

The Influence of the Temporal Characteristics of Events on Children's Pronoun Resolution

Gillian Francey

BA (Hons.), M.Sc.

Department of Psychology

Lancaster University

August 2018

This thesis is submitted in part fulfilment of the requirements for the degree of Doctorate in Philosophy.

Declaration

I declare that this thesis is my own work and that it has not previously been submitted in substantially the same form to this or any other institution for the award of a higher degree or any other qualifications.

Gillian Francey

August 2018

Acknowledgements

First I would like to thank my supervisor, Professor Kate Cain. You have encouraged and inspired me throughout my Ph.D. Thank you for your time, expert guidance and clarity of thought. I have learnt so much from you. I would also like to thank my second supervisor, Professor John Towse. Thank you for your words of encouragement along the way.

I also extend my gratitude to the Psychology Department for funding my Ph.D. with a teaching studentship. I enjoyed delivering undergraduate seminars and feel the experience contributed in many positive ways to my Ph.D. experience.

A big thank you to all the head teachers, teachers, parents and pupils of the participating schools. Thank you for your time and for your flexibility in scheduling data collection timetables.

My thanks must also go fellow colleagues Nicola Currie and Liam Blything. Your friendship and support have been invaluable over the last years and I have enjoyed our discussions in Kate's language and literacy research group. I have learnt a lot from our chats and hope we will continue to have them for many more years. Thanks also to my dear friends, Louise, Deb, Liz, Sharon and Ann you gave me the belief that I could and should do this.

Turning now to my family thanks Daniel, Becky and Patrick for being so supportive for so many years, and for accepting pizza for tea on such a regular basis. Thanks Mum and Alwyn, you always know what to say and when to just give me a hug. Thanks Dad, you may be gone but you are not forgotten. I hear your voice.

Finally, I would like to say thank you to my husband Paul, for providing me with the motivation to do this and for supporting me along the way. I would not have done this without you, thank you.

Contents Page

Declaration	p. ii
Acknowledgements	p. iii
List of Tables	p. ix
List of Figures	p. xiii
Abstract	p. xiv
Chapter 1: Literature Review	
1.1 Introduction	p. 1
1.2 Adult Pronoun Resolution Research	
1.2.1 Syntactic status	p. 3
1.2.2 Thematic role	p. 4
1.2.3 Temporal characteristics	p. 6
1.3 Why Do Adults Demonstrate these Effects?	p. 8
1.4 Bias For Protagonists or Coherence Relations?	p. 12
1.5 Lexical Aspect	p. 14
1.6 Children Pronoun Resolution Research	
1.6.1 Syntactic status	p. 19
1.6.2 Thematic role	p. 20
1.6.3 Pronoun resolution difficulties and poor comprehension	p. 23
1.6.4 Temporal characteristics	p. 26
1.7 Children's Understanding of Aspectual Morphemes	
1.7.1 Asymmetry in early productions.	p. 26
1.8 Effects of Grammatical Aspect in Narratives	p. 32
1.9 Overview of Literature Review	p. 40

Chapter 2: The Influence of Grammatical Aspect on Pronoun

Resolution for Events with Inherent Endpoints.

2.1 Introduction	p. 41
2.2 Experiment 1a: The Effect of Grammatical Aspect on Children's Resolution of Ambiguous Pronouns	p. 42
2.2.1 Method	p. 48
2.2.2 Results	p. 50
2.2.3 Discussion	p. 53
2.3 Experiment 1b: The Effect of Grammatical Aspect on Adults' Resolution of Ambiguous Pronouns	p. 54
2.3.1 Method	p. 55
2.3.2 Results	p. 55
2.3.3 Discussion	p. 57
2.4 Experiment 2a: The Effect of Grammatical Aspect on Children's Resolution of Pronouns when Protagonists are Different Genders: Cloze Task	p. 59
2.4.1 Method	p. 61
2.4.2 Results	p. 63
2.4.3 Discussion	p. 65
2.5 Experiment 2b: The Effect of Grammatical Aspect on Children's Resolution of Pronouns when Protagonists are Different Genders: Forced Choice Task	p. 66
2.5.1 Method	p. 67
2.5.2 Results	p. 67
2.5.3 Discussion	p. 70

2.6 General Discussion	p. 70
Chapter 3: The Influence of Grammatical Aspect on Pronoun Resolution Within Different Lexical Aspect Categories.	
3.1 Introduction	p. 73
3.2 Experiment 3a: The Effect of Grammatical Aspect on Adults' Pronoun Resolution within Different Lexical Aspect Categories	p. 75
3.2.1 Method	p. 79
3.2.2 Results	p. 83
3.2.3 Discussion	p. 90
3.3 Experiment 3b: The Effect of Grammatical Aspect on Children's Pronoun Resolution within Different Lexical Aspect Categories	p. 91
3.3.1 Method	p. 92
3.3.2 Results	p. 94
3.3.3 Discussion	p. 101
3.4 General Discussion	p. 103
Chapter 4: Grammatical Aspect Effects in Narratives.	
4.1 Introduction	p. 106
4.2 Experiment 4a: The Effect of Grammatical Aspect on Children's Judgement of the Ongoingness of Events within Narratives	p. 106
4.2.1 Method	p. 108
4.2.2 Results	p. 112
4.2.3 Discussion	p. 120
4.3 Experiment 4b: The Effect of Grammatical Aspect on Children's Pronoun Resolution within Narratives	p. 121
4.3.1 Method	p. 123

4.3.2 Results	p. 125
4.3.3 Discussion	p. 133
4.4 Experiment 4c: The Effect of Grammatical Aspect on Children's Pronoun Resolution when there is a Delay between the Aspectual Event and the Pronoun Continuation	p. 134
4.4.1 Method	p. 135
4.4.2 Results	p. 136
4.4.3 Discussion	p. 141
4.5 General Discussion	p. 141
Chapter 5: The Imperfective and Perfective Expression of Events in a Corpus of Children's Literature	
5.1 Introduction	p. 145
5.2 Method	p. 151
5.3 Results	p. 158
5.4 Discussion	p. 168
Chapter 6: General Discussion	
6.1 Aims of Thesis	p.173
6.2 Theoretical Contributions	
6.2.1 Lexical aspect	p. 174
6.2.2 Grammatical aspect and events without endpoints	p. 177
6.2.3 Grammatical aspect and events with endpoints	p. 177
6.2.3 a Age and sensitivity to imperfective aspect	p. 178
6.2.3 b Grammatical aspect, pronoun resolution and context	p. 184
6.3 Educational Implications	
6.3.1 Two biases	p. 188

6.3.2 The distance between a pronoun and its referent	p. 190
6.4 Limitations and Future Directions	
6.4.1 No 'no pronoun' condition	p. 191
6.4.2 Just transfer events	p. 192
6.4.3 The time course of children's processing	p. 193
6.5 Conclusions	p. 193
Chapter 7: Appendices	
Appendix A	p. 195
Appendix B	p. 198
Appendix C	p. 201
Appendix D	p. 216
References	p. 242

List of Tables

Chapter 1

Table 1.1 *Example Stimulus Sentences Varying the Thematic Role of Protagonists*

Table 1.2 *Example Sentences Expressing Events with Imperfective or Perfective Aspect*

Chapter 2

Table 2.1 *Stimuli Used in the Two Grammatical Aspect Conditions (List A)*

Table 2.2 *Mean Proportion of Source Selections (and Standard Deviations) in the Two Grammatical Aspect Conditions*

Table 2.3 *Summary GLMM for (log odds) Source Selection: Effects for Grammatical Aspect (GA) and Centered Age*

Table 2.4 *Summary GLMM for (log odds) Source Selection: Effects for Grammatical Aspect (GA) and Age Group*

Table 2.5 *Stimuli Used in the Two Grammatical Aspect Conditions (List A)*

Table 2.6 *Cloze task: Mean Proportion of Source Selections (and Standard Deviations) in the Two Grammatical Aspect Conditions*

Table 2.7 *Summary GLMM for (log odds) Source Selection (cloze task): Effects for Grammatical Aspect (GA) and Centered Age*

Table 2.8 *Forced Choice: Mean Proportion of Source Selections (and Standard Deviations) in the Two Grammatical Aspect Conditions*

Table 2.9 *Summary GLMM for (log odds) Source Selection (forced choice task): Effects for Grammatical Aspect (GA) and Centered Age*

Chapter 3

Table 3.1 *Lexical Categories and Their Temporal Properties*

Table 3.2 *Example Stimuli for Accomplishment and Activity events used in Becker et al. (2013)*

Table 3.3 *Stimuli Used in the Two Grammatical and Two Lexical Aspect Conditions (List A)*

Table 3.4 *Mean Proportion of Subject Selections (and Standard Deviations) in the Two Grammatical Aspect and Two Lexical Aspect Conditions*

Table 3.5 *Summary GLMM for (log odds) Subject Selection: Effects for Grammatical Aspect (GA) and Lexical Aspect (LA)*

Table 3.6 *Summary GLMM for (log odds) Subject Selection: Effects for Grammatical Aspect (GA) in the Two Lexical Aspect Conditions Separately*

Table 3.7 *Mean Proportion of Subject Selections (and Standard Deviations) in the Two Grammatical Aspect Conditions for Transfer Verbs used in Experiment 1b, Chapter 2*

Table 3.8 *Mean Correct Comprehension Question Scores (and Standard Deviations) by Year Group*

Table 3.9 *Mean Proportion of Subject Selections (and Standard Deviations) in the Two Grammatical Aspect and Two Lexical Aspect Conditions*

Table 3.10 *Summary GLMM for (log odds) Subject Selection: Effects for Grammatical Aspect (GA), Lexical Aspect (LA) and Centered Age*

Table 3.11 *Summary GLMM for (log odds) Subject Selection: Effects for Lexical Aspect (LA) in each Age Group; Perfective and Imperfective Grammatical Aspect items*

Table 3.12 *Mean Proportion of Subject Selections (and Standard Deviations) in the Two Grammatical Aspect Conditions for Transfer Verbs used in Experiment 1a, Chapter 2*

Chapter 4

Table 4.1 *Stimuli Used In the Two Grammatical Aspect and Two Intervening Text Conditions (List A)*

Table 4.2 *Examples of the Completions of the Transfer Events*

Table 4.3 *Mean Correct Comprehension Question Scores (and Standard Deviations) by Year Group*

Table 4.4 *Summary GLMM for (log odds) Ongoing Selection: Effects for Grammatical Aspect (GA), Intervening Text (IT) and Centered Age*

Table 4.5 *Summary GLMM for (log odds) Ongoing Selection: Effects for Grammatical Aspect (GA) in each Year Group; Without and With Intervening text items*

Table 4.6 *Summary GLMM for (log odds) Ongoing Selection: Effect of Intervening Text (IT) in each Year Group; Perfective and Imperfective items*

Table 4.7 *Stimuli Used In the Two Grammatical Aspect and Two Intervening Text Conditions (List A)*

Table 4.8 *Mean Correct Comprehension Question Scores (and Standard Deviations) by Year Group*

Table 4.9 *Summary GLMM for (log odds) Source Selection: Effects for Grammatical Aspect (GA), Intervening Text (IT) and Centered Age*

Table 4.10 *Summary GLMM for (log odds) Source Selection: Effects for Grammatical Aspect (GA) in each Year Group; Without and With Intervening text items*

Table 4.11 *Summary GLMM for (log odds) Source Selection: Effects for Intervening Text (IT) in each Year Group; Perfective and Imperfective items*

Table 4.12 *Stimuli Used in the Two Grammatical Aspect Conditions (List A)*

Table 4.13 *Forced Choice with Delay: Mean Proportion of Source Selections (and Standard Deviations) in the Two Grammatical Aspect Conditions*

Table 4.14 *Summary GLMM for (log odds) Source Selection (forced-choice task with delay): Effects for Grammatical Aspect (GA) and Centered Age*

Table 4.15 *Summary GLMM's for (log odds) Source Selection (forced-choice task with delay): Effects for Grammatical Aspect (GA) within each Year Group Separately*

Chapter 5

Table 5.1 *Coherence Relation Definitions and Examples of Continuations Collected in the Perfective Condition for the Stimulus **Matt passed a sandwich to David. He...***

Table 5.2 *Books Included in the Corpus*

Table 5.3 *Tenses Expressing Events with Imperfective and Perfective Aspect*

Table 5.4 *Verb Forms Extracted From the Corpus*

Table 5.5 *Frequency of Verb Forms*

Table 5.6 *Relative Frequency of Past Progressive (imperfective) and Simple Past (perfective) Verb Forms by Year Group*

Table 5.7 *Coherence Relations Following Perfective Transfer of Possession Events*

Table 5.8 *Coherence Relations Following Perfective Transfer of Possession Events with Alternative Structures*

Table 5.9 *Re-mention Biases Following Perfective Transfer of Possession Events*

List of Figures

Chapter 3

Figure 3.1 *Effect of Age on Selection of the Subject in the Accomplishment and Activity Lexical Aspect Conditions*

Chapter 4

Figure 4.1 *Mean Proportion of Ongoing Selections (and SE) in the Two Grammatical Aspect and Two Intervening Text conditions*

Figure 4.2 *Mean Proportion of Source Selections (and SE) in the Two Grammatical Aspect and Two Intervening Text conditions*

Chapter 5

Figure 5.1 *Re-mention Frequencies Across Coherence Relations for Perfective Expressions (141 examples)*

Abstract

The main goal of the thesis was to determine whether the temporal characteristics of events influence 7- to 11-year-olds' pronoun resolution to identify if this might explain contradictory findings in the literature regarding the age at which children demonstrate a subject bias interpretation of a pronoun. A second goal was to determine whether children demonstrate the same influence of aspectual morphemes in narrative contexts as shown by adults in previous research. A third goal was to examine whether literature written for children might provide a potential causal explanation (environmental exposure) for the pattern of development observed in the experimental work. Chapter 1 reviews the literature that is considered relevant to the experimental work.

The experiments in Chapter 2 examined pronoun resolution following Source-Goal transfer of possession events expressed with imperfective or perfective grammatical aspect. Experiment 1a (children) and Experiment 1b (adults) examined ambiguous pronoun resolution, Experiments 2a and 2b examined children's pronoun resolution following transfer events with different gender protagonists. In all experiments an effect of grammatical aspect was observed with children and adults selecting the Source protagonist more frequently when the event was expressed with imperfective than perfective aspect. Despite demonstrating an influence of grammatical aspect, unlike adults, children did not demonstrate a subject bias interpretation of an ambiguous pronoun following the imperfective expression of a transfer event and children were more likely than adults to demonstrate a Goal interpretation of the pronoun following perfectly expressed transfer events. Transfer of possession events have endpoints (they are telic) and this pattern of results suggests that the presence of an endpoint in the stimulus sentences influenced

children's tendency to resolve a subsequent pronoun towards the previous subject protagonist. This possibility was examined in Chapter 3.

The experiments in Chapter 3 examined the effect of grammatical aspect on adults' (Experiment 3a) and children's (Experiment 3b) resolution of ambiguous pronouns contained within events from two lexical aspect categories; those with inherent endpoints and those without. Adults and children were more likely to resolve the pronoun to the subject protagonist following events without endpoints than following events with endpoints. These findings support those reported in Chapter 2, showing that the inherent temporal characteristics of events influence adults' and children's pronoun resolution. Grammatical aspect had an influence on adults' pronoun resolution only for events with endpoints. In contrast, grammatical aspect influenced children's pronoun resolution for events from both lexical aspect categories. This was interpreted as a consequence of the smaller effect of grammatical aspect on children's pronoun resolution which limited the opportunity to observe an interaction.

The experiments in Chapter 4 examined the effect of grammatical aspect on children's judgement of transfer events ongoingness (Experiment 4a) and on children's pronoun resolution (Experiment 4b) when the events were embedded within narratives. In contrast to the previous experiments in the thesis where stimulus sentences were presented in isolation, the experiments in this chapter found an increase in children's sensitivity to imperfective aspect with age. When asked immediately after the aspectual event, children's judgement that imperfectively expressed events were ongoing increased with age as did their Source resolution of an ambiguous pronoun. When there was intervening text between the aspectual event and the question, children's judgement that imperfectively expressed events were ongoing

decreased with age, and similarly their Source resolution also decreased with age. Experiment 4c examined whether a short delay between the presentation of the aspectual sentence and the pronoun had the same effect as intervening text. This was confirmed: there was an age decrease in Source resolution for imperfectively expressed events but not for perfectly expressed events. These findings provide converging evidence that, like adults in previous research, older children take into account the temporal characteristics with which events are expressed and the inherent duration of events themselves in their construction of situation models during narrative comprehension.

Chapter 5 examined the frequency with which verbs typically used to describe telic events (events with endpoints) and atelic events (events without endpoints) were expressed with imperfective and perfective aspect in a corpus of literature read by children within the age range 7- to 11-years. It also examined the coherence relations most likely to follow perfectly expressed transfer events and the grammatical subject of these coherence relations. Verbs were more often expressed with perfective than imperfective aspect. Verbs typically used to describe atelic events were expressed with imperfective aspect more frequently than verbs typically used to describe telic events. This pattern suggests that, within these two lexical aspect categories, a distributional bias in imperfective expression persists beyond young children's language environment (Shirai & Andersen, 1995). Perfectively expressed transfer events were more often followed by Occasion than other coherence relations (Elaboration, Result, Parallel, Explanation, Other). There was no evidence of a Goal re-mention bias generally following transfer events, there was evidence of a Goal re-mention bias within Occasion relations. These findings support the proposal that the temporal characteristics of events are a stronger predictor of the type of coherence

relation that will follow events than the re-mention of particular protagonists. They further suggest that re-mention biases are contingent on coherence relations.

Taken together the findings demonstrate that children's pronoun resolution is influenced by both the inherent temporal characteristics of events and the grammatical aspect with which events are expressed. How these findings explain previously reported contradictory findings in the literature is discussed. How the findings inform our understanding of the nature of the difficulties some children experience with pronoun resolution is also discussed.

Chapter One: Literature Review

1.1 Introduction

There is widespread agreement that successful text comprehension involves constructing a mental representation of the situations described in the text (Johnson-Laird, 1983; Kintsch, 1988; Zwaan & Radvansky, 1998). This representation includes concepts which appeared in the text plus elements of prior knowledge that were activated by these concepts. As such it represents more than just a verbatim record of the text. One of the features of text is that writers may use different expressions to refer to the same entity, for example they may use personal pronouns, *he* or *she*, to refer to protagonists introduced earlier by name. Successful adult comprehenders rapidly resolve these co-references to achieve a cohesive and coherent mental model of the situation (Fukumura & van Gompel, 2015). This is a remarkable achievement and as a result identifying factors that influence adults' pronoun resolution has been the subject of considerable research in the literature.

An influential account of adults' pronoun resolution, The Event Structure Hypothesis (Rohde, Kehler, & Elman, 2006), suggests that the temporal characteristics of events influence the type of coherence relation adults expect to follow. Different coherence relations have different protagonists as their subject so the expectation associated with a particular coherence relation conditions the probability that a particular protagonist will be re-mentioned. This next-mention expectancy (associated with the specific coherence relation) combines with a bias towards resolving a pronoun to the previous subject protagonist, should a pronoun be encountered, to ultimately determine the most likely referent of a pronoun (Rohde et al., 2006). This account has not been tested on children and it provided an overarching theoretical framework for the work reported in this thesis.

The first aim of this thesis is to determine whether the temporal characteristics of events influence children's pronoun resolution, as has been found for adults (e.g., Rhode et al., 2006). This is because previous research, examining the age at which typically developing children demonstrate a subject bias interpretation of a pronoun, has not considered the temporal characteristics of the events in which protagonists are engaged as a potential influence. This influence may explain the contradictory findings in the literature (Arnold, Brown-Schmidt, & Trueswell, 2007; Hartshorne, Nappa, & Snedeker, 2015; Song & Fisher, 2005).

A second aim of the thesis is to identify if children demonstrate the same influence of aspectual morphemes in narrative contexts as shown by adults in previous research (Magliano & Schleich, 2000). There is body of literature demonstrating an influence of aspectual morphemes on adults' narrative comprehension (Carreiras, Carriedo, Alonso, & Fernández, 1997; Morrow, 1985; Mozuraitis, Chambers, & Daneman, 2013; Salomon, Magliano, & Radvansky, 2013). To date there have been no examinations of whether children are similarly influenced.

A third aim of the thesis was to examine whether literature written for children might provide a causal explanation for the pattern of development observed in the experimental work.

1.2 Factors that Influence Adults' Pronoun Resolution

1.2.1 Syntactic status

An early account of adults' pronoun resolution suggested that the order in which protagonists are mentioned influences the ease with which personal pronouns are resolved, with an advantage for first mentioned protagonists (Gernsbacher, 1989). This has been called the Order of Mention hypothesis (Gernsbacher, 1989). Support for this hypothesis comes from faster recognition latencies for a repeated name when it was the first mentioned protagonist than the second mentioned (Gernsbacher & Hargreaves, 1988). The explanation proffered was that first mentioned protagonists are more accessible in readers' mental models because they function as the starting point for the consequent text. However, recent research analysing reading times for pronouns and repeated names of protagonists following sentences where the order of mention and syntactic status of protagonists have been manipulated does not support this interpretation (Fukumura & van Gompel, 2015). Fukumura and van Gompel found an order of mention effect for repeated names, however they found no effect of order of mention on reading times for pronouns. Moreover, they found no effect of syntactic status on reading times for repeated names but an effect of syntactic status on reading times for pronouns with an advantage for pronouns with subject, rather than object, antecedents. The reading time advantage for pronouns with subject antecedents is consistent with the results of an earlier reading time study (Frederiksen, 1981).

Investigations of an effect of order of mention on adults' personal pronoun interpretation in languages with freer word order than English have to date proved inconclusive (Järvikivi, van Gompel, Hyönä, & Bertram, 2005; Kaiser & Trueswell, 2008). Using the visual-world eye-tracking method Kaiser and Trueswell, (2008)

found an effect of grammatical role but not order of mention on Finnish adults' processing of personal pronouns. In contrast, Järvikivi et al. (2005) found that both order of mention and subject-preference contribute separately to adults' pronoun processing. These studies differed in their provision of context sentences and it has been suggested that this might account for the contradictory findings (Kaiser & Trueswell, 2008).

In other research where an order of mention on adults' pronoun resolution has been found, the first mention protagonist has always been the subject of the stimulus sentences (Arnold, Eisenband, Brown-Schmidt, & Trueswell, 2000). Therefore on balance the evidence suggests an effect of syntactic status on adults' pronoun resolution rather than Order of Mention.

1.2.2 Thematic roles

Other research shows that adults' pronoun resolution is not only influenced by the syntactic status of protagonists in the previous clause but also by the thematic role protagonist play in events. The thematic roles of protagonists in events are defined according to how the arguments of particular verbs relate to the meaning of those verbs (Stevenson, Crawley, & Kleinman, 1994). For example, the arguments of transfer verbs fulfil the thematic roles of Source and Goal; arguments of action verbs the thematic roles of Agent and Patient; arguments of state verbs the thematic roles of Experiencer and Stimulus and finally arguments of motion verbs the thematic roles of Agent and Goal/Source. Examples from Stevenson et al. (1994) are given in Table 1.1 below.

Table 1.1 *Example Stimulus Sentences Varying the Thematic Role of Protagonists*

Type of event	Stimulus sentence
Transfer of possession	John _{goal} seized the comic from Bill _{source} . He...
	John _{source} passed the comic to Bill _{goal} . He...
Action	Joseph _{agent} hit Patrick _{patient} . He...
	Patrick _{patient} was hit by Joseph _{agent} . He...
State	Ken _{experiencer} admired Geoff _{stimulus} . He...
	Ken _{stimulus} impressed Geoff _{experiencer} . He...
Motion	Simon _{agent} ran towards Richard _{goal} . He...
	Simon _{agent} ran away from Richard _{source} . He...

It is important to note that the thematic roles of protagonists in the transfer, action and state events are not defined by their grammatical status. To illustrate, whether the Goal in transfer of possession events is the grammatical subject of the sentence (e.g. *John* in *John seized the comic from Bill*) or the Source is the subject (e.g. *John* in *John passed the comic to Bill*) depends on the particular verb of transfer used to describe the event. Similarly, whether the Experiencer in a state event is the subject (e.g. *Ken* in *Ken admired Geoff*) or the Stimulus is the subject (e.g. *Ken* in *Ken impressed Geoff*) depends on the particular state verb used to describe the event. Finally, whether the Agent in action events is the subject (e.g. *Joseph* in *Joseph hit Patrick*) or the Patient is the subject (e.g. *Patrick* in *Patrick was hit by Bill*) is determined by the choice of construction (active or passive respectively) used to describe the event.

In Stevenson et al. (1994) participants were asked to provide continuations following the stimulus sentences with and without an ambiguous pronoun at the start of the continuation. Adults demonstrated a subject bias resolution of the pronoun, in that their continuations were more likely to refer to the subject of the stimulus sentence in the pronoun condition compared to the no pronoun condition. However an influence of thematic roles was also evident in their pronoun interpretations, in that subject biases were lower when the Source rather than Goal; Agent rather than Patient; and Experiencer rather than Stimulus were the subject of the stimulus sentence (Stevenson et al., 1994).

1.2.3 Temporal characteristics: Grammatical aspect effects for events with endpoints.

Another factor which is known to influence adults' pronoun resolution is the way the temporal structure of individual events are described (Rohde et al., 2006). In English the temporal characteristics of individual events are expressed using different morphosyntactic verb forms. The morphosyntactic verb forms that express temporal characteristics of events have been termed grammatical verb aspects by linguists, with verb forms that express ongoing events termed imperfective aspect and verb forms that express completed events perfective aspect (Klein & Li, 2009). It is important to note that grammatical verb aspect differs from tense: tense describes how events are sequenced with reference to some narrative time line, whereas grammatical verb aspect describes the internal temporal characteristics of individual events within this time frame. It is therefore possible to express events as ongoing or completed within different tenses. Examples of the imperfective and perfective verb forms for a regular (*to pass*) and irregular verb (*to sleep*) within different tenses are given below to illustrate this point.

Table 1.2 *Example Sentences Expressing Events with Imperfective or Perfective Aspect*

Tense	Grammatical Aspect	
	Perfective	Imperfective
Past	Eve <i>passed</i> a book.	Eve <i>was passing</i> a book.
	Eve <i>slept</i> .	Eve <i>was sleeping</i> .
Past perfect	Eve <i>had passed</i> a book.	Eve <i>had been passing</i> a book.
	Eve <i>had slept</i> .	Eve <i>had been sleeping</i> .
Present	Eve <i>passes</i> a book.	Eve <i>is passing</i> a book.
	Eve <i>sleeps</i> .	Eve <i>is sleeping</i> .
Future	Eve <i>will pass</i> a book.	Eve <i>will be passing</i> a book.
	Eve <i>will sleep</i> .	Eve <i>will be sleeping</i> .

The evidence for the temporal structure of events influencing adults' pronoun resolution comes from studies where adults have been asked to provide continuations following Source-Goal transfer events where the aspect of the event has been manipulated such as in 1.1 where the event has been expressed with imperfective aspect in 1.1 (a) and perfective aspect in 1.1 (b) both within the past tense (Rohde et al., 2006).

Imperfective:

(1.1) a. John_{source} was handing a book to Bob_{goal}. He...

Perfective:

b. John_{source} handed a book to Bob_{goal}. He...

Rohde et al. (2006) found that in the perfective condition the proportion of Source and Goal interpretations of the pronoun is roughly equal consistent with previous research (Stevenson et al., 1994). In contrast, they found that in the imperfective condition the proportion of Source interpretations increased from 51% to 70%. Rohde et al. (2006) concluded that because imperfective aspect resulted in an increased percentage of Source interpretations, surface-level thematic role preferences and syntactic role preferences were insufficient explanations of participants' interpretations of ambiguous pronouns, instead they argued that the results show that adults take into account the temporal characteristics of an event during pronoun resolution.

The argument that event-level biases influence adults' expectancies for particular protagonists to be re-mentioned is supported in studies where adults have been asked to provide continuations without a prompt following Source-Goal verbs of transfer with protagonists of different gender. In this case adults more frequently start a continuation with the Goal rather than the Source of the stimulus sentence as subject. But, as with the above, the effect of grammatical aspect is to increase references to the Goal when the event is expressed with perfective (85.3%) as opposed to imperfective (77.3%) aspect. Furthermore, the same pattern of results is observed in the reduced set of continuations where adults have used a pronoun to refer to either of the protagonists, with the Goal bias being higher in the perfective (74.8%) condition than the imperfective (62.7%) condition (Ferretti, Rohde, Kehler, & Crutchley, 2009).

1.3 Why do Adults Demonstrate these Effects?

There is no clear consensus in the literature regarding why adults demonstrate the pattern of pronoun interpretation described above. One proposal suggests that the pattern arises because readers use estimates of the likelihood that particular

protagonists will be re-mentioned in their pronoun interpretation. This account is called the Expectancy Hypothesis (Arnold, 2001; Arnold et al., 2007). This account is supported in analyses of the frequency of re-mention of Source and Goal protagonists in adults' continuations not starting with pronouns (bare prompt condition) (Stevenson et al., 1994) and the distributional frequency of Source and Goal protagonist re-mentions in a corpus analysis (Arnold, 2001). In both cases Goal protagonists are re-mentioned more frequently than Source protagonists. This account does not however provide an explanation as to why the inclusion of a pronoun at the start of a continuation increases adults' tendency to start the continuation with the previous subject as the first mentioned protagonist compared to no pronoun conditions, observed in other research (Stevenson et al., 1994).

To explain the more frequent re-mention of previous subjects in adults' completions when pronouns are provided compared to completions where no pronoun has been provided, another account suggests that two biases are at play in adults' pronoun resolution (Stevenson et al., 1994). Similar to the Expectancy Hypothesis, Stevenson et al.'s (1994) account suggests that adults have 'top down' biases towards expecting re-mentions of protagonists occupying particular thematic roles. In contrast to the Expectancy Hypothesis, this account suggests that adults also possess a 'bottom up' bias triggered by the pronoun itself engendering a subject interpretation of a pronoun should one be encountered. In this second account, it is argued that Goal and Patient thematic role biases arise when adults are given continuations to complete, such as the above, because adults focus on consequences in their mental model of events (Stevenson et al., 1994). This interpretation is supported by comparison of the continuations adults provide for sentence fragments ending in the connectives *so* and *because*. The connective *so* reinforces a focus on consequences and results in more

Goal and Patient references than Source or Agent references in adults' continuations. In contrast, the connective *because* shifts adults' attention towards causes and away from consequences and reduces the tendency to provide Goal or Patient references compared to Source or Agent references (Stevenson et al., 1994).

A common theme in the above proposals is that placing protagonists in particular sentence positions, syntactic or thematic roles increases the activation, accessibility or salience of particular protagonists in adults' mental models of the text before a pronoun is encountered (Arnold, 2001; Gernsbacher & Hargreaves, 1988; Stevenson et al., 1994). The line of reasoning that follows is that these focusing cues licence adults to use reduced forms of reference such as pronouns for subsequent re-mentions of these protagonists and this explains the observed pattern of results. On this line of reasoning, factors that influence adults' production of pronouns are the same as those that adults rely on to interpret pronouns.

However, the findings from production studies where adults have been asked to provide sentence continuations following stimulus sentences without pronoun prompts do not support this interpretation. In these studies, analysis of the frequency of re-mention of particular protagonists supports the assertion that adults are biased towards expecting re-mentions of particular protagonists (Arnold, 2001; Stevenson et al., 1994). But a consistent finding is that the syntactic status of protagonists alone predicts whether a pronoun will be used to refer to a particular protagonist in these bare prompt continuations. That is, subjects of previous clauses are pronominalized more frequently than objects of previous clauses (Fukumura & van Gompel, 2010, 2015; Stevenson et al., 1994; Rohde, 2008). In contrast, protagonists in first mention positions are not pronominalized more frequently than second mentioned protagonists (Fukumura & van Gompel, 2015). Similarly, preferred thematic roles for

next mention are not pronominalized more frequently than non-preferred roles when adults are asked to provide written completions (Ferretti et al., 2009; Stevenson et al., 1994).

To account for the above findings, a third proposal in the literature is that adults' pronoun resolution is a process in which adults determine the weight of evidence for a pronoun's referent based on their probabilistic expectation that a pronoun would be used to refer to a particular protagonist given its syntactic status combined with their probabilistic expectation that a particular protagonist will be re-mentioned (Kehler, Kertz, Rohde, & Elman, 2008). As noted above, it has previously been suggested that adults' ultimate pronoun interpretation is determined by the combination of two biases: a grammatical role preference that ranks subjects over non-subjects and a thematic role bias that ranks certain thematic roles above others (Stevenson et al, 1994).

However, there are two important differences between the Kehler et al. (2008) proposal and the Stevenson et al. (1994) proposal. The first is that in Stevenson et al. (1994) the greater percentage of first mentions to the previous subject when a pronoun was provided than when it was not was taken as evidence of an interpretation bias towards the subject; in contrast, Kehler et al. argue that this bias is a production bias. The second is that, in the Kehler et al. account, adults' expectations for re-mentions of particular protagonists are conditioned on their expectations for the type of coherence relation that will follow particular events rather than biases for re-mentions of particular thematic roles per se. The evidence for this is explained in more detail below.

1.4 Bias for Re-mention of Protagonists or for Coherence Relations?

Rohde, Kelher and Elman (2006) annotated the continuations their participants provided following perfectly expressed transfer of possession events to find the frequency of the following five coherence relations (definitions taken from Kehler and Rohde, (2013a).

Occasion relation: describes a sequence of ordered events in which the end state of the first event acts as the start state of the second event.

For example, Matt passed a sandwich to David. *He ate it up.*

(The appropriateness of the connectives *and then or next* inserted between the stimulus and continuation can be used to determine this type of relation).

Elaboration relation: restates the previous assertion with identical entities.

For example, Matt passed a sandwich to David. *He gave a ham one to him.*

Explanation relation: the event denoted by the second clause explains the event denoted by the first.

For example, Matt passed a sandwich to David. *He didn't want David to starve.*

(The appropriateness of the connective *because* inserted between the stimulus and continuation can be used to determine this type of relation).

Result relation: the counterpart to explanation relations, but this time the event denoted by the first clause explains the event denoted by the second.

For example, Matt passed a sandwich to David. *He said thanks.*

(The appropriateness of the connectives *therefore, so, as a result* inserted between the stimulus and continuation can be used to determine this type of relation).

Parallel relation: the grammatical status of the entities is repeated.

For example, Matt passed a sandwich to David. *He passed him an apple too.* (The appropriateness of the connectives *similarly* or *in contrast* inserted between the stimulus and continuation can be used to determine this type of relation).

Rohde et al. (2006) found a distributional bias in the occurrence of these relations following perfective context sentences: the continuations adults provided most often described Occasion (43.2%), Elaboration (31.5%) or Explanation (18.2%) relations with fewer Result (0.5%) and Parallel (0.2%) relations. Moreover, Goals and Sources were not equally represented as the subject of the different relations: Occasion relations were dominated by continuations that referred to the Goal, while Elaborations and Explanations showed no evidence of a Goal preference; indeed these relations showed a Source preference. The authors suggest that because the Goal preference was restricted to the Occasion relation this demonstrates that adults' expectations for particular protagonists to be re-mentioned depends on the type of relation that is inferred to hold between two clauses rather than simply an expectation that a particular thematic role will be re-mentioned.

An influence of the temporal characteristics of events influencing adults' expectations for particular coherence relations to follow was also evident in this study in that the coherence relations following imperfectly expressed events revealed a significantly different coherence distribution from those following perfective context sentences. Imperfective context sentences yielded continuations that were dominated by a large proportion of Elaboration relations (49%) and a smaller proportion of Occasion relations (31%). From the examples given it appears that, as with the perfective context sentences, Goals were more frequently the subject of Occasion relations and Sources of Elaboration relations within these continuations. The actual

distribution of Goal and Source references within these relations was not given however.

An important point to add about the Kehler and Rohde account of the influence of grammatical aspect on adults' pronoun resolution is that it is only predicted to matter for context types in which entity prominence varies significantly across event structures described alternatively with imperfective or perfective grammatical aspect (Kehler & Rohde, 2013b). This is explained in more detail below.

1.5 Lexical Aspect

It has been proposed by a number of linguists that events (verbs and their predicates) can be classified into categories (called lexical categories) according to their inherent temporal properties (Comrie, 1976; Dowty, 1979; Vendler, 1967). Vendler's (1967) scheme is commonly cited in the literature and it identifies four lexical categories: states, activities, accomplishments and achievements. Events fall into these categories according to their possession of three properties, a definitive endpoint, duration, and the requirement for continual effort to be maintained. Examples are given in Table 1.3.

States (e.g., love), depict a situation that is assumed to last indefinitely unless some external force makes it change. Activities (e.g., run), on the other hand, are durative but require input of energy for them to take place and they have an arbitrary endpoint (i.e., they can be terminated at any time). Accomplishments (e.g., paint a picture), like activities, require energy and have duration but these events have an inherent endpoint (when the picture is finished) involving a change of state, after which the particular action cannot continue. Achievements (e.g., realizes), like accomplishments, have inherent endpoints but differ from accomplishments in that they have no duration, they can be reduced to a point on a time axis (i.e., they are

instantaneous, termed punctual in the literature). It is important to note that classifying events into a particular lexical aspect category cannot be achieved on the basis of the verb alone. This is because although some verbs fall naturally into a particular category (e.g., love-state, reaches-achievement), the categorisation of other verbs depends on the context in which they are used (compare: He runs-activity with He runs a mile-accomplishment), (Madden & Ferretti, 2009).

