be a difficulty processing those relationships that have a conflict of features. That is those that encode [-dynamic][+control], the HAVE states and those that encode [+dynamic] [-control] the GO events.

- Role Video;
  To carry out this task, there are a number of layers of structure that need to be conceptualised. These are: identifying the event type for ‘object’ and ‘people’ scenes, identifying the participant entities and
the relationship between them, and identifying the role played by these entities. Furthermore, it may be the case that there is a difference between identifying an event where a person acts on another person and one where a person acts on an object.

- Perspective Video;

This task could be used to look at access to language from conceptualisation, in terms of the selection of lexical labels. The scenes must first be conceptualised so as to encode the perspective to be taken and then the linguistic system must be able to use this information to access the correct label from the lexicon. This task differs from the other event tasks in that the events that are contrasted are very similar, for that reason this task can be used to assess relatively moderate conceptual problems. Another difference is that a number of these events involve three participant entities, making them particularly complex to process.

Just as these tasks precisely target various layers of conceptual processing for assessment purposes, they also provide guides for the separate remediation of these processing layers. The findings presented here also revealed more general characteristics of conceptualisation, such as the role of language in non-language tasks, which will affect therapy programmes. These issues are considered in the next section.

### 6.4.2 Remediating Conceptual Difficulties

The findings presented in this thesis strongly indicate that conceptual difficulties will manifest in all tasks that require conceptualisation for language. This includes the analysis of pictures, video scenes and events occurring in real time. This not to say that these materials cannot be used in therapy programmes aimed at remediating problems with verbs and events - pictures and videos have been used successfully (see section 1.5) - however, the way such material is used requires careful consideration.

In the light of the findings from this study, it is likely that the presentation of pictures alongside sentence stimuli in the mapping therapy studies did not constitute an aid to conceptualisation in a straightforward sense. More probable is the suggestion that all the materials acted together to clarify ways to structure an event,
thereby constraining the conceptualisation. Other cues that serve as a reminder of, and guide to, structuring should be just as helpful: an example of this is the use of colour coding in a number of the ‘mapping’ therapy programmes. In the Schwartz et al. (1994) programme participants often changed their analysis on being handed the coloured pen. For example a number of participants changed their minds about the identity of the NP that played the role of the theme in a particular sentence. Here, colour coding was clearly providing some sort of guide to structure that was not being provided by other aspects of the programme.

Although these findings make it clear that colour was an aid, it is not obvious how colour could have provided a cue to structural information: the association must have been an abstract one. It is possible that strategies such as colour coding are useful for association with a particular conceptual constituent, such as the ‘theme’ participant entity, because of the abstract nature of the association. Conceptual constituents are not characterised by visual attributes but rather they are abstract concepts that must be acquired on the basis of a number of observations. These observations will include information from a whole range of modalities, including vision and language. For example, in the case of ‘theme’ participant entities, the concept will include:

- details of likely visual attributes, e.g. the kind of entity that moves only after contact with some other entity, or the kind of entity that gets supported/contained/covered;
- language attributes, e.g. the kind of entity that gets specified by a verb’s selectional requirements, or the kind of entity that appears in a specific place in a verb’s semantic structure.

These kinds of indicator, from a range of modalities, are amassed into an abstract concept and it is not known exactly how they are represented in conceptual structure. Consequently, it cannot be assumed that such concepts are represented in a pictorial way or that pictorial representation is the best means of getting to such concepts during therapy. An abstract association, such as between a particular colour and a particular constituent, allows the person in the therapy programme to make their own links: it may allow for idiosyncratic association, which may help establish and retain the connection.

The five hypothesised layers of conceptual structuring need to be established with as much reinforcement as possible and so it is appropriate to provide a whole range of different types of material in order to do this. Such
material includes linguistic, visual and ‘real-time’ material and explanations and emphasis from the therapist. However, the aim is not to ‘teach’ a particular means of structuring conceptualisation, for example a visual representation of a particular event, but to facilitate and stimulate any residual organising principles. The important point for therapy is that a picture does not provide a direct link to linguistic structure, the information encoded in the picture must still enter the conceptual system and be structured in such a way as to allow access to language. An abstract association like colour coding may be more useful to allow this independent conceptualisation to occur.

Another phenomenon that might shed light on the conceptual process is the tendency to perseveration shown by J.F. in the Noun/Verb Naming and Perspective Tasks (see chapter 4 and 6.2.4 above). In both cases it seems that the perseveration occurred in accessing a lexical label from conceptualisation and there is a possibility that it was aspects of the conceptualisation of the scenes that were perseverating. For example, J.F. ’s repeated focus on one of the participants of the Perspective scenes. The main conclusion that should be drawn from this phenomenon is that structuring conceptualisation for language is probably not an all or nothing process. Conceptualisation can be selectively impaired, as suggested by the findings in the present study, but perseveration may indicate that conceptual difficulties may be caused by an inability to control the conceptualisation, so that it repeatedly processes material from previous conceptualisations. In other words, impairment may involve the loss of an ability to direct conceptualisation to the appropriate situation. Although the precise mechanism causing this kind of problem is not clear, the possibility that perseveration might occur needs to considered in assessment and therapy tasks.

The majority of ‘mapping’ therapy tasks are not reported in enough detail to assess whether perseveration is a problem for other people with non-fluent aphasia. However, there is a paper reporting a ‘mapping’ therapy programme carried out with someone with fluent aphasia (Pethers, 1997) that does make reference to a similar effect. P.T. was a fluent aphasic with ‘mapping’ symptoms: reversal errors in comprehension and verb omissions and reduced predicate-argument structure in production. He participated a treatment programme based on Jones’ ‘mapping’ programme which resulted in some production improvements but seemed not to aid his comprehension. One of the comprehension tasks used pre- and post- therapy was the Jones Picture Selection Test (op cit.), which P.T. had great difficulty with. He was asked for his thoughts about the cause of
the difficulty and he reported that the pictures were “triggering other words in his head, causing difficulty focussing on the main action” (Pethers op cit.: 177). This difficulty seems to be very similar to the problems J.F. had with the perseveration of one of the participant entities in the Perspective Task. P.T. was able to elaborate on his problems and he informed his therapist that he had to constantly monitor and inhibit these ‘rogue’ concepts. He was also able to precisely identify the aspect of the conceptualisation that was ‘triggering’ the rogue concepts.

“The people in the pictures all hold ‘instruments’ to identify their professions, many of which are unrelated to the event. P.T. knew that these instruments were not connected with the event in question, but found their presence confusing and heard himself retrieving the associated verb.” (Pethers op cit.: 177)

This description strongly suggests that P.T. was having difficulty identifying the event type; specifically, he was having difficulty selecting those aspects of the conceptualisation that would characterise the event. In J.F.’s case, it is more likely that he was having difficulty selecting the perspective to take or the role the participants played in the event.

Both J.F. and P.T. may have benefited from a change in processing between events: a break from the conceptual processing that caused them difficulties. This could have been achieved, for example, by switching away from a conceptualisation of the event to the description of a single object. As the particular source of the difficulty was hypothesised to differ for J.F. and P.T., it is likely that the most useful processing break would also be different in each case: in P.T.’s case it may have been useful to direct attention away from event type onto another aspect of the event, such as participant entities; in the case of J.F., it is harder to separate the aspects of event processing so clearly because of the nature of the events in the Perspective task. In theory, it may have been useful to direct J.F.’s attention away from participant entities onto some other aspect of the event, such as event type, however, in this particular task the perspective, participants and events are closely related (consider giving/taking), in that case it would seem that directing attention away from the entire event would be the most useful break (e.g. toward a single object).

Caution should be taken in comparing J.F.’s performance with that of P.T. because of the difference in their respective language impairments. However, the possibility of a lack of control over conceptualisation,
potentially leading to perseveration may be an issue worth considering for therapy. As this phenomenon was not one directly addressed in this study, the suggestions made here must remain tentative and they would benefit from further investigation.

The improved performance of all six participants in this study on the Objects and Actions Video suggests that tasks can be used to constrain conceptualisation and so facilitate production. The loss of a constraining influence from the language system will result in a lack of principles by which to organise conceptualisation and such a lack of structure in conceptualisation prevents access to language. That is, conceptualisations must be in the correct format in order to translate into semantic and ultimately syntactic structure. It seems that the lack of such constraint can be compensated for, in some measure, by the structure and content of stimulus material. For example, the Objects and Actions video constrained conceptualisation by reducing a number of the choices. A good example, is the way that this video constrained the identification of participant entities: in most cases, all the entities present in a scene were obligatory participants in the event (for example, the ball and the table were both participants in the on state); in other cases, there was a mixture of obligatory and optional participant entities (for example, the table in the rolling scenes). The crucial difference between these entities and those in the Wallace and Gromit video, in terms of constraint, is that the Objects and Actions entities were not participant in separate events; nor did these entities 'interfere' with the conceptualisation of the target event in any way. For example, in the rolling scene, conceptualising the table as a participant would not have caused the event to be misidentified. These features contrast to the design of the Wallace and Gromit video where the events were not so clearly separated, and non-participant and non-'contextual' entities were present in every scene.

It is reasonable to assume that stimulus material should be constrained along the lines of the layers of processing discussed above. That is, there are potentially separable means to constrain event type, relationship information, role information and perspective and so these factors should be controlled in stimulus materials. For example, to establish the need to conceptualise perspective the best method would be to constrain other aspects of conceptualisation: in order to work on making one sort of conceptual 'choice', the other kinds of choice should be minimised. Such constraining can be used in therapy materials in both language production (see design of Objects and Actions Video, as described above) and language comprehension. The results for the
Sentence Judgement Task indicate that the information encoded in language structure itself provides a useful constraint on conceptualisation and the Bierwisch and Schreuder model (1992: see section 1.3.1) suggests that there are separable layers of information implicated in the comprehension process. These layers may have varying roles to play, depending on the task requirements and on the event in question, and they may be separably impaired:

1. To judge some sentences it is necessary to integrate:

   - the semantic and syntactic properties of the sentence, particularly the information in the word order and syntactic frame;
   - the core meaning of the verb and the NPs;
   - the effect of the combination of these ‘core’ meanings, particularly the effect of the verb in combination with its internal argument.

   e.g. Helen opened the box.  *Helen opened.
   *The box opened Helen.  The box opened.

2. In other cases this complex combination is not as important:

   - some sentences can be judged on the basis of the ‘core’ meaning of the verb and the number of arguments alone.

   e.g. Helen kissed Mike.  *Helen kissed.
   Mike kissed Helen.  *Mike kissed.

This analysis suggests that the relative ease of processing a particular description of an event, in a particular task, should be considered in designing therapy materials. Many recent studies involving sentence processing are careful to distinguish between various event types (e.g. Byng, Nickels and Black 1994; Marshall, Pring and Chiat 1993), for instance: separating manner-of-motion events (run, hop skip) from transfer-of-possession events (give/take, buy/sell); or distinguishing between one-argument, two-argument and three-argument verbs. The above analysis of processing complexity adds another variable to be considered.

The notion of constraint on conceptualisation also has an application beyond the design of therapy materials. It seems highly likely that such constraint would be effective in all situations, including conversational settings and other everyday activities. It also seems likely that constraint would be possible in these situations, although
it might not be possible to minimise conceptual choices as effectively as in specifically designed clinical tasks.

One of the most important means of achieving generalisation beyond clinical tasks might be to teach communicative partners to constrain conceptualisation. This might mean showing them how to structure their language but, perhaps more importantly, it might mean making them aware of the kinds of question they might ask to encourage a conceptualisation to become more structured. For example, in a conversation with R.B. about where in London I lived, he indicated that he knew the area and tried to tell me something about it. He said, “My sister” and so I asked him whether she lived there too. He said “no” and began to gesture an action which I could not understand in this context. Given R.B.’s problems with identifying event type, participant entities and relationship information I asked him the following questions:

- Is this action about your sister?
- Does she do this?

R.B. said yes to these two questions, so I asked:

- What’s this? (pointing to the way he was holding his hand during the gesture)

In response, he gestured eating to show that his hand had been holding cutlery in the previous gesture. From this it became clear that his sister worked in a restaurant in the area where I live.

Partly, my eventual understanding of R.B. came from his eating gesture, but it seems at least possible that he was guided to this gesture by my questions. I had asked him about:

- the action,
- the participants, and
- whether his sister was the Agent of an action,

and this had resulted in a gesture signalling one of the actions that took place in her restaurant.

Clearly, these are the kinds of questions routinely used by therapists in clinic and by other conversational partners outside the clinic. The contribution made by this suggestion, in the context of this thesis, is to provide a strong theoretical motivation for this practice, and furthermore to precisely and separably identify those aspects of conceptualisation that can be constrained in this way. This precise and principled motivation is important in informing therapy practice because it defines the goal of the questioning processes and it makes the results measurable. For example, it would be possible to design a range of questions aimed at specific aspects of the conceptual process, which could then be evaluated in terms of the number of times the
questioning resulted in improved output⁹. Finding more reliable ways of facilitating the organisation of conceptualisation, and thereby improving both comprehension and output, requires further investigation and this thesis highlights a direction for further research that is both theoretically well-motivated and of clinical importance.

It is important to also emphasise that this thesis reports a psycholinguistic investigation of language processing that has direct implications for improving functional communication. The role of psycholinguistics in functional communication has been considered by a number of observers, such as Marshall (in Chiat, Law and Marshall, 1997) who describes the interaction as follows:

“One alternative [to targeting the language deficit] is to turn our attention to strengths within the system which can overcome or circumvent the deficit. Another is to direct our attention to the person's environment. This is where psycholinguistics can complement ideas emerging from the disability movement... [where attention is] directed towards identifying and removing the barriers which bar social access. An obvious example of such barrier removal, in the context of physical disability, is the provision of ramps in public buildings. Yet in the context of aphasia, barrier removal is necessarily more subtle.” (253)

Constraining the information to be conceptualised, either for comprehension or in preparation for production, is an example of barrier removal in non-fluent aphasia. The constraining process is motivated by psycholinguistic theory and investigation but its effect is functional. Such an effect is surely one of the most important aims of therapeutic intervention.

⁹ I am grateful to Karen Bryan for this suggestion
The main focus of this thesis is on the process of conceptualisation: those aspects of thought that Slobin (1996a) refers to as ‘thought for language’. The analysis and findings presented here extend our understanding of ‘thought for language’ in two ways: by clarifying the nature of the structuring involved in conceptualisation, and by examining the effects of language impairment on such structural processing.

Characterising conceptualisation is crucial for understanding the language problems of people with non-fluent aphasia but it also goes beyond this, to reveal features of our conceptual processing that are interesting in themselves. One of the most important features of conceptualisation emphasised by this thesis is how complex it is, and how dependent on other processing systems for its structure. One of the main systems influencing conceptualisation is language. The interaction between conceptualisation and language is both restrictive and liberating; thought must be packaged in a certain way to be expressed but the effect of that packaging is to enable intricate ideas to be communicated. Patsy Rodenburg (1993) refers to this duality in her discussion of the text in Drama: “the word is the tip of the iceberg and yet totally sufficient.”

Clearly, packaging complex ideas into ‘the tip of the iceberg’ must be a process of abstraction and refinement. Moreover, in order for thought to be expressed in language, that packaging must be effected in a language-relevant way. This thesis is therefore directed at uncovering those aspects of conceptual information that are important to language: those elements that must be included in a conceptualisation and the particular means of structuring those elements to allow access to the language system. The results presented here point to 5 layers of processing necessary to structure conceptualisation for language: distinguishing events from non-events; identifying event type; identifying relationships; identifying role information; and identifying perspective.

One way to appreciate the complexity of packaging thought into language, is to consider pictures. To explain how pictures can be described, it is essential to explain how visual information is first conceptualised and then how that conceptualisation is packaged into language. A key finding in this study is that even the initial process of conceptualising visual information can be guided by language. In other words, visual attention needs to be guided to certain aspects of a picture, and if the aim is to describe that picture, it is the language
system that must guide the visual attention. A crucial consequence of this finding is that a language
impairment can affect conceptualisation even in non-verbal tasks.

The comprehension of language must also involve complex processing. In this case, the task is to appreciate
the meaning encoded in the refined packaging of language: to use the 'tip' to find the whole 'iceberg'. This
process must involve some sort of augmentation and enrichment, because the message cannot be fully
appreciated from the words alone. The complexity of the enrichment process is reflected in this quote from the
'Anam Cara' (John O'Donohue, 1997),

"words are too thin to echo experience; they are too weak to bring the inner mystery of
things to real expression."

For this reason, this thesis is also directed at identifying those processes that are required to enrich words and
sentences into fully comprehensible conceptualisations.

Whilst emphasising the complexity of conceptual processing, this thesis also serves to identify a number of the
specific components involved. This clarifies our understanding of conceptualisation and makes clear the link
between language impairment and conceptualisation.
8. REFERENCES


M.Colheart, R. Job & G. Sartori (eds.). The cognitive neuropsychology of language. London:

Berndt, R.S. & Caramazza, A. (1980) A redefinition of the syndrome of Broca’s aphasia. Implications for a
neuropsychological model of language. Applied Psycholinguistics 1(3) 225-278.


Characterising single word impairments. Brain and Language 56(1) 68-106.

to sentence processing. Brain and Language 56(1) 107-137.

Human memory and cognitive capabilities: mechanisms and performances. Amsterdam:
Elsevier 765-784.


can be a complex matter. Journal of Neurolinguistics 6 79-101.


Lesser, R. & Milroy, L. (1993) Linguistics and Aphasia: Psycholinguistic and pragmatic aspects of
intervention. Longman.


Nuyts, J. & Pederson, E. (eds) *Language and Conceptualisation*. CUP


Wolfe, J.M. (1993) Talking to yourself about what is where - what is the vocabulary of pre-attentive vision?

*Behavioural and Brain Sciences, 16* (2), 254-255.


# 9. ANNEXES

## TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>ANNEX NO.</th>
<th>TITLE</th>
<th>PAGE NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NOUN/VERB NAMING TEST</td>
<td>358</td>
</tr>
<tr>
<td>2</td>
<td>NARRATIVE VIDEO STORYBOARD (WALLACE &amp; GROMIT)</td>
<td>359</td>
</tr>
<tr>
<td>3</td>
<td>SYNTAX JUDGEMENT TASK</td>
<td>361</td>
</tr>
<tr>
<td>4</td>
<td>CONTROL SUBJECTS</td>
<td>362</td>
</tr>
<tr>
<td>5</td>
<td>RESULTS OF LANGUAGE BATTERY - Participants with aphasia</td>
<td>363</td>
</tr>
<tr>
<td>6</td>
<td>RESULTS OF SELECTION TASKS - Participants with aphasia</td>
<td>365</td>
</tr>
<tr>
<td>7</td>
<td>RESULTS OF SELECTION TASKS - Control participants</td>
<td>366</td>
</tr>
<tr>
<td>8</td>
<td>EVENT VIDEO</td>
<td>369</td>
</tr>
<tr>
<td>9</td>
<td>EVENT PHOTOGRAPHS</td>
<td>371</td>
</tr>
<tr>
<td>10</td>
<td>PERSPECTIVE VIDEO</td>
<td>377</td>
</tr>
<tr>
<td>11</td>
<td>SENTENCE JUDGEMENT TASK - Version A</td>
<td>380</td>
</tr>
<tr>
<td>12</td>
<td>OBJECTS AND ACTIONS VIDEO</td>
<td>384</td>
</tr>
<tr>
<td>13</td>
<td>SENTENCE JUDGEMENT TASK - Version B</td>
<td>387</td>
</tr>
<tr>
<td>14</td>
<td>EVENT PHOTOGRAPH TASK - Additional Analysis</td>
<td>390</td>
</tr>
<tr>
<td>15</td>
<td>SENTENCE JUDGEMENT TASK - Additional Analysis</td>
<td>391</td>
</tr>
<tr>
<td>16</td>
<td>OBJECTS AND ACTIONS VIDEO - Transcript of production</td>
<td>394</td>
</tr>
<tr>
<td>17</td>
<td>NARRATIVE - Transcript of production</td>
<td>400</td>
</tr>
</tbody>
</table>
## ANNEX 1