Table 1.3 *Lexical Categories and Their Temporal Properties*

Lexical category	Temporal properties			Examples
	Has an endpoint	Has duration	Continues without effort	
State	x	√	√	She loves She wants
Activity	x	√	x	She runs She walks
Accomplishment	√	√	x	She paints a picture She runs a mile
Achievement	√	x	x	She reaches the summit She realizes something

As described in the previous section, the grammatical aspect with which transfer of possession events are described influences adults' resolution of a subsequent pronoun (Ferretti et al., 2009; Rohde et al., 2006). Transfer events are telic; they have a natural endpoint and duration. They are therefore classified as accomplishment events in terms of their lexical aspect. A number of studies show that

the grammatical aspect with which accomplishment events are expressed influences adults' mental representation of the event (Madden & Zwaan, 2003; Morrow, 1985).

For example, Madden and Zwaan (2003) used a picture verification task to demonstrate how perfective aspect constrains adults' representations of accomplishment events to the endpoint of a situation. Participants read a single sentence expressing an accomplishment event with either imperfective (e.g., The man was making a fire) or perfective aspect (e.g., The man made a fire) and then chose which of two pictures best matched the sentence. One of the pictures depicted the event as ongoing (half-made fire), the other as a completed event (man stood by lit fire). After reading sentences with perfective aspect, participants were more likely to choose the completed picture, but after reading imperfective sentences they were equally likely to choose the completed or ongoing picture. This pattern of response was also found in two subsequent experiments.

As discussed by the authors, the lack of constraint shown for imperfectively expressed events in these experiments does not necessarily mean that participants were not representing these events as ongoing. Rather, the lack of a consistent match for imperfectively expressed events to ongoing depictions may have arisen because of the difficulty of depicting events with definitive endpoints as ongoing situations. These can be represented as just beginning, near the middle or almost at completion, thus capturing a stage of completion pictorially that would effectively match participants representations is more difficult than capturing the endpoint of such an event.

An alternative proposal in the literature to explain the lack of constraint shown for imperfectively expressed events is that the adults in the Madden and Zwaan (2003) study were demonstrating a 'perfective facilitation' for the accomplishment

events presented (Yap et al., 2009). This proposal suggests that adults have a tendency to associate accomplishment events (which have an endpoint) with perfective aspect and also a tendency to associate activity events (which do not have endpoints) with ongoing representations. The support for this proposal is provided by a study, similar in design to Madden and Zwaan (2003), with native Cantonese speaking participants (Yap et al., 2009). This study included activity events as well as accomplishment events. Participants listened to a sentence, marked with imperfective or perfective aspect, and their accuracy and response latency to select an ongoing or completed depiction of the event as a match was examined. There was an opposite influence of grammatical aspect on response latencies and accuracy for activity events. For activity events, participants were more accurate and faster to verify that imperfectively expressed sentences matched ongoing depictions of these events than completed depictions.

Whilst the Yap et al. findings show that adults have a 'preferred' grammatical aspect/lexical aspect combination, (accomplishment-perfective, activity-imperfective) other research shows that the grammatical aspect with which accomplishment events are expressed has a greater influence on adults' mental representation of the event than it does on their representation of activity events (Becker, Ferretti, & Madden-Lombardi, 2013). This difference has been attributed to the fact that accomplishment events have inherent endpoints and activity events do not. This research is described next.

Becker et al. (2013) recorded adults' electroencephalogram responses as they read short narratives which included either accomplishment (Isaac packed/was packing his lunch in his backpack) or activity events (At the breakfast table Bert's mother talked/was talking about their neighbour) expressed with either perfective or

imperfective aspect as shown. Following these sentences participants read sentences where the narrative time interval was manipulated. These sentences indicated that either a short interval (e.g., he grabbed the map), or a long interval (e.g., he studied the map) had elapsed. Following these sentences participants read a target sentence which included a re-mention of a concept introduced in the aspectual sentence (e.g., lunch, mother).

Using the N400 ERP as a measure of semantic difficulty, they found an effect of grammatical aspect for accomplishment events: adults had less difficulty reading concepts which had previously been expressed in imperfective sentences than perfective sentences, but this was only following short intervening events. This finding suggests that, for accomplishment events, imperfective grammatical aspect facilitates the integration of recently mentioned concepts over short narrative time intervals, but that this advantage is lost when the narrative indicates a longer time interval has elapsed. In contrast, they found no effect of grammatical aspect for activity events in either of the two intervening event conditions. This suggests that, for activity events, grammatical aspect does not facilitate concept integration.

Becker et al. (2013) suggest that the reason why an effect of grammatical verb aspect is observed for accomplishment but not activity events is because this distinction is important only for accomplishment events which progress towards an endpoint. For example, they argue that expressing the accomplishment packing event as ‘was packing’ or ‘packed’ results in two different representations of the packing event. Whereas, expressing the activity talking event as ‘was talking’ or ‘talked’ results in similar representations of the talking event.

In summary, research with adults shows that the grammatical aspect with which accomplishment events (telic events-with endpoints) are expressed influences

their mental representation of those events (Madden & Zwaan, 2003), pronoun resolution (Rohde et al., 2006), and concept integration (Becker et al., 2013). It has been proposed that the difference in representation of accomplishment events expressed with different grammatical aspects explains why grammatical aspect influences adults' resolution of a subsequent pronoun (Kehler & Rohde, 2013a; Rohde et al., 2006) and concept integration (Becker et al., 2013). The grammatical aspect with which activity events (atelic events-without endpoints) are expressed does not facilitate concept integration (Becker et al., 2013). The Kehler and Rohde (2013a) account of pronoun resolution predicts that the grammatical aspect with which these events are expressed will not influence adults' resolution of a subsequent pronoun. Experiment 3a examines whether this is the case for adults and Experiment 3b for children. In the next section I describe research aimed at identifying factors that influence children's pronoun resolution.

1.6 Previous Research on Children's Pronoun Resolution

1.6.1 Syntactic status.

The review above shows that adults are biased towards resolving personal pronouns towards previous subject protagonists but the nature of context sentences *prior* to the pronoun (the thematic role of protagonists, the grammatical aspect with which particular events are expressed) also influences their ultimate interpretation. Research with children has generally not considered the contribution the context of stimulus sentences may make to the observance of a subject bias effect (Arnold et al., 2007; Hartshorne et al., 2015; Megherbi & Ehrlich, 2005). This may explain contradictory findings in the literature. Several studies have reported that 3-year-old (Pykkonen, Matthews, & Jarvikivi, 2010; Song & Fisher, 2005) and 5-year-old children demonstrate a subject bias interpretation of an ambiguous pronoun

(Hartshorne et al., 2015), whilst another reports that 5-year-olds do not (Arnold et al., 2007).

There is recent evidence that a possible reason for the differences in findings above lies in the time interval over which subject biases were expected to be demonstrated by children *after* the occurrence of the pronoun. When pronoun resolution is determined over an interval of 3-4 seconds from the onset of ambiguous pronoun, 5-year-old-children (Hartshorne et al., 2015) and 3-year-old children (Pyykkonen et al., 2010) do demonstrate subject biases for interpreting ambiguous pronouns but do more slowly than adults. The experiments in Chapters 2 and 3 of this thesis examine an alternative explanation for the contradictory findings by examining the occurrence of subject bias interpretations of pronouns where the context of the stimulus sentences *prior* to the pronoun is manipulated.

1.6.2 Thematic role.

As noted above, research examining typically developing children's pronoun resolution has in the main concentrated on identifying the age at which children demonstrate subject bias interpretations of pronouns. To date, there has been only one investigation of the effect of thematic roles on children's resolution of pronouns (Pyykkonen et al., 2010). This study found that 3-year-old children's looking behaviour following an ambiguous pronoun was influenced by the degree to which the subject and object of transitive verbs possessed the thematic role properties of Agent and Patient respectively. In this study 3-year-olds heard sentences (see 1.2) and their looking behaviour to pictures depicting the subject and object of the sentences was recorded as children listened to a subsequent sentence containing a pronoun (e.g., He hid in the hut).

High transitivity verb

(1.2) a. The panda_{agent} *hit* the parrot_{patient} near the hut.

Low transitivity verb

b. The panda_{agent} *saw* the parrot_{patient} near the hut.

High transitive verbs Agents and Patients show multiple Agent and Patient properties. Agent properties of the subject include: volitional involvement; sentience/perception; causing event/change of state; movement. Patient properties of the object include: undergo a change in state; casually affected; stationary. Low transitive verbs subjects and objects do not possess as many of the above properties.

Children looked more to the Agent than the Patient for low transitivity verbs such as *see*. However they looked at both the Agent and Patient for high transitivity verbs such as *hit*. The authors conclude that, because children's looking was directed to the Patient only in the high transitivity condition, the results suggest that the degree to which the Patient was affected by the action modulated children's attention to the characters in the event. Given the age of the children in this study, the findings suggest an early influence of thematic roles on children's pronoun resolution.

There are also indications of an early sensitivity to thematic roles in young children's expectations for re-mentions of particular protagonists. For example, Au (1986) found that when asked about the cause of an event, for Stimulus-Experiencer verbs (see 1.3 a.), 5-year-old-children, like adults, provided continuations with bias consistent subjects (John in the example).

(1.3) a. John_{stimulus} *scared* Mary_{experiencer}.

b. John_{experiencer} *hated* Mary_{stimulus}.

For Experiencer-Stimulus verbs (see 1.3 b.) children were less likely than adults to provide bias consistent subjects (Mary in the example) however the repeat mention of the subject prior to the stimulus sentence may have contributed to this finding.

Other research suggests that re-mention biases for particular thematic roles do not develop at the same time for all types of event. For example, Goikoetxea, Pascual and Acha (2008) found that for events with Agent-Patient/Agent-Evocator verbs (action verbs, see 1.4 a. and b.), 8- to 13-year-old children were similar to adults in their provision of continuations with bias consistent subjects (Helena and Esther in the examples 2.7 a. and b.).

- (1.4) a. Helena_{agent} called Uni_{patient} because...
- b. Jordi_{agent} took care of Esther_{evokator} because ...
- c. Ana_{stimulus} bored Gabriel_{experiencer} because ...
- d. Gonzalo_{experiencer} admired Lucia_{stimulus} because ...

But for Experiencer-Stimulus/Stimulus-Experiencer verbs (state verbs. see 1.4 c. and d.) children provided fewer bias consistent continuations than adults for Stimulus-Experiencer verbs (Ana in example 1.4 c.). This finding is not consistent with Au (86).

In summary, 3-year-old children show an early sensitivity to the thematic roles of protagonists in their pronoun resolution (Pyykkonen et al., 2010). Whilst 5-year-old children demonstrate similar patterns of performance to adults in their re-mention biases following some thematic role pairings (Au, 1986), other research shows that re-mention biases are still developing within 8-to 13-year-old children (Goikoetxea et al., 2008). The research in this thesis examines the influence of grammatical aspect on 7- to 11-year-old children's pronoun resolution following Source-Goal transfer of possession verbs. This age range is selected for the above reasons and also because

research has demonstrated there is considerable individual variability in children's understanding of pronominal expressions within this age range. The next section reviews this research.

1.6.3 Pronoun resolution difficulties and poor reading comprehension

A body of research shows that 7- to 11-year-old children with poor reading comprehension have difficulties with pronoun resolution (Ehrlich & Remond, 1997; Elbro, Oakhill, Megherbi, & Seigneuric, 2017; Engelen, Bouwmeester, de Bruin, & Zwaan, 2013; Francey & Cain, 2014; Megherbi & Ehrlich, 2005; Oakhill & Yuill, 1986; Yuill & Oakhill, 1991). Recent research shows that this difficulty contributes unique variance in reading comprehension (Elbro et al., 2017).

The studies above compare the performance of same age good and poor reading comprehenders and they have identified a number of differences between these groups of reader. For example, Oakhill and Yuill (1986) found that 7- to 8-year-old children with poor reading comprehension made more errors than same age, good comprehenders in identifying the antecedent of pronouns. Participants read transfer of possession sentences, with same gender or different gender protagonists, aloud (see 1.5). Participants were then asked who the pronoun referred to. For example, for 1.5 (a), "Who was poor?"

(1.5) a. Sally/Peter_{source} lent ten pence to Liz_{goal} because she was very poor.

b. Mary/Stephen_{source} sold a car to Max_{goal} because s/he needed the money.

In a second experiment, children with poor comprehension were also less able than good comprehenders to supply appropriate personal pronouns in a sentence cloze task with similar materials. Consistent findings, following Source-Goal transfer events, are reported in Francey and Cain (2014) for 9- to-10-year-old children with good and poor listening comprehension.

Other research has examined good and poor comprehenders' ability to identify the referents of pronouns or anaphors when these are embedded in narratives and the distance between the anaphors and their antecedents (in terms of the number of sentences) is manipulated (Ehrlich & Remond, 1997; Yuill & Oakhill, 1988). These studies show that the distance between an anaphor and its antecedent does not necessarily determine the difficulty children experience resolving it and children with good comprehension can still exhibit difficulties with anaphor and pronoun resolution. For example, Yuill and Oakhill (1998) examined the effect of distance on 7- to 8-year-old good and poor comprehenders' ability to identify the referents of four types of anaphor. Lexical ties, (e.g., John went home and opened the *door*, where the door is assumed to be John's house door), became easier for all children with distance; Reference pronouns, (e.g., he, she, you, yours, that's now), became easier for poor comprehenders with distance; Ellipses, (e.g., Are you going home? Yes I am (*)) got harder for poor comprehenders with distance and finally substitutions, (e.g., Mary *went home*, John *did* too), got harder for all children with distance.

Ehrlich and Remond (1997) similarly found that the number of sentences between a pronoun and its referent had different effects on 9-year-old good and poor comprehenders' pronoun resolution across two texts. Distance had a greater effect on poor comprehenders' than good comprehenders' performance but it was not consistent. For one text, distance reduced poor comprehenders' performance, for another text distance improved poor comprehenders' performance.

Other research has concluded that poor comprehenders have particular difficulty identifying the referents of personal pronouns when these are co-referential with the subject protagonist. For example, Megherbi and Ehrlich (2005) found that poor comprehenders (7- to 8-year-olds) demonstrated an advantage for object

antecedents in a listening task. In contrast, same age, good comprehenders demonstrated a subject advantage.

An important finding in more recent investigations of differences between 6- to 11-year-old good and poor comprehenders is that they differ in their expectancy for a re-mention of particular protagonists when listening to a narrative (Engelen et al., 2013). In this study children listened to a narrative whilst viewing a display containing line drawings of the four characters and their eye-movements were recorded. Throughout the story, the characters were re-mentioned either by name (e.g., squirrel) or using a personal pronoun (he). The differences in viewing patterns between the good and poor comprehenders were at the *onset* of a pronoun rather than differences after hearing a referring expression. Good comprehenders were more likely to be fixating the pronouns' referent than poor comprehenders indicating that the good comprehenders anticipated the re-mention of the referent. The Engelen et al. (2013) study is the first to show that good and poor comprehenders may differ in their processing of sentences prior to the pronoun.

In summary, research shows that 7- to 11-year-old poor comprehenders have a difficulty with pronoun resolution but even same age children with good comprehension do not show ceiling levels of performance (Ehrlich & Remond, 1997). Previous research has sometimes assumed that children's difficulty manifests itself at the point that a pronoun is encountered and reflects a difficulty in a backwards search for appropriate referents (Ehrlich & Remond, 1997). More recent research suggests that one difficulty poor comprehenders may have is in anticipating the upcoming re-mention of a protagonist given the current context (Engelen et al., 2013). The research in this thesis manipulates the context prior to a pronoun, to see if this has an influence on 7- to 11-year-old children's subsequent pronoun resolution. An examination of

whether the grammatical and lexical aspects of events influence children's pronoun resolution may provide some insight into potential sources of difficulty for children with poor reading comprehension. This in turn could be used in developing remediation programs aimed at alleviating their difficulties.

1.6.4 Temporal characteristics.

As outlined in the above section, investigations of children's pronoun resolution have not typically considered the context of the sentences prior to the pronoun. Critically, whether children's pronoun resolution is influenced by the temporal characteristics of events and whether intervening text has different effects on events expressed with different grammatical aspects have not previously been examined. The aim of this thesis is to investigate these potential sources of influence. The next section describes research examining young children's early language production. It outlines two theories of why this pattern of development occurs and explains why this research is relevant to an investigation of the influence of grammatical and lexical aspect on children's pronoun resolution.

1.7 Children's Understanding of Aspectual Morphemes

1.7.1 Asymmetry in early productions.

Language acquisition research has found a bias in children's early language production; until the age of about 2 years 6 months children typically use perfective forms to describe telic events (events with inherent endpoints), for example, *closed a window* and restrict their use of imperfective forms to describe atelic events (events without endpoints), for example, *playing with blocks* (Shirai, 2010; Shirai & Andersen, 1995). In terms of Vendler's (1967) semantic categories Shirai (2010) summarizes the available literature into the following points:

1. Children first use past tense markings on achievement/accomplishment verbs eventually extending use to activity and stative verbs.
2. In languages that encode the imperfective/perfective distinction imperfective past appears later than perfective past and imperfective past marking begins with stative verbs, extending next to activity verbs, then to accomplishment verbs and finally to achievement verbs.
3. In languages that have progressive aspect, progressive marking begins with activity verbs, then extends to accomplishment/achievement verbs.
4. Progressive markings are not incorrectly overextended to stative verbs.

Tomsello's (2003) usage-based theory of language acquisition posits that this pattern of development is as a result of the frequent association between particular verbs and particular inflections in the input. Shirai and Anderson (1995) present evidence that supports this claim. They looked at the frequency with which three mothers used perfective and imperfective inflections when interacting with their children. They found all three mothers used perfective inflections most frequently with achievements (58-64% of the time) and imperfective inflections most frequently with activities (53-61% of the time). More recent longitudinal research also supports the distributional hypothesis claim showing that young children's comprehension of the imperfective marker 'ing' is associated with the consistency with which it is provided in caregivers' language (Chin & Naigles, 2017).

Another suggestion to explain the characteristic development of verb tense marking makes the stronger claim of an influence of aspect on children's mental model of events; this is called the Aspect First Hypothesis (Shirai & Andersen, 1995; Wagner 2001, 2009). There are various forms of this hypothesis in the literature with some assuming a primary role for grammatical aspect distinctions (the ongoing or

completedness of events) in children's conceptualisation of events (Wagner, 2001), whilst others assume a primary role for lexical aspect distinctions (in particular event telicity) in children's event construal (Shirai & Andersen, 1995).

Despite these slight differences in emphasis, both accounts agree that the above production pattern arises because children initially make distinctions between events according to an event's possession of the properties which define aspect categories. That is, children make distinctions between events according to their possession of inherent endpoints (telicity) and duration, and they develop prototypes reflective of the typical expression of these events shown below (from Wagner (2009)).

Table 1.4 *Prototypical Temporal/Aspectual Groupings*

	Group 1	Group 2
Lexical Aspect	Telic (punctual)	Atelic (durative)
Grammatical Aspect	Perfective	Imperfective
Tense	Past	Present

From either the Distributional Bias (Tomasello, 2003) or the Aspect First (Shirai & Andersen, 1995; Wagner 2001, 2009) accounts of language acquisition, it is clear that children have to learn to generalise their use of aspectual morphemes to express the ongoing nature of a telic event, for example *closing a window* and the perfective expression of an atelic event for example *played with blocks* (Wagner, 2009). A number of studies have examined the development of this generalisation in cross-sectional designs with young children between the ages of 2- to 6-years-old. In general, these studies have used a picture matching task to examine whether children

associate events expressed with imperfective aspect to depictions of ongoing events and events expressed with perfective aspect to completed events.

There are mixed findings regarding the age at which children can perform above chance in non-typical, cross-aspectual matching tasks. Some studies report above chance performance for 3-year-olds whilst others find this level of performance only in 5-year-olds. For example, Weist et al. (1997; 1999) found that 3-year-old children learning to speak English could match the non-typical, imperfective expression of a telic event (e.g., the girl was drawing the flower) to a picture depicting the ongoing event with greater than chance accuracy, given the completed depiction as an alternative. In the task the children were first familiarised with two pictures of the same event. The experimenter then read two descriptions e.g. “In one of the pictures the girl was drawing the flower, in the other picture the girl drew the flower.” Children were then asked, “Which one shows (test alternative)?” The finding demonstrates that children of this age have an appreciation that telic events can be expressed as ongoing. In contrast, Wagner (2009) found that 5-year-olds could only succeed in a similar two-choice picture matching task, with greater than chance accuracy, when the depiction included an agent (e.g., a girl standing next to an incomplete painting). Without an agent in the picture (just a half finished painting), children were at chance.

The necessity for the inclusion of an agent in the depictions for success is interesting. Wagner (2009) suggests that this effect can be accounted for by assuming that children use the intentions of the agent to determine the ongoing/completed status of a telic event. This is important because it suggests that children’s perceptions of ongoing/completed are intimately tied to their expectations for what is going to happen next. As far as I am aware, the only research examining the predictive

reliability of grammatical aspect is that of Rohde et al., (2006) described in section 1.4. Chapter 5 examines re-mention biases for protagonists and coherence relations following perfectly expressed telic events in a body of children's literature to explore this issue further.

Other findings from this literature are that, whilst children's comprehension of the imperfective expression of telic events may be developing at around 3- to 5-years, children are not yet performing at the level of adults (Wagner, 2009) and their comprehension of the perfective expression of atelic events appears even less developed. To illustrate, Weist et al. (1999) included 2 atelic and 6 telic events in their experimental items and found across these items children were more accurate matching imperfective test alternatives to ongoing pictures (mean percentage correct 83%) than matching perfective test alternatives to completed pictures (mean percentage correct 64%). An error analysis revealed the 3, 4, and 5-year-old English speaking children had particular difficulty when matching a perfectly marked atelic event (e.g. swam) to a picture depicting a completed event. Similarly, Wagner (2009) found that 5-year-olds were at chance for perfectly marked atelic events.

Children's difficulty with perfective atelic items may simply reflect a difficulty in pictorially representing such a situation. Alternatively, it may reflect that distinctions between the ongoing/completed expressions of atelic events are just less significant than distinctions between the ongoing/completed expressions of telic events. This interpretation is examined in the experiments in Chapter 3.

Children's early competence in discriminating between ongoing and completed telic events on the basis of verb aspect in the above studies seems surprising given the finding that adults are equally likely to select a completed or ongoing picture in response to an event described with imperfective aspect (Madden

& Zwaan, 2003). It is possible that this anomaly results from differences in methodology. In the Weist et al. (1997, 1999) studies, children were given both descriptions before matching whereas in Madden and Zwaan (2003) adults were given only one description before matching. Children may therefore have assumed that one description matched one picture and the other description matched the other picture whereas this assumption may not have been made in the adult study. Support for this interpretation comes from the observation that when adults are given the Weist et al. two-descriptions and two-picture matching task their matching of imperfective sentences to ongoing depictions of events and perfective sentences to completed pictures is above chance (Wagner, 2009).

Other research using an eye-tracking methodology has shown that 3-year-old children, learning to speak Mandarin Chinese, use the temporal information encoded in grammatical aspect morphemes as rapidly as adults to facilitate event recognition (Zhou, Crain, & Zhan, 2014). In this experiment children's and adults' eye-movements were monitored as they heard sentences describing events similar to those used by Wagner (2009) whilst viewing two pictures of the event. One of the pictures depicted the event as ongoing the other as completed. On hearing an event described with imperfective aspect, eye-movements more often converged on the ongoing depiction of the event than the completed depiction. For perfective sentences, the opposite tendency was observed. Importantly, the effect occurred immediately after the onset of the aspectual morphemes both for adults in the study and children. These findings suggest that aspectual morphemes play an important role in the mental models children construct during language comprehension.

In summary, language acquisition research shows a typical pattern of morphemic associations in young children's early productions. Children are more

likely to use imperfective markers with atelic events and perfective markers for telic events (Shirai & Andersen, 1995). There are mixed findings in the research regarding the age at which children can reliably distinguish between the imperfective/perfective expression of telic events and atelic events with some research showing this is achieved at 3-years of age (Weist et al., 1997, 1999; Zhou et al., 2014) and other research showing this is not achieved until 5-years and does not match adults' performance (Wagner, 2009). There is some evidence that 3-year-old children can distinguish a difference between the imperfective/perfective expressions of telic events but at the same age are less sensitive to a difference between the imperfective/perfective expressions of atelic events (Weist et al., 1999).

Previous research has examined the development of cross-aspectual markings using picture matching tasks (Zhou et al., 2014) act out tasks (Wagner, 2001) and elicited imitation (Johnson & Fey, 2006). The research in Chapters 2-4 goes beyond these event recognition tasks and examines the influence of grammatical aspect on 7- to 11-year-old children's pronoun resolution, a task that requires the integration of two events. The research in Chapter 5 then examines whether there is evidence for a relation between the aspectual expression of telic events and the subsequent occurrence of particular coherence relations or subsequent re-mention of particular protagonists in a corpus of literature read by children in the age range 7- to 11-years.

1.8 Effects of Grammatical Aspect in Narratives

A body of evidence shows that the grammatical aspect with which events are described influences adults' narrative comprehension. It influences the availability of protagonists, locations, instruments and entire situations (Carreiras et al., 1997; Ferretti, Kutas, & McRae, 2007; Magliano & Schleich, 2000; Morrow, 1985; Truitt & Zwaan, 1997). Despite this, as the above review shows, investigations of typically

developing children's understanding of grammatical aspect are restricted to young children (3- to 6-years) and to children's processing of single sentences. The absence of any empirical investigations of the effect of grammatical aspect on children's narrative comprehension seems particularly surprising given the importance of understanding factors that influence children's narrative comprehension because of its strong relation with concurrent and subsequent reading comprehension (Silva & Cain, 2015; Oakhill & Cain, 2012). The research demonstrating an influence of grammatical aspect on adults' narrative comprehension is reviewed below.

Studies have demonstrated a facilitative effect of imperfective over perfective aspect on adults' generation of inferences relevant to the performance and likely location of events. For example, Truitt and Zwaan (1997) gave adults short texts to read and then asked them to verify if a particular word had been presented. They found that adults were faster to verify that an instrument (e.g., hammer) had been mentioned in preceding text when they had previously read imperfective sentences implying the use of a hammer (e.g., Jason began pounding the nails into the board) rather than perfective sentences (e.g., Jason pounded the nails into the board). This suggests that imperfective aspect facilitates relevant inference generation regarding the manner in which actions are performed.

Morrow (1985), in a series of experiments, showed that the grammatical aspect with which events are expressed in narratives influences adults' subsequent choice of referent for a noun phrase. In these experiments, adult participants first memorised the layout of model house and then read short narratives where the critical sentence described the protagonist moving between two rooms (e.g., She walked from the study into the bedroom.). The next sentence included a noun phrase (e.g., She didn't find the glasses in *the room*). Adults were asked to identify the referent of the

noun phrase (e.g. Which room is referred to?). Adults were more likely to choose the goal room (the bedroom in the example) rather than the path room (the study) when the critical sentence expressed the event with perfective aspect (walked). Expressing the event with imperfective aspect (was walking) had the opposite effect. This influence of aspect was clearly measurable over and above the order of mention of the two rooms (e.g., from the study into the bedroom, versus into the bedroom from the study) and the effects of prepositions (e.g., from, through, past, to, into). These findings show that grammatical aspect influences the focus of particular entities in narratives, and adults use this information to guide their construction of situation models as they process text.

Ferretti et al. (2007) did not investigate effects of aspect on adults' comprehension of extended texts but they found a similar effect of imperfective aspect focusing adults on the performance of events in their sentence tasks. They provided sentence fragments which differed in grammatical aspect (e.g., was skating/had skated) and asked adults to provide continuations. Adults were more likely to provide continuations with locative prepositions (e.g., in the arena) following imperfective sentence fragments than perfect sentence fragments. In another experiment, adults were given sentences to read where the typicality of a location was manipulated as well as the grammatical aspect. Using event-related-brain potential (ERP) methodology the authors found that adults had greater difficulty reading sentences with unexpected locations (e.g., the diver was snorkelling/had snorkelled in the pond) compared to expected locations (e.g., the diver was snorkelling/had snorkelled in the ocean) only when the event was expressed with imperfective aspect. When events were expressed with perfect aspect, there was no difference in the N400 (an ERP component known to index the ease of semantic integration of words in text).

Other research shows that imperfective aspect enhances the availability of characters in short narratives. For example, Carreiras et al. (1997) examined adults' recognition for protagonists' names after reading short stories in which protagonists had been described performing actions with either imperfective or perfective aspect such as 1.5.

(1.5) John works as a waiter in a restaurant. Mary eats there every day. John *was finishing/ had finished* his shift when Mary arrived at the restaurant. She asked for the dish of the day. She read the newspaper while waiting for the food.

Adults were faster to respond Yes to proper name probes (John in the example given) when the protagonists' action had been described with imperfective rather than perfective aspect. Furthermore the effect of describing the protagonists' action with imperfective rather than perfective aspect on the availability of the protagonist was evident not just immediately after the aspectual event but at the termination of two subsequent sentences. This result shows that the aspectual effect was sustained beyond the initial imperfective sentence.

The maintenance of an effect of imperfective aspect on adults' narrative comprehension has been examined in a number of studies and in a number of different ways. For example, Magliano and Schleich (2000) examined the influence of neutral intervening text on adults' judgements of events ongoingness. They inserted sentences, which were neutral with respect to the narrative time line, after aspectual events and asked whether events were still ongoing immediately after and after varying numbers of sentences. In their first experiment they found that imperfectively expressed events were judged as ongoing with a greater than chance frequency immediately and following 1,2 and 3 intervening sentences. This suggests that adults maintain an effect of imperfective aspect as they process text. They also found that

adults' judgement that imperfectly expressed events were ongoing decreased as a function of the number of intervening sentences between the aspectual event and the question. This suggests that adults update their judgement of events ongoingness as they process text. Surprisingly, Magliano and Schleich (2000) also found an effect of intervening text on adults' judgement that perfectly expressed events were completed. These events were more likely to be perceived as completed only immediately and following one intervening sentence. After 2 or 3 sentences adults were at chance in their judgement of these events' ongoingness. The authors suggest that this pattern was observed because adults became less certain as to how the narrative was unfolding in this condition.

In a second experiment, as well as manipulating grammatical aspect, the authors also manipulated the inherent duration of the aspectual events themselves. These had either typically short durations (e.g. writing/wrote a cheque) or longer durations (e.g. watching/watched a movie). When asked about the events' ongoingness immediately after the aspectual event, participants were more likely to judge both short and long duration events to be ongoing when they were expressed with imperfective compared to perfective aspect. The occurrence of four intervening sentences between the aspectual event and the question significantly reduced adults' judgement that imperfectly expressed short duration events were ongoing compared to the earlier question point. For imperfectly expressed long duration events, there was no significant difference in adults' judgement of events ongoingness between the two question positions. These findings show that adults are sensitive to both the grammatical aspect with which events are expressed and the inherent duration of events in their narrative comprehension. Whether children are similarly influenced is examined in Chapter 4.

Whether imperfective aspect has an influence on adults' narrative comprehension because it activates relevant aspects of the situation to a greater extent than perfective aspect, or whether it provides information about what should be maintained has also been investigated. There are mixed findings in this regard. To illustrate, in a third experiment Magliano and Schleich (2000) gave participants texts to read which introduced a target activity expressed with either imperfective or perfective aspect. At two later points in the story an un-tensed verb phrase that was related to the target activity was presented (e.g. change tyre). Participants had to verify whether the verb phrase corresponded with any of the previously presented activities in the story. At both time points, participants were faster to respond when the target activity had been expressed with imperfective compared to perfective aspect. This suggests that imperfective aspect activates events to a greater extent than perfective aspect. However, an advantage for imperfective over perfective aspect in response latency was not replicated in a subsequent experiment using the same materials. In this experiment participants were differentiated into those with high and low working-memory span scores. In contrast to the previous experiment, there was no effect of grammatical aspect for either group at the immediate testing point. However, there was an advantage for imperfective aspect over perfective aspect at the later testing point but this was only for high-span participants. The failure to find an effect of aspect immediately after the target event suggests that imperfectively expressed events are not more highly 'activated' than perfectly expressed events. The advantage for imperfectively expressed events compared to perfectly expressed events at the later point for high-span readers suggests imperfective aspect provides a cue to maintain information as text is processed.

Mozuraitis, Chambers and Daneman (2013) also examined the maintenance of an effect of aspect during adults' narrative comprehension but in this study an eye-tracking methodology was used. As with Magliano and Schleich (2000), target events differed in intrinsic duration (short duration-writing a cheque, long duration-knitting jumper) to examine whether world knowledge interacted with grammatical aspect. Unlike Magliano and Schleich, the influence of aspect was examined by presenting a target event within the narrative that was necessarily subsequent to the termination of the first aspectual event. For example "He sent the payment" for the cheque writing example and "She wore her new garment" for the knitting example. Reading times across this target sentence were used to determine an effect of aspect. This has the advantage of examining the effect of aspect on normal reading processes rather than disrupt these by requiring a response to a question. As in Magliano and Schleich, the maintenance of an effect of aspect was examined by the inclusion of neutral intervening text between the aspectual event and the target sentence for some test items ("This month's bill was unusually high" for the writing cheque passage and "This time it was for herself" for the knitting passage).

The pattern of results differed slightly from Magliano and Schleich. When there was no intervening text, reading times for the target sentence following imperfectly expressed events were longer than following perfectly expressed events but, unlike Magliano and Schleich, this was not demonstrated for both short and long events: only for the long duration events. This suggests that the imperfective expression of short duration events does not impede integration of a necessarily subsequent event but it does have this effect for longer duration events.

Consistent with Magliano and Schleich, intervening text did not influence target sentence reading times for imperfectly expressed, long duration events.

Inconsistent with Magliano and Schleich, intervening text had no effect on reading times for imperfectly expressed short duration events. The findings of Magliano and Schleich would predict a decrease in reading times for the target sentence following intervening text relative to before the intervening text, for short duration imperfectly expressed events. This would reflect adults updating their ongoing judgement of the event as the text proceeds. The authors suggest this was because the relevant difference between processing short and long imperfectly expressed events was captured at the first time point. The findings of this study suggest the effect of aspect on adults' integration of necessarily subsequent events in narratives may be greater for longer duration events than shorter ones.

In summary, in narrative contexts, the grammatical aspect with which events with endpoints are described influences adults' generation of inferences (Morrow, 1985; Truitt & Zwaan, 1997) and adults' maintain an effect of imperfective aspect over their processing of subsequent sentences (Carreiras et al., 1997; Magliano & Schleich, 2000; Mozuraitis et al., 2013). There have been no investigations of whether children demonstrate the same influence of grammatical aspect in their narrative comprehension. Experiment 4a, Chapter 4 examines whether 7- to 11—year-old children's judgement of short-duration events ongoingness is influenced by the grammatical aspect with which the events are expressed. This experiment also examines whether intervening text has the same influence on children's judgement of events ongoingness as seen with adults in previous research, Experiment 4b, Chapter 4 examines whether children demonstrate the same effects of grammatical aspect and intervening text on their pronoun resolution as seen in Experiment 4a.

1.9 Overview of Literature Review

In conclusion, my literature review shows that there is broad support for the Event Structure Hypothesis (Rohde et al., 2006) for adults. Research shows that young children are sensitive to lexical aspect in their language productions (Shirai & Andersen, 1995) and there is evidence that they are beginning to generalize these early grammatical aspect/lexical aspect associations from around 3- years-old (Weist et al., 1997). There is evidence that children's anaphor resolution is still developing in 7- to 11-year-olds (for example, Ehrlich & Remond, 1997) and although research has identified multiple influences on children's pronoun resolution (syntactic status, thematic roles, distance) there are inconsistent findings in the literature. Research examining children's pronoun resolution has not considered the temporal characteristics of the sentences prior to the pronoun. My experimental work will explore developmental differences in pronoun resolution in the age range 7- to 11- years and test the adequacy of the Event Structure Hypothesis. Further, I will explore the extent to which biases found in adult production and comprehension studies are present in children's literature, as a potential source of how these biases arise.

Chapter 2: The Influence of Grammatical Aspect on Pronoun Resolution for Events with Inherent Endpoints

2.1 Introduction

As discussed in Chapter 1, adults' pronoun resolution is influenced by the grammatical aspect with which transfer of possession events (events with endpoints) are expressed (Ferretti et al., 2009; Rohde et al., 2006). To date there are no published investigations on the influence of the temporal characteristics of events on children's pronoun resolution. The experiments in this chapter address that gap in the literature by investigating whether the grammatical aspect with which transfer of possession events are expressed influences typically developing children's resolution of a subsequent pronoun.

There are two ways in which events can be temporally differentiated. The first is by morphological inflection of the event verb itself. This is the grammatical aspect of an event and it primarily distinguishes between describing an event as completed or as ongoing (Madden & Ferretti, 2009). In English this is achieved by using the irregular past tense or the past tense inflection – *ed* to describe an event as completed, as in *John passed a book to Bob*, and through the use of auxiliaries *was*, *is* or *will be* and the inflection –*ing* to describe an event as ongoing, as in: *John was passing a book to Bob*. The second way in which events can be temporally differentiated is by the nature of the events themselves. This is the lexical aspect of events and this categorisation distinguishes primarily between events that have inherent endpoints and those which do not (Comrie, 1976; Dowty, 1979). Examples of each type of event are: *John was passing a book to Bob* and *John was standing at a bus stop with Bob*. The transfer of possession event *John was passing a book to Bob* has an inherent endpoint; if John stopped passing the book to Bob at an arbitrary point in time, it

would not be true that John passed the book to Bob. In contrast, the event *John was standing at a bus stop with Bob* does not have an inherent endpoint; if John stopped standing at the bus stop with Bob at an arbitrary point in time, it would still be true that John stood at the bus stop with Bob.