### NOUN/VERB NAMING TEST

<table>
<thead>
<tr>
<th>Nouns</th>
<th>Verbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>WATER</td>
<td>WATER</td>
</tr>
<tr>
<td>BUTTER</td>
<td>BUTTER</td>
</tr>
<tr>
<td>SHAMPOO</td>
<td>SHAMPOO</td>
</tr>
<tr>
<td>STAMP</td>
<td>STAMP</td>
</tr>
<tr>
<td>THREAD</td>
<td>THREAD</td>
</tr>
<tr>
<td>PEEL</td>
<td>PEEL</td>
</tr>
<tr>
<td>SALT</td>
<td>SALT</td>
</tr>
<tr>
<td>DUST</td>
<td>DUST</td>
</tr>
<tr>
<td>BUTTON</td>
<td>BUTTON</td>
</tr>
<tr>
<td>HOE</td>
<td>HOE</td>
</tr>
<tr>
<td>STRING</td>
<td>STRING</td>
</tr>
<tr>
<td>HAMMER</td>
<td>HAMMER</td>
</tr>
<tr>
<td>SPOON</td>
<td>SPOON</td>
</tr>
<tr>
<td>DIAL</td>
<td>DIAL</td>
</tr>
<tr>
<td>COMB</td>
<td>COMB</td>
</tr>
<tr>
<td>MOP</td>
<td>MOP</td>
</tr>
<tr>
<td>PUMP</td>
<td>PUMP</td>
</tr>
<tr>
<td>BATH</td>
<td>BATH</td>
</tr>
<tr>
<td>BOX</td>
<td>BOX</td>
</tr>
<tr>
<td>SHELF</td>
<td>SHELF</td>
</tr>
<tr>
<td>POCKET</td>
<td>POCKET</td>
</tr>
<tr>
<td>FRAME</td>
<td>FRAME</td>
</tr>
<tr>
<td>PAINT</td>
<td>PAINT</td>
</tr>
<tr>
<td>OIL</td>
<td>OIL</td>
</tr>
<tr>
<td>GLUE</td>
<td>GLUE</td>
</tr>
<tr>
<td>DRESS</td>
<td>DRESS</td>
</tr>
<tr>
<td>SOAP</td>
<td>SOAP</td>
</tr>
<tr>
<td>FLOUR</td>
<td>FLOUR</td>
</tr>
<tr>
<td>POLISH</td>
<td>POLISH</td>
</tr>
<tr>
<td>POWDER</td>
<td>POWDER</td>
</tr>
<tr>
<td>IRON</td>
<td>IRON</td>
</tr>
<tr>
<td>FILE (NAIL)</td>
<td>FILE (NAIL)</td>
</tr>
<tr>
<td>SAW</td>
<td>SAW</td>
</tr>
<tr>
<td>WHISK</td>
<td>WHISK</td>
</tr>
<tr>
<td>RAKE</td>
<td>RAKE</td>
</tr>
<tr>
<td>TOWEL</td>
<td>TOWEL</td>
</tr>
<tr>
<td>HOOVER</td>
<td>HOOVER</td>
</tr>
<tr>
<td>BRUSH</td>
<td>BRUSH</td>
</tr>
<tr>
<td>ZIP</td>
<td>ZIP</td>
</tr>
<tr>
<td>BUCKLE</td>
<td>BUCKLE</td>
</tr>
<tr>
<td>BOTTLE</td>
<td>BOTTLE</td>
</tr>
<tr>
<td>FILE</td>
<td>FILE</td>
</tr>
<tr>
<td>CAGE</td>
<td>CAGE</td>
</tr>
<tr>
<td>TAPE</td>
<td>TAPE</td>
</tr>
<tr>
<td>GRILL</td>
<td>GRILL</td>
</tr>
</tbody>
</table>
ANNEX 2
WALLACE & GROMIT VIDEO STORYBOARD

Below are representations of the video extract, divided into the 5 subsections used in the final viewing. Next to each picture is a description of what was going on in the scene. The description is not a connected narrative, but instead notes each main event and state in separate sentences. This is to make the participants’ responses easier to analyze.

Section 1

The dog is in bed.
The dog is knitting.
The dog hears a noise.
The dog looks outside.

Section 2

There is a cup of tea on the table.
There is a ball of wool on the table.
The table is shaking.
The cup of tea is shaking.
The ball of wool falls to the floor.
Section 3

There is a truck outside.
The truck stops at traffic lights.
A sheep is in the truck.
The sheep jumps out of the truck.

Section 4

A big dog and a woman are in the truck.
The big dog looks in the mirror.
The big dog sees the sheep escape.
The big dog wants to get out and catch the sheep.
The woman stops the dog.

Section 5

The sheep walks into an alley.
The sheep sees a door with a cat-flap.
The sheep goes inside.
ANNEX 3

SYNTAX JUDGEMENT TASK

1. Subjects-aux inversion;
   e.g.  Was Steven boiling the water?  *Was Steven boil the water?

2. Passive;
   e.g.  Trevor has finally opened the box.  *Trevor was finally opened the box.

3. Incomplete extraction;
   e.g.  How much butter did Michael melt in the pan?  *How much did Michael melt butter in the pan?

4. Empty elements;
   e.g.  Alex thought he was going to break the pen.  *Alex thought was going to break the pen

5. Gapless relatives;
   e.g.  Max closed the door that was open.  *Max closed the door that the window was open.

6. Wh-moved subcategorization;
   e.g.  Why did Lynne smile?  *Who did Lynne smile?

7. Particle movement;
   e.g.  They marched up the road very slowly.  *They marched the road up very slowly.

8. Phrase structure;
   e.g.  Helen burned the photograph of Max  *Helen burned the photograph Max.

9. Pronoun case;
   e.g.  Mabel drove him to the station  *Mabel drove he to the station.
## ANNEX 4

### CONTROL SUBJECTS

<table>
<thead>
<tr>
<th>NAME</th>
<th>AGE</th>
<th>GENDER</th>
<th>OCCUPATION</th>
<th>MATCH</th>
</tr>
</thead>
<tbody>
<tr>
<td>C.P</td>
<td>28</td>
<td>F</td>
<td>PERSONAL ASSISTANT</td>
<td>L.H.</td>
</tr>
<tr>
<td>S.T.</td>
<td>29</td>
<td>M</td>
<td>ACCOUNTANT</td>
<td>L.H.</td>
</tr>
<tr>
<td>E.T.</td>
<td>38</td>
<td>F</td>
<td>AT HOME MOTHER</td>
<td>R.K.</td>
</tr>
<tr>
<td>B.V.</td>
<td>40</td>
<td>F</td>
<td>CLEANER</td>
<td>R.K.</td>
</tr>
<tr>
<td>S.M.</td>
<td>46</td>
<td>M</td>
<td>PLUMBER</td>
<td>R.B.</td>
</tr>
<tr>
<td>R.G.</td>
<td>48</td>
<td>M</td>
<td>ELECTRICIAN</td>
<td>R.B.</td>
</tr>
<tr>
<td>P.S.</td>
<td>52</td>
<td>M</td>
<td>FACTORY WORKER</td>
<td>J.F.</td>
</tr>
<tr>
<td>A.M.</td>
<td>55</td>
<td>M</td>
<td>SHOP MANAGER</td>
<td>J.F.</td>
</tr>
<tr>
<td>D.G.</td>
<td>60</td>
<td>M</td>
<td>RETIRED CIVIL SERVANT</td>
<td>L.S.</td>
</tr>
<tr>
<td>G.D.</td>
<td>60</td>
<td>M</td>
<td>RETIRED TEACHER</td>
<td>L.S.</td>
</tr>
<tr>
<td>V.M.</td>
<td>52</td>
<td>F</td>
<td>AT HOME</td>
<td>J.D.</td>
</tr>
<tr>
<td>M.S.</td>
<td>54</td>
<td>M</td>
<td>BUS DRIVER</td>
<td>J.D.</td>
</tr>
</tbody>
</table>

### LIST OF THOSE PARTICIPANTS WITH NON-FLUENT APHASIA

<table>
<thead>
<tr>
<th>NAME</th>
<th>AGE</th>
<th>GENDER</th>
<th>OCCUPATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>J.D.</td>
<td>51</td>
<td>M</td>
<td>EX TAXI-DRIVER</td>
</tr>
<tr>
<td>J.F.</td>
<td>53</td>
<td>M</td>
<td>EX TAXI-DRIVER/MACHINIST</td>
</tr>
<tr>
<td>L.H.</td>
<td>27</td>
<td>F</td>
<td>AT HOME MOTHER (EX MIDWIFE)</td>
</tr>
<tr>
<td>L.S.</td>
<td>65</td>
<td>M</td>
<td>RETIRED HEAD-TEACHER</td>
</tr>
<tr>
<td>R.B.</td>
<td>44</td>
<td>M</td>
<td>EX CAR MECHANIC/SALESPERSON</td>
</tr>
<tr>
<td>R.K.</td>
<td>37</td>
<td>F</td>
<td>AT HOME MOTHER</td>
</tr>
</tbody>
</table>
ANNEX 5
RESULTS OF LANGUAGE BATTERY

1. Western Aphasia Battery

<table>
<thead>
<tr>
<th>Participant</th>
<th>Quotient</th>
<th>Breakdown</th>
</tr>
</thead>
</table>
| J.D.        | 58%      | Fluency: 2  
Comprehension: 9  
Repetition: 3  
Naming: 8     |
| J.F.        | 64%      | Fluency: 4  
Comprehension: 9  
Repetition: 5  
Naming: 8     |
| L.S.        | 64%      | Fluency: 2  
Comprehension: 8  
Repetition: 6  
Naming: 6     |
| R.B.        | 61%      | Fluency: 2  
Comprehension: 9  
Repetition: 5  
Naming: 8     |
| R.K.        | 64%      | Fluency: 2  
Comprehension: 8  
Repetition: 6  
Naming: 6     |

2. Word -> picture matching (PALPA)

<table>
<thead>
<tr>
<th>Participant</th>
<th>Score (n=40)</th>
</tr>
</thead>
<tbody>
<tr>
<td>J.D.</td>
<td>40</td>
</tr>
<tr>
<td>J.F.</td>
<td>40</td>
</tr>
<tr>
<td>L.S.</td>
<td>40</td>
</tr>
<tr>
<td>R.B.</td>
<td>40</td>
</tr>
<tr>
<td>R.K.</td>
<td>40</td>
</tr>
</tbody>
</table>

3. Picture -> picture matching (Pyramids & Palm Trees)

<table>
<thead>
<tr>
<th>Participant</th>
<th>Score</th>
<th>Error breakdown</th>
</tr>
</thead>
<tbody>
<tr>
<td>J.D.</td>
<td>48/52</td>
<td>4 semantic</td>
</tr>
<tr>
<td>J.F.</td>
<td>52/52</td>
<td>-</td>
</tr>
<tr>
<td>L.S.</td>
<td>44/52</td>
<td>2 visual 6 semantic</td>
</tr>
<tr>
<td>R.B.</td>
<td>49/52</td>
<td>3 semantic</td>
</tr>
<tr>
<td>R.K.</td>
<td>52/52</td>
<td>-</td>
</tr>
</tbody>
</table>
4. Sentence -> picture matching (TROG)

<table>
<thead>
<tr>
<th>Participant</th>
<th>Score</th>
<th>Error breakdown</th>
</tr>
</thead>
<tbody>
<tr>
<td>J.D.</td>
<td>65/80</td>
<td>8 reversal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7 lexical</td>
</tr>
<tr>
<td>J.F.</td>
<td>76/80</td>
<td>3 reversible</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 lexical</td>
</tr>
<tr>
<td>L.S.</td>
<td>42/44 (unable to continue after 44)</td>
<td>2 lexical</td>
</tr>
<tr>
<td>R.B.</td>
<td>40/56 (unable to continue after 56)</td>
<td>12 lexical</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 reversal</td>
</tr>
<tr>
<td>R.K.</td>
<td>70/80</td>
<td>8 reversal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 lexical</td>
</tr>
</tbody>
</table>
**ANNEX 6**

**RESULTS OF SELECTION TASKS - participants with aphasia**

1. **Naming:**

<table>
<thead>
<tr>
<th>Name</th>
<th>Noun Score</th>
<th>Verb Score: A (all unambiguous verbs counted)</th>
</tr>
</thead>
<tbody>
<tr>
<td>J.D.</td>
<td>38/45</td>
<td>6/45</td>
</tr>
<tr>
<td>J.F.</td>
<td>38/45</td>
<td>25/45</td>
</tr>
<tr>
<td>L.S.</td>
<td>35/45</td>
<td>1/10 (unable to continue)</td>
</tr>
<tr>
<td>R.B.</td>
<td>36/45</td>
<td>2/22 (unable to continue)</td>
</tr>
<tr>
<td>R.K.</td>
<td>29/45</td>
<td>16/45</td>
</tr>
</tbody>
</table>

**Verb Score: B**

(unambiguous verbs which are phonologically identical to the noun forms - this is a subset of those verbs counted in column A)

<table>
<thead>
<tr>
<th>J.D.</th>
<th>J.F.</th>
<th>L.S.</th>
<th>R.B.</th>
<th>R.K.</th>
</tr>
</thead>
<tbody>
<tr>
<td>4/45</td>
<td>24/45</td>
<td>30/45</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10/45</td>
<td>4/45</td>
<td>29/45</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0/10</td>
<td>1/10</td>
<td>2/10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0/22</td>
<td>1/22</td>
<td>4/22</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Verb Score: C**

(ambiguous N/Vs which are phonologically identical to the noun forms)

<table>
<thead>
<tr>
<th>J.D.</th>
<th>J.F.</th>
<th>L.S.</th>
<th>R.B.</th>
<th>R.K.</th>
</tr>
</thead>
<tbody>
<tr>
<td>8/45</td>
<td>5/45</td>
<td>20/45</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Verb Score: A+C**

(all suitable verb forms - includes ambiguous N/Vs)

<table>
<thead>
<tr>
<th>J.D.</th>
<th>J.F.</th>
<th>L.S.</th>
<th>R.B.</th>
<th>R.K.</th>
</tr>
</thead>
<tbody>
<tr>
<td>345</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. **Narrative:**

<table>
<thead>
<tr>
<th>J.D.</th>
<th>J.F.</th>
<th>L.H.</th>
<th>L.S.</th>
<th>R.B.</th>
<th>R.K.</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>7</td>
<td>6</td>
<td>1</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>14</td>
<td>10</td>
<td>5</td>
<td>4</td>
<td>11</td>
</tr>
</tbody>
</table>

345
3. Syntax:

<table>
<thead>
<tr>
<th>Participant</th>
<th>Score (n=40)</th>
<th>Error analysis (see key)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>J.D.</td>
<td>31 (78%)</td>
<td>1</td>
</tr>
<tr>
<td>J.F.</td>
<td>22 (55%)</td>
<td>0</td>
</tr>
<tr>
<td>L.H.</td>
<td>32 (80%)</td>
<td>2</td>
</tr>
<tr>
<td>L.S.</td>
<td>34 (85%)</td>
<td>0</td>
</tr>
<tr>
<td>R.B.</td>
<td>27 (68%)</td>
<td>2</td>
</tr>
<tr>
<td>R.K.</td>
<td>33 (83%)</td>
<td>2</td>
</tr>
</tbody>
</table>

key:
1. Subjects-aux inversion;
2. Passive;
3. Incomplete extraction;
4. Empty elements;
5. Gap-less relatives;
6. Wh-moved subcategorization;
7. Particle movement;
8. Phrase structure;

4. STM (NP pointing tasks)

<table>
<thead>
<tr>
<th>Participant</th>
<th>name-name (n=10)</th>
<th>name-object-name (n=10)</th>
<th>name-verb-name (n=10)</th>
<th>total (n=30)</th>
</tr>
</thead>
<tbody>
<tr>
<td>J.D.</td>
<td>8</td>
<td>8</td>
<td>7</td>
<td>23 (77%)</td>
</tr>
<tr>
<td>J.F.</td>
<td>10</td>
<td>10</td>
<td>8</td>
<td>28 (93%)</td>
</tr>
<tr>
<td>L.H.</td>
<td>10</td>
<td>10</td>
<td>7</td>
<td>27 (90%)</td>
</tr>
<tr>
<td>L.S.</td>
<td>10</td>
<td>10</td>
<td>8</td>
<td>28 (93%)</td>
</tr>
<tr>
<td>R.B.</td>
<td>10</td>
<td>10</td>
<td>8</td>
<td>28 (93%)</td>
</tr>
<tr>
<td>R.K.</td>
<td>10</td>
<td>9</td>
<td>7</td>
<td>26 (87%)</td>
</tr>
</tbody>
</table>
ANNEX 7

RESULTS OF SELECTION TASKS - participants with no language problems

1. Naming:

<table>
<thead>
<tr>
<th>NAME</th>
<th>Noun Score</th>
<th>Verb Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>C.P</td>
<td>45</td>
<td>45</td>
</tr>
<tr>
<td>S.T.</td>
<td>45</td>
<td>45</td>
</tr>
<tr>
<td>E.T.</td>
<td>45</td>
<td>45</td>
</tr>
<tr>
<td>B.V.</td>
<td>45</td>
<td>45</td>
</tr>
<tr>
<td>S.M.</td>
<td>45</td>
<td>45</td>
</tr>
<tr>
<td>R.G.</td>
<td>45</td>
<td>45</td>
</tr>
<tr>
<td>P.S.</td>
<td>45</td>
<td>45</td>
</tr>
<tr>
<td>A.M.</td>
<td>45</td>
<td>45</td>
</tr>
<tr>
<td>D.G.</td>
<td>45</td>
<td>45</td>
</tr>
<tr>
<td>G.D.</td>
<td>45</td>
<td>45</td>
</tr>
</tbody>
</table>

2. Narrative:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>single NP</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>single V</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>other single phrases</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>N + 'be'</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>V + 1</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>4</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>V + 2</td>
<td>12</td>
<td>11</td>
<td>9</td>
<td>10</td>
<td>10</td>
<td>12</td>
<td>20</td>
<td>9</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>V + 3</td>
<td>2</td>
<td>4</td>
<td>5</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>6</td>
<td>3</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Arg. minus function</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>order violation</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>total no. of utterances</td>
<td>14</td>
<td>16</td>
<td>14</td>
<td>11</td>
<td>15</td>
<td>16</td>
<td>20</td>
<td>13</td>
<td>13</td>
<td>11</td>
</tr>
</tbody>
</table>
3. Syntax:

<table>
<thead>
<tr>
<th>NAME</th>
<th>SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>C.P</td>
<td>100%</td>
</tr>
<tr>
<td>S.T.</td>
<td>100%</td>
</tr>
<tr>
<td>E.T.</td>
<td>100%</td>
</tr>
<tr>
<td>B.V.</td>
<td>100%</td>
</tr>
<tr>
<td>S.M.</td>
<td>100%</td>
</tr>
<tr>
<td>R.G.</td>
<td>100%</td>
</tr>
<tr>
<td>P.S.</td>
<td>100%</td>
</tr>
<tr>
<td>A.M.</td>
<td>100%</td>
</tr>
<tr>
<td>D.G.</td>
<td>100%</td>
</tr>
<tr>
<td>G.D.</td>
<td>100%</td>
</tr>
</tbody>
</table>

4. STM (NP pointing tasks)

<table>
<thead>
<tr>
<th>NAME</th>
<th>TOTAL</th>
<th>name-name (n=10)</th>
<th>name-object-name (n=10)</th>
<th>name-verb-name (n=10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>C.P</td>
<td>100%</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>S.T.</td>
<td>100%</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>E.T.</td>
<td>100%</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>B.V.</td>
<td>100%</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>S.M.</td>
<td>100%</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>R.G.</td>
<td>100%</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>P.S.</td>
<td>100%</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>A.M.</td>
<td>100%</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>D.G.</td>
<td>97%</td>
<td>10</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>G.D.</td>
<td>93%</td>
<td>10</td>
<td>8</td>
<td>10</td>
</tr>
</tbody>
</table>
ANNEX 8

EVENT VIDEO

a) Events: washing-up jumping
falling photographing
drinking eating
brushing dancing
kissing boiling

b) Static scenes: 2 people 1 person
washing line empty scene
washing-up draining

c) Objects: camera kettle
apple brush
cup
EVENT VIDEO

This video shows various scenes; including action scenes and static scenes. You should decide, for each of the scenes, whether something is happening. You have to decide whether the scene shows an EVENT or NO EVENT.

There are 4 practice scenes:

<table>
<thead>
<tr>
<th></th>
<th>EVENT</th>
<th>NO EVENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>b</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>c</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>d</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

TICK THE APPROPRIATE BOXES

<table>
<thead>
<tr>
<th></th>
<th>EVENT</th>
<th>NO EVENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>EVENT</td>
<td>NO EVENT</td>
</tr>
<tr>
<td>2</td>
<td>EVENT</td>
<td>NO EVENT</td>
</tr>
<tr>
<td>3</td>
<td>EVENT</td>
<td>NO EVENT</td>
</tr>
<tr>
<td>4</td>
<td>EVENT</td>
<td>NO EVENT</td>
</tr>
<tr>
<td>5</td>
<td>EVENT</td>
<td>NO EVENT</td>
</tr>
<tr>
<td>6</td>
<td>EVENT</td>
<td>NO EVENT</td>
</tr>
<tr>
<td>7</td>
<td>EVENT</td>
<td>NO EVENT</td>
</tr>
<tr>
<td>8</td>
<td>EVENT</td>
<td>NO EVENT</td>
</tr>
<tr>
<td>9</td>
<td>EVENT</td>
<td>NO EVENT</td>
</tr>
<tr>
<td>10</td>
<td>EVENT</td>
<td>NO EVENT</td>
</tr>
<tr>
<td>11</td>
<td>EVENT</td>
<td>NO EVENT</td>
</tr>
<tr>
<td>12</td>
<td>EVENT</td>
<td>NO EVENT</td>
</tr>
<tr>
<td>13</td>
<td>EVENT</td>
<td>NO EVENT</td>
</tr>
<tr>
<td>14</td>
<td>EVENT</td>
<td>NO EVENT</td>
</tr>
<tr>
<td>15</td>
<td>EVENT</td>
<td>NO EVENT</td>
</tr>
<tr>
<td>16</td>
<td>EVENT</td>
<td>NO EVENT</td>
</tr>
<tr>
<td>17</td>
<td>EVENT</td>
<td>NO EVENT</td>
</tr>
<tr>
<td>18</td>
<td>EVENT</td>
<td>NO EVENT</td>
</tr>
<tr>
<td>19</td>
<td>EVENT</td>
<td>NO EVENT</td>
</tr>
<tr>
<td>20</td>
<td>EVENT</td>
<td>NO EVENT</td>
</tr>
</tbody>
</table>
## ANNEX 9