The effect of grammatical aspect on adults' pronoun resolution has been examined using Source-Goal transfer of possession events (e.g. to pass a book) where protagonists in the transfer event have the same gender (Rohde et al., 2006; Stevenson et al., 1994) and different genders (Ferretti et al., 2009). The research in this chapter examines the effect of grammatical aspect for children in both these circumstances (Experiment 1a – same gender protagonists; Experiments 2a and 2b – different gender protagonists). The participants in Experiment 1b are adults in order to compare the pattern of findings for children and adults using the same materials and methodology (as Experiment 1a).

2.2 Experiment 1a: The Effect of Grammatical Aspect on Children's Resolution of Ambiguous Pronouns

When adults are given sentences with protagonists of the same gender, a Source-Goal verb of transfer and a pronoun prompt, adults more frequently provide continuations with the Source rather than the Goal as the subject of the continuation when the event has been expressed with imperfective grammatical aspect, see 2.1a below (Rohde et al., 2006). However, when the event is expressed with perfective grammatical aspect, see 2.1b, adults are almost as likely to treat the pronoun as referring to the Goal (Rohde et al., 2006; Stevenson et al., 1994). This demonstrates that grammatical aspect influences adults' resolution of a subsequent ambiguous pronoun.

Imperfective:

(2.1) a. John_{source} **was handing** a book to Bob_{goal}. He...

Perfective:

b. John_{source} **handed** a book to Bob_{goal}. He...

The almost equal frequency with which adults select the Goal and Source as the referent of the pronoun following 2.1b is not predicted by early accounts of pronoun resolution (Chambers & Smyth, 1998; Gernsbacher, 1989; Gernsbacher & Hargreaves, 1988; Smyth, 1994). A more recent account of adults' pronoun resolution suggests that the pattern of resolution occurs because adults take into account the temporal characteristics of an event in their mental model of that event and this influences their determination of a subsequent pronoun's referent (Kehler et al., 2008; Kehler & Rohde, 2013b). Specifically, in this account adults are proposed to evaluate two probabilities when resolving pronouns. The first is the probability that either of the two protagonists will be re-mentioned. This probability is influenced by the inherent temporal characteristic of the event. It is argued that, because transfer of possession events are telic, that is they have inherent endpoints, adults are biased towards expecting a re-mention of the Goal protagonist. In support of this, the Goal protagonist is re-mentioned as the subject of continuations more often than the Source protagonist when adults are required to provide continuations following transfer events without pronoun prompts such as 2.2 below (Stevenson et al., 1994).

(2.2) John_{source} passed the comic to Bill_{goal}.

The second probability is the likelihood that a pronoun would be used to refer to either of the two protagonists (Kehler et al., 2008; Kehler & Rohde, 2013b). This probability is unaffected by the temporal characteristic of the event but is influenced by the grammatical role each protagonist plays in that event. In support of this, when

asked to write a continuation of a sentence without a pronoun prompt (e.g., John_{source} **was handing** a book to Bob_{goal}.) continuation studies find that adults are more likely to use a pronoun to refer to a protagonist in the subject position (John) than one in the object position (Bob), regardless of which of the protagonists (John or Bob) is more frequently re-mentioned (Arnold, 2001; Ferretti et al., 2009; Fukumura & van Gompel, 2010; Rohde & Kehler, 2013; Stevenson et al., 1994). Thus it is argued that, when adults encounter a pronoun, their production bias to pronominalize a subject re-mention leads them to infer that the previous subject is more likely to be the referent of the pronoun than the previous clause object (Rohde & Kehler, 2013a). Support for the idea that pronouns themselves confer a subject bias interpretation, comes from studies where adults are asked to provide sentence continuations: previous subject protagonists are the subject of continuations more frequently when continuations begin with pronouns than in bare prompt conditions (Stevenson et al., 1994).

For adults, the combination of a Goal next mention bias and a subject interpretation bias for ambiguous pronouns explains the higher Goal interpretation of the pronoun in 2.1b than 2.1a as follows. Transfer of possession events have specific endpoints. Because of this feature, adults expect a re-mention of the Goal protagonist. The endpoint of the transfer has been reached in 2.1 (b) but not in 2.1 (a). The probability that the Goal will be re-mentioned is therefore different for the two aspect conditions; there is a higher probability that the Goal protagonist will be re-mentioned following 2.1 (b) than 2.1 (a). In contrast, the probability that the pronoun refers to the Source protagonist is the same for the two aspect conditions; for both conditions there is a higher probability that the pronoun refers to the Source protagonist than the Goal because the Source is the subject of the previous sentence. The combination of these two probabilities, the Goal next mention bias and the subject interpretation bias for

pronouns results in a higher resolution of the pronoun to the Goal protagonist in 2.1 (b) than in 2.1(a). For adults, the 50% resolution to the Source in the perfective condition 2.1 (b) indicates that despite a strong next mention bias towards the Goal, as found in bare prompt conditions, adults' subject interpretation bias for ambiguous pronouns is strong enough to rival this Goal re-mention bias (Ferretti et al, 2009; Rohde et al., 2006; Stevenson et al., 1994). In addition, the 70% resolution to the Source in the imperfective condition 2.1 (a) found by Rohde et al. (2006) indicates that, for adults, expressing telic events with imperfective aspect invokes a substantial reduction in their expectation that the Goal will be mentioned next.

Whether the temporal characteristics of events influence children's pronoun resolution has not been considered in previous research examining children's pronoun resolution. This may explain why a contradictory pattern of performance has been observed. Whilst some research has shown that participants from 3-year-olds through to adulthood demonstrate a subject interpretation of an ambiguous pronoun (Hartshorne et al., 2015; Song & Fisher, 2005) other work reports that only adults, but not 5-year-olds, demonstrate this bias (Arnold et al., 2007). All of these experiments tracked participants' eye movements as they viewed a picture while listening to sentences. Hartshorne et al. (2015) presented 5-year-olds and adults with sentences such as 2.3a and 2.3b:

- (2.3) a. Emily ate dinner with Hannah. *She* skipped her salad and only ate desert.
b. Emily and Hannah are going to Disneyland. Emily has never been to Disneyland. *She* is really excited about going to Disneyland.

In these sentences the protagonists are described performing a joint action and in 2.3b the subject protagonist is repeated in the sentences prior to the pronoun. Children and adults demonstrated a subject interpretation of the pronoun for both sentence types but

the effect occurred sooner for adults. Other work shows that 3-year-olds show a bias to resolve an ambiguous pronoun to the subject protagonist when the subject's name has been repeated in prior context sentences as in 2.4 b above (Song & Fisher, 2005).

In contrast, Arnold et al. (2007) found a subject bias for adults, but not for children. Their stimuli differ to those used by Hartshorne et al. (2015). An example is provided in 2.4 below.

(2.4) Donald is bringing some mail to Mickey while a violent storm is beginning.

He's carrying an umbrella and it looks like they're both going to need it.

In this type of event the second mentioned protagonist is central to the endpoint. It has been argued that children's failure to demonstrate a subject interpretation of the pronoun in Arnold et al. (2007) arose because the proximity of the pronoun and the disambiguating information limited the time available for children to demonstrate a subject bias in the looking task (Hartshorne et al., 2015). This argument is supported in the findings of Hartshorne et al. (2015) where, when no disambiguating information was provided (2.3 (a)), children demonstrated a subject interpretation of the pronoun.

However, there are other explanations for the Arnold et al. (2007) finding. As noted above, when adults are asked to provide continuations for events with endpoints like 2.4 they show a bias towards re-mentioning the second protagonist. This re-mention of the Goal protagonist is reduced when adults are asked to provide continuations beginning with pronouns, because adults more often use pronouns to refer to previous subject protagonists. Thus, the failure of young children to demonstrate a subject interpretation of the pronoun in Arnold et al. (2007) may indicate that the presence of an endpoint is an important influence on children's resolution of a subsequent pronoun. Specifically, Arnold's finding may indicate that a

re-mention bias for particular protagonists in events with endpoints develops prior to a subject interpretation of pronouns. Another explanation for the Arnold et al. (2007) result is that expressing a telic event with imperfective aspect does not lead children to revise their expectation for a re-mention of the Goal protagonist to the same extent as it does for adults.

The current experiment extends previous research by examining whether 7- to 11-year-olds demonstrate a subject interpretation of a pronoun following a transfer of possession event when no disambiguating information is provided. The experiment also examines whether the grammatical aspect with which these events are described influences children's resolution of pronouns. To make the task comparable to previous research with adults, children were presented with sentence pairs such as: "Josh brought/was bringing a biscuit to Kyle. He grinned". The first sentence was expressed with either perfective/imperfective aspect. The continuation could refer to either of the two protagonists. Children were required to identify the referent of the pronoun.

Children are sensitive to the morphemes that mark the grammatical aspect of telic events from 3- to 4-years of age (Wagner, 2009; Zhou et al., 2014). For that reason, differences in performance between perfective and imperfective aspect were expected. The specific nature of those differences was harder to predict. First, children may, like adults, have a re-mention bias for the Goal protagonist following transfer events but be less likely to infer that an ambiguous pronoun refers to the previous subject rather than object protagonist. A Goal bias interpretation of the pronoun in both grammatical aspect conditions in the current experiment would indicate that the presence of an endpoint is an important influence on 7- to 11-year-old's pronoun resolution.

Second, children may differ from adults in the moderating effect imperfective aspect has on their expectation for a re-mention of the Goal protagonist. Arnold et al. (2007) found that, unlike adults, 5-year-olds did not demonstrate a subject bias when telic events were expressed with imperfective aspect. The current experiment compared children across the age range of 7- to 11-years. It may be the case, that whilst the effect of imperfective aspect on children's pronoun resolution is not so large as to induce a subject interpretation of the pronoun in the imperfective condition, there is an age increase in selecting the Source in the imperfective condition compared to the perfective condition. This would indicate that children's sensitivity to imperfective aspect as a cue to the re-mention of the subject protagonists is developing within this age range.

2.2.1 Method

Participants

One hundred and fifty-two children from one urban Primary School in the East-Midlands region of England that served a mixed socioeconomic catchment area participated in this study. All spoke English as their first language and were from four Year Groups. There were 37 children from Year Three, age 7- to 8-years (21 girls, $M = 8$ years, 2 month, $SD = 4$ months); 38 children from Year Four, age 8- to 9-years (25 girls, $M = 9$ years, 3 months, $SD = 4$ months); 43 children from Year Five, age 9- to 10-years (22 girls, $M = 10$ years, 2 months, $SD = 4$ months) and 34 children from Year Six, age 10- to 11-years (19 girls, $M = 11$ years, 2 months, $SD = 4$ months).

Materials

The stimuli consisted of 48 experimental items each comprising a stimulus sentence that described a transfer of possession event followed by a continuation sentence. Examples are provided in Table 2.1 (see Appendix A for the full set). Six

regular and six irregular Source-Goal verbs of transfer were selected from the Ferretti et al. (2009) stimulus sentences. The regular verbs were: *to deliver*, *to hand*, *to pass*, *to carry*, *to push*, and *to chuck*. The irregular verbs were: *to give*, *to take*, *to send*, *to bring*, *to throw* and *to fling*. Each of these 12 verbs was used four times, twice in the perfective form and twice in the imperfective form. Forty-eight concrete nouns were selected to act as the item of transfer within these sentences. In each item Source and Goal referents were same gender proper names, matched for the number of syllables. There were equal numbers of male and female pairs across the four repetitions of each verb.

Table 2.1 *Stimuli Used in the Two Grammatical Aspect Conditions (List A)*

Protagonist	Grammatical Aspect	
	Perfective	Imperfective
Gender		
Female	Carol _{source} brought a broken toy to Charlotte _{goal} . She groaned.	Alice _{source} was bringing a DVD to Polly _{goal} . She groaned.
Male	Josh _{source} brought a biscuit to Kyle _{goal} . He grinned.	Alfie _{source} was bringing a voucher to Darren _{goal} . He grinned.

The continuations comprised a personal pronoun followed by one of the 10 actions used by Ferretti et al. (2009), (*smiled*, *chuckled*, *sighed*, *giggled*, *laughed*, *grinned*, *winked*, *groaned*, *squinted*, *frowned*) and two other actions (*sneezed*, *beamed*) to ensure that the continuations could be evenly distributed across the 48 items. Each continuation was used twice in the imperfective condition and twice in the perfective condition. The continuations were balanced across stimulus sentences

beginning with a female or male Source and across stimulus sentences with regular or irregular verbs.

Two lists of 48 experimental items were prepared with the order of items kept the same across the lists but with the aspect of the verb in each item counterbalanced across the lists. Seventy-five participants received list A, seventy-seven participants received list B with approximately equal numbers of children in each Year Group receiving each list.

Procedure

The task was administered as a group assessment in the children's classrooms using the whiteboard to display each numbered experimental item, which was read out by the assessor. Each item was displayed for 9 seconds in a timed PowerPoint presentation. After each item was displayed a second slide was presented with the question and the names of the two protagonists, for example, "Who grinned? Josh/Kyle". This was read out and displayed for 5 seconds while children circled their response in booklets where the question and the two possible referents were printed. A short break was allowed after every 8 items. The same explanation of the task and instructions were read to each Year Group and three practice items were administered. Any questions about the procedure were addressed before presentation of the experimental items.

2.2.2 Results

The mean proportion of Source selections by Year Group and grammatical aspect condition are reported in Table 2.2. Inspection of the mean proportions suggested that, in general, children showed a Goal interpretation of the pronoun in each grammatical aspect condition ($< .50$ selection of the Source in all conditions).

However, this tendency was reduced in the imperfective condition. There was no clear effect of age on children's performance in either condition.

Table 2.2 *Mean Proportion of Source Selections (and Standard Deviations) in the Two Grammatical Aspect Conditions*

Year Group	Grammatical Aspect		Total
	Perfective	Imperfective	
Year 3 ($n = 37$)	0.33 (0.47)	0.36 (0.48)	0.34 (0.48)
Year 4 ($n = 38$)	0.26 (0.44)	0.31 (0.46)	0.28 (0.45)
Year 5 ($n = 43$)	0.38 (0.49)	0.47 (0.50)	0.42 (0.49)
Year 6 ($n = 34$)	0.35 (0.48)	0.41 (0.49)	0.38 (0.49)
($N = 152$)	0.33 (0.47)	0.39 (0.49)	0.36 (0.48)

To examine these effects statistically, the analysis modelled the probability (log odds) of selecting the Source in a series of mixed effects binomial models in the R statistics environment (R Core Team, 2014) using the lme4 package (Bates, Mächler, Bolker, & Walker, 2015). This method is essentially an extension of logistic regression, such that a mixed effects analysis provides estimates for the effects of experimentally manipulated variables while taking into account random error variance due to differences between participants or between stimulus items sampled for the study. Following the recommendations of Barr et al. (2013), fixed effects were estimated in a model that included full random effects terms corresponding to: random differences in overall selection of the Source protagonist between participants and between items (random intercepts); random differences in the slopes of the effect of aspect between participants and between items; and random differences in the slopes of the effect of age between items. The Age variable was centered and the data

were treatment coded such that the intercept represented the log odds probability that a child at the mean age of the sample (9 years, 7 months) selected the Source in the perfective condition (Dalal & Zickar, 2012). This coding of the intercept was used for all the experiments in this thesis to provide a common reference point for the experiments. Centering the aspect variable did not change the pattern of significance. A summary of the final model is reported in Table 2.3.

Table 2.3 *Summary GLMM for (log odds) Source Selection: Effects for Grammatical Aspect (GA) and Centered Age*

Fixed effects	Estimated coefficient (<i>b</i>)	<i>SE</i>	<i>z</i>	Pr(> <i>z</i>)
(Intercept)	-0.98	0.15	-6.75	< .01
GA (imperfective)	0.33	0.07	4.65	< .01
cAge	0.13	0.09	1.40	.16
GA (imperfective): cAge	0.08	0.05	1.54	.12
Random effects			Variance	<i>SD</i>
Participant:	(intercept)		1.30	1.14
	GA (slope)		<0.01	0.02
Item:	(intercept)		0.50	0.71
	GA (slope)		0.06	0.25
	cAge		0.04	0.19
7296 observations; 152 participants, 48 items				

Table 2.3 presents the inferential statistics for the fixed effects of grammatical aspect and age. The first column provides the coefficient estimates for the effects (*b*). The significant, negative value of the intercept coefficient shows that, following a Source-Goal transfer of possession event expressed with perfective aspect, children were more likely to resolve an ambiguous pronoun at the start of a continuation as co-

referential with the previously mentioned Goal protagonist than the Source protagonist. The coefficient of the fixed effect of aspect shows the change in log odds probability of selecting the Source in the imperfective aspect condition. The significant, positive value of the aspect coefficient shows that children were more likely to select the Source as the antecedent of the ambiguous pronoun in the imperfective condition than the perfective reference condition. The non-significant value of the age coefficient shows that children's age did not influence the likelihood that they selected the Source as the antecedent of the ambiguous pronoun in the perfective reference condition. The non-significant value of the aspect (imperfective): age coefficient shows that children's age did not influence the likelihood that they selected the Source as the antecedent of the ambiguous pronoun in the imperfective condition.

2.2.3 Discussion

The first aim of this experiment was to determine whether children, like adults, demonstrated a subject interpretation of an ambiguous pronoun following a Source-Goal transfer of possession event when no disambiguating information was provided. In contrast to previous research with adults (Rhode et al., 2006) children demonstrated a Goal bias interpretation of the pronoun in both aspect conditions. However, the Goal bias result is consistent with previous studies of (younger) children; for example, Arnold et al (2007) found that 5-year-olds did not demonstrate a subject bias interpretation of an ambiguous pronoun when a telic event was expressed with imperfective aspect. Transfer of possession events have endpoints and children's Goal bias interpretation of the pronoun in the current study suggests that the presence of an endpoint influences their resolution of a subsequent pronoun. This explanation is examined further in Experiment 3b, Chapter 3 of this thesis where

children's pronoun resolution following events with and without endpoints is compared. An alternative explanation for the current findings is that the continuations themselves encouraged a strong Goal bias interpretation. This methodological possibility was examined in Experiment 1b, by presenting adults with the same materials. If the continuations confer a Goal bias, adults should demonstrate a Goal bias in both grammatical aspect conditions.

The second aim of the experiment was to examine whether the grammatical aspect with which the event was expressed influenced children's resolution of a subsequent ambiguous pronoun. The results support this viewpoint: children were more likely to select the Source as the referent of the pronoun when the event was expressed with imperfective aspect than when it was expressed with perfective aspect. This finding is consistent with previous work with adults (Rohde et al., 2006; Stevenson et al., 1994). The result suggests that, like adults, children are sensitive to the temporal information encoded in aspectual morphemes and use this information to integrate successive events as they process text.

2.3 Experiment 1b: The Effect of Grammatical Aspect on Adult's Resolution of Ambiguous Pronouns

It is possible that the Goal bias demonstrated by children in Experiment 1a arose because the continuations themselves encouraged a strong Goal bias interpretation. To examine whether this was the case, Experiment 1b presented adults with the same stimuli used in Experiment 1a and the frequency with which they demonstrated Source biases in the two aspect conditions was examined. On the basis of previous adult research, it was anticipated that adults would resolve the pronoun more frequently to the Source protagonist in the imperfective condition compared to the perfective condition. However, if the continuations themselves conferred a Goal

bias, adults should not demonstrate a mean proportion Source selection above .5 in the imperfective condition and a mean proportion Source selection of about .5 in the perfective condition. Rather their mean proportion Source selection would be below .5 in both conditions as demonstrated by the children in Experiment 1a.

2.3.1 Method

Participants

Twenty-eight adults (18 female, $M = 31$ years, 8 months, $SD = 13$ years, 3 months, Minimum = 18 years, Maximum = 54 years, 1 month) recruited from the North-West of England participated in the study. All were native English speakers.

Materials and procedure

The stimuli consisted of the same experimental items as in Experiment 1a. Participants were tested individually in a quiet room. Each sentence pair was displayed for 9 seconds, using a timed Powerpoint presentation, but in this study the sentences were presented on a Celcus monitor rather than a whiteboard. The question “Who grinned? Josh/Kyle”, was displayed for 5 seconds following the stimulus sentences. Different to Experiment 1a, the participants read the stimulus sentences and questions independently. As for the study with children, the questions were printed in a booklet, together with the two possible referents and participants circled their responses in the booklet. Fourteen participants received list A (9 female), and fourteen list B (9 female).

2.3.2 Results

Adults showed a different pattern of response to that shown by children: they showed a strong bias to Source selections in the imperfective condition ($M = .68$, $SD = .47$), $t(671) = 9.72$, $p < .01$) and a Goal bias in the perfective condition ($M = .42$, $SD = .49$), $t(671) = -4.46$, $p < .01$). To examine differences in the pattern of adults’

and children's responses, the data from children (Experiment 1a) and adults (Experiment 1b) were combined. The analysis modelled the probability (log odds) of selecting the Source in a mixed effects binomial model in the R statistics environment (R Core Team, 2014) using the lme4 package (Bates et al., 2015). The data were coded so that the intercept represented the log odds probability of a child at the mean age of the sample (9 years, 7 months), selecting the Source in the perfective condition. Centering the aspect variable did not change the pattern of significance. As previously, random intercepts for participants and items and random slopes for aspect in the participants and items terms were included in this model to take account of individual variation in selection of the Source and individual variation in the effect of the aspect condition. This model is shown in Table 2.4.

In Table 2.4 the inferential statistics for the first two lines of this model repeat those in Table 2.3, with slight rounding differences, because the data was coded such that the intercept represented the log odds probability of selecting the Source in the perfective condition for children. The positive, significant coefficient for the age group (adult) effect shows that adults were significantly more likely than children to select the Source in the perfective condition. The positive significant coefficient for the aspect (imperfective): age group (adult) effect shows that the increase in source selection for adults compared to children was significantly greater in the imperfective condition than the perfective condition.

Table 2.4 *Summary GLMM for (log odds) Source Selection: Effects for Grammatical Aspect (GA) and Age Group*

Fixed effects	Estimated			
	coefficient (<i>b</i>)	<i>SE</i>	<i>z</i>	Pr(> <i>z</i>)
(Intercept)	-0.97	0.15	-6.61	< .01
GA (imperfective)	0.32	0.07	4.25	< .01
Age Group (adult)	0.56	0.24	2.39	.02
GA (imperfective): Age Group (adult)	0.97	0.14	6.89	< .01
Random effects			Variance	<i>SD</i>
Participant:	(intercept)		1.09	1.05
	GA (slope)		0.01	0.09
Item:	(intercept)		0.59	0.77
	GA (slope)		0.09	0.31

8640 observations; 180 participants, 48 items

2.3.3 Discussion

The aim of this experiment was to determine whether the materials used in Experiment 1a conferred a Goal bias. There was some indication that this was the case: adults were more likely to resolve the pronoun to the Goal rather than Source protagonist in the perfective condition. This result is not consistent with previous research that has found that adults are equally likely to resolve a pronoun to the Goal or Source protagonist when asked to provide written continuations following transfer events expressed with perfective aspect (Rohde et al., 2006). However, when events were expressed with imperfective aspect, adults were more likely to resolve the pronoun to the Source. Indeed the mean proportion Source selection in the

imperfective condition was above the chance score of .5. This shows that, in the imperfective condition, adults overcame any Goal bias interpretation that may have been inadvertently included in the continuations and demonstrated a subject bias interpretation of the pronoun in this condition. This finding is consistent with previous research (Rohde et al., 2006). Together, these findings suggest that children's Goal bias interpretation of the pronoun in both the perfective and imperfective conditions in Experiment 1a is not simply explained by a Goal bias implicit in the stimuli.

In conclusion, Experiments 1a and 1b showed that children were less likely than adults to resolve an ambiguous pronoun towards the Source protagonist following a transfer of possession event. As noted, while some research has found that children, like adults, demonstrate subject interpretations of pronouns (Hartshorne et al., 2015) (Song & Fisher, 2005), other research has found a subject bias interpretation of ambiguous pronouns for adults but not children (Arnold et al., 2007). Transfer of possession events have endpoints and the results of the current experiments suggest that the presence of an endpoint in stimulus sentences influences children's tendency to resolve a subsequent ambiguous pronoun towards the previous subject protagonist. This possibility was further examined in Experiment 3b, Chapter 3.

Experiments 1a and 1b also showed that, whilst children in the age range 7- to 11-years were more likely to resolve an ambiguous pronoun to the Source protagonist in the imperfective compared to perfective conditions, the effect of imperfective aspect on their Source selection was significantly lower than that observed with adults. Furthermore, there was no effect of age on 7- to 11-year-old's tendency to resolve a pronoun to the Source in the imperfective condition. This indicates that an

increase in resolving an ambiguous pronoun towards the Source protagonist in the imperfective condition may occur post 11 years of age.

2.4 Experiment 2a: The Effect of Grammatical Aspect on Children's Resolution of Pronouns When Protagonists are Different Genders: Cloze Task

Experiments 1a and 1b investigated the effect of grammatical aspect on children's and adults' resolution of ambiguous pronouns following Source-Goal transfer of possession events. Experiment 2a examines the effect of grammatical aspects on children's pronoun resolution when the protagonists are different genders and the subsequent pronoun is, therefore, unambiguous.

The grammatical aspect with which transfer events are described influences adults' resolution of subsequent unambiguous pronouns (Ferretti et al., 2009). Ferretti presented adults with sentence pairs such as 2.6a and 2.6b. The first sentence in each pair has two different gender protagonists involved in a transfer of possession event expressed with either imperfective (2.6 a) or perfective (2.6 b) grammatical aspect. The first sentence was followed by a continuation beginning with a pronoun that was either consistent with the gender of the Source or Goal protagonist in the first sentence. In the examples below, 'he' as a continuation is Source consistent.

Imperfective:

(2.6) a. Kyle_{source} was blowing a kiss to Sasha_{goal}. He/She winked flirtatiously.

Perfective:

b. Kyle_{source} blew a kiss to Sasha_{goal}. He/She winked flirtatiously.

The stimulus sentences were presented one word at a time and event-related brain potentials (ERPs) were recorded and examined 100 ms before the pronoun to 1000 ms after its onset whilst adults read the sentences. Adults exhibited a greater positive brain potential (P600) for continuations beginning with Source consistent

pronouns than Goal consistent pronouns only in the perfective condition. This was interpreted as suggesting that Source protagonists are less available in adults' situation models as potential referents of the pronoun following perfectly expressed transfer events.

The reduced availability of the Source protagonist following perfective rather than imperfective stimulus sentences is consistent with the pattern of continuations adults provided following stimulus sentences such as 2.7 in a second experiment (Ferretti et al., 2009).

Imperfective:

(2.7) a. John_{source} was handing a book to Mary_{goal}.

Perfective:

b. John_{source} handed a book to Mary_{goal}.

Adults provided Goal consistent continuations more frequently than Source continuations in both aspect conditions. But importantly, Goal consistent continuations were more frequent (85% of continuations) when transfer events were expressed with perfective aspect 2.7 (b) than expressed with imperfective aspect (77% of continuations) 2.7 (a). This was also the case in the reduced set of continuations where adults had used a pronoun to refer to either of the two protagonists: the Goal bias was more frequent following perfective sentences (75% of continuations) than imperfective sentences (63% of continuations) (Ferretti et al., 2009).

The main aim of Experiment 2 was to determine whether children demonstrated a bias in their choice of subject for a continuation following a transfer of possession event with different gender protagonists. A cloze task was used. A second aim was to determine whether the grammatical aspect with which the event was described influenced children's choice of subject for the continuation. If children

behave like adults (Ferretti et al., 2009), they should select Goal consistent pronouns as the subject of continuations more frequently than Source consistent pronouns in both aspect conditions. Further, they should select Source consistent pronouns more frequently when events are expressed with imperfective aspect rather than perfective aspect. As previously, children across the age range 7- to 11-years were examined to establish any age related changes in selection of the Source consistent protagonist in either of the aspect conditions.

2.4.1 Method

Participants

One hundred and ninety-seven children from two rural Primary Schools that served mixed socioeconomic catchment areas, one in the North-East and one in the East-Midlands regions of England, participated in this study. All spoke English as their first language and were from four Year Groups. There were 52 children from Year Three, age 7- to 8-years (28 girls, $M = 8$ years, 4 months, $SD = 3$ months); 48 children from Year Four, age 8- to 9-years (22 girls, $M = 9$ years, 2 months, $SD = 4$ months); 50 children from Year Five, age 9- to 10-years (20 girls, $M = 10$ years, 4 months, $SD = 3$ months) and 47 children from Year Six, age 10- to 11-years (20 girls, $M = 11$ years, 2 months, $SD = 3$ months).

Materials

The stimuli consisted of the same 48 experimental items used in Experiments 1a and 1b, but with different gender Source and Goal protagonists. Protagonist names were matched on number of syllables. Examples are provided in Table 2.5 (see Appendix A for the full set).

As in the previous experiment, two lists of 48 experimental items were prepared with the order of items kept the same across the lists but with the aspect of

the verb in each item counterbalanced across the lists. Ninety-three participants received list A, one hundred and four participants received list B with approximately equal numbers of children in each Year Group receiving each list.

Table 2.5 *Stimuli Used in the Two Grammatical Aspect Conditions (List A)*

Protagonist	Grammatical Aspect	
	Perfective	Imperfective
Gender		
Female first	Carol _{source} brought a broken toy to Gary _{goal} . _____ groaned.	Alice _{source} was bringing a DVD to Aaron _{goal} . _____ groaned.
Male first	Josh _{source} brought a biscuit to Claire _{goal} . _____ grinned.	Alfie _{source} was bringing a voucher to Polly _{goal} . _____ grinned.

Procedure

The task was administered as a group assessment in the children's classrooms using the whiteboard to display each numbered experimental item. The assessor read the item as it was written in the examples above but included the pronoun options as a choice as in "Harriet was passing a map to Oliver. *She or he* sneezed." Each item was displayed for 10 seconds in a timed PowerPoint presentation. Children were required to write their preferred pronoun in a booklet where the items were numbered and the continuations were printed. A short break was allowed after every 8 items. The same explanation of the task and instructions were read to each Year Group and three practice items were administered. Any questions about the procedure were addressed before presentation of the experimental items.

2.4.2 Results

The mean proportion of Source selections by Year Group and grammatical aspect condition are reported in Table 2.6. Inspection of mean proportions suggested that, in general, children showed a Goal preference for the continuation in each grammatical aspect condition ($< .50$ selection of the Source in all conditions).

However, this tendency was reduced in the imperfective condition. There was no clear effect of age on children's performance in either condition.

Table 2.6 *Cloze task: Mean proportion of Source Selections (and Standard Deviations) in the Two Grammatical Aspect Conditions*

Year Group	Grammatical Aspect		Total
	Perfective	Imperfective	
Year 3 ($n = 52$)	0.30 (0.46)	0.32 (0.47)	0.31 (0.46)
Year 4 ($n = 48$)	0.32 (0.47)	0.34 (0.47)	0.33 (0.47)
Year 5 ($n = 50$)	0.28 (0.45)	0.33 (0.47)	0.30 (0.46)
Year 6 ($n = 47$)	0.30 (0.46)	0.31 (0.46)	0.31 (0.46)
($N = 197$)	0.30 (0.46)	0.33 (0.47)	0.32 (0.46)

To examine these effects statistically, the analysis modelled the probability (log odds) of selecting the Source consistent pronoun in a series of mixed effects binomial models in the R statistics environment (R Core Team, 2014) using the lme4 package (Bates et al., 2015). As previously, following the recommendations of Barr et al. (2013), fixed effects were estimated in a model that included random effects terms corresponding to: random differences in overall selection of the Source protagonist between participants and between items (random intercepts); random differences in the slopes of the effect of aspect between participants and between items; and random

differences in the slopes of the effect of age between items. As previously, the data was coded so that the intercept represented the likelihood that a child at the mean age of the sample (9 years, 8 months) selected the Source in the perfective condition (Dalal & Zickar, 2012). Centering the aspect variable did not change the pattern of significance. A summary of the final model is reported in Table 2.7.

Table 2.7 *Summary GLMM for (log odds) Source Selection (cloze task): Effects for Grammatical Aspect (GA) and Centered Age*

Fixed effects	Estimated coefficient (<i>b</i>)	<i>SE</i>	<i>z</i>	Pr(> <i>z</i>)
(Intercept)	-1.08	0.12	-8.86	< .01
GA (imperfective)	0.18	0.06	3.00	< .01
cAge	-0.02	0.07	-0.27	.79
GA (imperfective): cAge	-0.02	0.04	-0.36	.72
Random effects		Variance	<i>SD</i>	
Participant:	(intercept)	0.89	0.94	
	GA (slope)	0.01	0.10	
Item:	(intercept)	0.42	0.65	
	GA (slope)	0.04	0.20	
	cAge (slope)	0.01	0.10	

9456 observations; 197 participants, 48 items

The pattern of results was the same as that found in Experiment 1a. The significant, negative value of the intercept coefficient shows that, following a Source-Goal transfer of possession event expressed with perfective aspect, children were more likely to select a Goal consistent pronoun than a Source consistent pronoun as the subject of a continuation. The significant, positive value of the aspect coefficient shows that children were more likely to select the Source consistent pronoun as the

subject of a continuation in the imperfective condition than the perfective reference condition. The non-significant value of the age coefficient shows that children's age did not influence the likelihood that they selected the Source as the antecedent of the pronoun in the perfective condition. The non-significant value of the aspect (imperfective): age coefficient shows that children's age did not influence the likelihood that they selected the Source as the antecedent of the pronoun in the imperfective condition.

2.4.3 Discussion

The main aim of this experiment was to determine whether children were more likely to select a Goal consistent rather than Source consistent pronoun as the subject of a continuation following a transfer event with different gender protagonists. A second aim was to determine whether the grammatical aspect with which the event was described influenced children's choice of subject for a continuation. Children were more likely to choose a Goal consistent pronoun as the subject of a continuation in both aspect conditions. However, they were more likely to select a Source consistent pronoun when the event was expressed with imperfective rather than perfective grammatical aspect. These results are consistent with previous research with adults (Ferretti et al., 2009) .

The effect of imperfective aspect on children's pronoun resolution in the current experiment was lower than that observed in Experiment 1a, where protagonists were the same gender (aspect:imperfective co-efficient $b = 0.18$ vs $b = 0.33$). This suggests that grammatical aspect may have less influence on children's subsequent pronoun resolution when protagonists differ in gender than when they do not. This is consistent with adult studies that report greater differences between aspectual conditions when protagonists are the same gender (Rohde et al., 2006) than

different genders (Ferretti et al., 2009). However, another possible reason for the reduced effect of grammatical aspect on children's pronoun resolution here, relative to Experiment 1a, was the use of a different task. In Experiment 2a, a cloze task was used and children had to write their preferred pronoun choice for the continuation. In Experiment 1a a forced choice task was used: children circled the name of the protagonist they thought the pronoun referred to. To test the reproducibility of this main finding that, children rely less on the grammatical aspect of events in their determination of the subject of a continuation when protagonists are different genders than when protagonists are the same gender, Experiment 2a was repeated but this time a forced choice task was used as the response measure.

2.5 Experiment 2b: The Effect of Grammatical Aspect on Children's Resolution of Pronouns When Protagonists are Different Genders: Forced Choice Task

This experiment used a forced choice task to assess whether the grammatical aspect of the verb in sentences with two protagonists of different gender influenced children's choice of subject for a subsequent continuation. The purpose of this experiment was to examine whether the smaller fixed effect of grammatical aspect seen in Experiment 2a with different gender protagonists ($b = 0.18$) compared to Experiment 1a with same gender protagonists ($b = 0.33$) was a task specific effect. If the pattern of response in Experiment 2a was not task specific, children should select Goal consistent pronouns more frequently than Source consistent pronouns as the subject of the continuations in both aspect conditions. In addition, they should select Source consistent pronouns more frequently when events were expressed with imperfective aspect rather than perfective aspect. As previously, children across the age range 7 to 11 years were examined to establish any age related changes in selection of the Source consistent protagonist in either of the aspect conditions.

2.5.1 Method

Participants

Two hundred and fourteen children from one urban Primary School in the North-East region of England that served a mixed socioeconomic catchment area participated in this study. All spoke English as their first language and were from four Year Groups. There were 58 children from Year Three, age 7- to 8-years (29 girls, $M = 8$ years, 1 month $SD = 3$ months); 53 children from Year Four, age 8- to 9-years (23 girls, $M = 9$ years, 1 month $SD = 4$ months); 48 children from Year Five, age 9- to 10-years (24 girls, $M = 10$ years, 2 months $SD = 4$ months) and 55 children from Year Six, age 10- to 11-years (28 girls, $M = 11$ years, 1 month $SD = 3$ months).

Materials and procedure

The 48 experimental items from Experiment 2a were used, but in this task the pronoun choices for the continuation were provided in the booklet and shown on the slide (see appendix A). The task was administered with the same timings and presentation as for Experiment 2a, but the response mode differed: children were required to circle their preferred pronoun in the booklet. As in the previous experiment, two lists of the 48 experimental items were prepared with the order of items kept the same across the lists but with the aspect of the verb in each item counterbalanced across the lists. One hundred and seven participants received list A, one hundred and seven participants received list B with approximately equal numbers of children in each Year Group receiving each list.

2.5.2 Results

Fifteen participants, out of a total of two hundred and fourteen who were assessed, failed to provide responses for between one and three of the forty-eight items. Six of these participants were in Year Three, seven in Year Four and two in

Year Six. These participants' data were included in the analysis. The mean proportion of Source selections by Year Group and grammatical aspect condition are reported in Table 2.8.

Table 2.8 *Forced Choice: Mean Proportion of Source Selections (and Standard Deviations) in the Two Grammatical Aspect Conditions*

Year Group	Grammatical Aspect		Total
	Perfective	Imperfective	
Year 3 ($n = 58$)	0.36 (0.48)	0.37 (0.48)	0.37 (0.48)
Year 4 ($n = 53$)	0.22 (0.41)	0.25 (0.43)	0.23 (0.42)
Year 5 ($n = 48$)	0.28 (0.45)	0.29 (0.46)	0.29 (0.45)
Year 6 ($n = 55$)	0.34 (0.47)	0.37 (0.48)	0.36 (0.48)
($N = 214$)	0.30 (0.46)	0.32 (0.47)	0.31 (0.46)

Inspection of mean proportions suggested that, as in the previous experiment, children showed a Goal bias in each grammatical aspect condition ($< .50$ selection of the Source in all conditions). However this tendency was reduced in the imperfective condition. Also as previously, there was no clear effect of age on children's performance in either condition.

To examine these effects statistically the analysis modelled the probability (log odds) of selecting Source in a series of mixed effects binomial models following the same design as described for Experiment 2a. As previously, the Age variable was centered and data were coded so that the intercept represented the likelihood that a child at the mean age of the sample (9 years, 7 months) selected the Source in the perfective condition (Dalal & Zickar, 2012). Centering the aspect variable did not

change the pattern of significance. A summary of the final model is reported in Table 2.9.

Table 2.9 *Summary GLMM for (log odds) Source Selection (forced-choice task):*

Effects for Grammatical Aspect (GA) and Centered Age

Estimated coefficient				
Fixed effects	(<i>b</i>)	<i>SE</i>	<i>z</i>	Pr(> <i>z</i>)
(Intercept)	-1.16	0.12	-10.00	< .01
GA (imperfective)	0.15	0.06	2.55	.01
cAge	-0.06	0.08	-0.80	.43
GA (imperfective): cAge	0.04	0.04	1.13	.26
Random effects			Variance	<i>SD</i>
Participant:	(intercept)		1.57	1.25
	GA (slope)		<0.01	0.07
Item:	(intercept)		0.20	0.45
	GA (slope)		0.01	0.10
	cAge (slope)		0.02	0.13

10247 observations; 214 participants, 48 items

The pattern of results was the same as that found in Experiment 2a. The significant negative value of the intercept coefficient shows that, following a Source-Goal transfer of possession event expressed with perfective aspect, children were more likely to select a Goal consistent pronoun than a Source consistent pronoun as the subject of a continuation. The significant, positive value of the aspect coefficient shows that children were more likely to select the Source consistent pronoun as the subject of a continuation in the imperfective condition than the perfective reference condition. The non-significant value of the age coefficient shows that children's age

did not influence the likelihood that they selected the Source as the antecedent of the pronoun in the perfective condition. The non-significant value of the aspect (imperfective): age coefficient shows that children's age did not influence the likelihood that they selected the Source as the antecedent of the pronoun in the imperfective condition.

2.5.3 Discussion

Similar to Experiment 2a, children demonstrated a Goal bias in their choice of subject for the continuations. In addition, the grammatical aspect with which the event was expressed influenced children's choice of subject for a continuation: children were more likely to select the Source consistent pronoun as the subject of the continuation when the event was expressed with imperfective aspect than when it was expressed with perfective aspect. Both findings are consistent with previous work with adults (Ferretti et al., 2009).

A cloze task was used in Experiment 2a and a forced choice task in Experiment 2b. The fixed effect of imperfective aspect in both tasks was similar: the cloze task was $b = 0.18$ and in the forced choice $b = 0.15$. The findings of Experiments 2a and 2b provided converging evidence that, when protagonists in a transfer event have different genders, the grammatical aspect with which events are described influences children's choice of subject for a continuation.

2.6 General Discussion

The experiments in this chapter examined children's pronoun resolution following transfer of possession events (events with endpoints) and, specifically, whether the grammatical aspect of the verb in Source-Goal transfer of possession events influenced children's resolution of a subsequent pronoun. An effect of

grammatical aspect was examined for events with same gender protagonists and those with different gender protagonists.

Several important results emerge from these experiments. First, in the experiment with ambiguous pronouns, children did not demonstrate a subject bias interpretation of the pronoun. Second, in all experiments an effect of grammatical aspect was observed with children selecting the Source protagonist more frequently when the event was expressed with imperfective aspect than perfective aspect.

The Development of Subject Bias Interpretations of Ambiguous Pronouns

An important finding in Experiment 1a was that children aged 7- to 11-years did not demonstrate a subject bias for interpreting an ambiguous pronoun following a transfer of possession event. This finding is not consistent with previous research that has demonstrated subject interpretations of ambiguous pronouns in 3-year-old (Song & Fisher, 2005) and 5-year-old children (Hartshorne et al., 2015). However, transfer of possession events have natural endpoints and the Goal protagonist is central to this endpoint. Previous research has found that 5-year-old children do not demonstrate a subject bias interpretation of an ambiguous pronoun for events with endpoints (Arnold et al., 2007). The results of Experiment 1a are consistent with Arnold et al (2007) and extend this finding to children in the age range 7- to 11-years. The results suggest that the presence of an endpoint reduces children's tendency to resolve a subsequent ambiguous pronoun towards the previous subject protagonist. This was examined further in Chapter 3, Experiment 3b.

The Influence of Grammatical Aspect on Children's Resolution of Pronouns

The grammatical aspect with which transfer events are described is known to influence adults' resolution of a subsequent pronoun towards the Source and Goal protagonists (Ferretti et al., 2009; Rohde et al., 2006). Previous research has shown

that 3-to 4-year-olds are sensitive to the grammatical aspect with which events with endpoints are described in their event recognition (Wagner, 2009; Zhou et al., 2014). The experiments in this chapter extend these findings by showing that the grammatical aspect with which transfer events are described influences 7- to 11-year-old's resolution of a subsequent pronoun. An important finding from Experiments 1a and 1b was that, whilst children were more likely to resolve a pronoun to the Source protagonist in the imperfective than perfective condition, this effect was significantly lower than that observed with adults. Furthermore there was no effect of age on 7- to 11- year-old's tendency to resolve the pronoun to the Source in the imperfective condition. This finding indicates that an increase in resolving an ambiguous pronoun towards the Source protagonist in the imperfective condition may occur post 11 years of age. This possibility was not examined any further in this thesis and presents an area for future research.

In conclusion, previous studies examining children's pronoun resolution have not considered the temporal characteristics of the stimulus sentences used, for example whether stimulus events have natural endpoints or not or whether events are described as ongoing or completed with imperfective and perfective aspect respectively. The experiments in this chapter suggest that, the temporal characteristics of events in which protagonists are engaged, influences children's resolution of a subsequent pronoun.

Chapter 3: The Influence of Grammatical Aspect on Pronoun Resolution Within Different Lexical Aspect Categories

3.1 Introduction

The experiments in Chapter 2 found that the grammatical verb aspect (imperfective/perfective) with which Source-Goal transfer of possession events were expressed influenced adults' and children's resolution of a subsequent pronoun. Transfer of possession events have inherent endpoints and this has been cited as an important feature in explaining adults' pronoun resolution following such events (Rohde et al., 2006). The experiments in this chapter compare the effects of grammatical verb aspect on adults' (Experiment 3a) and children's (Experiment 3b) resolution of a subsequent pronoun for events with inherent endpoints and those without. Events differing in their possession of an endpoint fall into different lexical aspect categories, explained below.

Linguists have proposed that events (verbs and their predicates) can be classified into categories (called lexical categories) according to their inherent temporal properties. One such property is whether events have a specific endpoint (telic events) or have no inherent endpoint (atelic events) (Comrie, 1976; Dowty, 1979). Another property used to distinguish between events is whether they have duration (durative events) or whether they have no duration (termed punctual events in the literature). A final property is whether events require a continual effort to be maintained. A commonly cited scheme which classifies events on the basis of these properties is that of Vendler (1967). This scheme identifies four lexical categories; states, activities, accomplishments and achievements. Examples are given in Table 3.1. As can be seen in the table, events falling into the lexical categories of activity

and accomplishments are similar, differing only in their possession of an inherent endpoint.

Table 3.1 *Lexical Categories and Their Temporal Properties*

Lexical category	Temporal properties			Example
	Has an endpoint	Has duration	Continues without effort	
State	x	√	√	She loves
Activity	x	√	x	He runs
Accomplishment	√	√	x	He runs a mile
Achievement	√	x	x	He reaches the summit

A number of methods have been proposed to determine whether events have inherent endpoints or not. One method is to determine whether describing the event as ongoing, using auxiliaries and the inflection *-ing* on the event verb (e.g. was talking/handing), entails the situation has happened and can therefore be described in the simple past (e.g. talked/handed). If this is true then the event does not have a specific endpoint (it is atelic). If it is not true then the event does have a specific endpoint (it is telic) (Dowty, 1979). The examples below are given to illustrate this point.

- (3.1) a. Michael was talking in the meeting with Gary. (activity, atelic)
 b. Stephen was handing a jumper to Jimmy. (accomplishment, telic)

In 3.1 (a) if Michael stopped talking at an arbitrary point in time then it would still be true that Michael talked, this event is therefore atelic. In contrast, in 3.1 (b) if Stephen stopped handing then it would not be true that Stephen handed, this is because this event has an inherent endpoint, this event is therefore telic.

The experiments in this chapter examine the effect of grammatical verb aspect on adults' and children's pronoun resolution for events falling within these two (activity, accomplishment) lexical aspect categories.

3.2 Experiment 3a: The Effect of Grammatical Aspect on Adults' Pronoun Resolution Within Different Lexical Aspect Categories

Experiment 1b in Chapter 2 found that the grammatical verb aspect with which transfer of possession events were expressed influenced adults' resolution of a subsequent pronoun. Adults were more likely to resolve the pronoun to the Source protagonist when the event was expressed with imperfective aspect 3.2 (a) than when it was expressed with perfective aspect 3.2 (b). This result is consistent with previous research with adults (Ferretti et al., 2009; Rohde et al., 2006).

Imperfective:

(3.2) a. Josh_{source} **was bringing** a biscuit to Kyle_{goal}. He grinned.

Perfective:

b. Josh_{source} **brought** a biscuit to Kyle_{goal}. He grinned.

It has been suggested that this pattern of results is observed because adults take the temporal characteristics of events into account in their mental model of events and this influences their determination of a subsequent pronoun's referent (Rohde et al., 2006). Specifically, this account (hereafter referred to as the Event Structure account) explains the pattern of results seen above as a consequence of transfer of possession events having inherent endpoints. This feature increases the

likelihood that the Goal will be re-mentioned subsequent to the event because adults have expectations for the type of coherence relation that will follow events with endpoints and the Goal protagonist is the grammatical subject (hereafter Subject) of the most likely relation to follow this type of event. This expectation for the Goal to be re-mentioned influences adults' resolution of a subsequent pronoun. Expressing the event with perfective rather than imperfective aspect increases the likelihood that the Goal protagonist will be re-mentioned. Thus adults' pronoun resolution is influenced by the grammatical aspect with which such events are expressed (Kehler et al., 2008; Kehler & Rohde, 2013b).

Many other studies have also found an influence of grammatical verb aspect on adults' mental representation of events. Some of these have investigated the effect of grammatical aspect across events taken from multiple lexical aspect categories (Carreiras et al., 1997; Ferretti et al., 2007; Magliano & Schleich, 2000); others have restricted events to the lexical category of accomplishment (Madden & Zwaan, 2003; Morrow, 1985; Mozuraitis et al., 2013). To date, there have been few studies contrasting the effect of grammatical aspect on adults' mental representation of events from different lexical aspect categories (Becker et al., 2013; Yap et al., 2009). Of relevance to the current study are the findings of Becker et al. (2013). In this study the authors found, using the N400 ERP as a measure of semantic difficulty, that adults had less difficulty reading concepts which had been previously expressed in imperfective sentences than perfective sentences for events from the lexical category of accomplishment. In contrast, for activity events there was no difference in mean N400 ERP in the two grammatical aspect conditions. Examples of their stimuli are given in Table 3.2.

Table 3.2 *Example Stimuli for Accomplishment and Activity events used in Becker et al. (2013)*

	Accomplishment	Activity
Critical sentence varying grammatical aspect	Isaac <i>packed/was packing</i> his lunch in his backpack.	At the breakfast table Bert's mother <i>talked/was talking</i> about their neighbour.
Probe sentence with target concept (in bold)	Isaac thought about his lunch and wondered if he packed enough.	He thought about his mother and how he didn't listen to her at breakfast.

The authors suggest that expressing events with imperfective rather than perfective aspect facilitates adults' concept integration only for accomplishment events because it is only for these types of events that adults' mental representation of the two aspect manipulations differ. For example, using the examples given in Table 3.2, they argue that expressing the accomplishment packing event as 'was packing' or 'packed' results in two different representations of the packing event. In contrast, expressing the activity talking event as 'was talking' or 'talked' results in similar representations of the talking event. An effect of grammatical aspect on adults' mental representation of accomplishment events has been found in other research (Madden & Zwaan, 2003; Yap et al., 2009; Zhou et al., 2014). For example, Madden and Zwaan (2003) found using a picture verification task that, adults' mental representation of accomplishment events were constrained to completed depictions of those events whilst imperfective aspect did not have a constraining effect.

Whether the grammatical aspect with which activity events are described has an influence on adults' resolution of a subsequent pronoun has not previously been examined. For this reason the current study examined the effect of grammatical verb aspect on adults' resolution of a subsequent ambiguous pronoun for events from accomplishment and activity lexical categories. As noted above, previous research has found that, the grammatical aspect with which activity events are described does not influence adults' subsequent integration of concepts which were mentioned as part of the event (Becker et al., 2013). Because pronoun resolution is a process requiring the integration of a pronoun and its referent, on the basis of the Becker et al. finding it is predicted that the grammatical aspect with which activity events are described will not influence adults' resolution of a subsequent pronoun.

A second aim of the study was to determine whether the lexical aspect of events influences adults' resolution of a pronoun to the Subject of the previous sentence. The presence of an endpoint in transfer of possession events has been cited as an important feature in explaining adults' pronoun resolution following such events (Rohde et al., 2006). Finding a difference in frequency of resolution to the Subject protagonist for events without endpoints compared to events with endpoints would support the Event Structure account of pronoun resolution.

Various methods have been employed to examine the effect of grammatical verb aspect with adults. For example, the effect of grammatical verb aspect on adults' pronoun resolution has been examined by asking adults to provide written continuations following stimulus sentences; whilst the effect of grammatical verb aspect on adults' integration of concepts has been examined using the N400 ERP as a measure of semantic difficulty. Experiment 1b, Chapter 2 found that, the grammatical verb aspect with which accomplishment events are described, influenced adults'

resolution of a subsequent pronoun at the start of a given continuation. The current study also uses this method because it is suitable for use with children, the subject of subsequent studies.

In summary, on the basis of previous research (Becker et al., 2013) it is predicted that an effect of grammatical aspect will be seen for accomplishment events, which have endpoints, but not for activity events, which do not. On the basis of the Event Structure account of pronoun resolution (Rohde et al., 2006) it is predicted that lexical aspect will influence adults' pronoun resolution and that adults will resolve the pronoun more frequently to the Subject protagonist for activity events compared to accomplishment events.

3.2.1 Method

Participants

Twenty-four students (19 female, $M = 19$ years, $SD = 1$ year, 4 months, Minimum = 19 years, Maximum = 23 years, 11 month) from the University of Lancaster participated for a small fee. All were native English speakers.

Materials

The stimuli consisted of 64 experimental items each comprising a stimulus sentence followed by a continuation sentence. Thirty-two of the stimulus sentences described accomplishment events, and 32 stimulus sentences described activity events. Examples of each are provided in Table 3.3, and the full list of materials is provided in Appendix B.

Accomplishment events have duration and progress towards an endpoint. Acts of transfer can be considered as accomplishment events so these items were constructed using eight Source-Goal verbs of transfer (four regular and four irregular). For these verbs the Source protagonist is the grammatical Subject and the Goal is the

grammatical Object. The regular verbs were: *to hand*, *to toss*, *to chuck* and *to carry*. The irregular verbs were: *to take*, *to give*, *to bring* and *to throw*. These verbs were selected from the 12 used in the experiments in Chapter 2 with the exception of the regular verb *to toss* which was not used previously. This substitution was made to emphasize the co-location of the protagonists involved in the event. This was important because previous research with adults indicates that the grammatical aspect with which a transfer event is described influences adults' pronoun resolution only when protagonists are co-located (Rohde et al., 2006). Each stimulus sentence had the same form and described two, same gender protagonists engaged in the transfer. There were equal numbers of male and female pairs across the four repetitions of each verb and each stimulus sentence included a concrete noun as the transferred item.

Activity events have duration but no intrinsic endpoints. The activity items were constructed using eight verbs (four regular and four irregular) selected from the Becker et al. (2013) activity stimulus sentences. As with the accomplishment stimulus sentences, each verb was used four times, twice in the imperfective form and twice in the perfective form. The regular verbs were: *to play*, *to watch*, *to study* and *to talk*. The irregular verbs were *to stand*, *to drink*, *to speak* and *to run*. Each stimulus sentence had the same form and described two, same gender protagonists engaged in the activity at a single location. There were equal numbers of male and female pairs across the four repetitions of each verb.

Table 3.3 *Stimuli Used in the Two Grammatical and Two Lexical Aspect Conditions (List A)*

Grammatical Aspect		
Lexical Aspect	Perfective	Imperfective
Accomplishment		
Female	Kay handed a skipping rope to Liz. She chuckled.	Nina was handing a racquet to Gemma. She chuckled.
Male	Alan handed a bag of sweets to Nick. He grinned.	Stephen was handing a jumper to Jimmy. He grinned.
Activity		
Female	Joanne talked on the phone with Amy. She sighed.	Martha was talking in the playgoup with Mary. She sighed.
Male	Mike talked in the garage with Bob. He laughed.	Michael was talking in the meeting with Gary. He laughed.

Eight of the twelve continuation sentences used in Experiment 1, Chapter 2 were added to the stimulus sentences. Eight of the original twelve continuations were used because in this experiment there were eight not twelve verbs in each lexical aspect condition. As previously, the continuations comprised a personal pronoun followed by an action that could be attributed to either of the two protagonists (*smiled, chuckled, sighed, giggled, laughed, grinned, groaned and frowned*). In each lexical aspect condition each continuation was repeated four times, twice in the

imperfective condition and twice in the perfective condition. The continuations were balanced across stimulus sentences with female or male protagonists and across stimulus sentences with regular or irregular verbs.

Two lists of 64 experimental items were prepared with the order of items kept the same across the lists but with the aspect of the verb in each item counterbalanced across the lists. Twelve participants received list A (9 female), twelve participants received list B (10 female).

Procedure

Participants were tested individually in a quiet room. Each pair of stimulus sentences was displayed, for 9 seconds, on a computer monitor using a timed Powerpoint presentation. Following this, a prompt with the continuation and the names of the two protagonists, for example, “Who chuckled?” Kay/Liz, was shown for 5 seconds. These timings were used because they were suitable for children, who participated in a subsequent experiment with the same materials. The questions were also printed in a booklet, together with the two possible referents of the pronoun. Participants read the stimulus sentences and questions and circled their responses in the booklet. Eight comprehension questions were included; one after every eight items. Four of these questions asked whether a particular object had been mentioned in the previous eight items for example, “Was a bag of sweets mentioned?” The other four questions asked whether a particular location had been mentioned, for example “Was a library mentioned?” Response options of Yes/No were given in the booklets with equal numbers of Yes/No answers across the two question types. The same explanation of the task and instructions were read to each participant and three practice items and a practice comprehension question were administered prior to the

experimental items. Any questions about the procedure were addressed before the presentation of the experimental items began.

3.2.2 Results

The total number of correct answers to the 8 comprehension questions was calculated for each participant. The mean correct score, and maximum and minimum scores indicated that all participants had engaged in the task ($M = 7.33$, $SD = 0.80$, Maximum = 8, Minimum = 5).

The mean proportion of Subject selections by grammatical aspect and lexical aspect are reported in Table 3.4. Inspection of the mean proportions suggested that, for accomplishment events, adults resolved the ambiguous pronoun more frequently towards Subject protagonist than the Object protagonist in the imperfective condition compared to the perfective condition. The mean proportions also suggested that, imperfective rather than perfective aspect did not increase resolution of the pronoun to the previous Subject to the same extent for activity events. Finally, the mean proportions suggested that adults selected the previous Subject as the referent of the pronoun more frequently following activity events than accomplishment events in both grammatical aspect conditions.

Table 3.4 *Mean Proportion of Subject Selections (and Standard Deviations) in the Two Grammatical Aspect and Two Lexical Aspect Conditions*

Lexical aspect	Grammatical Aspect		Total
	Perfective	Imperfective	
Accomplishment	0.32 (0.47)	0.48 (0.50)	0.40 (0.49)
Activity	0.81 (0.39)	0.83 (0.38)	0.82 (0.38)
($N = 24$)	0.57 (0.50)	0.66 (0.48)	0.61 (0.49)

To examine these comparisons statistically the analysis modelled the probability (log odds) of selecting the Subject in a series of mixed effects binomial models in the R statistics environment (R Core Team, 2014) using the lme4 package (Bates et al., 2015). This method is essentially an extension of logistic regression, such that a mixed effects analysis provides estimates for the effects of experimentally manipulated variables while taking into account random error variance due to differences between participants or between stimulus items sampled for the study. Following the recommendations of Barr et al. (2013), fixed effects were estimated in a model that included full random effects terms corresponding to: random differences in overall selection of the Subject protagonist between participants and between items (random intercepts); random differences in the slopes of the effect of grammatical aspect between participants and between items and random differences in the effect of lexical aspect between participants. The grammatical aspect and lexical aspect variables were coded so that the intercept could be interpreted as the log odds probability of selecting the Subject when grammatical aspect was perfective and lexical aspect was accomplishment. This coding was used to perform the comparisons outlined above and so that the pattern of significance obtained in this experiment could be compared to that obtained in subsequent experiments. Centering the grammatical aspect and lexical aspect variables did not change the pattern of significance. A summary of the final model is reported in Table 3.5.

The first column provides the coefficient estimates for the effects. The significant negative value of the intercept shows that, for accomplishment events expressed with perfective aspect, adults were more likely to resolve an ambiguous pronoun at the start of a continuation as co-referential with the previously mentioned Object protagonist than the Subject protagonist.

Table 3.5 Summary GLMM for (log odds) Subject Selection: Effects for Grammatical Aspect (GA) and Lexical Aspect (LA)

Fixed effects	Estimated coefficient (<i>b</i>)	<i>SE</i>	<i>z</i>	Pr(> <i>z</i>)
(Intercept)	-1.02	0.35	-2.89	< .01
GA (imperfective)	0.99	0.19	5.11	< .01
LA (activity)	3.17	0.45	6.99	< .01
GA (imperfective): LA (activity)	-0.74	0.31	-2.39	.02
Random effects			Variance	<i>SD</i>
Participant:	(intercept)		2.15	1.47
	GA (slope)		0.08	0.28
	LA (slope)		2.71	1.65
Item:	(intercept)		0.52	0.72
	GA (slope)		0.02	0.12

1536 observations; 24 participants, 64 items

The significant, positive value of the grammatical aspect co-efficient shows that, for accomplishment events, adults were more likely to select the Subject as the antecedent of the ambiguous pronoun in the imperfective condition than the perfective reference condition. The significant, positive value of the lexical aspect co-efficient shows that, in the perfective grammatical aspect condition, adults were more likely to select the Subject as the antecedent of the ambiguous pronoun for activity events

compared to accomplishment events. The significant, negative value of the imperfective aspect: activity coefficient shows that the increase in Subject selection in the imperfective condition compared to perfective condition for accomplishment events was significantly reduced in the activity condition.

The reduced effect of grammatical aspect in the activity compared to the accomplishment condition was further examined by determining the effect of grammatical aspect in the accomplishment and activity items separately. These models are shown in Table 3.6. As previously the data was coded such that the intercept represents the probability of selecting the Subject in the perfective condition. Random intercepts for participants and items were included and random slopes for differences in the effect of grammatical aspect between participants and items.

The significant value and sign of the intercept coefficients in Table 3.7 show that, in the perfective condition adults demonstrated an Object bias interpretation of the pronoun for accomplishment events ($b = -0.99, p = < .01$) and a Subject bias interpretation of the pronoun for activity events ($b = 2.19, p = < .01$) respectively. The models confirm that for accomplishment events adults were more likely to select the Subject in the imperfective aspect condition than the perfective condition ($b = 0.96, p = < .01$) but for activity events, imperfective aspect did not significantly increase selection of the Subject ($b = 0.14, p = .68$).

Table 3.6 *Summary GLMM for (log odds) Subject Selection: Effects for Grammatical Aspect (GA) in the Two Lexical Aspect Conditions Separately*

	Lexical Aspect							
	Accomplishment				Activity			
	Estimated coefficient (<i>b</i>)	<i>SE</i>	<i>z</i>	Pr(> <i>z</i>)	Estimated coefficient (<i>b</i>)	<i>SE</i>	<i>z</i>	Pr(> <i>z</i>)
Fixed effects								
(Intercept)	-0.99	0.33	-2.98	< .01	2.19	0.40	5.45	< .01
GA (imperfective)	0.96	0.22	4.31	< .01	0.14	0.34	0.41	.68
Random effects			Variance	<i>SD</i>			Variance	<i>SD</i>
Participant:	(intercept)		1.79	1.34			2.31	1.52
	GA (slope)		0.20	0.45			0.31	0.56
Item:	(intercept)		0.50	0.72			0.58	0.76
	GA (slope)		0.18	0.42			0.00	0.03

768 observations; 24 participants, 32 item

The analysis shows that, for accomplishment events adults selected the Subject more frequently in the imperfective condition compared to the perfective condition. However, the means in Table 3.4 show that adults did not demonstrate a Subject bias interpretation of the pronoun in the accomplishment, imperfective condition. Rather, their mean selections of the Subject in the 16 items in this condition appear to be chance. This was confirmed in a *t* test ($M = 7.83$ $SD = 4.14$) $t(23) = -0.19$, $p = .85$. This is inconsistent with Experiment 1b, Chapter 2, where with 24 items adults demonstrated a Subject bias in the accomplishment imperfective condition. To investigate whether this result may be in part because of the narrower range of verbs used in the current experiment, the frequency with which the Subject was selected, in each aspect, for each verb used in Experiment 1b, was calculated. These frequencies are presented in Table 3.7. Verbs used in the current experiment are marked with an asterisk (*). The regular verb ‘to toss’ was included in the current study; this verb was not used in Experiment 1b. It was selected in place of the regular verbs to deliver, to pass or to push to highlight the co-location of protagonists. The verbs are ordered in the table by the frequency of Subject selection in the imperfective aspect condition. There are too few items in each condition to perform a statistical analysis of differences in effect of aspect on Subject selection by verb, so the main highlights are described. A maximum score of two was possible for each verb in each aspect condition.

Table 3.7 *Mean Proportion of Subject Selections (and Standard Deviations) in the Two Grammatical Aspect Conditions for Transfer Verbs used in Experiment 1b, Chapter 2*

Verb	Grammatical Aspect		Difference
	Imperfective	Perfective	
To send	1.89 (0.31)	0.93 (0.86)	0.96
To pass	1.71 (0.46)	0.86 (0.52)	0.85
To push	1.68 (0.55)	1.36 (0.73)	0.32
To fling	1.64 (0.56)	1.14 (0.80)	0.50
To chuck*	1.61 (0.57)	1.11 (0.76)	0.50
To give*	1.57 (0.50)	1.07 (0.47)	0.50
To deliver	1.46 (0.69)	0.82 (0.72)	0.64
To carry*	1.11 (0.68)	0.71 (0.76)	0.40
To take*	1.07 (0.77)	0.46 (0.63)	0.61
To throw*	1.07 (0.66)	0.61 (0.68)	0.46
To bring*	0.71 (0.71)	0.39 (0.49)	0.32
To hand*	0.67 (0.61)	0.50 (0.69)	0.18

Table 3.7 shows that, the Subject was selected as the pronoun referent more frequently in the imperfective than perfective condition for all of the verbs used in Experiment 1b. However, Table 3.7 also suggests that, there were differences in the size of the effect of imperfective grammatical aspect on Subject selection for individual transfer of possession verbs. The table shows that Subject selection in the imperfective aspect condition was most frequent with the verbs *to send*, *to pass*, *to push* and *to fling* in Experiment 1b. These verbs were not included in the accomplishment items of the current experiment. This may explain why a Subject bias was not observed in the accomplishment imperfective condition of the current experiment. It is noteworthy that the three verbs showing the greatest difference between Subject selection in the imperfective compared to perfective conditions *to send*, *to pass* and *to deliver* in Table 3.7, were not included in the current study. This offers some explanation as to why the coefficient for the effect of grammatical aspect

for accomplishment items in the current experiment ($b = 0.99$, Table 3.5) was lower than in Experiment 1b, Chapter 2 ($b = 1.51$, see Appendix B, Table A3.1)

3.2.3 Discussion

The aim of this study was to determine whether the effect of grammatical aspect on adults' resolution of ambiguous pronouns following Source-Goal transfer of possession events, seen in Experiment 1b, Chapter 2, was specific to events with endpoints (accomplishments) or would also be observed in events without endpoints (activities). A second aim of the study was to examine whether the lexical aspect of events influenced adults' tendency to resolve ambiguous pronouns towards previous Subject protagonists.

For accomplishment events, the grammatical aspect with which events were described influenced adults' resolution of a subsequent pronoun. Adults were more likely to select the Subject protagonist as the referent of an ambiguous pronoun when the event was described with imperfective aspect rather than perfective aspect. This is consistent with the findings of Experiment 1b, Chapter 2 and previous research (Rohde et al., 2006). However, in contrast to these previous findings, adults did not demonstrate a Subject bias interpretation of the pronoun in the imperfective condition. To investigate a potential source of this inconsistency, the frequency of Subject selection in each grammatical aspect condition was found for each of the verbs used in Experiment 1b. Inspection of these frequencies suggested that, although the Subject was selected more frequently in the imperfective compared to perfective condition for all the verbs sampled in Experiment 1b, there were differences in the size of the effect of imperfective aspect on Subject selection for individual transfer of possession verbs. The four verbs that showed the most frequent Subject selection in the imperfective aspect condition in Experiment 1b were not included in the current study. This likely

explains why a Subject bias interpretation of the pronoun was not observed in the imperfective aspect condition in the current experiment.

Activity events showed a different pattern of selection. For these, the grammatical aspect with which events were described did not influence adults' resolution of a subsequent pronoun. Pronoun resolution is a process requiring the integration of a pronoun and its referent. This result is therefore consistent with previous findings that, for activity events, the grammatical aspect with which events are described does not influence adults' integration of subsequent concepts (Becker et al., 2013).

With regard to the second aim of the experiment, the lexical aspect of events influenced adults' tendency to select the Subject of the previous sentence as the referent of the pronoun. Adults were more likely to select the Subject as the pronoun referent for activity events than for accomplishment events, in both the perfective and imperfective grammatical aspect conditions. Since activity events do not have endpoints and accomplishment events do, this finding supports the Kehler and Rohde (2013a) account that the inherent temporal characteristics of events influences adults' pronoun resolution. The second study in this chapter examines whether 7- to 11-year-olds are influenced by the grammatical aspect and lexical aspect of events in a similar way to adults.

3.3 Experiment 3b: The Effect of Grammatical Aspect on Children's Pronoun Resolution within Different Lexical Aspect Categories

Experiment 1a in Chapter 2 examined 7- to 11-year-old's resolution of ambiguous pronouns following Source-Goal transfer of possession events. The grammatical verb aspect of events influenced children's pronoun resolution; they resolved the ambiguous pronoun to the Source protagonist more frequently in the

imperfective aspect condition compared to the perfective condition consistent with previous adult research (Rohde et al., 2006). The current experiment examines whether the effect of grammatical verb aspect on children's ambiguous pronoun resolution seen with the accomplishment events used in Experiment 1a extends to their resolution of pronouns following activity events or whether, like adults in Experiment 4a, children's pronoun resolution is not influenced by the grammatical verb aspect with which activity events are expressed. The current study also examines whether the lexical aspect of events influences children's tendency to resolve an ambiguous pronoun towards the previous Subject protagonist.

If children behave like adults an effect of grammatical verb aspect should be seen for accomplishment events, which have endpoints, but not for activity events, which do not. With regard to lexical aspect, if the presence of an endpoint is an important influence on children's pronoun resolution they will be less likely to select the Subject protagonist in the accomplishment condition than the activity condition.

3.3.1 Method

Participants

One hundred and ninety-two children from two urban Primary Schools (East-Midlands and North-East regions of England) and two rural (North-west region of England) that served mixed socioeconomic catchment areas participated in this study. All spoke English as their first language and were from four Year Groups. There were 53 children from Year Three, age 7- to 8-years (24 girls, $M = 8$ years, 1 month, $SD = 3$ months); 53 children from Year Four, age 8- to 9-years (25 girls, $M = 9$ years, 1 months, $SD = 4$ months); 49 children from Year Five, age 9- to 10-years (19 girls, $M = 10$ years, 1 months, $SD = 4$ months) and 37 children from Year Six, age 10- to 11-years (19 girls, $M = 11$ years, 5 months, $SD = 3$ months).

Materials

The stimuli consisted of the same 64 experimental items described previously for the adult study. As for adults, two lists of 64 experimental items were prepared, with the order of items kept the same across the lists but with the aspect of the verb in each item counterbalanced across the lists. Ninety-eight participants received list A, ninety-four participants received list B with approximately equal numbers of children in each Year Group receiving each list.

Procedure

The task was administered as a group assessment in the children's classrooms using the whiteboard to display each numbered experimental item, which was read out by the assessor. Each item was displayed for 9 seconds in a timed PowerPoint presentation. Following this, a prompt with the continuation and the names of the two protagonists, for example, "Who chuckled?" Kay/Liz, was shown for 5 seconds. The question was printed in a booklet, together with the two possible referents. Children circled their response. As previously, eight comprehension questions were included; one after every eight items. Four of these questions asked whether a particular object had been mentioned in the previous eight items for example, "Was a bag of sweets mentioned?" The other four questions asked whether a particular location had been mentioned, for example "Was a library mentioned?". Response options of Yes/No were given in the booklets with equal numbers of Yes/No answers across the two question types.

The same explanation of the task and instructions were read to each Year group and three practice items and a practice comprehension question were administered prior to the experimental items. Any questions about the procedure were addressed before presentation of the experimental items.

3.3.2 Results

The total number of correct answers to the eight comprehension questions was calculated for each participant. The mean correct scores obtained in each Year group are reported in Table 3.8. The means for each Year group were close to ceiling and there were no significant differences between Year groups $F(3,188) = 1.75, p = .16$ indicating that children in all Year groups engaged in the task.

Table 3.8 *Mean Correct Comprehension Question Scores (and Standard Deviation) by Year Group*

Year Group	Mean	SD	Minimum	Maximum
Year 3 ($n = 53$)	6.55	0.98	4	8
Year 4 ($n = 53$)	6.92	1.08	4	8
Year 5 ($n = 49$)	7.00	1.03	4	8
Year 6 ($n = 37$)	6.81	1.21	4	8
($N = 192$)	6.82	1.08	4	8

The mean proportion of Source selections by Year Group, grammatical aspect and lexical aspect are reported in Table 3.9. Inspection of the mean proportions suggested that generally, like adults, children resolved the pronoun to the Subject protagonist more often in the imperfective condition than the perfective condition but unlike adults, for whom this tendency was significant only in the accomplishment condition, for children the effect of grammatical aspect appears to be the same in each of the lexical aspect conditions. In addition, like adults, children selected the previous Subject as the referent of the pronoun more frequently for activity events than accomplishment events in both perfective and imperfective grammatical aspect conditions.

Table 3.9 *Mean Proportion of Subject Selections (and Standard Deviations) in the Two Grammatical Aspect and Two Lexical Aspect Conditions*

Lexical aspect	Year Group	Grammatical Aspect		Total
		Perfective	Imperfective	
Accomplishment	Year 3 ($n = 53$)	0.38 (0.49)	0.39 (0.49)	0.39 (0.49)
	Year 4 ($n = 53$)	0.39 (0.49)	0.38 (0.49)	0.39 (0.49)
	Year 5 ($n = 49$)	0.30 (0.46)	0.39 (0.49)	0.35 (0.48)
	Year 6 ($n = 37$)	0.40 (0.49)	0.42 (0.49)	0.41 (0.49)
	($N = 192$)	0.37 (0.48)	0.39 (0.48)	0.38 (0.49)
Activity	Year 3 ($n = 53$)	0.49 (0.50)	0.50 (0.50)	0.50 (0.50)
	Year 4 ($n = 53$)	0.50 (0.50)	0.52 (0.50)	0.51 (0.50)
	Year 5 ($n = 49$)	0.57 (0.50)	0.59 (0.49)	0.58 (0.49)
	Year 6 ($n = 37$)	0.55 (0.49)	0.58 (0.50)	0.56 (0.50)
	($N = 192$)	0.52 (0.50)	0.54 (0.49)	0.53 (0.50)

To examine these comparisons statistically, the analysis procedure used in Experiment 3a was followed. The analysis modelled the probability (log odds) of selecting the Source in a series of mixed effects binomial models in the R statistics environment (R Core Team, 2014) using the lme4 package (Bates et al., 2015). As previously, following the recommendations of Barr et al. (2013), fixed effects were estimated in a model that included full random effects terms corresponding to: random differences in overall selection of the Subject protagonist between participants and items (random intercepts); random differences in the slopes of the effect of grammatical aspect between participants and items; random differences in the effect of lexical aspect between participants and random differences in the effect

of age between items. Before modelling, the age variable was centered on the mean age of the sample (9 years, 6 months) (Dalal & Zickar, 2012). As before, the grammatical aspect and lexical aspect variables were not centered and were coded so that the intercept could be interpreted as the log odds probability of selecting the Subject for a child aged 9 years 6 months when grammatical aspect was perfective and lexical aspect was accomplishment. This coding was used so that the pattern of significance obtained in this experiment could be compared to that obtained in the adult study. Centering the grammatical and lexical aspect variables did not change the pattern of significance. A summary of the final model is reported in Table 3.10.