### EVENT PHOTO ODD-ONE-OUT TASK

1. **BE**
   - sad
   - on the table
   - a cat
   - in the bin

2. **HAVE**
   - a bike
   - toothache
   - cold
   - broken arm

3. **ACT**
   - eat
   - drink
   - kiss
   - kick

4. **GO**
   - enter
   - leave
   - fall
   - jump
The full set of 40 triads used in the Event Photograph task:

<table>
<thead>
<tr>
<th>Triad 1</th>
<th>Triad 2</th>
<th>Triad 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Have toothache - Have a broken arm - Drinking</td>
<td>2. Have toothache - Have a cold - Eating</td>
<td>3. Drinking - Kicking - Have a broken arm</td>
</tr>
<tr>
<td>4. Kissing - Kicking - Have a cold</td>
<td>25. Have a bike - Have a cold - Drinking</td>
<td>26. Is sad - Is in the bin - Entering</td>
</tr>
<tr>
<td>6. Have a cold - Kissing - Kicking</td>
<td>29. Have a broken arm - Have a bike - Eating</td>
<td>29. Is sad - Is a cat - Jumping</td>
</tr>
<tr>
<td>8. Drinking - Kicking - Have toothache</td>
<td>32. Falling - Entering - Is sad</td>
<td>32. Falling - Entering - Is sad</td>
</tr>
<tr>
<td>9. Is on the table - Is a cat - Jumping</td>
<td>33. Is in the bin - Is on the table - Drinking</td>
<td>33. Is in the bin - Is on the table - Drinking</td>
</tr>
<tr>
<td>10. Have toothache - Have a cold - Kicking</td>
<td>34. Have a broken arm - Have toothache - Entering</td>
<td>34. Have a broken arm - Have toothache - Entering</td>
</tr>
<tr>
<td>11. Leaving - Entering - Is in the bin</td>
<td>35. Eating - Kicking - Is in the bin</td>
<td>35. Eating - Kicking - Is in the bin</td>
</tr>
<tr>
<td>13. Have a broken arm - Have a cold - Falling</td>
<td>37. Is a cat - Is on the table - Eating</td>
<td>37. Is a cat - Is on the table - Eating</td>
</tr>
<tr>
<td>14. Is on the table - Is sad - Eating</td>
<td>38. Have a bike - Have a broken arm - Falling</td>
<td>38. Have a bike - Have a broken arm - Falling</td>
</tr>
<tr>
<td>16. Drinking - Kicking - Is in the bin</td>
<td>40. Have a broken arm - Have a cold - Entering</td>
<td>40. Have a broken arm - Have a cold - Entering</td>
</tr>
</tbody>
</table>
HAVE States
BE States
ACT Events
ANNEX 10

PERSPECTIVE VIDEO

Training scenes

1. push/fall - unbiased
2. push/fall - push
3. push/fall - fall
4. borrow/lend - unbiased
5. borrow/lend - borrow
6. borrow/lend - lend

Experimental Scenes

<table>
<thead>
<tr>
<th></th>
<th>PUSH PULL</th>
<th>PUSH LIFT PULL</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>PUSH</td>
<td>PULL PUSH LIFT</td>
</tr>
<tr>
<td>3</td>
<td>PULL</td>
<td>PUSH LIFT PULL</td>
</tr>
<tr>
<td>4</td>
<td>TAKE GIVE</td>
<td>TAKE FEED GIVE</td>
</tr>
<tr>
<td>5</td>
<td>GIVE</td>
<td>TAKE GIVE FEEED</td>
</tr>
<tr>
<td>6</td>
<td>TAKE</td>
<td>EAT GIVE TAKE</td>
</tr>
<tr>
<td>7</td>
<td>POUR FILL</td>
<td>BREAK POUR FILL</td>
</tr>
<tr>
<td>8</td>
<td>POUR</td>
<td>SPILL FILL POUR</td>
</tr>
<tr>
<td>9</td>
<td>FILL</td>
<td>POUR FILL BREAK</td>
</tr>
<tr>
<td>10</td>
<td>SELL BUY</td>
<td>SELL WRITE BUY</td>
</tr>
<tr>
<td>11</td>
<td>SELL</td>
<td>SELL WRITE BUY</td>
</tr>
<tr>
<td>12</td>
<td>BUY</td>
<td>SELL BUY STEAL</td>
</tr>
<tr>
<td>13</td>
<td>CARRY RIDE</td>
<td>CARRY RIDE DROP</td>
</tr>
<tr>
<td>14</td>
<td>CARRY</td>
<td>DROP CARRY RIDE</td>
</tr>
<tr>
<td>15</td>
<td>FLEE</td>
<td>FLEE KICK CHASE</td>
</tr>
<tr>
<td>16</td>
<td>CHASE FLEE</td>
<td>CHASE KICK FLEE</td>
</tr>
<tr>
<td>17</td>
<td>RIDE</td>
<td>CARRY RIDE HIT</td>
</tr>
<tr>
<td>18</td>
<td>CHASE</td>
<td>CHASE FLEE KICK</td>
</tr>
</tbody>
</table>

357
**PERSPECTIVE VIDEO**

This video shows various action scenes. Each scene can be described in more than one way. For example, the first scene shows someone pushing someone else to the floor - this scene could be described as either **PUSHING** or **FALLING**.

For each scene you should decide on the best way to describe the action.

You will be given a choice of 3 words; you simply have to circle one of them. You should only choose one word for each scene.

For some of the scenes the choice will be quite straightforward, for others it will be hard to decide between which word fits best.

There are 4 practice scenes:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>PUSH or FALL (either word will do)</td>
</tr>
<tr>
<td>b</td>
<td>PUSH</td>
</tr>
<tr>
<td>c</td>
<td>FALL</td>
</tr>
<tr>
<td>d</td>
<td>BORROW or LEND</td>
</tr>
<tr>
<td>e</td>
<td>BORROW</td>
</tr>
<tr>
<td>f</td>
<td>LEND</td>
</tr>
</tbody>
</table>

There are 18 scenes for you to do yourself.
<table>
<thead>
<tr>
<th>Scene</th>
<th>Action 1</th>
<th>Action 2</th>
<th>Action 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PUSH</td>
<td>LIFT</td>
<td>PULL</td>
</tr>
<tr>
<td>2</td>
<td>SPILL</td>
<td>FILL</td>
<td>POUR</td>
</tr>
<tr>
<td>3</td>
<td>TAKE</td>
<td>FEED</td>
<td>GIVE</td>
</tr>
<tr>
<td>4</td>
<td>CHASE</td>
<td>FLEE</td>
<td>KICK</td>
</tr>
<tr>
<td>5</td>
<td>TAKE</td>
<td>GIVE</td>
<td>FEED</td>
</tr>
<tr>
<td>6</td>
<td>BREAK</td>
<td>POUR</td>
<td>FILL</td>
</tr>
<tr>
<td>7</td>
<td>SELL</td>
<td>WRITE</td>
<td>BUY</td>
</tr>
<tr>
<td>8</td>
<td>CARRY</td>
<td>RIDE</td>
<td>DROP</td>
</tr>
<tr>
<td>9</td>
<td>EAT</td>
<td>GIVE</td>
<td>TAKE</td>
</tr>
<tr>
<td>10</td>
<td>PULL</td>
<td>PUSH</td>
<td>LIFT</td>
</tr>
<tr>
<td>11</td>
<td>SELL</td>
<td>WRITE</td>
<td>BUY</td>
</tr>
<tr>
<td>12</td>
<td>CARRY</td>
<td>RIDE</td>
<td>HIT</td>
</tr>
<tr>
<td>13</td>
<td>CHASE</td>
<td>FLEE</td>
<td>KICK</td>
</tr>
<tr>
<td>14</td>
<td>FLEE</td>
<td>KICK</td>
<td>CHASE</td>
</tr>
<tr>
<td>15</td>
<td>DROP</td>
<td>CARRY</td>
<td>RIDE</td>
</tr>
<tr>
<td>16</td>
<td>SELL</td>
<td>BUY</td>
<td>STEAL</td>
</tr>
<tr>
<td>17</td>
<td>PUSH</td>
<td>LIFT</td>
<td>PULL</td>
</tr>
<tr>
<td>18</td>
<td>POUR</td>
<td>FILL</td>
<td>BREAK</td>
</tr>
</tbody>
</table>
ANNEX 11
Sentence Judgement Task - Version A

This is the full set of verbs used:

<table>
<thead>
<tr>
<th>Set A</th>
<th>Set B</th>
<th>Set C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-causative verbs</td>
<td>Anti-causative verbs</td>
<td>Causative verbs</td>
</tr>
<tr>
<td>die</td>
<td>bring</td>
<td>open</td>
</tr>
<tr>
<td>fall</td>
<td>pull</td>
<td>shake</td>
</tr>
<tr>
<td>cry</td>
<td>take</td>
<td>break</td>
</tr>
<tr>
<td>go</td>
<td>drop</td>
<td>march</td>
</tr>
<tr>
<td>smile</td>
<td>raise</td>
<td>burn</td>
</tr>
<tr>
<td>stay</td>
<td>tickle</td>
<td>shrink</td>
</tr>
<tr>
<td>rise</td>
<td>cut</td>
<td>melt</td>
</tr>
<tr>
<td>come</td>
<td>hit</td>
<td>drive</td>
</tr>
<tr>
<td>laugh</td>
<td>throw</td>
<td>boil</td>
</tr>
<tr>
<td>hop</td>
<td></td>
<td>fly</td>
</tr>
<tr>
<td>disappear</td>
<td></td>
<td>shatter</td>
</tr>
<tr>
<td>wait</td>
<td></td>
<td>close</td>
</tr>
<tr>
<td>(12)</td>
<td>(9)</td>
<td>(12)</td>
</tr>
</tbody>
</table>
Set A - Non-Causative:

Non-reversible:

1i) a) *The vase dies the flower.
    b) *The flower dies the vase.
    c) *The vase dies.
    d) The flower dies.

Reversible:

1ii) e) *The nurse falls the queen.
     f) *The queen falls the nurse.
     g) The nurse falls.
     h) The queen falls.

2i) a) *The box cries the nun.
    b) *The nun cries the box.
    c) *The box cries.
    d) The nun cries.

2ii) e) *The king goes the judge.
     f) *The judge goes the king.
     g) The king goes.
     h) The judge goes.

3i) a) *The cup smile the pilot.
    b) *The pilot smiles the cup.
    c) *The cup smiles.
    d) The pilot smiles.