The pattern of results was the same as that found with adults in Experiment 3a with one exception; for adults expressing an event with imperfective rather than perfective grammatical aspect significantly increased Subject selection only for accomplishment events. Children did not demonstrate this; they selected the Subject more frequently in the imperfective than perfective grammatical aspect conditions for both accomplishment and activity events. This is shown in the significant, positive value of the grammatical aspect (imperfective) coefficient and the non-significant value of the grammatical aspect (imperfective: lexical aspect (activity) coefficient. The model also showed that for children, Subject selection following activity events significantly increased with age but there was no significant effect of age on Subject selection for accomplishment events. The effect of age on Subject selection was examined further by examining the effect of lexical aspect on Subject selection in the perfective and imperfective conditions in each of the Year groups separately. These models are shown in Table 3.11.

Table 3.10 *Summary GLMM for (log odds) Subject Selection: Effects for Grammatical Aspect (GA), Lexical Aspect (LA) and Centered Age*

	Estimated coefficient			
Fixed effects	(<i>b</i>)	<i>SE</i>	<i>z</i>	Pr(> <i>z</i>)
(Intercept)	-0.66	0.12	-5.53	< .01
GA (imperfective)	0.15	0.08	1.95	.05
LA (activity)	0.79	0.12	6.40	< .01
Age	-0.02	0.08	-0.28	.78
GA (imperfective): LA (activity)	-0.06	0.11	-0.55	.58
GA (imperfective): Age	0.08	0.05	1.61	.11
LA (activity): Age	0.17	0.07	2.31	.02
GA (imperfective): LA (activity): Age	-0.06	0.07	-0.92	.36
Random effects		Variance	<i>SD</i>	
Participant:	(intercept)	1.52	1.23	
	GA (slope)	0.01	0.10	
	LA (slope)	0.58	0.76	
Item (intercept)	(intercept)	0.14	0.38	
	GA (slope)	0.08	0.28	
	Age (slope)	0.01	0.11	

12288 observations; 192 participants, 64 item

Table 3.11 *Summary GLMM for (log odds) Subject Selection: Effects for Lexical Aspect (LA) in each Year Group; Perfective and Imperfective Grammatical Aspect items*

Perfective items																			
Year Group																			
Year 3 (7- to 8-years) Year 4 (8- to 9-years) Year 5 (9- to 10-years) Year 6 (10- to 11-years)																			
Fixed effects	(b)	SE	z	Pr(> z)	(b)	SE	z	Pr(> z)	(b)	SE	z	Pr(> z)	(b)	SE	z	Pr(> z)			
Intercept	-0.56	0.14	-3.96	< .01	-0.61	0.24	-2.57	.01	-0.91	0.16	-5.55	< .01	-0.50	0.23	-2.15	.03			
LA (act)	0.50	0.13	3.79	< .01	0.67	0.17	3.95	< .01	1.19	0.18	6.61	< .01	0.81	0.15	5.28	< .01			
Random effects	Variance		SD		Variance		SD		Variance		SD		Variance		SD				
Participant:(intercept)	0.56		0.75		2.19		1.48		0.53		0.73		1.54		1.24				
Item: (intercept)	0.10		0.32		0.24		0.49		0.27		0.52		0.12		0.35				
Age (slope)	0.06		0.25		0.10		0.31		0.17		0.41		1.66		1.29				
Imperfective items																			
Fixed effects	(b)	SE	z	Pr(> z)	(b)	SE	z	Pr(> z)	(b)	SE	z	Pr(> z)	(b)	SE	z	Pr(> z)			
Intercept	-0.50	0.13	-3.98	< .01	-0.61	0.24	-2.59	< .01	-0.52	0.16	-3.22	< .01	-0.35	0.26	-1.31	.19			
LA (act)	0.51	0.11	4.76	< .01	0.68	0.18	3.77	< .01	0.93	0.17	5.55	< .01	0.84	0.20	4.19	< .01			
Random effects	Variance		SD		Variance		SD		Variance		SD		Variance		SD				
Participant:(intercept)	0.52		0.72		2.05		1.43		0.57		0.75		1.76		1.33				
Item: (intercept)	0.01		0.09		0.31		0.55		0.25		0.50		0.38		0.62				
Age (slope)	<0.01		0.01		0.16		0.40		0.02		0.15		0.60		0.78				
1696 observations 53 participants					1696 observations 53 participants					1568 observations 49 participants					1184 observations, 37 participants				

In Table 3.11 it can be seen that the coefficient of the effect of lexical aspect (activity) increased between the age groups 7- to 8-years, 8- to 9-years and 9- to 10-years for the perfective items and similarly for the imperfective items. The coefficient for age group 10- to 11-years is lower than that for the 9- to 10-years group however it is higher than that for the younger age groups. This general trend towards increased Subject selection with age in the activity condition explains the positive value of the Lexical aspect (activity): Age coefficient in the main analysis. The increase in selection of the Subject with age for activity items but no effect of age on selection of the Subject for accomplishment items is shown in Figure 3.1.

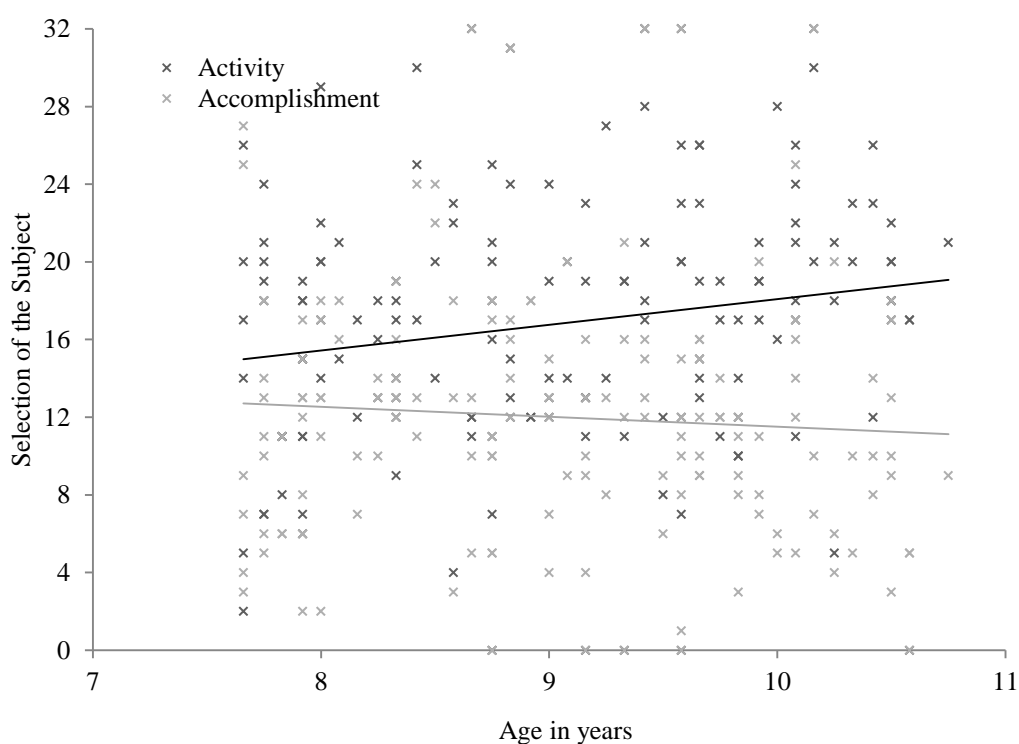


Figure 3.1 *Effect of Age on Selection of the Subject in the Accomplishment and Activity Lexical Aspect Conditions*

It was noted that the coefficient for imperfective grammatical aspect for accomplishment events in Experiment 3a, current chapter ($b = 0.99$) (adults) was lower than in the adult sample reported in Experiment 1b, Chapter 2 ($b = 1.51$) (see Appendix B, Table A3.1). This was also observed in the children's current experiment ($b = 0.15$) compared to the children's Experiment 1a, Chapter 1 ($b = 0.32$). To investigate whether this result may be in part because of the narrower range of verbs used in the current experiment, the frequency with which the Subject was selected, in each aspect, for each verb used in Experiment 1a, was calculated. These frequencies are presented in Table 3.12. Verbs used in the current experiment are marked with an asterisk (*). The verbs are ordered in the table by the frequency of Subject selection in the imperfective aspect condition. As previously, there are too few items in each condition to perform a statistical analysis of differences in effect of aspect on Subject selection by verb, so the main highlights are described.

Table 3.12 *Mean Proportion of Subject Selections (and Standard Deviations) in the Two Grammatical Aspect Conditions for Transfer Verbs used in Experiment 1a, Chapter 2*

Verb	Grammatical Aspect		Difference
	Imperfective	Perfective	
To chuck*	1.05 (0.76)	0.90 (0.74)	0.15
To deliver	1.01 (0.74)	0.88 (0.79)	0.13
To fling	1.00 (0.79)	0.89 (0.81)	0.11
To push	0.98 (0.75)	1.01 (0.75)	-0.03
To give*	0.77 (0.61)	0.66 (0.63)	0.11
To take*	0.76 (0.76)	0.50 (0.63)	0.26
To pass	0.73 (0.71)	0.70 (0.66)	0.03
To send	0.71 (0.76)	0.43 (0.67)	0.28
To carry*	0.70 (0.66)	0.52 (0.61)	0.18
To hand*	0.57 (0.63)	0.51 (0.63)	0.06
To throw*	0.53 (0.70)	0.44 (0.62)	0.09
To bring*	0.49 (0.71)	0.45 (0.58)	0.04

Inspection of the Subject selection in the imperfective compared to the perfective condition shows that children selected the Subject more frequently in the imperfective condition compared to the perfective condition for all the verbs selected in Experiment 1a, with the exception of the verb *to push*. As for adults however, inspection of the differences between Subject selection in the two conditions suggests there were differences in the size of the effect of grammatical aspect condition between individual verbs. Not including the verbs *to send* and *to deliver* in the current study may account for the lower effect of grammatical aspect observed in the current study compared to Experiment 1a, Chapter 2.

3.3.3 Discussion

The aim of this study was to determine whether the effect of grammatical aspect on children's resolution of ambiguous pronouns following Source-Goal transfer of possession events seen in Experiment 1a, Chapter 2 was specific to events with endpoints (accomplishments) or would be also observed in events without endpoints (activities). A second aim of the study was to examine whether the lexical aspect of events influenced children's tendency to resolve an ambiguous pronoun towards the previous Subject protagonist.

The grammatical verb aspect with which accomplishment events were described influenced children's resolution of ambiguous pronouns. For accomplishment events, children were more likely to select the Subject protagonist as the referent of the pronoun in the imperfective aspect condition than the perfective aspect condition. This is consistent with the findings of Experiment 1a, Chapter 2; findings with adults (Experiment 1b, Chapter 2 and Experiment 3a in this Chapter) and previous research with adults (Rohde et al., 2006).

The grammatical verb aspect with which activity events were expressed was not expected to influence children's selection of the Subject protagonist as the referent of an ambiguous pronoun. This prediction was based on findings with adults in Experiment 3a in this chapter and previous research with adults (Becker et al., 2013). Contrary to this prediction, there was no interaction between grammatical aspect and lexical aspect; children were more likely to resolve the pronoun to the Subject protagonist in the imperfective rather than the perfective condition for both accomplishment and activity items. Given the size of the effect of grammatical verb aspect on adults' ($b = 0.99$) and children's ($b = 0.15$) pronoun resolution following accomplishment events in Experiments 3a and 3b respectively, it seems unlikely that the failure to observe an interaction in the children's experiment result reflects a greater influence of grammatical verb aspect on children's compared to adults' pronoun resolution generally. Rather, a more likely explanation is that the reduced size of the effect of grammatical verb aspect in the children's experiment compared to the adult experiment explains the absence of a significant interaction in the children's study. It was noted that the effect of grammatical aspect on children's pronoun resolution for accomplishment events in the current experiment was lower than that observed with a broader range of verbs in Experiment 1a. A future experiment with a broader range of verbs in the accomplishment condition could re-examine the possibility that like adults, grammatical aspect has a greater influence on children's pronoun resolution for accomplishment compared to activity events.

With respect to the second aim of the study, the results show that the lexical aspect of events influenced children's expression of a Subject bias for interpreting ambiguous pronouns. Children were more likely to select the previous sentence Subject protagonist as the referent of an ambiguous pronoun for events which have no

inherent endpoint (activity events) than for events with inherent endpoints (accomplishment events). Furthermore, the tendency to select the Subject-consistent protagonist as the referent of the pronoun increased with age for activity events but not for accomplishment events.

3.4 General Discussion

The experiments in this chapter found that the grammatical aspect with which events with endpoints (accomplishments) were described similarly influenced adults' and children's resolution of a subsequent pronoun. For events from this lexical aspect category, adults and children were more likely to resolve the pronoun to the Subject of the previous sentence when the event was expressed with imperfective aspect than perfective aspect. This is consistent with previous Experiments in Chapter 2 and previous research with adults (Rohde et al., 2006).

In contrast, but in line with predictions, the grammatical aspect with which events without endpoints (activities) were described did not influence adults' resolution of a subsequent pronoun. This finding is consistent with previous adult research that has found that grammatical verb aspect does not influence adults' integration of subsequent concepts (Becker et al., 2013). Contrary to predictions and findings with adults, for children the effect of grammatical aspect on pronoun resolution for activity events did not differ from the effect seen with accomplishment events. However, rather than this finding reflecting a broader influence of grammatical verb aspect on children's pronoun resolution compared to adults, the more likely explanation for this finding is the much lower effect of grammatical verb aspect on children's pronoun resolution compared to adults limiting the opportunity to observe an interaction between grammatical and lexical aspect.

The greater effect of grammatical verb aspect on adults' compared to children's pronoun resolution for accomplishment events, shown in the experiments in this chapter, replicate the findings of Experiment 1a and 1b, Chapter 2. This replication suggests that although an influence of grammatical verb aspect is evident in the 7- to 11-year-old age range this influence increases post 11 years.

The experiments in this chapter also found that adults and children were more likely to select the previous Subject as the referent of a pronoun for events with no inherent endpoints (activities) than for events with endpoints (accomplishments). Furthermore, selection of the previous Subject as the referent of the pronoun increased with age for activity events but no effect of age on Subject selection was observed for accomplishment events. Previous research with young children has found Subject interpretations of ambiguous pronouns for 3-year-olds (Järvikivi, Pyykkönen-Klauck, Schimke, Colonna, & Hemforth, 2013) and five-year-olds (Hartshorne et al., 2015). The current findings add to this body of research, extending it by demonstrating that Subject interpretations of ambiguous pronouns are not necessarily developed at the same time for all types of event.

Finding a difference in the frequency of Subject resolution of a subsequent pronoun in different lexical categories of events may provide some insight into why some children have difficulties with pronoun resolution. A number of studies have found that children with poor reading find resolving pronouns easier when these refer back to a recently mentioned (object) protagonist than a more distant (subject) protagonist (Francey & Cain, 2014; Megherbi & Ehrlich, 2005). This pattern has been explained as a consequence of weak working memory in children with poor reading. In the two examples below, the distance in terms of the number of intervening words, between the pronoun and the two protagonists is the same. The results from

Experiment 3b show that the pronoun was more often resolved to the Subject in 3.7 (a) than (b).

Activity:

(3.7) a. Julia stood/was standing in a queue with Alison. She smiled.

Accomplishment:

b. Nina handed/was handing a racquet to Gemma. She chuckled.

Thus the results of Experiment 3b may suggest that in some cases failure to resolve a pronoun to a Subject protagonist may result from a failure to take into account the temporal characteristics of events.

In conclusion, adults' and children's pronoun resolution was influenced by lexical aspect. This suggests that the inherent temporal characteristic of events cues adults and children to expect re-mentions of particular protagonists. Whether this is a reliable cue is examined in Chapter 5 where the frequency of re-mention of Source and Goal protagonists following transfer events are examined in a corpus of children's literature.

Chapter 4: Grammatical Aspect effects in Narratives

4.1 Introduction

The experiments in Chapters 2 and 3 examined the effect of grammatical verb aspect on children's and adults' resolution of a subsequent pronoun when aspectual events were presented as isolated sentences. The two main experiments in this chapter examine the effects of grammatical aspect on 7- to 11-year-old's perception of events that are embedded in narratives. Experiment 4a examines children's judgement of the ongoingness of those events within narratives, and Experiment 4b examines children's pronoun resolution. Experiment 4c examines the effect of grammatical aspect on children's pronoun resolution in isolated sentences, but with a time delay between presentation of the aspectual sentence and the continuation.

4.2 Experiment 4a: The Effect of Grammatical Aspect on Children's Judgement of the Ongoingness of Events Within Narratives

The grammatical aspect with which events are described influences adults' judgement of the ongoingness of those events within narratives. For example, adults are more likely than chance to judge imperfectly expressed events such as 'Stephanie *was changing* the flat tyre' as ongoing and perfectly expressed events such as 'Stephanie *changed* the flat tyre' as completed when these events are embedded within narratives (Magliano & Schleich, 2000). Adults maintain an effect of grammatical aspect on their judgement of an event's ongoingness as a narrative proceeds, however their perception that imperfectly expressed events are ongoing declines. This decline has been attributed to adults' use of world knowledge of the duration of events to update their situation model of a text. This explanation is supported by the observation that, for adults, the ongoingness of short duration, imperfectly expressed events (e.g. scratching your nose) declines more rapidly as

text proceeds than the ongoingness of long duration events (e.g. watching a movie) (Magliano & Schleich, 2000). The current experiment examined whether 7- to 11-year-old's judgement of the ongoingness of short duration events, within narratives, was similarly affected by the grammatical aspect with which the events were described.

Previous research shows that young children are sensitive to aspectual markers, for example children's eye movements indicate that they associate imperfective aspect with depictions of ongoing events and perfective aspect with depictions of completed events (Zhou et al., 2014). This finding replicates earlier work using a picture matching task (Wagner, 2009; Weist, Atanassova, Wysocka, & Pawlak, 1999; Weist, Lyytinen, Wysocka, & Atanassova, 1997). If children demonstrate the same sensitivity to aspectual markers when events are embedded within narratives, they should demonstrate a difference in their explicit judgements of the ongoingness of imperfectively and perfectly expressed events. Specifically, children should be more likely to judge imperfectively expressed events as ongoing than perfectly expressed events. If children maintain an effect of grammatical aspect over their processing of subsequent text as adults do, they should judge imperfectively expressed events to be ongoing and perfectly expressed events to be completed when intervening text occurs between the aspectual event and the question. Moreover, if children use their world knowledge of the duration of events to update their situation model as narratives proceed intervening text will reduce their perception that imperfectively expressed events are ongoing.

4.2.1 Method

Participants

One hundred and ninety eight children from a Primary School in the North-East region of England that served a mixed socioeconomic catchment area participated in this study. All spoke English as their first language and were from four Year Groups. There were 51 children from Year Three, age 7- to 8-years (23 girls, $M = 8$ years, 3 months years, $SD = 3$ months); 52 children from Year Four, age 8- to 9-years (24 girls, $M = 9$ years, 4 months years, $SD = 3$ months); 46 children from Year Five, age 9- to 10-years (18 girls, $M = 10$ years, 3 months years, $SD = 3$ months and 49 children from Year 6, age 10- to 11-years (26 girls, $M = 11$ years, 4 months, $SD = 3$ months).

Materials

The stimuli consisted of 32 experimental items each comprising a stimulus sentence describing the transfer of a concrete object between two named protagonists of the same gender. Names were matched for number of syllables. The experimental items were written using eight Source-Goal verbs of transfer. In these events the transfer passes from the first mentioned, subject protagonist (Source) to the second mentioned protagonist (Goal). Verbs of transfer were chosen so that all items described telic events (events with duration and endpoints) (Becker et al., 2013). Half of the verbs were regular, that is the perfective form was indicated by the addition of -ed (*to toss, to hand, to carry and to chuck*) and half were irregular (*to take, to give, to bring, to throw*). These verbs were selected from those used in Ferretti et. al.,(2009). Each verb was repeated four times, twice in the imperfective form and twice in the perfective form. There were equal numbers of male and female pairs across the four repetitions of each verb.

To create the intervening text conditions (without and with), a sentence was added to two of the four repetitions of each verb. As in Magliano and Schleich (2000) the sentence was neutral with respect to the passage of time: in the current experiment it described the object being transferred. The intervening text was balanced across items with female and male protagonists and verbs expressed with imperfective /perfective aspect. Examples are provided in Table 4.1.

Table 4.1 *Stimuli Used In the Two Grammatical Aspect and Two Intervening Text Conditions (List A)*

Intervening Text	Grammatical Aspect	
	Perfective	Imperfective
Without	Lewis _{source} took a box of eggs to Jimmy _{goal} .	Becky _{source} was taking a birthday present to Jasmine _{goal} .
With	Janet _{source} took a lemon to Carol _{goal} . The lemon was large and looked juicy.	Darren _{source} was taking a can of red paint to Alfie _{goal} . The paint can was large and heavy.

The 32 stimulus items were distributed across eight short stories (four items per story with conditions of aspect and presence of an additional sentence evenly distributed between the first four and second four stories). The stories were 457 to 469 words in length $M=462$, $SD=8$. Four stories described a series of events experienced by two female protagonists and four described events experienced by two male protagonists. Each story had an episodic structure that began with a setting (to introduce characters, locations) and included categories of story units including events, goals, attempts, outcomes and/or reactions (Stein, 1982).

In Magliano and Schleich (2000) adults read 24 stories and the completion of the aspectual event was always confirmed in the conclusion of these stories, after the question asking whether the aspectual event was still in progress. A shorter task, suitable for children, was required: Children heard eight stories and were asked four questions concerning the ongoingness of events within each story. To reduce the possibility that the completion statuses of earlier items might influence decisions about completion statuses of later items within these stories, the completion status of the transfer events was controlled. For 16 of the stimulus items the completion of the transfer was confirmed immediately in the next sentence: 8 of these transfers were successful; the other 8 transfers did not go as planned. For the remaining 16 items the completion of the transfer was not confirmed until later in the narrative (6 items) or was not confirmed at all (10 items). The transfer completions were balanced across the first four stories and the second four stories. Examples of the transfer completions are provided in Table 4.2 below and the full texts are included in Appendix C.

The Coh-metrix Text Easability Assessor (Graesser, McNamara, & Kulikowich, 2011) metrics showed that the texts had high narrativity (the extent to which the text is story-like: $M = 79\%$), a high number of concrete and imageable content words ($M = 85\%$), were syntactically simple ($M = 77\%$), had high local referential cohesion ($M = 50\%$) and high global cohesion ($M = 77\%$). Two presentations of the stories were prepared with the order of the stories kept the same but the aspect of the verb in each item counterbalanced across the presentations. One hundred participants received presentation A, ninety-eight participants received presentation B with approximately equal numbers of children in each Year Group receiving each presentation.

Table 4.2 *Examples of the Completions of the Transfer Events*

Completion of transfer:	Stimulus sentence	Following sentence(s)
Confirmed in the sentence following the stimulus: transfer successful	A warm breeze blew as Gail was handing/handed a glass of lemonade to Beth.	Thanks Gail, said Beth taking a sip.
Confirmed in the sentence following the stimulus: transfer not successful	A moment later, Gail was chucking/chucked a biscuit to Beth.	The biscuit fell on the floor because Beth suddenly squealed and jumped up off the ground.
Confirmed more than one sentence after the stimulus sentence	A few minutes later, Gail was carrying/carried a tray to Beth.	The tray had a plate of biscuits and two glasses of lemonade on it. As she crossed the garden Gail almost tripped but she managed to steady herself and eventually put the tray down on the grass next to Beth.
Not confirmed	Nick was chucking/chucked the Goalie gloves to Alan.	“You all played really well,” said the coach, “but the man of the match has to be Alan for that fantastic throw in.

Procedure

The task was administered as a group assessment in the children's classrooms. Children were told that they were going to be shown eight stories on their classroom whiteboard, which the assessor was going to read to them, and at intervals they would be asked a question which they should answer by circling yes or no in the booklet provided. The same explanation of the task and instructions were read out to each Year Group. A practice story was administered prior to the test stories. Any questions about the procedure were addressed before presentation of the stories.

Each story was presented one sentence at a time cumulatively using the classroom whiteboard. After the stimulus item was presented, the text was replaced with a question asking whether the aspectual event was considered to be ongoing or completed for example, "Has Janet taken the lemon to Carol yet?" As in Magliano and Schleich (2000) these questions were phrased so that the answer "yes" indicated that the activity in the aspect sentence was completed and "no" indicated that the activity was still ongoing. The story presentation then continued from that point (i.e., the previously seen text was not available for inspection). In addition to the four experimental questions per story, two comprehension questions were asked: one during the introduction of the story, the other during the conclusion. These required retrieval of stated information or simple inferences. Half of the correct answers to these questions were yes and half no. Short breaks were taken after every story.

4.2.2 Results

Accuracy to comprehension questions

The total number of correct answers to the 16 comprehension questions was calculated for each participant. The mean correct scores, in each Year Group, are reported in Table 4.3.

Table 4.3 *Mean Correct Comprehension Question Scores (and Standard Deviations) by Year Group*

Year Group	Mean	SD	Minimum	Maximum
Year 3 ($n = 51$)	12.78	1.39	10	15
Year 4 ($n = 52$)	13.25	1.60	9	16
Year 5 ($n = 46$)	13.57	1.38	10	16
Year 6 ($n = 49$)	13.96	1.14	11	16
($N = 198$)	13.38	1.46	9	16

(Max = 16)

Children performed at a high level, with all Year Groups achieving at least 80% correct indicating that the stories were well understood. A one way ANOVA revealed a main effect of Year Group, $F(3,194) = 6.24$, $p < .01$. The post-hoc analysis revealed that the Year 3 mean was significantly lower than the Year 6 mean at the Bonferroni adjusted $p = .0125$ alpha level for multiple comparisons. This suggests that although there is some evidence that the Year 3 children were less accurate in their responses to the comprehension questions than the Year 6 group, the means indicate good levels of understanding.

Selection of the aspectual event as ongoing

The mean proportion of ongoing selections (i.e., answering “no” to the aspect questions) by Year Group, grammatical aspect and intervening text condition are shown in Figure 4.1. The full table of mean proportions is given in Appendix C. Inspection of the mean proportions suggested that, in general, children were more likely to consider the event to be completed than ongoing ($< .50$ selection of the event as ongoing in all conditions). In addition, children were more likely to perceive an event to be ongoing when the event was expressed with imperfective rather than

perfective aspect. The means also suggested that intervening text reduced the likelihood that imperfectly expressed events were considered ongoing. Finally, children's age appears to have influenced children's perception of the ongoingness of events expressed in the imperfective.

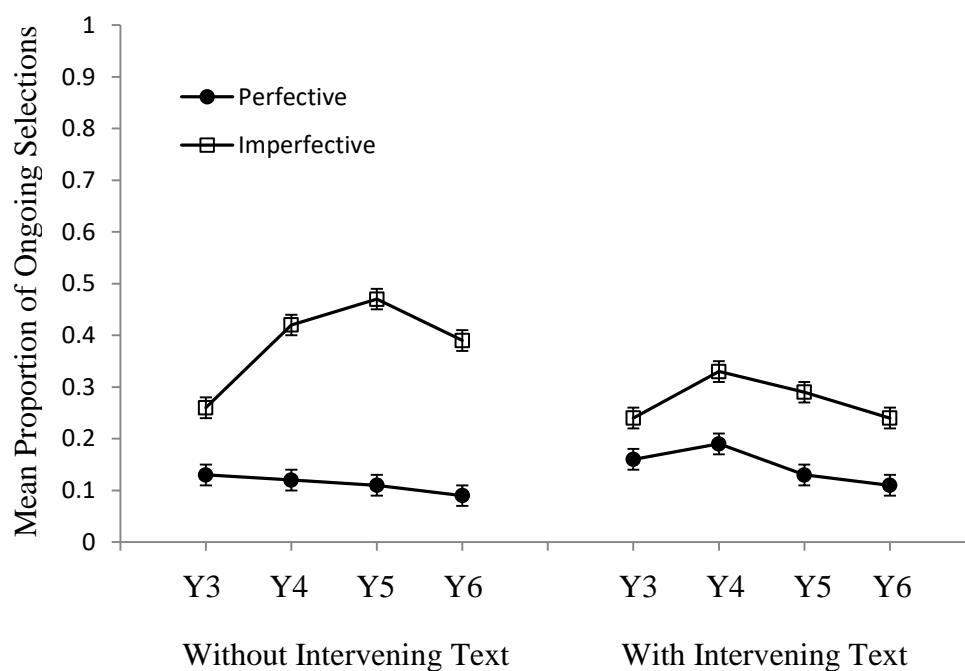


Figure 4.1 *Mean Proportion of Ongoing Selections (and SE) in the Two Grammatical Aspect and Two Intervening Text conditions*

To examine these effects statistically, the analysis modelled the probability (log odds) of selecting the action as ongoing in a series of mixed effects binomial models in the R statistics environment (R Core Team, 2014) using the lme4 package. (Bates et al., 2015). As with analyses in previous chapters, fixed effects were estimated in a model that included full random effects terms (Barr, Levy, Scheepers, & Tily, 2013). In this experiment these corresponded to: random differences in overall selection that the event was ongoing between participants and between items (random intercepts); random differences in the slopes of the effect of grammatical aspect between participants and between items; random differences in the slopes of the effect

of intervening text between participants and random differences in the slopes of the effect of age between items. The age variable was centered and the data were coded such that the intercept represented the likelihood that a child at the mean age of the sample (9 years, 9 months) selected that the event was ongoing in the perfective, without intervening text, condition (Dalal & Zickar, 2012). Centering the aspect and intervening text variables did not change the pattern of significance. A summary of the final model is reported in Table 4.4.

The first column of Table 4.4 provides the coefficient estimates for the change in log odds probability of selecting the event as ongoing associated with each fixed effect. The significant, negative value of the intercept coefficient shows that in the reference condition (at the mean age of the sample, when there was no intervening text between the aspectual item and the event was expressed with perfective aspect), children were more likely than chance to state that the event was completed.

The significant, positive grammatical aspect (imperfective) coefficient shows that in the no intervening text condition children were more likely to state that the event was ongoing when the event was expressed with imperfective compared to perfective aspect. The significant, positive grammatical aspect (imperfective): cAge coefficient shows that this tendency increased with age. The significant, negative grammatical aspect (imperfective): Intervening text (with) coefficient shows that intervening text reduced the probability that imperfectively expressed events were considered ongoing. The significant, negative grammatical aspect (imperfective): Intervening text (with): cAge coefficient shows that this tendency increased with age. Finally, the non-significant values for the Intervening text (with), cAge and Intervening text (with): cAge coefficients show that intervening text and age did not

significantly influence the likelihood that perfectly expressed events were considered ongoing.

Table 4.4 *Summary GLMM for (log odds) Ongoing Selection: Effects for Grammatical Aspect (GA), Intervening Text (IT) and Centered Age*

		Estimated coefficient			
Fixed effects		(<i>b</i>)	<i>SE</i>	<i>z</i>	Pr(> <i>z</i>)
(Intercept)		-2.86	0.22	-13.17	< .01
GA (imperfective)		2.10	0.19	11.28	< .01
IT (with)		0.29	0.25	1.15	.25
cAge		-0.17	0.13	-1.32	.19
GA (imperfective): IT (with)		-0.90	0.21	-4.18	< .01
GA (imperfective): cAge		0.40	0.12	3.37	< .01
IT (with): cAge		-0.01	0.11	-0.11	.91
GA (imperfective): IT (with): cAge		-0.26	0.13	-1.93	.05
Random effects		Variance		<i>SD</i>	
Participant:	(intercept)	2.19		1.48	
	GA (slope)	1.22		1.10	
	IT (slope)	0.34		0.58	
Item:	(intercept)	0.34		0.58	
	GA (slope)	0.16		0.41	
	Age (slope)	0.01		0.10	

6336 observations; 198 participants, 32 items

To examine the interactions between grammatical aspect, intervening text and age the data were further explored in two ways. First, the effect of grammatical aspect (imperfective) was examined in each of the four Year Groups and intervening text conditions (without and with) separately. These models are shown in Table 4.5.

Models were fit as previously. The models show that the coefficient for grammatical aspect (imperfective) was positive and significant in each Year Group in both intervening text conditions (without and with). This shows that in both intervening text conditions (without and with) children in all Year Groups were more likely to state that the event was ongoing for imperfective items than perfective items. The values for the coefficients show an increasing trend across the Year Groups in the without condition but not in the with intervening text condition. These trends explain the positive grammatical aspect (imperfective): cAge coefficient and the negative grammatical aspect (imperfective): Intervening text (with): cAge coefficient in the main analysis respectively.

Second, the effect of intervening text (with) was examined in each of the four Year Groups and grammatical aspect conditions (perfective and imperfective) separately. These models are shown in Table 4.6. The data were coded such that the intercept represented the probability of selecting the event as ongoing in the without condition. Age was centered and models included random intercepts for participants and items, random slopes for intervening text (participants) and random slopes for age (items). These models showed no consistent trend in the effect of intervening text across the Year Groups in the perfective condition. This explains the non-significant values for the age and intervening text coefficients for perfective items in the main analysis. These models also showed that intervening text reduced the likelihood that imperfectively expressed events were considered ongoing for older age groups: the effect was significant for the Year 5 Year Group (age 9- to 10-years) and approached significance for the Year 6 Year group (age 10- to 11-years). This explains the significant, negative grammatical aspect (imperfective): Intervening text (with): cAge coefficient in the main analysis.

Table 4.5 Summary GLMM for (log odds) Ongoing Selection: Effects for Grammatical Aspect (GA) in each Year Group; Without and With Intervening text

Intervening Text	Year Group															
	Year 3 (7- to 8-years)				Year 4 (8- to 9-years)				Year 5 (9- to 10-years)				Year 6 (10- to 11-years)			
	Estimated coefficient		SE		z		Pr(> z)		Estimated coefficient		SE		z		Pr(> z)	
Without	(b)	SE	z	Pr(> z)	(b)	SE	z	Pr(> z)	(b)	SE	z	Pr(> z)	(b)	SE	z	Pr(> z)
Fixed effects																
Intercept	-3.04	0.50	-6.08	< .01	-2.85	0.39	-7.24	< .01	-3.38	0.61	-5.50	< .01	-2.94	0.40	-7.41	< .01
GA (imp)	1.31	0.48	2.72	< .01	2.38	0.42	5.63	< .01	3.19	0.61	5.20	< .01	2.08	0.42	4.92	< .01
Random effects	Variance		SD		Variance		SD		Variance		SD		Variance		SD	
Participant:	(intercept)		4.00	2.00			2.00	1.42			3.61	1.90			1.16	1.08
	GA (slope)		1.35	1.16			2.96	1.72			3.92	1.98			1.15	1.07
Item:	(intercept)		0.17	0.41			0.38	0.62			0.79	0.89			0.37	0.60
	GA (slope)		0.01	0.08			0.17	0.41			0.24	0.49			0.16	0.40
	cAge (slope)		0.64	0.80			0.52	0.73			0.02	0.14			0.88	0.94
With																
Fixed effects	(b)	SE	z	Pr(> z)	(b)	SE	z	Pr(> z)	(b)	SE	z	Pr(> z)	(b)	SE	z	Pr(> z)
Intercept	-2.56	0.39	-6.50	< .01	-1.91	0.31	-6.11	< .01	-2.44	0.37	-7.26	< .01	-3.22	0.56	-5.78	< .01
GA (imp)	0.92	0.35	2.61	< .01	0.99	0.34	2.97	< .01	1.20	0.35	3.47	< .01	1.79	0.56	3.21	< .01
Random effects	Variance		SD		Variance		SD		Variance		SD		Variance		SD	
Participant:	(intercept)		2.99	1.73			0.97	0.99			1.46	1.21			2.05	1.43
	GA (slope)		0.41	0.64			0.43	0.66			0.01	0.07			0.90	0.95
Item:	(intercept)		0.21	0.46			0.72	0.85			0.36	0.60			1.51	1.23
	GA (slope)		0.07	0.26			0.95	0.98			0.53	0.73			1.42	1.19
	c Age (slope)		0.15	0.38			1.03	1.01			0.16	0.40			0.08	0.29
816 observations; 51 participants				832 observations; 52 participants				736 observations; 46 participants				784 observations ; 49 participants				

Table 4.6 Summary GLMM for (log odds) Ongoing Selection: Effect of Intervening Text (IT) in each Year Group; Perfective and Imperfective items

Aspect	Year Group															
	Year 3 (7- to 8-years)				Year 4 (8- to 9-years)				Year 5 (9- to 10-years)				Year 6 (10- to 11-years)			
Perfective	Estimated coefficient				Estimated coefficient				Estimated coefficient				Estimated coefficient			
	(b)	SE	z	Pr(> z)	(b)	SE	z	Pr(> z)	(b)	SE	z	Pr(> z)	(b)	SE	z	Pr(> z)
Fixed effects																
Intercept	-2.98	0.45	-6.60	< .01	-2.94	0.42	-7.08	< .01	-3.11	0.52	-6.00	< .01	-2.93	0.40	-7.30	< .01
IT (with)	0.31	0.43	0.73	.47	1.08	0.42	2.59	< .01	0.57	0.56	1.04	.30	-0.01	0.54	-0.02	.98
Random effects		Variance	SD			Variance	SD			Variance	SD			Variance	SD	
Participant:	(intercept)		3.52	1.88			2.54	1.60			2.68	1.64			0.83	0.91
	IT (slope)		<0.01	0.05			0.25	0.51			0.72	0.85			0.85	0.92
Item:	(intercept)		0.18	0.43			0.42	0.66			0.61	0.78			0.73	0.86
	cAge (slope)		1.78	1.33			0.13	0.36			0.53	0.73			0.09	0.30
Imperfective																
Perfective	Estimated coefficient				Estimated coefficient				Estimated coefficient				Estimated coefficient			
	(b)	SE	z	Pr(> z)	(b)	SE	z	Pr(> z)	(b)	SE	z	Pr(> z)	(b)	SE	z	Pr(> z)
Fixed effects																
Intercept	-1.75	0.35	-5.02	< .01	-0.43	0.27	-1.56	.12	-0.16	0.36	-0.46	.65	-0.81	0.38	-2.15	.03
IT (with)	0.12	0.34	0.35	.73	-0.49	0.31	-1.57	.12	-1.07	0.36	-2.99	< .01	-0.75	0.40	-1.89	.06
Random effects		Variance	SD			Variance	SD			Variance	SD			Variance	SD	
Participant:	(intercept)		3.44	1.86			1.70	1.30			3.24	1.80			3.48	1.86
	IT (slope)		1.09	1.04			0.55	0.74			0.46	0.68			0.88	0.94
Item:	(intercept)		0.26	0.51			0.46	0.68			0.59	0.77			0.76	0.87
	c Age (slope)		0.23	0.48			0.37	0.61			0.01	0.11			0.14	0.37
	816 observations; 51 participants				832 observations; 52 participants				736 observations; 46 participants				784 observations ; 49 participants			

4.2.3 Discussion

This experiment examined whether the grammatical aspect with which an event was described influenced 7-to 11-year-old's judgement of the ongoingness of that event, when these events were embedded within narratives. The aspect with which an event was described influenced children's judgement of the event's ongoingness: children were more likely to state that an event was ongoing when it was expressed with imperfective (e.g., 'was handing') rather than perfective (e.g., 'handed') aspect. This finding is consistent with previous research which has found that young children associate imperfective aspect with depictions of ongoing events and perfective aspect with depictions of completed events (Wagner, 2009; Weist et al., 1999; Weist et al., 1997; Zhou et al., 2014).

This experiment also examined the effect of intervening text on children's judgement of events ongoingness. Children maintained an effect of grammatical aspect on their judgement of events ongoingness when there was intervening text between the event and the question. This is consistent with adult findings (Magliano & Schleich, 2000). Moreover, intervening text reduced older children's judgement that imperfectively expressed events were ongoing. It did not influence children's judgement of the completion of perfectly expressed events. The result for older children is consistent with adult findings (Magliano & Schleich, 2000) and suggests that children's use of world knowledge of event durations, to modify their situation model as text proceeds, is developing within the age range 7- to 11-years.

There was one difference between children's judgements of event's ongoingness and that observed with adults previously (Magliano & Schleich, 2000). Although, like adults, children were more likely than chance to state that perfectly expressed events within narratives were completed. Unlike adults, they were not more

likely than chance to state that imperfectly expressed events were ongoing. This suggests that children are less sensitive than adults to imperfective aspect in a narrative context. A difference in adults' and children's sensitivity to imperfective aspect was observed in Experiments 1a and 1b Chapter 2 where, when given the same stimulus items, adults but not children (7- to 11-years) demonstrated a greater than chance resolution of a subsequent pronoun to the Source protagonist following imperfectly expressed events. In Experiment 1a there was no effect of age on children's Source resolution in the imperfective condition, suggesting that children's sensitivity to imperfective aspect develops post 11-years. In contrast, in the current experiment children's sensitivity to imperfective aspect increased with age. This suggests that children's sensitivity to imperfective aspect in a narrative context is developing in the age range 7- to 11-years. This possibility was examined further in the following experiment.

4.3 Experiment 4b: The Effect of Grammatical Aspect on Children's Pronoun Resolution Within Narratives

Experiment 1a in Chapter 2 examined the effect of grammatical aspect on 7- to 11-year-old's resolution of ambiguous pronouns following Source-Goal transfer of possession events. The transfer events were presented as isolated sentences. Children were generally more likely to resolve a pronoun to the Goal than the Source protagonist however the aspect with which the event was expressed influenced their resolution: They were more likely to resolve the pronoun to the Source protagonist when events were expressed with imperfective compared to perfective aspect, see 4.1 (a) and (b) below.

Imperfective:

(4.1) a. Josh_{source} was bringing a biscuit to Kyle_{goal}. He grinned.

Perfective:

b. Josh_{source} brought a biscuit to Kyle_{goal}. He grinned.

Using the same materials as in Experiment 1a, Experiment 1b in Chapter 2 showed that adults demonstrated a Source bias interpretation of the pronoun in the imperfective condition. There were no effects of age on Children's Source resolution in Experiment 1a, suggesting that children's use of imperfective aspect as a cue to resolving a subsequent pronoun increases post 11 years of age. In contrast, in Experiment 4a when aspectual events were embedded in narratives children's sensitivity to imperfective aspect increased with age. To better understand the effect of age on children's performance, the current experiment used the same narrative presentation as in Experiment 4a and examined the effect of aspect on 7- to 11-year-old's resolution of a subsequent ambiguous pronoun in this context. If children's sensitivity to imperfective aspect in narratives increases in the age range 7- to 11-years children's tendency to resolve an ambiguous pronoun to the Source protagonist immediately after the aspectual event in the imperfective condition will increase with age.

The current experiment also examined the effect of intervening text on children's pronoun resolution following events expressed with imperfective and perfective aspect. Experiment 4a, this chapter, found that intervening text reduced older but not younger children's perception that imperfectively expressed events were ongoing. This suggests that children's use of world knowledge of event durations, to modify their situation model as text proceeds, is developing within the age range 7- to 11-years. A significant reduction in older children's resolution of the pronoun to the

Source following intervening text only in the imperfective condition of the current experiment would support this conclusion.

4.3.1 Method

Participants

Two hundred children from three Primary Schools in the North-West region of England that served mixed socioeconomic catchment areas participated in this study. These children had not taken part in any previous experiments. All spoke English as their first language and were from four Year Groups. There were 59 children from Year Three, age 7- to 8-years (33 girls, $M = 8$ years, 4 months years, $SD = 4$ months); 47 children from Year Four, age 8- to 9-years (27 girls, $M = 9$ years, 4 months years, $SD = 3$ months); 50 children from Year Five, age 9-to 10-years (24 girls, $M = 10$ years, 4 months years, $SD = 4$ months) and 44 children from Year 6, age 10- to 11-years (23 girls, $M = 11$ years, 5 months, $SD = 4$ months).

Materials

The stimuli consisted of same 32 experimental items and stories used in the previous experiment but in this experiment four continuations, each beginning with a personal pronoun and each expressing a positive action (laughed, grinned, smiled and chuckled) were added to the experimental items. These continuations were selected from the twelve continuations used previously in Experiment 1a. A different continuation was paired with each of the four repetitions of the verbs. Example stimuli are provided in Table 4.7.

Table 4.7 *Stimuli Used In the Two Grammatical Aspect and Two Intervening Text Conditions (List A)*

Intervening Text	Grammatical Aspect	
	Perfective	Imperfective
Without	Lewis _{source} took a box of eggs to Jimmy _{goal} , he chuckled.	Becky _{source} was taking a birthday present to Jasmine _{goal} , she grinned.
With	Janet _{source} took a lemon to Carol _{goal} . The lemon was large and looked juicy, she laughed.	Darren _{source} was taking a can of red paint to Alfie _{goal} . The paint can was large and heavy, he smiled.

The Coh-metrix Text Easability Assessor (Graesser et al., 2011) metrics showed that the texts had high narrativity (the extent to which the text is story-like: $M = 82\%$), a high number of concrete and imageable content words ($M = 86\%$), were syntactically simple ($M = 76\%$), had high local referential cohesion ($M = 52\%$) and high global cohesion ($M = 75\%$). Two presentations of the stories were prepared with the order of the stories kept the same but the aspect of the verb in each item counterbalanced across the presentations. Ninety-nine participants received presentations A, 101 participants received presentation B with approximately equal numbers of children in each Year Group receiving each presentation.

Procedure

The same procedure was followed for this experiment as for the previous experiment with the exception that the question asking whether the event was ongoing was replaced with a question asking who the pronoun referred to. For example, “Who

chuckled? Lewis or Jimmy”. As previously, the story-telling then continued from that point (i.e., the previously seen text was not available for inspection). The same comprehension questions were asked as previously, one during the introduction and one during the conclusion of each story. Children provided their responses by circling either “yes” or “no” to the comprehension questions and circling the name of their preferred referent of the pronoun in booklets provided.

4.3.2 Results

Accuracy to comprehension questions

The total number of correct answers to the 16 comprehension questions was calculated for each participant. The mean correct scores, in each Year Group, are reported in Table 4.8. As for Experiment 4a, children performed at a high level, with all Year Groups achieving at least 83% correct indicating that that the stories were well understood. A one way ANOVA revealed a main effect of age, $F(3,196) = 3.83$, $p < .01$, but the differences did not reach statistical significance when corrected for multiple comparisons (Bonferroni correct $p = .0125$).

Table 4.8 *Mean Correct Comprehension Question Scores (and Standard Deviations) by Year Group*

Year Group	Mean	SD	Minimum	Maximum
Year 3 ($n = 59$)	13.29	1.65	10	16
Year 4 ($n = 47$)	14.11	1.54	9	16
Year 5 ($n = 50$)	13.92	1.56	8	16
Year 6 ($n = 44$)	14.18	1.28	11	16
($N = 200$)	13.84	1.56	8	16

Selection of the Source as the pronoun referent

The mean proportion of Source selections (i.e., choosing the first protagonist as the pronoun referent) by Year Group, grammatical aspect and intervening text condition are shown in Figure 4.2. The full table of mean proportions is given in Appendix C.

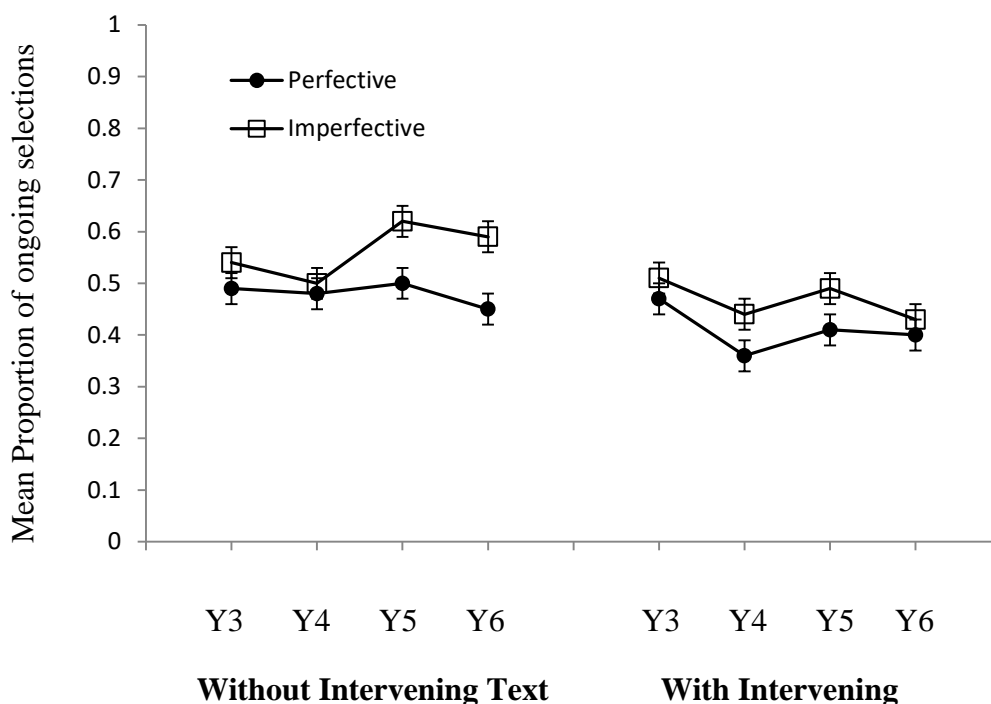


Figure 4.2 Mean Proportion of Source Selections (and SE) in the Two Grammatical Aspect and Two Intervening Text conditions

Inspection of the mean proportions suggested that, in general children were at chance in selecting the Source as the referent of the pronoun. They also suggested that children were more likely to resolve the pronoun to the Source in the imperfective condition compared to the perfective condition but this depended on age and whether there was intervening text between the aspectual event and the pronoun. To examine these effects statistically, the analysis modelled the probability (log odds) of selecting the Source in a series of mixed effects binomial models in the R statistics environment (R Core Team, 2014) using the lme4 package. (Bates et al., 2015) and following the

same principles described in detail in Chapter 2. The age variable was centered and the data were coded such that the intercept represented the likelihood that a child at the mean age of the sample (9 years, 9 months) selected the Source in the perfective, without intervening text, condition (Dalal & Zickar, 2012). A summary of the final model is reported in Table 4.9.

Table 4.9 *Summary GLMM for (log odds) Source Selection: Effects for Grammatical Aspect (GA), Intervening Text (IT) and Centered Age*

Fixed effects	Estimated coefficient (<i>b</i>)	<i>SE</i>	<i>z</i>	Pr(> <i>z</i>)
(Intercept)	-0.09	0.13	-0.65	.52
GA (imperfective)	0.39	0.09	4.42	< .01
IT (with)	-0.29	0.17	-1.76	.08
cAge	-0.06	0.08	-0.66	.51
GA (imperfective): IT (with)	-0.13	0.12	-1.05	.29
GA (imperfective): cAge	0.20	0.07	2.95	< .01
IT (with): cAge	-0.02	0.09	-0.25	.80
GA (imperfective): IT (with): cAge	-0.20	0.09	-2.16	.03
Random effects		Variance	<i>SD</i>	
Participant:	(intercept)	0.86	0.93	
	GA (slope)	0.01	0.12	
	IT (slope)	0.19	0.44	
Item:	(intercept)	0.16	0.41	
	GA (slope)	0.03	0.16	
	cAge (slope)	0.03	0.16	

6400 observations; 200 participants, 32 items

The first column of Table 4.9 provides the coefficient estimates for the change in log odds probability of selecting the Source associated with each fixed effect. The intercept coefficient was not significant, this means that children were at chance in their selection of the Source in the perfective, no intervening text condition. This contrasts with Experiments 1a and 4a where the intercept coefficient was negative and significant. The grammatical aspect (imperfective) coefficient was significant and positive, as was the grammatical aspect (imperfective): cAge coefficient. In the current experiment these coefficients show respectively that, children were more likely to select the Source as the referent of the pronoun when the event was expressed with imperfective compared to perfective aspect in the no intervening text condition and this tendency increased with age in this condition. These results are consistent with Experiment 4a and show an age increase in sensitivity to imperfective aspect immediately after the aspectual event. The grammatical aspect (imperfective): intervening text (with) coefficient was not significant indicating that intervening text did not generally have a significant influence on Source selection in the imperfective condition. This contrasts with Experiment 4a where intervening text had a general effect of reducing children's perception of the ongoingness of events. However, consistent with Experiment 4a, the grammatical aspect (imperfective): intervening text (with): cAge coefficient was significant and its negative sign indicates in this experiment a decrease with age in selection of the Source in the imperfective condition when there was intervening text. As in Experiment 4a, the coefficients of the effects for Intervening text (with), cAge and Intervening text (with) :cAge were not significant and in this experiment this shows that intervening text and age did not significantly influence children's likelihood of selecting the Source for perfective items.

The interactions between grammatical aspect, intervening text and age were explored in the same way as for Experiment 4a. First, the grammatical aspect (imperfective) effect in each of the four Year Groups and intervening text conditions (without and with) was examined separately. These models are shown in Table 4.10. Models were fit as previously. The models show that, in the without intervening text condition, the coefficients for grammatical aspect (imperfective) were positive and significant for the older Year Groups and show an increasing trend whereas younger Year Groups were at chance in both aspect conditions. Aspect was not a significant effect in any Year Group in the with intervening text condition. This pattern of significance differed from Experiment 4a where a significant effect of aspect was seen for all Year Groups in both intervening text conditions. The different pattern of significance indicates that the aspect with which events are expressed has a greater influence on children's judgement of events ongoingness than on their pronoun resolution. However, the increasing effect of aspect with age in the without intervening text condition was consistent with Experiment 4a and explains the positive grammatical aspect (imperfective): cAge coefficient in the main analysis.

Second, as for Experiment 4a, the effect of intervening text in each of the four Year Groups and grammatical aspect conditions (perfective and imperfective) was examined separately. These models are shown in Table 4.11. Models were fit as previously. Consistent with Experiment 4a, these models show no consistent trend in the effect of intervening text across the Year Groups in the perfective condition. This explains the non-significant coefficient values for the age and intervening text coefficients for perfective items in the main analysis. Also consistent with Experiment 4a, the models also show that intervening text significantly reduced the likelihood that older Year Groups selected the Source as the referent of the pronoun in the

imperfective condition. This explains the significant, negative grammatical aspect (imperfective): Intervening text (with): cAge coefficient in the main analysis.

Table 4.10 Summary GLMM for (log odds) Source Selection: Effects for Grammatical Aspect (GA) in each Year Group; Without and With Intervening text

Intervening Text	Year Group																
	Year 3 (7- to 8-years)				Year 4 (8- to 9-years)				Year 5 (9- to 10-years)				Year 6 (10- to 11-years)				
	Estimated coefficient		SE		z		Pr(> z)		Estimated coefficient		SE		z		Pr(> z)		
Fixed effects	(b)	SE	z	Pr(> z)	(b)	SE	z	Pr(> z)	(b)	SE	z	Pr(> z)	(b)	SE	z	Pr(> z)	
Intercept	-0.04	0.24	-0.15	.88	-0.10	0.20	-0.49	.62	-0.01	0.22	-0.05	.96	-0.32	0.34	-0.96	.34	
GA (imp)	0.21	0.18	1.22	.26	0.07	0.27	0.28	.78	0.68	0.20	3.32	< .01	0.76	0.20	3.77	< .01	
Random effects	Variance		SD		Variance		SD		Variance		SD		Variance		SD		
Participant:	(intercept)	0.74		0.86		0.90		0.95		0.94		0.97		2.10		1.45	
	GA (slope)	0.03		0.16		0.83		0.91		0.02		0.14		0.16		0.40	
Item:	(intercept)	0.57		0.75		0.12		0.33		0.22		0.47		0.83		0.91	
	GA (slope)	0.21		0.46		0.45		0.67		0.22		0.47		0.06		0.25	
	cAge (slope)	0.52		0.72		0.02		0.13		0.08		0.29		0.63		0.79	
With																	
Fixed effects	(b)	SE	z	Pr(> z)	(b)	SE	z	Pr(> z)	(b)	SE	z	Pr(> z)	(b)	SE	z	Pr(> z)	
Intercept	-0.12	0.18	-0.64	.52	-0.68	0.28	-2.73	< .01	-0.46	0.16	-2.92	< .01	-0.49	0.21	-2.30	.02	
GA (imp)	0.17	0.20	0.89	.38	0.40	0.27	1.51	.13	0.36	0.20	1.76	.08	0.17	0.21	0.80	.43	
Random effects	Variance		SD		Variance		SD		Variance		SD		Variance		SD		
Participant:	(intercept)	0.42		0.65		0.31		0.55		0.11		0.33		0.41		0.64	
	GA (slope)	0.39		0.63		0.03		0.18		0.09		0.30		0.51		0.71	
Item:	(intercept)	0.27		0.52		0.60		0.78		0.17		0.42		0.37		0.59	
	GA (slope)	0.21		0.46		0.64		0.80		0.17		0.41		0.04		0.19	
	c Age (slope)	0.05		0.23		0.20		0.45		0.81		0.91		0.03		0.17	
914 observations; 59 participants				752 observations; 47 participants				800 observations; 50 participants				704 observations ; 44 participants					

Table 4.11 Summary GLMM for (log odds) Source Selection: Effects for Intervening Text (IT) in each Year Group; Perfective and Imperfective items

Aspect	Year Group															
	Year 3 (7- to 8-years)				Year 4 (8- to 9-years)				Year 5 (9- to 10-years)				Year 6 (10- to 11-years)			
Perfective	Estimated coefficient				Estimated coefficient				Estimated coefficient				Estimated coefficient			
Fixed effects	(b)	SE	z	Pr(> z)	(b)	SE	z	Pr(> z)	(b)	SE	z	Pr(> z)	(b)	SE	z	Pr(> z)
Intercept	-0.04	0.22	-0.16	.87	-0.11	0.22	-0.47	.64	-0.01	0.20	-0.02	.98	-0.30	0.31	-0.97	.33
IT (with)	-0.10	0.29	-0.35	.73	-0.54	0.27	-1.97	.05	-0.40	0.23	-1.73	.08	-0.20	0.34	-0.61	.54
Random effects		Variance	SD			Variance	SD			Variance	SD			Variance	SD	
Participant:	(intercept)	0.71	0.84		0.90	0.95			0.89	0.94			1.99	1.41		
	IT (slope)	0.84	0.92		0.40	0.63			0.27	0.52			0.96	0.98		
Item:	(intercept)	0.41	0.64		0.31	0.56			0.18	0.42			0.52	0.72		
	cAge (slope)	0.55	0.74		0.01	0.09			0.45	0.67			0.35	0.59		
Imperfective																
Fixed effects	(b)	SE	z	Pr(> z)	(b)	SE	z	Pr(> z)	(b)	SE	z	Pr(> z)	(b)	SE	z	Pr(> z)
Intercept	0.17	0.20	0.87	.39	-0.02	0.20	-0.11	.92	0.63	0.23	2.74	< .01	0.44	0.23	1.88	.06
IT (with)	-0.12	0.25	-0.50	.62	-0.26	0.24	-1.11	.27	-0.68	0.23	-2.90	< .01	-0.74	0.27	-2.77	< .01
Random effects		Variance	SD			Variance	SD			Variance	SD			Variance	SD	
Participant:	(intercept)	0.46	0.68		0.89	0.94			1.17	1.08			3.48	1.86		
	IT (slope)	0.12	0.34		0.47	0.69			0.14	0.37			0.88	0.94		
Item:	(intercept)	0.34	0.59		0.16	0.40			0.24	0.49			0.76	0.87		
	c Age (slope)	0.04	0.19		0.01	0.06			0.38	0.62			0.14	0.37		
	944 observations; 59 participants				752 observations; 47 participants				800 observations; 50 participants				704 observations ; 44 participants			

4.3.3 Discussion

This experiment examined whether expressing events with imperfective or perfective grammatical aspect influenced 7- to 11-year-old children's resolution of a subsequent pronoun when these events were embedded within narratives. This effect was examined when the pronoun occurred immediately after the aspectual event and when there was intervening text between the aspectual event and the pronoun. This experiment used the same materials and age group as Experiment 4a, so also served to assess the reproducibility of the main findings reported previously.

The grammatical aspect with which events were expressed influenced children's pronoun resolution when the pronoun occurred immediately after the event: they were more likely to resolve the pronoun to the first mentioned, Source protagonist, when events were expressed with imperfective compared to perfective aspect. This tendency increased with age, it was a significant effect for 9- to 11-year-old children but not for 7- to 9-year-old children. The effect of age on children's sensitivity to imperfective aspect in this experiment is consistent with that seen in Experiment 4a and contrasts with that seen in Experiment 1a where aspectual events were presented as isolated sentences and no effects of age were observed. This suggests that children's sensitivity to imperfective aspect within a narrative context increases in the age range 7- to 11-years.

Intervening text significantly reduced the probability that a pronoun would be resolved to the Source protagonist but only for imperfectively and not perfectly expressed events and only for older children (9- to 11-years) but not for younger children (7- to 9-years). The pattern of results for older children is consistent with the findings of Experiment 4a, and suggests that children's use of world knowledge of

event durations, to modify their situation model as text proceeds, is developing within the age range 7- to 11-years.

4.4 Experiment 4c: The Effect of Grammatical Aspect on Children's Pronoun Resolution When There is a Delay Between the Aspectual Event and the Pronoun Continuation

In Experiment 4a intervening text significantly reduced older children's perception that imperfectly expressed events were ongoing. In contrast, intervening text had no influence on children's perception of the ongoingness of perfectly expressed events, which were considered completed immediately after the event and following intervening text. A similar effect of intervening text in the two aspectual conditions was seen in Experiment 4b where children were asked to resolve a pronoun: Intervening text significantly reduced older children's Source resolution for imperfectly expressed events but not for perfectly expressed events, children performed at chance for perfectly expressed events. The different effect of intervening text in the two aspect conditions in 4a and 4b suggests that older children use their world knowledge of the duration of events to modify their situation model of a text as a narrative proceeds. To examine if this effect was specific to narrative, Experiment 4c examined the effect of introducing a short delay between presentation of the aspectual sentence and a pronoun continuation. The stimuli were not embedded in narratives and protagonists were of different genders predicting a Goal bias interpretation of the pronoun in the perfective condition (see Experiments 2a and 2b, Chapter 2).

If older children use world knowledge of event durations to update their situation model, a delay in presentation of the continuation should have the same effect as that seen for intervening text in Experiments 4a and 4b. That is, following a

delay there should be an effect of age on children's Source resolution for imperfective items with a decrease in Source resolution for older children. There should also be no effect of age on children's Source resolution for perfective items.

4.4.1 Method

Participants

One hundred and eighty-three children from two rural Primary Schools in the North-East region of England that served mixed socioeconomic catchment areas participated in this study. All spoke English as their first language and were from four Year Groups. There were 41 children from Year Three, age 7- to 8-years (19 girls, $M = 8$ years, 1 month $SD = 4$ months); 52 children from Year Four, age 8- to 9-years (30 girls and 22 boy, $M = 9$ years, 1 month $SD = 4$ months); 46 children from Year Five, age 9- to 10-years (25 girls, $M = 10$ years, 1 month $SD = 3$ months) and 44 children from Year Six, age 10- to 11-years (24 girls, $M = 11$ years, 1 month $SD = 4$ months).

Materials and procedure

The stimuli consisted of the same 48 experimental items used in Experiment 2b Chapter 2, see Table 4.12 for examples and Appendix A for the full list. In these stimuli protagonists are of different gender. In Experiment 2b the aspectual sentence and continuation were shown on the same slide. In the current experiment the aspectual sentence was shown on one slide, and the pronoun choices and the continuation on the following slide. Two lists of 48 experimental items were prepared with the order of items kept the same across the lists but with the aspect of the verb in each item counterbalanced across the lists. Eighty-two participants received list A, eighty-nine participants received list B with approximately equal numbers of children in each Year Group receiving each list.

Table 4.12 *Stimuli Used in the Two Grammatical Aspect Conditions (List A)*

Protagonist	Grammatical Aspect	
	Perfective	Imperfective
Gender		
Female first	Carol _{source} brought a broken toy to Gary _{goal} . She/He groaned.	Alice _{source} was bringing a DVD to Aaron _{goal} . She/He groaned.
Male first	Josh _{source} brought a biscuit to Claire _{goal} . She/He grinned.	Alfie _{source} was bringing a voucher to Polly _{goal} . She/He grinned.

The task was administered as a group assessment in the children's classrooms using the whiteboard to display each numbered experimental item. The aspectual sentence for each item was displayed for 7 seconds in a timed PowerPoint presentation and read by the assessor. Following the aspectual sentence a second slide was presented with the pronoun choices and the continuation for the item. This was read out and displayed for 6 seconds. Children were required to circle their preferred pronoun in a booklet where the items were numbered and the pronoun choices and continuations were printed. A short break was allowed after every 8 items. The same explanation of the task and instructions were read to each Year Group and three practice items were administered. Any questions about the procedure were addressed before presentation of the experimental items.

4.4.2 Results

Twelve participants, out of a total of one hundred and eighty-three who were assessed, failed to provide responses for between one and three of the forty-eight

items. Seven of these participants were in Year Three, four in Year Four and one in Year Five. These participants' data were included in the analysis. The mean proportion of Source selections by Year Group and grammatical aspect condition are reported in Table 4.13.

Table 4.13 *Forced Choice with Delay: Mean Proportion of Source Selections (and Standard Deviations) in the Two Grammatical Aspect Conditions*

Year Group	Grammatical Aspect		Total
	Perfective	Imperfective	
Year 3 ($n = 41$)	0.33 (0.47)	0.41 (0.49)	0.37 (0.48)
Year 4 ($n = 52$)	0.35 (0.48)	0.37 (0.48)	0.36 (0.48)
Year 5 ($n = 46$)	0.32 (0.47)	0.36 (0.48)	0.34 (0.47)
Year 6 ($n = 44$)	0.32 (0.47)	0.32 (0.47)	0.32 (0.47)
($N = 183$)	0.33 (0.47)	0.36 (0.48)	0.35 (0.48)

Inspection of the mean proportions suggested that, children showed a Goal bias in each grammatical aspect condition (<.50 selection of the Source in all conditions). The mean proportions further suggested a decrease in children's tendency to select the Source protagonist in the imperfective condition with age but no effect of age on children's tendency to select the Source in the perfective condition. To examine this statistically, the analysis modelled the probability (log odds) of selecting the Source in a series of mixed effects binomial models in the R statistics environment (R Core Team, 2014) using the lme4 package (Bates et al., 2015). The same principles in model fit were followed as in previous experiments. As previously, the data was effect coded so that the intercept represented the likelihood that a child at mean age of

the sample (9 years, 7 months) selected the Source in the perfective condition (Dalal & Zickar, 2012). A summary of the final model is reported in Table 4.14.

Table 4.14 *Summary GLMM for (log odds) Source Selection (forced-choice task with delay): Effects for Grammatical Aspect (GA) and Centered Age*

Estimated coefficient				
Fixed effects	(<i>b</i>)	<i>SE</i>	<i>z</i>	Pr(> <i>z</i>)
(Intercept)	-0.83	0.10	-8.59	< .01
GA (imperfective)	0.17	0.05	3.29	< .01
cAge	-0.09	0.07	-1.37	.17
GA (imperfective): cAge	-0.08	0.04	-1.96	.05
Random effects			Variance	<i>SD</i>
Participant:	(intercept)		0.83	0.91
	GA (slope)		0.01	0.08
Item:	(intercept)		0.17	0.41
	GA (slope)		0.01	0.10
	cAge(slope)		0.02	0.13

8765 observations; 183 participants, 48 items

Consistent with Experiments 2a and 2b, the intercept coefficient was significant and negative showing that children were more likely to select a Goal than a Source consistent pronoun as the subject of a continuation when a transfer event with different gender protagonists was expressed with perfective aspect. The age coefficient was not significant showing that, children's age did not influence Source resolution in the perfective aspect condition. This is consistent with Experiment 4b showing that following intervening text (Experiment 4b) and a delay (current experiment) age did not influence children's Source resolution for perfective items.

The coefficient for the aspect (imperfective): age effect was negative and significant. This was also consistent with Experiment 4b showing that following intervening text (Experiment 4b) and a delay (current experiment) the tendency to select the Source in the imperfective condition decreased with age. The nature of the significant, negative coefficient of the aspect (imperfective): age effect was further examined by examining the effect of aspect in each of the Year Groups separately. Random intercepts and slopes were included as previously.

Table 4.15 presents the inferential statistics for the effects of grammatical verb aspect for each Year Group separately. Comparison of the effect of imperfective aspect in each of the Year Groups shows that, imperfective aspect significantly increased Source selection for the youngest children aged 7- to 8-years and children aged 9- to 10-years but the effect was reduced for the older age group. It also shows that imperfective aspect did not significantly increase Source selection for children aged 8- to 9-years and 10- to 11-years. This pattern of results explains the negative value of the imperfective aspect: age coefficient in the main analysis and shows that the effect of imperfective aspect on Source selection following a delay decreased with age.

Table 4.15 *Summary GLMM's for (log odds) Source Selection (forced-choice task with delay): Effects for Grammatical Aspect (GA) within each Year Group Separately*

Fixed effects	Year Group															
	Year 3 (7- to 8-years)				Year 4 (8- to 9-years)				Year 5 (9- to 10-years)				Year 6 (10- to 11-years)			
	Estimated coefficient (b)	SE	z	Pr(> z)	Estimated coefficient (b)	SE	z	Pr(> z)	Estimated coefficient (b)	SE	z	Pr(> z)	Estimate d coefficient (b)	SE	z	Pr(> z)
Intercept	-0.75	0.11	-6.49	< .01	-0.71	0.15	-4.74	< .01	-0.99	0.21	-4.93	< .01	-0.94	0.19	-4.90	< .01
GA (imp)	0.35	0.11	3.35	< .01	0.12	0.11	1.13	.26	0.24	0.10	2.24	.03	0.01	0.10	0.13	.90
Random effects	Variance		SD		Variance		SD		Variance		SD		Variance		SD	
Participant:(intercept)	0.31		0.56		0.68		0.82		1.53		1.24		1.19		1.09	
GA (slope)	<0.01		0.03		0.01		0.11		0.02		0.15		0.01		0.09	
Item: (intercept)	0.03		0.17		0.24		0.49		0.27		0.52		0.52		0.72	
GA (slope)	0.05		0.22		0.13		0.36		<0.01		0.05		0.40		0.60	
Age (slope)	0.11		0.33		0.03		0.16		0.33		0.57		0.64		0.80	
1956 observations; 41 participants				2490 observations; 52 participants				2207 observations; 46 participants				2112 observations ; 44 participants				

4.4.3 Discussion

The aim of Experiment 4c was to determine whether the effect of intervening text on children's subject choice for a continuations following imperfectly and perfectly expressed events seen in Experiment 4b, would also be demonstrated when a short delay occurred between presentation of the aspectual sentence and the continuation. The results showed the same pattern as seen in Experiment 4b.

In Experiments 4b and 4c there was no effect of age on children's Source resolution of a pronoun in the perfective condition. In contrast, in both experiments children's Source resolution of a pronoun in the imperfective condition decreased with age. In Experiment 4b this decrease was observed when intervening text occurred between the aspectual event and the pronoun. In Experiment 4c this decrease was observed when a delay occurred between the aspectual event and the pronoun. The similarity of the findings supports the conclusion that children's use of world knowledge of the duration of events to modify their situation model of a text increases in the age range 7- to 11-years.

4.5 General Discussion

The experiments in this chapter demonstrated that children's sensitivity to imperfective aspect in a narrative context increases in the age range 7- to 11-years. When asked immediately after an event, children's perception that imperfectly expressed events were ongoing increased with age as did their Source resolution of an ambiguous pronoun. When there was intervening text between the aspectual item and the question, children's perception that imperfectly expressed events were ongoing decreased with age and similarly their Source resolution also decreased with age. There were no effects of age on children's perception of the ongoingness of perfectly expressed events or children's resolution of pronouns following

perfectively expressed events. The experiments in Chapters 2 and 3 found no effect of age on children's sensitivity to imperfective aspect when stimuli were presented as isolated sentences. In contrast, the findings of the experiments in this chapter provide converging evidence that children's sensitivity to imperfective aspect in a narrative context increases between 7-to 11-years.

A consistent finding in the narrative experiments in this chapter was that intervening text, which was neutral with respect to the passage of time within the narrative, had different effects following imperfectively and perfectively expressed events. It reduced older children's judgement that imperfectively expressed events were ongoing but did not influence children's judgement of the completion status of perfectively expressed events. Similarly, it reduced older children's Source resolution for imperfectively expressed events but did not influence children's Source resolution for perfectively expressed events. A delay between the aspectual event and a pronoun continuation had the same effect as intervening text: there was an age decrease in Source resolution for imperfectively expressed events but not for perfectively expressed events. These findings provide converging evidence that like adults, older children take into account the temporal characteristics with which events are expressed and the inherent duration of events themselves in their construction of situation models during narrative comprehension.

Although the pattern of effects found in the two narrative experiments were similar, children's Source resolution of the pronoun was not always consistent with their judgement of events ongoingness. For example, children were more likely than chance to judge that perfectively expressed events were completed when the question was asked immediately after the aspectual event (Experiment 4a) predicting a Goal bias interpretation of the pronoun in the same condition in Experiment 4b. However

this was not observed: children were equally likely to select the Source or Goal as the referent of the pronoun. Children's chance resolution of the pronoun in the perfective condition of Experiment 4b contrasts with a Goal bias interpretation when aspectual events were presented as isolated sentences (Experiment 1a, Chapter 2). The Source protagonist was always the subject of the aspectual events in the isolated sentences experiment and the narrative context experiment. The finding of a chance interpretation of the pronoun in Experiment 4b suggests that a narrative context increases the likelihood that children will resolve a pronoun to the previous clause subject (even for a perfectly expressed event with an endpoint). This interpretation is consistent with previous research which has found subject bias interpretations of ambiguous pronouns for young children when protagonists have been subjects of the previous sentences in narratives (Hartshorne et al., 2015; Pyykkonen et al., 2010; Song & Fisher, 2005).

The question remains as to why imperfective aspect results in more frequent resolutions of an ambiguous pronoun to the Source protagonist than perfective aspect. The results of experiments so far in this thesis could be interpreted as suggesting that imperfective aspect focuses attention on Source protagonists and perfective aspect focuses attention on Goal protagonists. There is however another explanation. Rather than aspect having an effect on the 'activation' of particular protagonists in comprehenders' situation models, it has been suggested that the aspect with which a transfer event is expressed signals the likelihood that a particular coherence relationship will occur subsequent to the event and that Sources and Goals are not equally likely to be the subject of these different coherence relations (Kehler & Rohde, 2013a). The next chapter examines the coherence relations that follow imperfectively and perfectly expressed transfer events in a corpus of literature

written for children. This is to determine to what extent children may expect particular coherence relations to occur following such events. Whether Sources and Goals appear as the subject of different coherence relations with different frequencies will also be examined.