3ii) e) *The policeman stays the actor.
     f) *The actor stays the policeman.
     g) The policeman stays.
     h) The actor stays.

4i) a) *The teacher rises the water.
    b) *The water rises the teacher.
    c) *The teacher rises.
    d) The water rises.

4ii) e) *The lawyer comes the gardener.
     f) *The gardener comes the lawyer.
     g) The lawyer comes.
     h) The gardener comes.

5i) a) *The pen laughs the farmer.
    b) *The farmer laughs the pen.
    a) *The pen laughs.
    b) The farmer laughs.

5ii) e) *The dustman hops the student.
     f) *The student hops the dustman.
     g) The dustman hops.
     h) The student hops.

6ii) e) *The soldier disappears the airman.
     f) *The airman disappears the soldier.
     g) The soldier disappears.
     h) The airman disappears.

7ii) a) *The nun waits the dancer.
     b) *The dancer waits the nun.
     c) The nun waits.
     d) The dancer waits.
Set B - Anti-causative:

Non - reversible;

1i)  
   a) The Queen brings the vase.  
   b) *The vase brings the Queen.  
   c) *The Queen brings.  
   d) *The plate brings.

Reversible;

1ii)  
   e) The nurse pulls the teacher.  
   f) The teacher pulls the nurse.  
   g) *The nurse pulls.  
   h) *The teacher pulls.

2i)  
   a) The judge takes the pen.  
   b) *The pen takes the judge.  
   c) *The judge takes.  
   d) *The pen takes.

2ii)  
   e) The pilot drops the airman.  
   f) The airman drops the pilot.  
   g) *The pilot drops.  
   h) *The airman drops.

3i)  
   a) The king raises the flag.  
   b) *The flag raise the king.  
   c) *The king raises  
   d) *The flag raises.

3ii)  
   e) The policeman tickles the lawyer.  
   f) The lawyer tickles the policeman.  
   g) *The policeman tickles.  
   h) *The lawyer tickles.

4i)  
   a) The gardener cuts the cloth.  
   b) *The cloth cuts the gardener.  
   c) *The gardener cuts.  
   d) *The cloth cuts.

4ii)  
   e) The actor hits the farmer.  
   f) The farmer hits the actor.  
   g) *The actor hits.  
   h) *The farmer hits.

5i)  
   a) The actor throws the pen.  
   b) *The pen throws the actor.  
   c) *The actor throws.
   d) *The pen throws.
Set C - Causative:

Non-reversible:

1i) a) The nurse opens the box.
    b) *The box opens the nurse.
    c) *The nurse opens.
    d) The box opens.

Reversible:

1ii) e) The actor shakes the dancer.
     f) The dancer shakes the actor.
     g) The actor shakes.
     h) The dancer shakes.

2i) a) The nun breaks the cup.
    b) *The cup breaks the nun.
    c) *The nun breaks.
    d) The cup breaks.

2ii) e) The policeman marches the soldier.
     f) The soldier marches the policeman.
     g) The policeman marches.
     h) The soldier marches.

3i) a) The queen burns the box.
    b) *The box burns the queen.
    c) *The queen burns.
    d) The queen burns.

3ii) e) The king shrinks the judge.
     f) The judge shrinks the king.
     g) The king shrinks.
     h) The judge shrinks.

4i) a) The dustman melts the butter.
     b) *The butter melts the dustman.
     c) *The dustman melts.
     d) The butter melts.

4ii) e) The teacher drives the lawyer.
     f) The lawyer drives the teacher.
     g) The teacher drives.
     h) The lawyer drives.

5i) a) The gardener boils the water.
     b) *The water boils the gardener.
     c) *The gardener boils.
     d) The water boils.

5ii) e) The pilot flies the airman.
     f) The airman flies the pilot.
     g) The pilot flies.
     h) The airman flies.

6i) a) The farmer shatters the glass.
     b) *The glass shatters the farmer.
     c) *The farmer shatters.
     d) The glass shatters.

7i) a) The student closes the door.
     b) *The door closes the student.
     c) *The student closes.
     d) The door closes.
ANNEX 12

OBJECTS AND ACTIONS VIDEO

N.B. The submitted video contains 16 scenes, 6 of these were not used in the task because they addressed visual manipulations that were not appropriate for the language impairments under investigation; these would involve the use of prepositions and other spatial terms (e.g. in the middle).

The following scenes were not used: 4, 7, 9, 12, 14, 16

<table>
<thead>
<tr>
<th>Scene</th>
<th>Expected response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. <em>The man rolls the ball.</em></td>
<td></td>
</tr>
<tr>
<td>(Control)</td>
<td>man = subject</td>
</tr>
<tr>
<td></td>
<td>man mentioned before ball</td>
</tr>
<tr>
<td>2. <em>The ball is on the table.</em></td>
<td></td>
</tr>
<tr>
<td>(Close-up)</td>
<td>ball = subject</td>
</tr>
<tr>
<td></td>
<td>ball mentioned before table</td>
</tr>
<tr>
<td>3. <em>There is a big ball on the table. A smaller ball hits it.</em></td>
<td></td>
</tr>
<tr>
<td>(Size)</td>
<td>either, 2 sentences</td>
</tr>
<tr>
<td></td>
<td>or, passive</td>
</tr>
<tr>
<td>5. <em>The man rolls the ball.</em></td>
<td></td>
</tr>
<tr>
<td>(Close-up)</td>
<td>man = subject</td>
</tr>
<tr>
<td></td>
<td>man mentioned before ball</td>
</tr>
<tr>
<td>6. <em>The (big) ball is on the table.</em></td>
<td></td>
</tr>
<tr>
<td>(Size)</td>
<td>ball = subject</td>
</tr>
<tr>
<td></td>
<td>ball mentioned before table</td>
</tr>
<tr>
<td>8. <em>The ball is on the table.</em></td>
<td></td>
</tr>
<tr>
<td>(Control)</td>
<td>ball = subject</td>
</tr>
<tr>
<td></td>
<td>ball mentioned before table</td>
</tr>
<tr>
<td>10. <em>There is a doll on the table.</em></td>
<td></td>
</tr>
<tr>
<td>(Animacy)</td>
<td>doll = subject</td>
</tr>
<tr>
<td></td>
<td>doll mentioned before table</td>
</tr>
<tr>
<td>11. <em>There is a doll on the table. A ball hits it</em></td>
<td></td>
</tr>
<tr>
<td>(Animacy)</td>
<td>Sentences</td>
</tr>
<tr>
<td></td>
<td>passive</td>
</tr>
<tr>
<td>13. <em>A ball hits another ball.</em></td>
<td></td>
</tr>
<tr>
<td>(Control)</td>
<td>canonical order</td>
</tr>
<tr>
<td>15. <em>There is a ball on the table. Another ball hits it.</em></td>
<td></td>
</tr>
<tr>
<td>(Close-up)</td>
<td>sentences</td>
</tr>
<tr>
<td></td>
<td>passive</td>
</tr>
</tbody>
</table>
OBJECTS AND ACTIONS VIDEO

The video shows various scenes involving ordinary objects (such as a ball or a table) and simple actions (such as rolling or hitting).

You should try and describe each scene in a clear and simple way. Preferably in just one, short, sentence.

Some of the scenes are easy to describe, others are more complex.

Many of the scenes vary only slightly, so you may think that you have scene a particular scene more than once. Don’t let this put you off, just consider each scene individually.

There are 4 practice scenes:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>There is a cup on the table</td>
</tr>
<tr>
<td>b</td>
<td>The man takes the cup</td>
</tr>
<tr>
<td>c</td>
<td>The ball hits the cup</td>
</tr>
<tr>
<td>d</td>
<td>The man takes the middle cup</td>
</tr>
<tr>
<td></td>
<td>Describe the scene as clearly as possible</td>
</tr>
<tr>
<td>---</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td></td>
</tr>
</tbody>
</table>
ANNEX 13

Sentence Judgement Task - Version B

Proper Names

Steve       Kate
John        Sue
Mike        Mary
Bill        Jane
Bob         Helen

Object Names

the box     the glass
the cup     the meat
the water   the ball
the butter  the cloth
Sentence Judgement Task - Version B

Sentences

Set A

a)*Steve fell the ball.
b)*The ball fell Steve.
c)*Steve fell.
d)*The ball fell.
a)*Mike cried Jane.
b)*Jane cried Mike.
c)*Mike cried.
d)*Jane cried.
a)*Mary went Bill.
b)*Bill went Mary.
c)*Mary went.
d)*Bill went.
a)*Bob smiled Steve.
b)*Steve smiled Bob.
c)*Bob smiled.
d)*Steve smiled.
a)*John disappeared the meat.
b)*The meat disappeared John.
c)*John disappeared.
d)*The meat disappeared.
a)*Kate rose the water.
b)*The water rose Kate.
c)*Kate rose.
d)*The water rose.

Set B

a)*Helen brought the water.
b)*The water brought Helen.
c)*Helen brought.
d)*The water brought.
a)*Jane took the ball.
b)*The ball took Jane.
c)*Jane took.
d)*The ball took.
a)*Bill collected the meat.
b)*The meat collected Bill.
c)*Bill collected.
d)*The meat collected.
a)*Steve raised the glass.
b)*The glass raised Steve.
c)*Steve raised.
d)*The glass raised.
a)*John opened the box.
b)*The box opened John.
c)*John opened.
d)*The box opened.