Chapter 5: The Imperfective and Perfective Expression of Events in a Corpus of Children's Literature.

5.1 Introduction

The experiments in Chapter 4 showed that when transfer of possession events were embedded in narratives, children's sensitivity to the imperfective expression of events increased within the age range 7- to 11-years. For example, the frequency with which children judged imperfectively expressed events, such as Janet *was taking* a lemon to Carol as ongoing, increased with age. In contrast no age effects were observed for the completion status of perfectly expressed events, such as Darren *took* a box of eggs to Jimmy.

Exposure to print is a key driver of language development for children in the age range examined by this thesis (7- to 11-years) influencing vocabulary development (Cain & Oakhill, 2011) and syntactic processing (Montag & Macdonald, 2015). The research in this chapter examines whether the frequency with which events are expressed with imperfective and perfective aspect within a corpus of literature read by children across the age range 7- to 11-years changes with readership age. If so, this might provide a causal explanation for the developmental pattern found in the experiments reported in Chapter 4. This chapter also examines the coherence relations that follow imperfectively and perfectly expressed transfer events in the children's corpus and the frequency with which Goals and Sources are re-mentioned as the subject of these relations. The reason for this is explained next.

Two current accounts of adults' pronoun processing, The Expectancy Hypothesis (Arnold, 2001) and the Event Structure Hypothesis (Kehler et al., 2008), provide alternative explanations for the influence of grammatical verb aspect on pronoun resolution. The Expectancy Hypothesis (Arnold, 2001) suggests that adults'

mental model of events includes re-mention biases for particular protagonists which determine the 'activation' of protagonists in adults' mental models. This account suggests that pronouns are used to refer to protagonists achieving the highest level of 'activation'. In this account protagonist re-mention biases are the product of multiple influencing factors, for example the grammatical and thematic status of protagonists and the aspect with which events are expressed. The possibility that re-mention biases are computed afresh 'on the spot' in a complex evaluation of the current context or acquired through experience and observation of language use and applied when particular circumstances arise are both allowed in this account.

Support for a re-mention bias for protagonists occupying particular grammatical and thematic roles has been demonstrated in studies where adults have been asked to provide continuations following transfer of possession verbs without pronoun prompts (Arnold, 2001; Stevenson et al., 1994). Similarly, the grammatical aspect with which transfer of possession events are expressed has been noted to influence adults' re-mention bias for Goal protagonists in bare prompt conditions (Ferretti et al., 2009). Relevant to the current chapter, in a corpus analysis of transcripts from the Canadian Parliament, Arnold (2001) found that Goals were more likely to be re-mentioned than Sources within a data set that included both Source-Goal and Goal-Source transfer events.

The Event Structure Hypothesis, (Rohde et al., 2006) also accords a role for protagonist re-mention biases in adults' pronoun resolution but in this model the re-mention bias applies regardless of the form of reference ultimately used to refer to protagonists and it is characterised as an epiphenomenon of a more general tendency for adults to expect particular coherence relations to follow events varying in context. It is argued that different coherence relations have different protagonists as their

grammatical subject and it is this that manifests the appearance of a re-mention bias for particular protagonists. The evidence for this comes from analysis of the continuations adults provide following perfectly and imperfectly expressed transfer of possession events with protagonists of the same gender (Rohde et al., 2006).

In the Rohde et al. (2006) experiment, a pronoun was always given as the start of the continuation and the continuations once collected were classified as falling into one of the five coherence relations described in Table 5.1 below. The continuations following perfective stimulus sentences had a significantly different coherence distribution from those following imperfective stimulus sentences. Perfective stimulus sentences were most often followed by continuations falling into the coherence relation categories of Occasion, Elaboration or Explanation with few Result and Parallel relations as shown in the table. Imperfective stimulus sentences yielded continuations that were dominated by a large proportion of Elaboration relations (49% of continuations) and a smaller proportion of Occasion relations (31% of continuations).

Rohde et al. (2006) examined pronoun resolution choices following perfective stimulus sentences. If perfective aspect focuses attention on Goal protagonists then a Goal interpretation of the pronoun would be expected in all continuations regardless of their coherence relation classification. This was not found. Goal interpretations of the pronoun dominated continuations classified as Occasions, whilst Source interpretations were more frequent for continuations classified as Elaborations or Explanations (as shown in the example continuations given in Table 5.1). The authors suggest that, because the Goal preference following a perfectly expressed event is restricted to the Occasion relation, this demonstrates that adults' re-mention bias is

conditioned on the type of relation that is inferred to hold between two clauses rather than simply an expectation that a particular protagonist will be re-mentioned.

In the experiments so far conducted in this thesis, children have been provided with continuations comprising a pronoun and a verb expressing an action that could be attributed to either the Source or Goal protagonist in a transfer of possession event, for example, *She smiled*. These continuations were written to ensure that several different coherence relations could be inferred to hold between the aspectual items and the continuations. For example, for 5.1 below, *She smiled* could be interpreted as having an Occasion coherence relation with the previous clause i.e. Jasmine smiled after receiving the present or Result coherence relation i.e. Jasmine smiled as a result of receiving the present. It could also be interpreted as having an Elaboration coherence relation with the previous clause i.e. Becky smiled as she was taking/took or Parallel coherence relation i.e. as well as taking, Becky smiled.

(5.1) Becky_{source} was taking/took a birthday present to Jasmine_{goal}. *She smiled*.

In these examples Goal protagonists are the subject of Occasion and Result coherence relations and Source protagonists are the subject of Elaboration and Parallel relations, in line with the most commonly found subjects of these relations in adults' continuations (Rohde, Kehler, & Elman, 2006). The more frequent Goal resolution of the pronoun by children in the perfective condition compared to the imperfective condition found so far in the experiments in this thesis may result because like adults, children are more likely to infer Occasion or Result relations following perfectly expressed events and to infer Elaboration or Parallel relations following imperfectly expressed events.

In summary, the current chapter examines the frequency with which events are expressed with imperfective and perfective aspect in a corpus of children's literature

read by children in the age ranges 7- to 8-years, 8- to 9-years, 9- to 10-years and 10- to 11-years. An increase in the imperfective expression of events in books read by older children may explain the greater sensitivity to imperfective aspect observed in older children in the experiments of Chapter 4. The analysis then examines the coherence relations that follow imperfectively and perfectly expressed transfer events. A difference in coherence relations following imperfectively and perfectly expressed events would support the view that grammatical aspect provides a cue as to likelihood that particular relations follow transfer events. The grammatical subject of the different coherence relations is then examined. A Goal re-mention bias across all relations would support the Expectancy Hypothesis; the restriction of a Goal re-mention bias to the Occasion coherence relation would support the Event Structure Hypothesis. Finding a bias in the re-mention of particular protagonists or in the frequency with which particular coherence relations follow transfer events differing in grammatical aspect would provide some insight into the pattern of pronoun resolution shown by children in Chapters 2-4.

Table 5.1 *Coherence Relation Definitions and Examples of Continuations Collected in the Perfective Condition for the Stimulus**Matt passed a sandwich to David. He...*

Coherence relation	Definition	Example continuation	% frequency
Occasion	Infer a change of state from the second sentence, taking its initial state to be the final state of the eventuality described in the first sentence.	<i>...ate it up.</i>	43.2
Elaboration	Infer that both sentences provide descriptions of the same eventuality.	<i>...gave a ham one to him.</i>	31.5
Explanation	Infer that the second sentence describes a cause or reason for the eventuality described in the first sentence.	<i>...didn't want David to starve.</i>	18.2
Result	Infer that the first sentence describes a cause or reason for the eventuality described in the second sentence.	<i>...thanked Matt.</i>	0.5
Parallel	Infer that the first and second sentences express similar eventualities, as if each provides a partial answer to a common question.	<i>...gave a drink to Maria.</i>	0.2

5.2 Method

Corpus Construction

The corpus was constructed from the entire digital text of the 11 books shown in Table 5.2. These books were the five most frequently read books in Year Groups 3- to 6, between August 1 2016 and July 31 2017 (Dundee University 2018 reading report). The word counts for each of the books and their graded level of difficulty as determined by their ATOS score are also given. The ATOS formula determines the readability of a book taking four factors into account: average sentence length, average word length, word difficulty level and total number of words in a book.

Table 5.2 *Books Included in the Corpus*

Book Title	Author	ATOS	Read by Year Groups	Word Count
Don't be Horrid Henry	Francesca Simon	2.3	3	608
The Gruffalo	Julia Donaldson	2.3	3	687
The Magic Finger	Roald Dahl	3.1	3,4	3724
George's Marvellous Medicine	Roald Dahl	4.0	3,4	11963
Fantastic Mr Fox	Roald Dahl	4.1	4	9387
The Twits	Roald Dahl	4.4	3,4,5	8265
Gangsta Granny	David Walliams	4.9	5,6	30285
Diary of a Wimpy Kid	Jeff Kinney	5.2	4,5,6	19784
Diary of a Wimpy Kid	Jeff Kinney	5.2		
Rodrick Rules			5,6	20165
Diary of a Wimpy Kid	Jeff Kinney	5.5		
Double Down			6	19416
The Midnight Gang	David Walliams	6.0	5,6	44834
Total				169118

Corpus Extraction

All sentences containing the verb forms shown in Table 5.4 were extracted from this corpus for analysis. The sentences immediately following these context sentences were also extracted for the coherence relation analysis. These verb forms were examined for the following reasons.

The experiments in this thesis have used the **Past Progressive Tense** (e.g. was giving) to convey ongoing events (imperfective Aspect) and the **Simple Past Tense** (e.g. gave) to convey completed events (perfective aspect). This was in keeping with the majority of adult research investigating the effect of grammatical verb aspect on adults' mental representation of events (Becker et al., 2013; Ferretti et al., 2009; Madden & Zwaan, 2003; Magliano & Schleich, 2000; Morrow, 1985). Tense describes how events are sequenced with reference to some narrative time line: grammatical aspect describes the internal temporal characteristics of individual events within this time frame. It is therefore possible to express events with imperfective or perfective aspect in tenses other than the Past Progressive and Simple Past, shown below in Table 5.3. A minority of adult research has used the **Past Perfect Tense** (e.g. had given) rather than the **Simple Past Tense** (gave) to convey perfective aspect (Carreiras et al., 1997; Ferretti et al., 2007; Madden & Therriault, 2009). Perfect Tenses use the past participle of the verb (e.g. given) in their construction and for some verbs this participle can differ from the Simple Past form of the verb (e.g. gave).

Table 5.3 *Tenses Expressing Events with Imperfective and Perfective Aspect*

Aspect	Tense	Example
Imperfective	Past Progressive	<i>was giving</i>
	Present Progressive	<i>is giving</i>
	Future Progressive	<i>will be giving</i>
	Past Perfect Progressive	<i>had been giving</i>
	Present Perfect Progressive	<i>has been giving</i>
	Future Perfect Progressive	<i>will have been giving</i>
Perfective: Simple	Simple Past	<i>gave</i>
	Perfect Past Perfect	<i>had given</i>
	Present Perfect	<i>has given</i>
	Future Perfect	<i>will have given</i>

To capture the frequency with which transfer of possession verbs were expressed in the corpus with imperfective or perfective aspect, across the range of tenses illustrated in Table 5.3, the verb forms given in Table 5.4 were used as the search item. The extraction was performed for the eight transfer of possession verbs used previously to construct accomplishment items in Chapter 3. The extraction was also performed for the eight verbs used to construct activity items in Chapter 3 to provide a comparison.

Table 5.4 *Verb Forms Extracted From the Corpus*

Verb forms used previously for	Verb forms used previously for
Accomplishment items	Activity items
handing, handed,	playing, played
tossing, tossed	watching, watched
chucking, chucked	studying, studied
carrying, carried	talking, talked
taking, took, taken*	standing, stood
giving, gave, given*	drinking, drank, drunk*
bringing, brought	speaking, spoke, spoken*
throwing, threw, thrown*	running, ran, run*

*Irregular Past participles, not used in previous items but used in Past Perfect constructions

A total of 854 sentences containing these verb forms were extracted from the corpus. There were roughly equal numbers of sentences containing verbs used previously for accomplishment items (432) and activity items (422). The tense of the extracted verb forms was next established using the classification scheme included in Appendix D. Non-finite uses of the present participle for example *carrying* in 5.1, were noted and included as a separate category within the tense classification scheme.

(5.1) He marched right out *carrying* a snow shovel, and I thought I was going to have to make a run for it.

A second rater classified the tense of the extracted verb forms using the same scheme, agreement was 99.9% with the classification of three items being agreed by discussion.

Frequency of Imperfectively Expressed Events by Year Group.

The experiments in Chapter 4 used Past Progressive and Simple Past tense to convey imperfective and perfective aspect respectively. To examine the possibility that transfer events are expressed with imperfective aspect with increasing frequency in books read by children in the age range 7- to 11-years, the relative frequency with which transfer events were expressed with Past Progressive (17 examples) and Simple Past tense (275 examples) in the extracted sample was examined by Year Group. To provide a comparison, the relative frequency of these verb forms for verbs used to create activity items in Chapter 3 was also examined (Past Progressive 82 examples, Simple Past 165 examples).

Coherence Relations Following Transfer of Possession Events.

To allow comparison of coherence relations following transfer events in the corpus with those found in previous research with adults (Rohde et al., 2006), the full extracted sample was reduced to include only events having the same structure as in the adult research. This entailed, in the first instance, only including events that expressed transfer events with Past Progressive and Simple Past tense (292 sentences in total). This sample was further reduced to include only instances where the event included an explicit Source and Goal (206 sentences). Sources were defined as protagonists performing the transfer, Goals were defined as the recipient of the transfer or a place using the scheme included in Appendix D (see 5.2 for examples). A second rater performed the Source-Goal classification; agreement was 97.5% disagreements were agreed by discussion. Finally, this sample was further reduced to include only instances using the propositional frame X_{source} was taking/took Z to Y_{goal} . The application of these criteria reduced the sample to 33 sentences (shown in

Appendix D); all these expressed the transfer event with Simple Past tense (perfective aspect).

For each of these 33 events the next “independent” event was identified in subsequent text. In the majority of cases, the next independent event following the transfer was the start of the next sentence as shown underlined in 5.2 (a). Events were judged as independent if they were finite, not a sentential complement of the matrix clause and not a relative clause as in the Arnold (2001) corpus analysis. Complement clauses generally start with: *that*; *wh-* pronouns; *present participles* (-ing) or *infinitives*. Relative clauses start with *who*, *whose*, *which*, *where*, *when*. Further examples of events judged as independent are underlined in 5.2 (b) - (e), subsequent clauses or text not fitting the above independent event criteria are shown in italics for illustration.

- (5.2)
- | | | | |
|----|---|----------------|---|
| a. | He _{source} opened the can in the kitchen and | handed | it to George _{goal} . <u>George poured the paint into the saucepan.</u> |
| b. | She _{source} | took | me down to Scotty’s house _{goal} and <u>explained the situation to his mother.</u> |
| c. | I picked out this cool video game that just came out, and I _{source} | handed | it to Mom _{goal} <u>so she could pay for it.</u> |
| d. | Rowley’s birthday party is tomorrow, so Mom _{source} | took | me to the mall _{goal} <i>to get him a gift.</i> <u>I picked out this cool video game that just came out</u> and handed it to Mom so she could pay. |
| e. | The Kid _{source} who played Toto | brought | a stool and a pile of comic books on to the stage _{goal} , <i>and that totally ruined the whole “dog” effect.</i> <u>When it was time for the forest scene me and the other Trees hopped into our positions.</u> |

The coherence relation between the transfer and the independent event was next determined using the classification scheme included in Appendix D. This scheme

included the five coherence relations used by Rohde et al. (2006), shown in Table 5.1 and also a sixth category (other) to include events which could not be otherwise classified. A second rater also performed the classification with 100% agreement.

Frequency of Goal and Source Re-mentions Following Transfer Events

Previous research with adults has examined the frequency with which Goals and Sources are re-mentioned in adults' continuations following Source-Goal transfer events having the propositional frame X_{source} transfer verb Z to Y_{goal} . Stevenson et al (1994) found a Goal re-mention bias in adults' continuations where the protagonists were the same gender and the transfer was expressed with Simple Past Tense (perfective aspect, e.g. took). The presence of a pronoun, at the start of the continuation, reduced adults' re-mention bias for the Goal in Source-Goal transfers (Rohde et al., 2006; Stevenson et al., 1994). Ferretti et al (2009) also found a Goal re-mention bias in adults' continuations following Source-Goal transfer events where protagonists were different genders and the transfer was expressed with Past Progressive or Simple Past Tense (imperfective aspect, e.g. was taking and perfective aspect e.g. took respectively).

Likewise, Arnold (2001) found a Goal re-mention bias following perfectly expressed transfer events in a corpus of transcripts from the Canadian Parliament. Arnold's study included Source-Goal transfer events (X_{source} transfer verb Z to Y_{goal}) as above and also Goal-Source transfer events with the propositional frame X_{goal} transfer verb Z from Y_{source} . In Arnold's study the infinitive verb form (for example Source-Goal *give* Goal-Source *get*) was used to extract transfer events from the corpus. The use of this verb form as the search item necessarily restricts the aspect of the extracted examples to a range of tenses having perfective aspect including for example the Present Simple, we give; the Future Simple, we will give, we are going to

give; the Conditional Simple, we would give and expressions using modal verbs for example we must/could/should give.

Re-mention biases in the children's corpus were examined by identifying the subject of the previously coded 'independent' events following transfer events expressed within the frame X_{source} was taking/took Z to Y_{goal} . Subjects were coded as being co-referent with the previous Source, Goal, Item or as Other. Interrater agreement for the coding was 100%.

Frequency of Goal and Source Subjects within Coherence Relations

Rohde et al. (2006) examined the frequency of Goal and Source re-mentions in the subset of adults' continuations that referred unambiguously to either of these protagonists. For perfectly expressed transfer events, they found a Goal re-mention bias in Occasion relations and a Source re-mention bias in Elaboration and Explanation coherence relations. To gain an overview of the extent to which these biases may be represented in children's literature, the current analysis examined the frequency with which Source and Goals were the subject of the different coherence relations against the background of mentioning other protagonists or the item being transferred.

5.3 Results

Frequency of Imperfective and Perfective Expressions in the Corpus.

The frequency with which the extracted verb forms occurred in different tenses is shown in Table 5.5. The table shows that, within the corpus, transfer events were more often expressed as completed events with verb forms from the perfective aspect category than as ongoing events with verb forms using imperfective aspect. The table also shows that events were described with Simple Past tense (e.g. handed) more frequently than Past Perfect tense (e.g. had handed). The same pattern was

observed for verbs that had previously been used for activity events however it appeared that these verbs were more likely to be expressed with imperfective aspect and less likely to be expressed with perfective aspect than the transfer event verbs. A Chi square test of independence confirmed that the distribution of Past Progressive and Simple Past occurrences differed between the two groups of verbs ($\chi^2(1, N = 539) = 66.89, p < .001$).

Table 5.5 *Frequency of Verb Forms*

Aspect	Tense	Verbs used for Accomplishment		Verbs used for Activity		
		Frequency	Percent	Frequency	Percent	
Imperfective	Past Progressive	17	3.9	82	19.4	
	Past Progressive (other meaning)	2	0.5			
	Past Progressive (modal)	2	0.5			
	Present Progressive	10	2.3	26	6.2	
	Present Progressive (modal)			1	0.2	
	Future Progressive	1	0.2	3	0.7	
	Past Perfect Progressive			2	0.5	
	Present Perfect Progressive	2	0.5	7	1.7	
	Conditional Progressive	1	0.2	3	0.7	
	Perfective: Simple	Simple Past	275	63.7	165	39.1
Simple Past (other meaning)		15	3.5			
Simple Past (passive)		9	2.1			
Simple Past (conditional)		1	0.2			
Perfect		Past Perfect	17	3.9	4	0.9
		Past Perfect (other meaning)	3	0.7		
		Past Perfect (modal)	2	0.5		
		Past Perfect (passive)	3	0.7		
		Present Perfect	9	2.1	3	0.7
		Present Perfect (other meaning)	1	0.2		
		Present Perfect (modal)	6	1.4	1	0.2
		Present Perfect (passive)	1	0.2		
		Present Perfect (conditional)	1	0.2		
		Future Perfect (passive)	1	0.2		
Non Finite		53	12.3	125	29.6	
		432	100.0	422	100.0	

Frequency of Imperfectively Expressed Events by Year Group

The relative frequency with which transfer events were expressed with Past Progressive Tense (imperfective aspect) and Simple Past Tense (perfective aspect) in books read by children in Years 3, 4, 5, and 6 is shown in Table 5.6. The relative frequency with which activity item verbs were expressed with these tenses is given for comparison. The full distribution of the extracted verbs by Year Group is included in Appendix D.

The infrequent occurrence of Past Progressive expressions of transfer events in the extracted sample limits any firm conclusions that can be drawn regarding Year Group trends. In this sample, Table 5.6 shows that Past Progressive instances of transfer events did not appear to increase relative to Simple Past occurrences across the Year Groups. In contrast, across the Year Groups, there did appear to be an increase in occurrence of Past Progressive compared to Simple Past expressions of verbs used previously for activity items. This suggests a general increase in frequency with which events are described as ongoing in children's literature across the Year Groups 3- to 6, but these instances were too low to enable statistical analysis. The possibility of a developmental trend could be examined further in a larger corpus of children's literature.

Table 5.6 *Relative Frequency of Past Progressive (imperfective) and Simple Past (perfective) Verb Forms by Year Group*

	Y3		Y4		Y5		Y6	
Accomplishment	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Past Progressive	4	7.1	9	8.1	10	4.8	12	5.4
Simple Past	52	92.9	102	91.9	200	95.2	209	94.6
	56	100	111	100	210	100	221	100
Activity								
Past Progressive	9	17.0	19	23.5	66	38.2	71	39.7
Simple Past	44	83.0	62	76.5	107	61.8	108	60.3
	53	100	81	100	173	100	179	100
Total								
Past Progressive	13	11.9	28	14.6	76	19.8	83	20.1
Simple Past	96	88.1	164	85.4	307	80.2	317	79.3
	109	100	192	100	383	100	400	100

% = relative frequency. NB instances of Past Progressive > than shown in Table 5.3 because some books were read by more than one Year Group.

Coherence Relations Following Transfer of Possession Events.

One of the aims of the corpus analysis was to examine the coherence relations following imperfectly and perfectly expressed transfer events having the same structure as that used in previous research with adults (i.e. X_{source} was taking/took Z to Y_{goal}) (Rohde et al., 2006). Applying the criteria that transfer events must have an explicit Source and Goal and the Goal must be the object of the prepositional phrase *to* returned a sample of 33 examples (see Appendix D). Each expressed the event with perfective aspect. This did not permit an analysis of coherence relations following imperfectly expressed events.

A summary of the coherence relations following perfectly expressed transfer events with the above structure is shown in Table 5.7.

Table 5.7 *Coherence Relations Following Perfective Transfer of Possession Events*

Coherence relation	Goal, Source, Item, other subjects		Goal, Source subjects		Rohde et al. (2006) Goal, Source subjects	
	Frequency	%	Frequency	%	Frequency	%
	Occasion	19	57.6	13	61.9	195
Elaboration	3	9.1	2	9.5	142	31.5
Explanation	3	9.1	2	9.5	82	18.2
Result	2	6.1	1	4.8	24	5.3
Parallel	2	6.1	1	4.8	8	1.8
Other	4	12.1	2	9.5		
Total	33	100	21	100	451	100

The first two columns include instances where the subject of the coherence relation could be the Goal, Source, Item or other. This indicates the overall frequency

with which these relations followed perfectly expressed transfer events in the corpus. The second two columns include instances where the subject of the coherence relation was restricted to just the Goal or Source. This restriction was to allow comparison of the pattern of frequencies with the Rohde et al. (2006) adult findings, (third two columns) where coherence relations were examined in adults' continuations with just Goal or Source subjects.

Table 5.7 shows that Occasion relations were the most frequently occurring relation following perfectly expressed transfer events in the children's corpus. This is consistent with adult findings. However, the data also suggest that, whilst the distribution of coherence relations in the children's corpus was broadly similar to that found with adults, Occasion relations dominated the children's corpus to a greater extent than the adult corpus. This pattern may have arisen due to 'task' differences: when adults write for children they may produce a more limited range of coherence relations following transfer events than when they are asked to provide continuations in experimental conditions. This pattern may also simply reflect the limited number of examples of perfectly expressed transfer events within the frame X_{source} took the Y to Z_{goal} in the children's corpus.

To examine these possibilities, the coherence relations following transfer events with two other structures were examined. First, the extracted sentences with explicit Sources and Goals were searched for examples of the structure X_{source} was taking/took Z_{goal} the Y . This returned a sample of 71 sentences (3 Past Progressive (imperfective), 68 Simple Past (perfective)), examples are shown in 5.3 and the full sample is given in Appendix D.

- (5.3) a. I_{source} **gave** him_{goal} the money, and he turned over the paper.
- b. The porter_{source} **gave** Tom_{goal} a dinner plate *to pass to Sally*. It had been drawn on with black felt-tip pen to make it look like a steering wheel.

Second, the extracted sentences with explicit Sources and Goals were examined for instances where propositions other than *to* had been used in the structure X_{source} was taking/took Z *preposition* Y_{goal}. This returned a sample of 40 sentences (all Simple Past), examples are shown in 5.4 (a)-(b) and the full sample given in Appendix D. This structure broadened the range of transfers to include instances where the verbs had been used in Goal-Source frames, examples are shown in 5.4 (c)-(d).

- (5.4) a. He_{source} **carried** the cup *into* the living-room_{goal}. Grandma sipped the tea.
- b. Tom_{source} **took** one last look *at* his friends_{goal}. Sally smiled back, but Thews yanked Tom's arm and the tall doors swung open and shut.
- c. Without making a sound, he **took** his bike *out of* the garage_{source}, and cycled to Granny's house one last time.
- d. While he_{goal} was spluttering, the superior officer_{goal} **took** the walkie-talkie *from* PC Fudge_{source}. "Yep. Uh-huh. Right. Thank you," he said. He turned to Ben and Granny.

The coherence relations following these two different structures were classified using the same scheme as previously. The full classification of the events is included in Appendix D. A summary of coherence relations following perfectly expressed transfer events in these structures is shown in Table 5.8.

Table 5.8 *Coherence Relations Following Perfective Transfer of Possession Events with Alternative Structures*

	X _{source} took Z _{goal} the Y				X _{source/goal} took Z _{preposition} Y			
					goa/source1			
	Goal, Source, Item, Other subjects		Goal, Source subjects		Goal, Source, Item, Other subjects		Goal, Source subjects	
Coherence relation	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Occasion	42	61.8	31	67.4	24	60.0	18	60.0
Elaboration	11	16.2	6	13.0	7	17.5	4	13.3
Explanation	3	4.4	2	4.3	1	2.5	1	3.3
Result	3	4.4	2	4.3	5	12.5	5	16.7
Parallel	5	7.4	4	8.7	1	2.5	1	3.3
Other	4	5.9	1	2.2	2	5.0	1	3.3
Total	68	100	46	100	40	100	30	100

Table 5.8 shows that, as with the previous structure, Occasion relations were the most frequent relation following perfectly expressed transfer events. Analysis of the combined three structures data set showed that, the six coherence relations (with only Goal or Source subjects) were not equally likely to follow perfectly expressed event ($\chi^2(5, N = 97) = 158.40, p < .001$). Overall, the frequencies suggest a general tendency for Occasion relations to follow perfectly expressed transfer events.

Who is mentioned next after Transfer events?

The frequencies with which Goals, Sources, Items or Other entities were re-mentioned as the subject of the next independent event following perfectly expressed transfer events are shown in Table 5.9. The frequencies do not suggest a strong Goal bias generally. Looking only at the relative frequency of Goal and Source re-mentions in the three structures separately, there was a Goal bias in the extracted sample with the structure $X_{\text{source}} \text{ took } Z_{\text{goal}} \text{ Y}$ ($\chi^2(1, N = 46) = 4.26, p = .04$) but not in the other two structures. Overall across the three structures, there was no evidence of a Goal bias ($\chi^2(1, N = 97) = 2.98, p = .08$).

Table 5.9 *Re-mention Biases Following Perfective Transfer of Possession Events*

Subject	$X_{\text{source}} \text{ took } Y \text{ to } Z_{\text{goal}}$		$X_{\text{source}} \text{ took } Z_{\text{goal}} \text{ Y}$		$X_{\text{source/goal}} \text{ took } Z_{\text{preposition } Y_{\text{goal/source}}}$	
	Frequency	%	Frequency	%	Frequency	%
Goal	11	33.3	30	44.1	16	40.0
Source	10	30.3	16	23.5	14	35.0
Item	3	9.1	6	8.8	-	-
Other	9	27.3	16	23.5	10	25.0
Total	33	100	68	100	40	100

Frequency of Goal and Source Subjects within Coherence Relations

Figure 5.1 shows the frequency with which Goals, Sources, Items and Other entities were re-mentioned as the subject of different coherence relations following the perfective expression of the three transfer of possession structures combined.

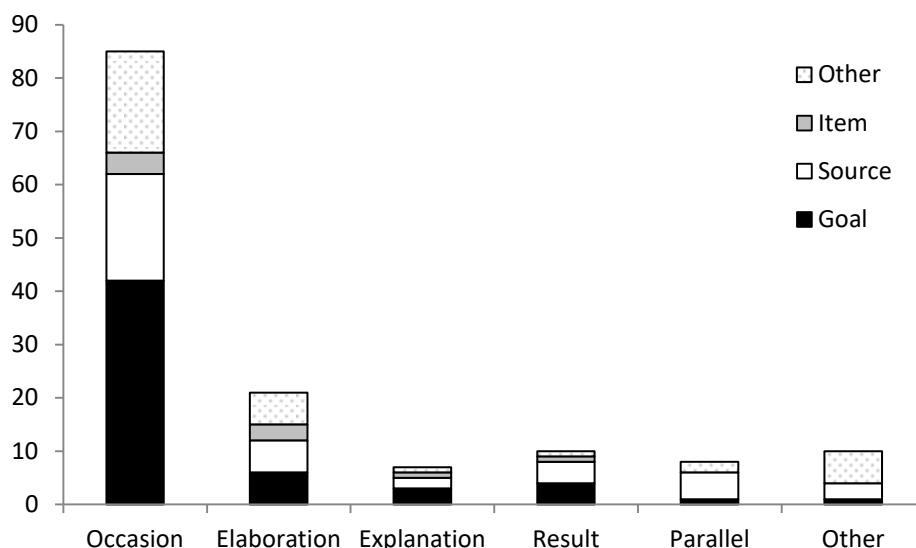


Figure 5.1 *Re-mention Frequencies Across Coherence Relations for Perfective Expressions (141 examples)*

Figure 5.1 suggests that the frequency with which Goals and Sources were re-mentioned as the subject of the next event differed according to the type of coherence relation that held between the transfer event and the continuation. Only two of the coherence relations, Occasion and Elaboration, had sufficient instances of Goal and Source re-mentions to permit a statistical analysis. Goals were re-mentioned more frequently than Source protagonists within Occasion relations ($\chi^2(1, N = 62) = 7.81, p = .01$). Goals and Sources were re-mentioned equally often within Elaboration relations (Goals $N = 6$, Sources $N = 6$) ($\chi^2(1, N = 12) = 0, p = 1.0$). The distribution of Goal, Source Item and Other re-mentions within the three different structures individually are shown in Appendix D.

5.4 Discussion

This chapter examined the frequency with which events were expressed with imperfective and perfective aspect in a corpus of children's literature read by children in the age range 7- to 11-years. It also examined the coherence relations following

perfectively expressed transfer events and the frequency with which Goal and Source protagonists were the subject of these relations.

Within the corpus, events were more often expressed as completed events with Simple Past tense (perfective aspect) than as ongoing events with Past Progressive tense (imperfective aspect). The more frequent expression of events as completed than ongoing perhaps reflects the nature of narratives. Interestingly, events involving transfer verbs were expressed as ongoing less frequently than events using verbs used previously for activity items. Transfer events have duration and an inherent endpoint which is reached when the event is expressed with perfective aspect. These features place transfer events in the lexical aspect category of accomplishment. The difference in frequency with which the two sets of verbs were expressed with imperfective aspect in the corpus is consistent with previous research which has examined the frequency with which events from different lexical aspect categories are expressed with imperfective aspect in adults' speech to young children (1 year, 6 months to 4 years, 10 months)(Chin & Naigles, 2017; Shirai & Andersen, 1995).

This finding suggests a distributional difference in imperfective expression within lexical aspect categories persists in 7- to 11-year-old children's language environment. This lends support to the idea that lexical aspect is an important, distinctive feature of events. However, a caveat to the current observation is that the extracted sentences were not scrutinized for lexical aspect. It is possible to use certain verbs used previously to create activity items to express events that would fall within the accomplishment lexical aspect category as shown in 5.5 (a) and (b).

(5.5) a. X was drinking with Y. (activity)

b. X was drinking a bottle of wine with Y. (accomplishment)

For a) if X was drinking with Y then X drank with Y. For b) if X was drinking a bottle of wine with Y it is not necessarily true that X drank a bottle of wine with Y- this event has an explicit endpoint- an empty bottle. Future research could examine the frequency with which events from different lexical aspect categories are expressed with imperfective and perfective aspect in a larger children's corpus.

There was no evidence of an increase in the imperfective expression of transfer events with readership age in the corpus, but the small number of examples limits firm conclusions. There was some indication of an increase in imperfective expression of events using verbs used previously for activity items across the readership age groups 7- to 8-years, 8- to 9-years, 9- to 10-years and 10- to 11-years. This suggests a general increase in exposure to the imperfective expression of events within children's literature with readership age. This general increase in exposure to imperfective aspect with age may, in part, explain older children's greater sensitivity to imperfective aspect seen in the experiments of Chapter 4. Whether age related increases in exposure to imperfective aspect occur within particular lexical aspect categories prior to an increase in other lexical aspect categories could be explored in a larger children's corpus.

Within the corpus, perfectly expressed transfer events (with the structure X_{source} gave a Z to Y_{goal}) were more likely to be followed by events with an Occasion coherence relation with the transfer event (62% of relations) than by events with other coherence relations (Elaboration, Explanation, Result, Parallel or Other). This pattern was also observed for perfectly expressed events with other structures. The more frequent occurrence of Occasion relations than other relations following perfectly expressed transfer events in the corpus is consistent with adult continuation studies (Rohde et al., 2006). The high frequency of Occasion relations and consistency of this

finding across alternative structures suggests that perfective aspect provides a reliable cue as to the likelihood that an Occasion coherence relation will follow a transfer event in children's literature. It was not possible to examine whether imperfective aspect similarly provides a cue as to the likelihood of a particular coherence relation following a transfer event due to the very infrequent occurrence of transfer events expressed with this form. It is possible that this scarcity increases the prominence of imperfectly expressed transfer events, facilitating learning when they do occur. Alternatively, their infrequent occurrence may be too low to extract rules and enable robust learning. This presents an area for future research within a larger corpus.

In contrast to the consistency with which particular coherence relations followed perfectly expressed transfer events within the corpus, no clear pattern emerged in the re-mention of Goal and Source protagonists generally across different structures. Goal protagonists were more likely to be re-mentioned than Source protagonists following the structure $X_{\text{source}} \text{ gave } Y_{\text{goal}} Z$ but there was no evidence of a Goal bias following the other two structures or in the combined sample overall. This result is inconsistent with previous adult continuation studies finding a Goal re-mention bias following perfectly expressed Source-Goal transfer events (Ferretti et al., 2009; Stevenson et al., 1994).

There are a number of possible reasons for this inconsistency. The first is the small number of examples extracted from the corpus, this may have limited the opportunity to observe a bias in particular structures. An examination of Goal and Source re-mentions in a larger corpus could investigate this possibility. A second reason is a task difference: adults may be more likely to provide Goal continuations following Source-Goal transfers in experimental settings than in narrative settings. Support for this alternative is provided by close examination of the Arnold (2001)

corpus analysis findings. In this analysis Goal and Source re-mentions were examined following perfectly expressed Source-Goal and Goal-Source transfer events in discourse contexts; while a Goal bias was observed following Goal-Source transfers a Source bias was observed following Source-Goal transfers. This finding was explained as a consequence of adults' tendency to continue to talk about the previous grammatical subject. This suggests that Goal re-mention biases following Source-Goal transfers may be sensitive to the context in which they are produced.

In summary, the findings suggest that within a corpus of children's literature perfective aspect is more predictive of the type of coherence relation that will follow a transfer event than the most likely protagonists to be re-mentioned. Importantly, within the two coherence relations with sufficient instances of Goal and Source re-mentions to permit analysis, Goal rather than Source protagonists were more often the subject of Occasion relations while there was no Goal bias within Elaboration relations. A Goal bias restricted to Occasion relations is consistent with previous adult research (Rohde et al., 2006). Thus, on balance, this small scale corpus analysis found greater support for the Event Structure Hypothesis which specifies that grammatical aspect cues the likelihood that particular coherence relations will follow events than the Expectancy Hypothesis which specifies that grammatical aspect cues the likelihood that particular protagonists will be re-mentioned.

6.1 Aims of Thesis

In the experimental work in this thesis I investigated whether the temporal characteristics of events influence 7- to 11- year-old children's pronoun resolution. This was to identify whether such an influence might explain contradictory findings in the literature regarding the age at which children demonstrate a subject interpretation of an ambiguous pronoun (Arnold et al., 2007; Hartshorne et al., 2015; Song & Fisher, 2005).

Although there is a body of research showing that the grammatical aspect with which events are expressed influences adults' narrative comprehension (Carreiras et al., 1997; Magliano & Schleich, 2000; Morrow, 1985; Truitt & Zwaan, 1997) to date, there has not been any research to examine if children are similarly influenced. To address this gap in the literature, I investigated whether children demonstrate the same influence of aspectual morphemes in narrative contexts as shown by adults in previous research (Magliano & Schleich, 2000). Following this, I examined if age related sensitivity to the judgement of events ongoingness in narratives, was also demonstrated in children's pronoun resolution in the same narratives.