Set C

a)*Kate tore the cloth.
b)*The cloth tore Kate.
c)*Kate tore.
d)*The cloth tore.
a)*Sue broke the cup.
b)*The cup broke Sue.
c)*Sue broke.
d)*The cup broke.
a)*Helen roasted the meat.
b)*The meat roasted Helen.
c)*Helen roasted.
d)*The meat roasted.
a)*Jane melted the butter.
b)*The butter melted Jane.
c)*Jane melted.
d)*The butter melted.
a)*Sue cracked the cup.
b)*The cup cracked Sue.
c)*Sue cracked.
d)*The cup cracked.
<table>
<thead>
<tr>
<th>(a)</th>
<th>(b)</th>
<th>(c)</th>
<th>(d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>*Jane hopped Kate.</td>
<td>*Kate trimmed the cloth.</td>
<td>*Mary closed the box.</td>
<td>*Mary closed.</td>
</tr>
<tr>
<td>*Sue waited Mary.</td>
<td>*Bill caught the box.</td>
<td>*Bob shattered the glass.</td>
<td>*Bob shattered.</td>
</tr>
</tbody>
</table>
ANNEX 14

Event Photograph task - analysis to consider the use of non-linguistic strategies

A = results from using non-linguistic variables
B = L.S.'s results
C = J.D.'s results
D = R.B.'s results

<table>
<thead>
<tr>
<th>NO.</th>
<th>ODD-ONE-OUT</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Have toothache</td>
<td>Have a broken arm</td>
<td>Drinking</td>
<td>✓</td>
<td>X</td>
</tr>
<tr>
<td>2.</td>
<td>Is sad</td>
<td>Is a cat arm</td>
<td>Kissing</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>3.</td>
<td>Leaving</td>
<td>Is a cat</td>
<td>Jumping</td>
<td>✓</td>
<td>X</td>
</tr>
<tr>
<td>4.</td>
<td>Falling</td>
<td>Leaving</td>
<td>Have a bike</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>5.</td>
<td>Is in the bin</td>
<td>Is a cat</td>
<td>Entering</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>6.</td>
<td>Have a cold</td>
<td>Kissing</td>
<td>Kicking</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>7.</td>
<td>Entering</td>
<td>Leaving</td>
<td>Is on the table</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>8.</td>
<td>Drinking</td>
<td>Kicking</td>
<td>Have toothache</td>
<td>✓</td>
<td>X</td>
</tr>
<tr>
<td>9.</td>
<td>Is on the table</td>
<td>Is a cat</td>
<td>Jumping</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>10.</td>
<td>Have toothache</td>
<td>Have a cold</td>
<td>Kicking</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>11.</td>
<td>Leaving</td>
<td>Entering</td>
<td>Is in the bin</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>12.</td>
<td>Kicking</td>
<td>Drinking</td>
<td>Is sad</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>13.</td>
<td>Have a broken arm</td>
<td>Have a bike</td>
<td>Falling</td>
<td>✓</td>
<td>X</td>
</tr>
<tr>
<td>14.</td>
<td>Is on the table</td>
<td>Is sad</td>
<td>Eating</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>15.</td>
<td>Falling</td>
<td>Entering</td>
<td>Have a cold</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>16.</td>
<td>Drinking</td>
<td>Kicking</td>
<td>Is in the bin</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>17.</td>
<td>Is in the bin</td>
<td>Is on the table</td>
<td>Kissing</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>18.</td>
<td>Have a bike</td>
<td>Have a cold</td>
<td>Falling</td>
<td>✓</td>
<td>X</td>
</tr>
<tr>
<td>19.</td>
<td>Kicking</td>
<td>Kissing</td>
<td>Is sad</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>20.</td>
<td>Jumping</td>
<td>Falling</td>
<td>Have a broken arm</td>
<td>✓</td>
<td>X</td>
</tr>
<tr>
<td>21.</td>
<td>Have toothache</td>
<td>Have a cold</td>
<td>Eating</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>22.</td>
<td>Is a cat</td>
<td>Is on the table</td>
<td>Leaving</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>23.</td>
<td>Drinking</td>
<td>Kicking</td>
<td>Have a bike</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>24.</td>
<td>Jumping</td>
<td>Leaving</td>
<td>Have a bike</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>25.</td>
<td>Have a bike</td>
<td>Have toothache</td>
<td>Drinking</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>26.</td>
<td>Is sad</td>
<td>Is in the bin</td>
<td>Falling</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>27.</td>
<td>Kissing</td>
<td>Kicking</td>
<td>Have a broken arm</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>28.</td>
<td>Jumping</td>
<td>Leaving</td>
<td>Is on the table</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>29.</td>
<td>Have a broken arm</td>
<td>Have a bike</td>
<td>Eating</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>30.</td>
<td>Is sad</td>
<td>Is a cat</td>
<td>Jumping</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>31.</td>
<td>Kissing</td>
<td>Eating</td>
<td>Have toothache</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>32.</td>
<td>Falling</td>
<td>Entering</td>
<td>Is sad</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>33.</td>
<td>Is in the bin</td>
<td>Is on the table</td>
<td>Drinking</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>34.</td>
<td>Have a broken arm</td>
<td>Have toothache</td>
<td>Entering</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>35.</td>
<td>Eating</td>
<td>Kicking</td>
<td>Is in the bin</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>36.</td>
<td>Jumping</td>
<td>Leaving</td>
<td>Have a cold</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>37.</td>
<td>Is a cat</td>
<td>Is on the table</td>
<td>Eating</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>38.</td>
<td>Have a bike</td>
<td>Have a broken arm</td>
<td>Jumping</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>39.</td>
<td>Eating</td>
<td>Drinking</td>
<td>Is a cat</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>40.</td>
<td>Have a broken arm</td>
<td>Have a cold</td>
<td>Entering</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
ANNEX 15
Sentence Judgement Task - additional analysis

Here is a list of the analyses used to try and explain the error patterns in the Sentence Judgement Task. None of these analyses provided an explanatory account of the results, neither for the group results nor for individual error patterns.

1. The semantic coherence of the verb phrase (VP);

   The various sets of VPs were examined in terms of the semantic coherence of the verb and the 2nd argument. That is, a judgement was made about the amount of integrative effort that was required to interpret the VP.

   For example, compare the following sentences:
   
   a) Ruby read the book
   b) Ruby finished the book
   c) Ruby dried the book

   The difficulty of integrating the verb and its theme increases from a) - c). The first sentence is most easily understood because of the selectional restrictions of the verb \textit{read}, it requires a theme denoting an entity that can be ‘read’ and a \textit{book} is just this sort of entity. The kinds of theme \textit{finish} can appear with are not so narrowly constrained, and so there needs to be some constructional effort in order to understand how it is that a \textit{book} may be ‘finished’. The sentence must be interpreted as meaning that Ruby finished some activity involving the \textit{book}, for example \textit{reading} or \textit{writing}. Sentence c) requires further effort because \textit{drying} is not an activity commonly associated with a \textit{book}. However, \textit{drying} is a possible activity involving a \textit{book} because of the nature of the paper from which \textit{books} are made. In this case, the meaning of the verb and the meaning of \textit{book} can be integrated although it requires some effort.

   This scale of difficulty relates to the ‘qualia’ structure of the theme (Pustejovsky 1995). As discussed in chapter 1, nouns have a number of meaning components, or ‘quale’, that may interact with predicate meaning: constitutive, formal, telic and agentive. In these terms:

   • Sentence a) can be interpreted using the whole of the meaning of \textit{book}. 
Sentence b) requires an interpretation using a specific ‘quale’ of *book*; either the telic or agentive ‘quale’. That is, the telic ‘quale’ provides the information that a *book* is an entity that is *read* and the agentive ‘quale’ provides the information that a *book* is created by the act of *writing*.

Sentence c) requires that the constitutive ‘quale’ is the component of meaning that is integrated with the verb. This ‘quale’ would provide the information that a *book* is made from paper.

This notion of qualia structure also provided the second way in which the Sentence Judgement Task results were analysed, this analysis is outlined below.

2. The qualia of the noun phrase (NP);

Both the problematic sentences and those that were correctly judged were analysed in terms of the qualia structure of the second NP. That is, the sentences were divided into five sets:

a) sentences whose meaning depended on the integration of the constitutive quale of the 2nd NP;

b) sentences whose meaning depended on the integration of the formal quale of the 2nd NP;

c) sentences whose meaning depended on the integration of the telic quale of the 2nd NP;

d) sentences whose meaning depended on the integration of the agentive quale of the 2nd NP;

e) sentences whose meaning depended on the integration of the whole meaning of the 2nd NP;

This analysis differs from that outlined in 1) above. The analysis in 1) looks at the coherence of the VP in order to discover whether those VPs which require greater integration of meaning are more difficult. The analysis outlined here looks at the NP in order to discover whether a particular ‘quale’ is more difficult than the others.

3. The ‘headedness’ of the event;

As discussed in chapter 1, Pustejovsky’s (op cit) account of the lexicon provides a means of indicating the ‘headedness’ of an event. In this account, the temporal structure of an event is analysed in terms of sub-events and one of these sub-events will be marked as more important than the others. For example, consider the predicate *arrive*, which includes a beginning motion and a final ‘arrival’. The focus of this predicate is on the end-point (the goal) of the event. The predicate *leave* is a description of the same event but that focuses on the beginning of the event.
4. The 'typicality' of the theme;

A further account of the various layers of meaning to be integrated in sentence comprehension, is that of McRae, Ferretti & Amyote, 1997 (see chapter 1, section 1.2.2). This paper concentrates of the constraining influence of knowledge about thematic roles, for example the importance of knowledge of theme features in a sentence containing a theme NP. The authors claim that "world knowledge of events and their common participants is organised so that it is linguistically relevant" (pg 170, op cit). The experimental evidence presented in that paper provides two key findings:

a) some NPs are better exemplars of themes than others; and

b) both the similarity of the features of an NP and the features of a theme predict the 'typicality' of that NP as a theme.

The particular theme features that were examined in this paper were those identified by Dowty (cited by McRae et al., 1997), these are as follows:

- the theme undergoes a change of state;
- the theme is causally affected by an agent;
- the theme stationary with respect to other entities; and
- it does not exist independently of the event.

To these features, it is possible to add a further feature referred to by Pinker (1989):

- themes are generally holistic entities;

The sentences in the Sentence Judgement Task were analysed in terms of the 'typicality' of the theme NP in order to see whether more 'typical' themes made a sentence easier to judge (i.e. caused less errors). This analysis is not the same as that examining the coherence of the VP (see 1) above). VP coherence is an evaluation of an NP's suitability in a particular event, whereas theme 'typicality' is an evaluation of an NP's 'theme-ness' per se. For example, consider the following:

Ruby dried the book

Here, the book scores quite highly as a 'typical' theme: it undergoes a change of state; is causally affected by the agent; and is a holistic entity. This should make this sentence relatively easy to judge. However, as noted in 1) above, the interpretation of this sentence requires an integrative effort focussing particularly on the constitutive 'quale' of book, which may make this sentence relatively difficult to judge.
On States

The ball is on the table. (Control)
THEME - PREDICATE - LOCATION

The (big) ball is on the table. (Size)
THEME - PREDICATE - LOCATION

The ball is on the table. (Close-up)
THEME - PREDICATE - LOCATION

The doll is on the table. (Animacy)
THEME - PREDICATE - LOCATION

Rolling Events

The man rolls the ball. (Control)
AGENT - PREDICATE - THEME

The man rolls the ball. (Close-up)
AGENT - PREDICATE - THEME

Hitting Events

A ball hits another ball. (Control)
AGENT - PREDICATE - THEME

The big ball is on the table. (Size)
THEME - PREDICATE - LOCATION

&
A smaller ball hits it.
AGENT - PREDICATE - THEME

The ball is on the table. (Close-up)
THEME - PREDICATE - LOCATION

&
Another ball hits it.
AGENT - PREDICATE - THEME

The doll is on the table. (Animacy)
THEME - PREDICATE - LOCATION

&
A ball hits it.
AGENT - PREDICATE - THEME

The ball still.
THEME - PREDICATE

The ball still.
THEME - PREDICATE

The ball of still.
THEME - PREDICATE

The doll of sitting.
THEME - PREDICATE

The roll - ball fell table.
THEME - PREDICATE - SOURCE

The ball throw.
THEME - PREDICATE

The ball fell the table.
THEME - PREDICATE - SOURCE

The big ball hit of small ball.
AGENT - PREDICATE - THEME

The ball under the table
THEME - PREDICATE - LOCATION

of ball threw ball.
? - PREDICATE - THEME

The doll of threw - sitting.
THEME - ? PREDICATE

374
On States

The ball is on the table. (Control)
THEME - PREDICATE - LOCATION

The (big) ball is on the table. (Size)
THEME - PREDICATE - LOCATION

The ball is on the table. (Close-up)
THEME - PREDICATE - LOCATION

The doll is on the table. (Animacy)
THEME - PREDICATE - LOCATION

Table, tennis ball sitting there
LOCATION - THEME - PREDICATE - LOCATION

Table is big ball.
LOCATION - ? - THEME

Ball is sitting on the table.
THEME - PREDICATE - LOCATION

Girl, girl is sitting on the table.
THEME - PREDICATE - LOCATION

Rolling Events

The man rolls the ball. (Control)
AGENT - PREDICATE - THEME

The man rolls the ball. (Close-up)
AGENT - PREDICATE - THEME

Man is rolling the ball on the table.
AGENT - PREDICATE - THEME - PATH

Man is . . . ball.
AGENT - PREDICATE - THEME

Hitting Events

A ball hits another ball. (Control)
AGENT - PREDICATE - THEME

The big ball is on the table. (Size)
THEME - PREDICATE - LOCATION
&
A smaller ball hits it.
AGENT - PREDICATE - THEME

Little ball come over the top the little ball.
AGENT - PREDICATE - PATH - ? THEME

Ball is sitting on the table
THEME-PREDICATE-LOCATION

Another ball knocks it off.
AGENT - PREDICATE - THEME-PATH

Man, Table and
LOCATION

2 balls put off it.
THEME - PREDICATE - GOAL

Woman.
THEME

Ball hitting woman and (gesture)
AGENT - PREDICATE - THEME - (?RESULT)
On States

The ball is on the table. (Control)
THEME - PREDICATE - LOCATION

The (big) ball is on the table. (Size)
THEME - PREDICATE - LOCATION

The ball is on the table. (Close-up)
THEME - PREDICATE - LOCATION

The doll is on the table. (Animacy)
THEME - PREDICATE - LOCATION

The tennis ball is sitting on the table
THEME - PREDICATE - LOCATION

A big ball is sitting on the table.
THEME - PREDICATE - LOCATION

The ball is sitting on the table
THEME - PREDICATE - LOCATION

The doll is sitting on the table.
THEME - PREDICATE - LOCATION

Rolling Events

The man rolls the ball. (Control)
AGENT - PREDICATE - THEME

The man rolls the ball. (Close-up)
AGENT - PREDICATE - THEME

The man is rolling across the table
AGENT - PREDICATE - PATH
by the ball.
THEME

The man throws on the table and
AGENT - PREDICATE - PATH
drops to the floor
PREDICATE - GOAL

Hitting Events

A ball hits another ball. (Control)
AGENT - PREDICATE - THEME

The big ball is on the table. (Size)
THEME - PREDICATE - LOCATION
&
A smaller ball hits it.
AGENT - PREDICATE - THEME

The ball is on the table.
THEME - PREDICATE - LOCATION

The man is throwing it and
AGENT - PREDICATE - THEME
he hits it.
AGENT - PREDICATE - THEME

The big ball is knocked of
THEME - PREDICATE
by the small ball.
& AGENT

The ball is on the table. (Close-up)
THEME - PREDICATE - LOCATION
&
Another ball hits it.
AGENT - PREDICATE - THEME

The man hits both balls on the floor.
AGENT - PREDICATE - THEME - GOAL

The doll is on the table. (Animacy).
THEME - PREDICATE - LOCATION
&
A ball hits it.
AGENT - PREDICATE - THEME

The dolly is on the table.
THEME - PREDICATE - LOCATION

The a tennis ball hits the doll.
AGENT - PREDICATE - THEME
On States

The ball is on the table. (Control)
THEME - PREDICATE - LOCATION

The (big) ball is on the table. (Size)
THEME - PREDICATE - LOCATION

The ball is on the table. (Close-up)
THEME - PREDICATE - LOCATION

The doll is on the table. (Animacy)
THEME - PREDICATE - LOCATION

Rolling Events

The man rolls the ball. (Control)
AGENT - PREDICATE - THEME

The man rolls the ball. (Close-up)
AGENT - PREDICATE - THEME

Hitting Events

A ball hits another ball. (Control)
AGENT - PREDICATE - THEME

The big ball is on the table. (Size)
THEME - PREDICATE - LOCATION

A smaller ball hits it.
AGENT - PREDICATE - THEME

The ball is on the table. (Close-up)
THEME - PREDICATE - LOCATION

Another ball hits it.
AGENT - PREDICATE - THEME

The doll is on the table. (Animacy)
THEME - PREDICATE - LOCATION

A ball hits it.
AGENT - PREDICATE - THEME
On States

The ball is on the table. (Control)
THEME - PREDICATE - LOCATION

The (big) ball is on the table. (Size)
THEME - PREDICATE - LOCATION

The ball is on the table. (Close-up)
THEME - PREDICATE - LOCATION

The doll is on the table. (Animacy)
THEME - PREDICATE - LOCATION

Rolling Events

The man rolls the ball. (Control)
AGENT - PREDICATE - THEME

The man rolls the ball. (Close-up)
AGENT - PREDICATE - THEME

Hitting Events

A ball hits another ball. (Control)
AGENT - PREDICATE - THEME

The big ball is on the table. (Size)
THEME - PREDICATE - LOCATION
&
A smaller ball hits it.
AGENT - PREDICATE - THEME

The ball is on the table. (Close-up)
THEME - PREDICATE - LOCATION
&
Another ball hits it.
AGENT - PREDICATE - THEME

The doll is on the table. (Animacy)
THEME - PREDICATE - LOCATION
&
A ball hits it.
AGENT - PREDICATE - THEME

Tennis ball and static and table.
THEME - PREDICATE - LOCATION

Ball, table, static.
THEME - LOCATION - PREDICATE

Ball and then table.
THEME - LOCATION

Baby, table and .. (no clothes).
THEME - LOCATION -

Ball and (gestures 'rolling').
THEME - (PREDICATE)

Tennis ball and then (gestures 'rolling').
THEME - (PREDICATE)

Ball and then (gesture) and then (gesture)
THEME - (PREDICATE) - (GOAL)

And now (draws big ball) and
(AGENT)

Now (draws small ball).
(AGENT)

Ball steady, then
THEME - PREDICATE

Ball bang, and tennis ball.
AGENT - PREDICATE - THEME

Ball and .. er .. leg.
AGENT - ?PROPERTY
On States

The ball is on the table. (Control)
THEME - PREDICATE - LOCATION

The (big) ball is on the table. (Size)
THEME - PREDICATE - LOCATION

The ball is on the table. (Close-up)
THEME - PREDICATE - LOCATION

The doll is on the table. (Animacy)
THEME - PREDICATE - LOCATION

Rolling Events

The man rolls the ball. (Control)
AGENT - PREDICATE - THEME

The man rolls the ball. (Close-up)
AGENT - PREDICATE - THEME

Hitting Events

A ball hits another ball. (Control)
AGENT - PREDICATE - THEME

The big ball is on the table. (Size)
THEME - PREDICATE - LOCATION
&
A smaller ball hits it.
AGENT - PREDICATE - THEME

The ball is on the table. (Close-up)
THEME - PREDICATE - LOCATION
&
Another ball hits it.
AGENT - PREDICATE - THEME

The doll is on the table. (Animacy)
THEME - PREDICATE - LOCATION
&
A ball hits it.
AGENT - PREDICATE - THEME

The ball is on the table.
THEME - PREDICATE - LOCATION

The table, big ball, sitting.
LOCATION - THEME - PREDICATE

The chair [table] and go, sitting there.
LOCATION - PREDICATE - LOCATION

The doll. The doll on the chair. [table]
THEME - THEME - PREDICATE - LOCATION

The ball (gesture). The ball ..er. go over.
THEME (PREDICATE / AGENT). THEME - PREDICATE - GOAL

Chair and the table the man all over
?

The ball the ball.
?

2 balls & popping, and .. er .. on the floor.
THEME - PREDICATE - GOAL

The big ball,
THEME
a small one..er..the big ball and. er..hitting.
AGENT - THEME - PREDICATE

There's 2 balls.
AGENT & THEME?

The doll is,
THEME

and the ball, .. er .. hits the ball.
AGENT - PREDICATE - THEME
<table>
<thead>
<tr>
<th>Scene 1</th>
<th>Scene 2</th>
<th>Scene 3</th>
<th>Scene 4</th>
<th>Scene 5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>L.H.</strong></td>
<td>knitting -&gt; Gromit</td>
<td>cup of tea</td>
<td>sheep -&gt; running</td>
<td>big dog</td>
</tr>
<tr>
<td></td>
<td>bed</td>
<td></td>
<td>lorry</td>
<td>lady shake</td>
</tr>
<tr>
<td><strong>L.S.</strong></td>
<td>its knitting</td>
<td>the tea boiling</td>
<td>(points at sheep)</td>
<td>the dogs coming</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>and doors</td>
</tr>
<tr>
<td><strong>R.B.</strong></td>
<td>knitting</td>
<td>cup of tea</td>
<td>and eh</td>
<td>(gesture:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>sheep</td>
<td>eyes looking)</td>
</tr>
<tr>
<td><strong>J.D.</strong></td>
<td>dog</td>
<td>wool</td>
<td>lorry</td>
<td>women</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>dog</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>door</td>
</tr>
<tr>
<td><strong>J.F.</strong></td>
<td>wool</td>
<td>wool fell down</td>
<td>sheep</td>
<td>mirror</td>
</tr>
<tr>
<td></td>
<td>mother lamb</td>
<td>the clock alright</td>
<td>big car</td>
<td>eyes looking</td>
</tr>
<tr>
<td></td>
<td>mother knitting</td>
<td></td>
<td>got out</td>
<td>stop</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>big car</td>
</tr>
<tr>
<td><strong>R.K.</strong></td>
<td>the knitting</td>
<td>and 2 o’clock</td>
<td>the van</td>
<td>is a mirror</td>
</tr>
<tr>
<td></td>
<td></td>
<td>and the wool</td>
<td>is driving somewhere</td>
<td>(gesture: cat flap)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>is stopped and</td>
<td>go inside</td>
</tr>
</tbody>
</table>