Finally, I investigated whether the frequencies with which events were expressed with imperfective and perfective aspect, in a corpus of literature read by 7- to 11-year-old children, might provide a causal (exposure) explanation for the pattern of development observed in the experimental work. I also investigated within the corpus, whether the grammatical aspect of events was more predictive of the type of coherence relation that followed the event or the re-mention of particular protagonists. In my discussion section first, I outline the theoretical contributions of the work in the thesis (section 6.2) then I outline the educational implications of the work (section

6.3). Limitations and future directions are then considered (section 6.4) followed by my conclusions (section 6.5).

6.2 Theoretical Contributions

6.2.1 Lexical aspect

The Kehler and Rohde (2013a) account of pronoun resolution suggests that the temporal characteristics of events, in particular whether they have a salient end state, influence adults' expectancies for the type of coherence relation that will follow. The argument continues that, different coherence relations have different protagonists as their subject, so the expectation associated with a particular coherence relation conditions the probability that a particular protagonist will be re-mentioned. This next-mention expectancy (associated with a particular coherence relation) combines with a bias towards resolving a pronoun to the previous subject protagonist, should a pronoun be encountered (Kehler & Rohde, 2013a; Rohde et al., 2006). This account predicts that events with and without endpoints will result in alternative interpretations of a subsequent ambiguous pronoun.

The findings of the experiments in Chapter 3 provide support for this account. In Experiments 3a (adults) and 3b (7- to 11-year-old children), participants were presented with stimuli (see 6.1) and asked to resolve a subsequent ambiguous pronoun. The event described in 6.1(a) has no inherent endpoint (activity lexical aspect category) whereas the event (b) has an inherent endpoint (accomplishment lexical aspect category). Adults (Experiment 3a) and 7- to 11-year-old children (Experiment 3b) were more likely to resolve an ambiguous pronoun to the subject protagonist (Maxine) following 6.1 (a) than the subject protagonist (Kay) following (b).

- (6.1) a. Maxine studied/was studying in the library with Rachael. She chuckled.
b. Kay handed/was handing a skipping rope to Liz. She chuckled.

For accomplishment items (6.1 b), adults and children were more likely to select the previous object protagonist as the referent of the pronoun. For activity items (6.1 a), adults selected the subject as the referent, children were at chance but their tendency to select the subject increased with age. In the Experiments in Chapter 3 the grammatical aspect, with which events from the two lexical aspect categories (activity and accomplishment) were presented, was also manipulated as shown in 6.1. For both adults and children, the effect size for lexical aspect was greater than for grammatical aspect indicating that lexical aspect has a greater influence on pronoun resolution than grammatical aspect.

The difference in tendency to select the subject as the referent of a subsequent pronoun seen for 6.1a and 6.1b could be framed as a difference in the degree to which the subjects and objects in the two lexical aspect conditions possess the properties of Agents and Patients. Agent and Patient properties were discussed in the literature review section 1.62 and are repeated here for ease of reference. Agent properties of subject protagonists include: volitional involvement; sentience/perception; causing event/change of state; movement. Patient properties of the object include; undergo a change in state; causally affected; stationary. The Agents and Patients of high transitive verbs show multiple Agent and Patient properties. In contrast, the Agents and Patients of low transitive verbs do not possess as many of the above properties (Pyykkonen et al., 2010).

Previous research has shown that 3-year-old children's looking behaviour following an ambiguous pronoun is directed towards the Agent for low transitive verbs (e.g., see) and towards both the Agent and Patient for high transitive verbs (e.g.,

hit). It has been suggested that this indicates that, from an early age children's attention to characters is modulated by the degree to which the Patient is affected (Pykkonen et al., 2010). The findings of Experiment 3b are consistent with these findings, in that it can be argued that the object protagonists in the activity events in Experiment 3a and 3b demonstrate fewer Patient properties than the object protagonists in the accomplishment events.

The influence of lexical aspect on children's pronoun resolution shown in Experiment 3b, Chapter 3, provides an explanation for the inconsistent findings in the literature regarding the age at which children demonstrate a subject bias interpretation of an ambiguous pronoun. Whilst some research has shown that 5-year-olds demonstrate this bias (Hartshorne et al., 2015) other work reports that 5-year-olds do not show this tendency (Arnold et al., 2007). In both the above experiments, participants' eye-movements were tracked as they viewed a picture whilst listening to sentences. In Hartshorne et al. (2015) participants heard sentences where the protagonists were described performing a joint action. In contrast, in Arnold et al. (2007) participants heard sentences describing a telic event expressed with imperfective aspect. Thus, the stimuli used in these two experiments differed with regard to lexical aspect: Hartshorne et al. (2015) used stimuli sentences without an inherent endpoint; in contrast, Arnold et al. (2007) used stimuli sentences with an inherent endpoint.

Given the greater influence of lexical rather than grammatical aspect on children's and adults' pronoun resolution, it is important in future research to examine if lexical aspect provides a reliable cue as to the likelihood that particular coherence relations will follow events. Some ideas for how this might be achieved are included in section 6.3.1 below.

6.2.2 Grammatical aspect and events without endpoints

As noted in the last section, in the Experiments in Chapter 3 the grammatical aspect, with which events from the two lexical aspect categories (activity and accomplishment) were presented, was manipulated as shown in 6.1. For accomplishment events, grammatical aspect influenced adults' and children's pronoun resolution. This was consistent with Experiments 1a (children) , 1b (adults) , 2a and 2b (children) in Chapter 2 and previous research with adults (Rohde et al., 2006).

For activity events, grammatical aspect did not influence adults' pronoun resolution. This finding was predicted by the Kehler and Rohde (2013a) account of pronoun resolution but has not previously been tested. The finding thus provides additional support for the Kehler and Rohde (2013a) account and was consistent with previous adult research that has found that grammatical aspect does not influence adults' integration of subsequent concepts (Becker et al., 2013). Contrary to predictions, for activity events, grammatical aspect influenced children's pronoun resolution. The most likely reason for this was the lower effect of grammatical aspect on children's pronoun resolution compared to adults', which limited the opportunity to observe an interaction.

6.2.3 Grammatical aspect and events with endpoints

A consistent finding across the experiments in Chapters 2-4 was that the grammatical aspect, with which Source-Goal transfer of possession events was expressed, influenced 7- to 11-year-old children's resolution of a subsequent pronoun. Children were more likely to select the Source protagonist as the referent of the pronoun if the event was expressed with imperfective aspect (e.g. was handing) rather than perfective aspect (handed). This influence was demonstrated when stimuli were presented as isolated sentences and protagonists were the same gender (Experiment

1a, Chapter 2; Experiment 3b, Chapter 3) or different genders Experiments 2a and 2b, Chapter 2; Experiment 4c, Chapter 4). It was also demonstrated by older children (9- to 11-year-olds) when stimuli were presented embedded in narratives (Experiment 4b, Chapter 4). An influence of grammatical aspect on pronoun resolution is consistent with previous research with adults (Ferretti et al., 2009; Rohde et al., 2006) but its influence has not previously been examined in children. In the next section I discuss age related changes in children's sensitivity to the imperfective expression of transfer events in these experiments. Then I discuss differences in younger (7- to 9-year-old) children's sensitivity to grammatical aspect in isolated sentences and in narrative contexts and how these might be explained in terms of the Keller and Rohde (2013a) account of pronoun resolution.

6.2.3 a: Age and sensitivity to the imperfective expression of telic events

Transfer events have inherent endpoints, they are telic. Young children typically use perfective aspect in their speech productions to describe telic events and imperfective aspect to describe atelic events (events without endpoints) until about 2 years 6 months when they begin to generalize these forms (Shirai, 2010; Shirai & Andersen, 1995).

Previous research has examined the development of this generalization in young children (3- to 6-year-olds) using event recognition tasks (Matsuo, 2009; Wagner, 2009; Weist et al., 1991; Zhou et al., 2014); act out tasks (Wagner, 2001) and elicited imitation tasks (Johnson & Fey, 2006).

Within this body of research there are inconsistencies concerning the age at which young children reach adults' levels of performance in matching imperfectively expressed telic events to ongoing depictions, some studies report adult like performance at 3-years of age in children learning to speak Mandarin Chinese (Zhou

et al., 2014) whilst others show that 5-year-old children do not yet meet adults' levels of performance (Wagner, 2009).

The research in this thesis extends previous findings in two ways. First, this is the first research to examine children's discrimination between the imperfective and perfective expression of telic events in narrative contexts (Experiments 4a and 4b, Chapter 4). Second, this is the first research to examine whether the grammatical aspect with which telic events are expressed influences children's integration of two events; their resolution of a subsequent pronoun (Chapters 2-4).

The experimental findings in Chapters 2-4 show that children's sensitivity to the imperfective expression of transfer (telic) events is still developing within the age range 7- to 11-years-old. First, Experiment 4a (Chapter 4) shows that when transfer (telic) events are embedded in narratives, 7-to 11-year-old children show increasing sensitivity to the imperfective expression of events with age, but are less sensitive to the imperfective expression of events than adults in previous research (Magliano & Schleich, 2000). Second, Experiments 1a and 1b (Chapter 2) show that expressing a transfer (telic) event with imperfective rather than perfective aspect has less influence on 7- to 11-year-olds' resolution of a subsequent ambiguous pronoun than in does for adults' using the same materials. These findings are discussed below.

In Experiment 4a, 7- to 11-year-old children were asked to judge whether transfer events, expressed with perfective or imperfective aspect, were ongoing. The transfers were embedded in narratives and the question was asked immediately after the aspectual event or when there was intervening text between the aspectual event and the question. When the question was asked immediately after the event, children were more likely than chance to state that perfectly expressed events were completed, like adults in previous research (Magliano & Schleich, 2000). Although,

like adults, children were more likely to state that imperfectly expressed events were ongoing than perfectly expressed events, they were not more likely than chance to state that imperfectly expressed were ongoing. This is unlike adults in previous research (Magliano & Schleich, 2000). This suggests that 7- to 11-year-old children are less sensitive to the imperfective expression of telic events than adults when these are embedded in narratives.

It is possible that a difference in the inherent duration of events between Experiment 4a and Magliano and Schleich (2000) contributed to the difference shown in children's and adults' judgement of the ongoingness of imperfectly expressed events. Magliano and Schleich (2000) used events such as dancing to a song and vacuuming a room, to represent their short duration events. In contrast, Experiment 4a used transfer of possession events, such as taking a can of paint or throwing a good luck coin, with arguably much shorter inherent durations. A difference in the inherent duration of events between Experiment 4a and Magliano and Schleich (2000) could explain why children were less likely than chance to judge the imperfectly expressed events in Experiment 4a as ongoing. It would be useful to examine children's and adults' judgement of the ongoingness of the same events, expressed with imperfective and perfective aspect within narratives, in a future experiment. This is discussed further in section on future directions.

Although children did not demonstrate a greater than chance judgement that imperfectly expressed events were ongoing, an important finding from Experiment 4a was that this tendency increased with age when the question was asked immediately after the aspectual event. There were no age effects for perfectly expressed events. This suggests that, when telic events are embedded in narratives 7-

to 11- year-old children's sensitivity to their imperfective expression is increasing in the age range 7- to 11-years.

Further evidence for an increase in sensitivity to the imperfective expression of telic events in narratives with age was provided in Experiment 4b. In this experiment the narratives used in Experiment 4a were adjusted: a pronoun continuation was inserted immediately after the aspectual event and also following the intervening text. Similar to Experiment 4a, there was an age increase in resolving the pronoun to the Source protagonist immediately after the aspectual event. Consistent with Experiment 4a, there were no age effects for perfective items.

In Chapter 5 I examined a corpus of literature written for children in this age range to determine whether this area of children's language environment provided a potential cause (increased exposure) for older children's greater sensitivity to the imperfective expression of transfer events. There was no evidence of an increase in imperfective expression of transfer events with readership age in the corpus, but the small number of examples limits firm conclusions. Interestingly, there was some indication of an increase in imperfective expression of verbs typically used to describe atelic events within this readership age range. This general increase in exposure to imperfective aspect with age may, in part, explain older children's greater sensitivity to imperfective aspect seen in the experiments of Chapter 4. Whether age related increases in exposure to imperfective aspect occur within particular lexical aspect categories prior to an increase in other lexical aspect categories could be explored in a larger children's corpus.

There was evidence in Chapter 4 that the increased sensitivity to imperfective aspect in narratives, shown by older compared to younger children, reflects older children's greater world knowledge of the inherent duration of events themselves.

This was because intervening text reduced older (9- to 11-year-old) but not younger (7- to 9-year-old) children's judgement that imperfectly events were ongoing. Intervening text did not influence children's judgement of the completion of perfectly expressed events. A reduction in judgement that short duration, imperfectly expressed events are ongoing following intervening text compared to before is consistent with previous research with adults (Magliano & Schleich, 2000). Similarly, intervening text reduced older (9- to 11-year-old) but not younger (7- to 9-year-old) children's Source resolution of a pronoun following imperfectly expressed events in Experiment 4b. Intervening text did not influence children's Source resolution for perfectly expressed events. In addition, when there was a short delay between the presentation of the stimulus sentence and the pronoun continuation there was an age decrease in Source resolution for imperfectly expressed events but not for perfectly expressed events (Experiment 4c, Chapter 4). Future research could examine 7- to 11-year-old children's explicit judgement of how long it takes to perform particular actions to explore this potential explanation for the reported age differences.

Interestingly, although younger children (7- to 9-years) did not demonstrate an influence of grammatical aspect on their pronoun resolution when events were presented in narratives, they did demonstrate such an effect when events were presented in isolated sentences (Chapter 2). In Experiments 1a and 1b (Chapter 2), 7- to 11- year-old children (1a) and adults (1b) were asked to resolve an ambiguous pronoun following a transfer of possession event expressed with imperfective or perfective aspect. Children demonstrated a Goal bias in both conditions, but this was significantly reduced in the imperfective condition compared to the perfective condition. There was no effect of age on 7- to 11-year old children's tendency to

resolve the pronoun to the Source in the imperfective condition in this context. Using the same materials, adults demonstrated a bias towards resolving the pronoun to the Goal protagonist in the perfective condition and the Source in the Imperfective condition. This shows that expressing a telic event with imperfective aspect has less influence on 7- to 11-year-old children's pronoun resolution than it does for adults'. This finding is discussed further in section 6.4.1 below.

Taken together, these findings show that children's imperfective representation of telic events is still undergoing development in the age range 7-to 11-years-old. As noted above, the Kehler and Rohde (2013a) account of pronoun resolution suggests that the temporal characteristics of events influence adults' expectancies that particular coherence relations will follow events. Their evidence for this is an examination of the coherence relations adults' provided when asked to write a continuation following a Source-Goal transfer of possession event expressed with either imperfective or perfective aspect (Rohde et al., 2006). Adults were more likely to provide continuations with Occasion and Result coherence relations when transfers were expressed with perfective aspect. These continuations more often began with a Goal than a Source referent. Adults were more likely to provide continuations with Elaboration and Explanation relations when transfers were expressed with imperfective aspect. These continuations more often began with a Source than a Goal referent.

In Chapter 5, I provide an analysis of the coherence relations following perfectly expressed transfer events in a corpus of literature read by 7- to 11-year-old children. This analysis found a bias for Occasion relations, consistent with Rohde et al. (2006). Also consistent with Rohde et al. (2006), the analysis found a bias for re-mentions of the Goal protagonist within these relations. There were too few examples

of imperfectly expressed transfer events within the corpus to examine if, like adult continuations, these were consistently followed by Elaboration coherence relations. However, this infrequency in itself may in part explain why children were less likely to infer Elaboration (Source bias) coherence relations following imperfectly expressed transfer events, as shown by adults previously (Rohde et al., 2006). The consistency of the findings for perfectly expressed transfer events between the Rohde et al. (2006) analysis and the corpus analysis (Chapter 5) suggests that the grammatical aspect with which transfer events are expressed provides a reliable cue as to the likelihood that a particular coherence relation will follow, at least for perfectly expressed events.

The increase in sensitivity to imperfective aspect with increasing age, observed in Experiments 4a and 4b, suggests that children's identification of the ongoingness of events is associated with their identification of the type of coherence relation that will follow. Whether the age increase in sensitivity to imperfective aspect reflects an age increase in children's world knowledge of the inherent duration of particular events and/or an age increase in expectation that an ongoing event will be followed by an Elaboration coherence relation is an important area for future research. As noted in Section 6.2.1, given the greater influence of the lexical rather than the grammatical aspect of events on adults' and children's pronoun resolution in the experiments in Chapter 3, determining whether the lexical aspect of events provides a reliable cue as to the likelihood a particular coherence relation will follow is also an important area for future research.

6.2.3 b: Grammatical aspect and pronoun resolution in sentences and narratives

Younger (7- to 9-year-old) children demonstrated sensitivity to grammatical aspect in their pronoun resolution when stimuli were presented in isolated sentences

(Experiment 1a) but apparent insensitivity when stimuli were presented in narratives (Experiment 4b). There are two potential explanations for this difference, a theoretical one and a non-theoretical one. The theoretical explanation is given first.

To recap, Kehler and Rohde (2013a) suggest that pronoun resolution is the product of two biases. The first is a bias towards expecting particular coherence relations to follow events (a bias which is influenced by the temporal characteristics of events). The second is a bias towards resolving a pronoun, should one be encountered, to the previous subject protagonist. This bias is not influenced by the temporal characteristics of the event and is a specific response to a pronoun. Importantly this bias is characterised as a production bias in adults.

Like older children, younger children demonstrated a significant effect of grammatical aspect in Experiment 4a when they were asked to judge the ongoingness of the same events used in Experiment 4b. So the failure to demonstrate an effect of grammatical aspect on their pronoun resolution in Experiment 4b does not appear to be because they are less sensitive to grammatical aspect in this context per se.

A two part explanation is offered to explain the difference in findings for the younger children between the isolated sentences and narrative presentation. First, I suggest that, for all children, the relative contribution of the second of these two biases (subject interpretation of a pronoun) differs between the two contexts, with it having greater influence in the narrative context than in the isolated sentence presentation. And second I suggest that, younger children's subject interpretation is governed by previous mentions of a particular protagonist whilst older children's subject interpretation is more production oriented, like adults' according to the Kehler and Rohde account.

The rational and evidence supporting this interpretation is that, in the isolated sentence experiments (Experiments 1a, Chapter 2 and 3b, Chapter 3), despite demonstrating an influence of grammatical aspect on their pronoun resolution, children demonstrated a Goal interpretation of the pronoun in both aspect conditions. In contrast, in the narrative context, children were at chance in their interpretation of the pronoun in the perfective condition and older children demonstrated a Source interpretation of the pronoun in the imperfective condition (Experiment 4b). As mentioned, Kehler and Rohde (2013a) characterise this second bias as a production bias in their account and their evidence for this is adults' tendency to pronominalize subject re-mentions more often than object re-mentions following stimulus sentences (Fukumura & van Gompel, 2010; Rodhe, 2008) but it is possible that for children, the tendency to interpret a pronoun as co-referential with the previous subject is influenced by the number of times a protagonist has been the subject of sentences in the previous context. This interpretation is consistent with previous research which has found subject bias interpretations of ambiguous pronouns for 3-year-old children when protagonists have been subjects in previous sentences in narrative contexts (Song & Fisher, 2005) but no subject bias for 5-year-old children when only one context sentence is provided before the ambiguous pronoun (Arnold et al., 2007). This explanation would explain why a higher Source interpretation was demonstrated in the narrative compared to the isolated sentences contexts.

A difference in origin of a subject interpretation bias in younger and older children might then explain why younger children did not demonstrate an effect of grammatical aspect in narratives. There is evidence that children tend to use pronouns with clear referents only at around 10-years of age (Karmiloff-smith, 1985) with younger children (4- to 7-year-olds) using pronouns for all given referents (Hendriks,

Koster, & Hoeks, 2014). If older children are more consistent with providing pronouns to refer to the previous subject/topic then their expectation that the Goal protagonist is the most likely referent to be re-mentioned next in the perfective condition and their expectation that the Source protagonist is the most likely referent to be re-mentioned next in the imperfective condition will equivalently be revised on encountering a pronoun. Therefore, their difference in expectation for re-mentions of particular protagonists across the two aspect conditions will still be apparent in their interpretation. Younger children however, for whom pronoun production is more haphazard (Hendriks et al., 2014) may rely more on a repeat mention principle than a stable production bias when interpreting pronouns in narratives. This may obscure any greater expectation they held for a Goal re-mention following perfectly rather than imperfectly expressed events and hence their demonstration of an effect of aspect on their pronoun interpretation. There are a number of ways these ideas could be tested in future experiments. These are suggested in the future directions section.

An alternative non-theoretical explanation could be that the differences in findings between Experiments 1a and 4b lie in slight difference in materials used to create the stimulus items. Whilst Experiment 1a used 12 verbs and 12 continuations for the transfer events, Experiment 4b used only 8 of these verbs and 4 of these continuations. Children demonstrated a significant influence of aspect in their judgement of the ongoingness of the 8 verbs used in Experiment 4b in Experiment 4a. This suggests that the difference in verbs used does not explain the differences. However, it remains possible that the differences may have been because the reduced number of continuations in Experiment 4b compared to 1a increased all children's Source resolution, and extinguished younger children's sensitivity to aspect. Another difference in the materials used in Experiment 1a and 4b was the use of a comma

before the pronoun continuation in Experiment 4b, and a full stop in Experiment 1a. Asking adults to provide continuations when the pronoun is included in the same sentence as the stimulus and is separated by a comma (e.g., and he...) results in more frequent resolution to the Goal compared to presenting the pronoun after a full stop (. He...) (Stevenson et al., 1994). Therefore, it does not seem likely that this difference between isolated sentences and narrative presentation could explain the more frequent Source bias interpretation in the narratives compared to the isolated sentences.

6.3 Educational Implications

6.3.1 Two biases

The experimental work in this thesis has found consistent evidence that 7- to 11-year-old children's subject interpretation of an ambiguous pronoun is influenced by the temporal characteristics of events prior to the pronoun. Children were more likely to resolve a pronoun to the subject protagonist when events were expressed with imperfective aspect than perfective aspect. They were also more likely to resolve a pronoun to the subject protagonist for events without inherent endpoints than for events with endpoints. Because a uniform subject interpretation of a pronoun was not demonstrated across the stimuli in the experiments, these findings support the Kehler and Rodhe (2013a) account that pronoun resolution is the product of two biases. The first is a bias towards expecting particular coherence relations to follow an event (a bias which is influenced by the temporal characteristics of the event). The second is a bias towards resolving a pronoun to the previous subject protagonist. This account suggests new ways to investigate children's pronoun resolution development and investigate potential sources of difficulty for children who demonstrate difficulties with pronoun resolution.

First, the experiments in Chapter 3 showed that the lexical aspect of events (whether they have an inherent endpoint or not) had a greater influence on children's pronoun resolution than the grammatical aspect (whether events were described as ongoing or completed) in the 7- to 11-years age range examined. This was also the case for adults. This suggests that whether events have endpoints or not provides a strong cue to both children and adults as to the likelihood of a subsequent coherence relation. Perhaps establishing an expectation for particular coherence relations to follow events differing in lexical aspect is necessary before these expectations can be generalised across events differing in grammatical aspect. Further research is required to establish whether particular coherence relations reliably follow events with and without endpoints and whether particular protagonists are reliably the subject of these different relations. These could be examined in a corpus of literature written for children and in caregivers child directed speech. Whether children with good and poor reading comprehension differ in their expectancies for particular coherence relations to follow events differing in temporal characteristics could also be examined to further our understanding of the difficulties experienced by some children. The relation between children's expectation for particular coherence relations to follow events and their world knowledge of the inherent duration of events also needs examining to further our understanding of children's construction of situation models during narrative comprehension.

Second, Kehler and Rohde (2013a) suggest that the subject interpretation of a pronoun is influenced by an individual's production bias. The correlation of these two tendencies could be examined across an age range of children to determine whether this is the case for children and whether the correlation changes with age. Whether children with poor pronoun resolution are less constrained to pronominalize previous

sentence subjects/topics than same age children without pronoun resolution problems could also be examined, to see if this is a contributing factor in their difficulties.

6.3.2 The distance between a pronoun and its referent

Previous research examining children's pronoun resolution has often examined the effect of distance (the number of sentences) between a pronoun and its antecedent and children's ability to identify the referent (Ehrlich & Remond, 1997; Yuill & Oakhill, 1988). There have been mixed findings regarding the effect of this measure of distance on pronoun and anaphor resolution (Ehrlich & Remond, 1997; Yuill & Oakhill, 1988). The findings of the experiments in this thesis suggest that consideration should be given to the temporal characteristics of events when considering the distance between a pronoun and its referent. For example, in Experiment 3a where the lexical aspect of events was manipulated, the distance between the subject protagonist and the pronoun was the same in terms of the number of words between them in the two lexical aspect conditions. However, children were more likely to resolve the pronoun to the previous subject for events without endpoints (activities) than for events with endpoints (accomplishment).

Similarly, in Experiments 1a, 2a and 2b (Chapter 2) and Experiment 4b (Chapter 4) where the grammatical aspect of events was manipulated, the number of intervening words between the subject protagonist and the pronoun was the same in the two grammatical aspect conditions. But, children were more likely to resolve the pronoun to the subject protagonist when the event was described with imperfective rather than perfective aspect.

In addition, in Experiment 4b intervening text had a different effect on probability that source would be identified as the referent of the pronoun for events expressed with imperfective or perfective aspect. Intervening text reduced older

children's subject interpretation of a pronoun for imperfectly expressed events but had no influence on their subject interpretation for perfectly expressed events.

6.4 Limitations and Future Directions

6.4.1 No 'no pronoun' condition

Experiments 1a (children) and 1b (adults) in Chapter 2 found that 7- to 11-year-old children were less likely than adults to resolve an ambiguous pronoun to the Source (subject) protagonist and this difference was greater for imperfectly expressed events than perfectly expressed events. In terms of the Kehler and Rohde (2013a) account of pronoun resolution, children's more frequent Goal interpretation in both aspect conditions could have resulted from any of the three possibilities shown below:

1. Children are more Goal (Occasion) bias than adults and are less likely to revise to a Source (Subject) interpretation on encountering a pronoun.
2. Children are more Goal (Occasion) bias than adults but are equally likely to revise to a Source (Subject) interpretation on encountering a pronoun.
3. Children have an equivalent Goal (Occasion) bias to adults but less likely to revise to a Source (Subject) interpretation on encountering a pronoun.

When children and adults were given activity events (without endpoints) in Chapter 3, adults demonstrated a Subject interpretation of a subsequent ambiguous pronoun and children were at chance but children were more likely to resolve the pronoun to the Subject protagonist with age. Children's less frequent Subject interpretation than adults', for events without endpoints, suggest that possibilities 1 and 3 explain the findings of Experiments 1a and 1b, Chapter 2, and suggest that possibility 2 is less likely.

The corpus analysis in Chapter 5 showed that following perfectly expressed transfer events, Occasion relations occurred more frequently in a corpus of children's literature (62% of relations) than they occurred in a corpus of adults' continuations written to follow perfectly expressed transfer events (43.2 % of relations). Although this difference was not statistically tested, it suggests a possible causal reason (exposure) for a strong Goal bias in children (because Goal protagonists in the corpus were more often the subject of Occasion relations). On balance, this reasoning suggests possibility 1 is the more likely reason for the less frequent Source interpretation of the pronoun shown by children in Experiment 1a than that shown by adults in 1b. But without a 'no pronoun' condition with which to compare the frequency of Goal and Source continuations in the two groups (adults and children) this cannot be firmly established. Future work should include a no pronoun condition, with names as well as pronoun choices offered, to establish children's tendency to re-mention and pronominalize the previous Source and Goal protagonists.

6.4.2 Just transfer events

In my experimental chapters, I used Source-Goal transfer of possession events to represent telic events. This was because previous research investigating an influence of grammatical aspect on adults' pronoun resolution has used Source-Goal verbs (Ferretti et al., 2009; Rohde et al., 2006). In section 6.2.2, I acknowledge that the exclusive use of arguably very short duration transfer events may have limited children's opportunity to demonstrate sensitivity to imperfective aspect in a narrative context. It would be useful in future research to obtain children's estimates of the duration of particular events and separately examine children's judgement of these events ongoingness when expressed with imperfective aspect in narratives. For example, it would also be useful to examine at what age children demonstrate a

reduction in judgement of the ongoingness of short duration events but not long duration events after intervening text as adults do (Magliano & Schleich, 2000). This would help determine whether children's increasing sensitivity to imperfective aspect with age is related to an age related increase in world knowledge of the inherent duration of events themselves.

6.4.3 The time course of children's processing

It would be helpful in future experiments to examine the time course of children's processing of events to examine the hypothesis that children are anticipating particular coherence relations before a pronoun is encountered. This has been demonstrated in a visual world experiment with adults (Rohde & Horton, 2014). Children's anticipatory looks towards particular protagonists when events are expressed with different grammatical aspect could also be examined as it has with adults (Grüter, Takeda, Rohde, & Schafer, 2018). In this experiment, participants' eye-movements towards different gender Source and Goal protagonists were monitored during a pause between hearing a Source-Goal transfer event and the re-mention of one of the protagonists with a pronoun. Transfers were expressed with either perfective or imperfective aspect. Adults looked towards the Goal protagonist more often than the Source for both conditions, but this preference was greater following perfective than imperfective events, and importantly it occurred before the onset of the pronoun. A similar study could be conducted with children, now that a consistent influence of grammatical aspect on children's pronoun resolution has been established by the experiments in this thesis.

6.5 Conclusions

The research in this thesis demonstrated that when events are presented as isolated sentences, 7- to 11-year-old children are influenced by the lexical aspect of

those events and the grammatical aspect with which they are expressed in their resolution of a subsequent pronoun. Older children (9- to 11-year-olds) also demonstrated an influence of grammatical aspect on their pronoun resolution when events were embedded in narratives. These findings explain previous inconsistent findings in the literature regarding the age at which children demonstrate a subject interpretation of a pronoun. Why children are influenced by grammatical aspect in their pronoun resolution was examined by investigating whether grammatical aspect is predictive of the type of coherence relation that will follow or the re-mention of a particular protagonist, in a corpus of literature read by children in the age range 7- to 11-years. There was evidence that perfective aspect is more predictive of the type of coherence relation (with different re-mention biases within these relations) than the re-mention of a particular protagonist. The experimental work also suggested that children's demonstration of an influence of grammatical aspect may be associated with their world knowledge of the inherent duration of events.

The findings of the experiments in Chapters 2-4 provide support for the Rohde et al. (2006) Event Structure Hypothesis wherein, pronoun resolution is modelled as the product of two biases: a bias towards expecting a particular coherence relation to follow (given the temporal characteristic of an event), and a bias towards interpreting a pronoun towards a previous subject protagonist. Considering children's pronoun interpretation as the product of these two biases offers new insights into understanding children's pronoun resolution development and suggests new areas to investigate to determine why some children experience difficulty with pronoun resolution.

Stimuli used in Experiments 1a and 1b showing the grammatical aspect of the verb in presentations A/B.

Practice items

- 1 Sarah passed/was passing a lolly to Helen. She beamed.
- 2 Graeme was handing/handed a cabbage to Farrell. He groaned.
- 3 Paul threw/was throwing a ball to Burt. He squinted.

Test items

- 1 Kath was delivering/delivered a newspaper to Ruth. She sneezed.
- 2 Alan handed/was handing a chocolate bar to Nick. He squinted.
- 3 Harry was carrying/carried a cup to Kevin. He smiled.
- 4 Alice was bringing/brought a DVD to Polly. She groaned.
- 5 Anne carried/was carrying a cake to Lynn. She frowned.
- 6 Peter was flinging/flung a cushion to Ian. He giggled.
- 7 Barry passed/was passing a pencil to Steven. He chuckled.
- 8 Sharron threw/was throwing a ball to Nancy. She squinted.
- 9 Carl was chucking/chucked an egg to Wayne. He laughed.
- 10 Carol brought/was bringing a broken toy to Charlotte. She groaned.
- 11 Elaine sent/was sending a letter to Lisa. She chuckled.
- 12 Christopher was giving/gave a low grade to Cameron. He frowned.
- 13 David flung/was flinging a beanbag to Tony. He giggled.
- 14 Dennis delivered/was delivering a box to Aaron. He groaned.
- 15 Eve was carrying/carried a tray to Kate. She frowned.
- 16 Edward carried/was carrying a xmas cracker to Patrick. He smiled.
- 17 Chloe was sending/sent an e-mail to Lauren. She chuckled.
- 18 Harriet was passing a map to Stephanie. She sighed.
- 19 Gail gave/was giving a pill to Beth. She winked.
- 20 Grace flung/was flinging a towel to Claire. She laughed.
- 21 Alfie was bringing/brought a voucher to Darren. He grinned.
- 22 Helen was flinging/flung a rope to Linda. She laughed.
- 23 Jack gave/was giving a bad mark to Dan. He frowned.
- 24 Russell was sending/sent a text to Andrew. He beamed.
- 25 Jasmine delivered/was delivering a gift to Becky. She sneezed.
- 26 Lewis was handing/handed a jumper to Jimmy. He squinted.
- 27 Liam was taking/took a report to Gavin. He sighed.
- 28 Joanne pushed/was pushing a bike to Amy. She giggled.
- 29 Josh brought/was bringing a biscuit to Kyle. He grinned.
- 30 Philip was delivering/delivered a packet to Joseph. He groaned.
- 31 Kay handed/was handing a present to Liz. She beamed.
- 32 Kevin took/was taking a toy to Robert. He sighed.
- 33 Martha was pushing/pushed a toy car to Mary. She giggled.
- 34 Michael was pushing/pushed a scooter to Gary. He winked.
- 35 Sally took/was taking a coat to Brenda. She smiled.
- 36 Bethany was throwing/threw a frisbee to Sabrina. She squinted.
- 37 Nina was handing/handed a game to Gemma. She beamed.

- 38 Wendy chucked/was chucking a duster to Sheila. She grinned.
- 39 Louise was taking/took a flower to Tracey. She smiled.
- 40 Luke was passing/passed a book to John. He chuckled.
- 41 Mike pushed/was pushing a cart to Bob. He winked.
- 42 Simon chucked/was chucking a paper aeroplane to Richard. He laughed.
- 43 Julia was giving/gave a sweet to Alison. She winked.
- 44 Stuart threw/was throwing a dish cloth to Roger. He sneezed.
- 45 Maxine was chucking/chucked a hat to Rachael. She grinned.
- 46 Thomas sent/was sending a picture to Ryan. He beamed.
- 47 Ross was throwing/threw a snowball to Matt. He sneezed.
- 48 Emma passed/was passing a note to Jenny. She sighed.

Stimuli used in Experiments 2b and 4c showing the grammatical aspect of the verb in presentations A/B. In Experiment 2a the continuation was presented without the pronoun choices for example _____ beamed.

Practice items

- 1 Sarah passed/was passing a lolly to Michael. She/He beamed.
- 2 Graeme was handing/handed a cabbage to Lesley. She/He groaned.
- 3 Paul threw/was throwing a ball to Gill. She/He squinted.

Test items

- 1 Kath was delivering/delivered a newspaper to Dan. She/He sneezed.
- 2 Alan handed/was handing a chocolate bar to Liz. She/He squinted.
- 3 Harry was carrying/carried a cup to Rachael. She/He smiled.
- 4 Alice was bringing/brought a DVD to Aaron. She/He groaned.
- 5 Anne carried/was carrying a cake to Bob. She/He frowned.
- 6 Peter was flinging/flung a cushion to Linda. She/He giggled.
- 7 Barry passed/was passing a pencil to Amy. She/He chuckled.
- 8 Sharron threw/was throwing a ball to Roger. She/He squinted.
- 9 Carl was chucking/chucked an egg to Beth. She/He laughed.
- 10 Carol brought/was bringing a broken toy to Gary. She/He groaned.
- 11 Elaine sent/was sending a letter to Ryan. She/He chuckled.
- 12 Christopher was giving/gave a low grade to Alison. She/He frowned.
- 13 David flung/was flinging a beanbag to Becky. She/He giggled.
- 14 Dennis delivered/was delivering a box to Jenny. She/He groaned.
- 15 Eve was carrying/carried a tray to John. She/He frowned.
- 16 Edward carried/was carrying a xmas cracker to Tessa. She/He smiled.
- 17 Chloe was sending/sent an e-mail to Andrew. She/He chuckled.
- 18 Harriet was passing/passed a map to Oliver. She/He sighed.
- 19 Gail gave/was giving a pill to Wayne. She/He winked.
- 20 Grace flung/was flinging a towel to Kyle. She/He laughed.
- 21 Alfie was bringing/brought a voucher to Polly. She/He grinned.
- 22 Helen was flinging/flung a rope to Ian. She/He laughed.

- 23 Jack gave/was giving a bad mark to Ruth. She/He frowned.
- 24 Russell was sending/sent a text to Lauren. She/He beamed.
- 25 Jasmine delivered/was delivering a gift to Tony. She/He sneezed.
- 26 Lewis was handing/handed a jumper to Gemma. She/He squinted.
- 27 Liam was taking/took a report to Tracey. She/He sighed.
- 28 Joanne pushed/was pushing a bike to Steven. She/He giggled.
- 29 Josh brought/was bringing a biscuit to Claire. She/He grinned.
- 30 Philip was delivering/delivered a packet to Donna. She/He groaned.
- 31 Kay handed/was handing a present to Nick. She/He beamed.
- 32 Kevin took/was taking a toy to Brenda. She/He sighed.
- 33 Martha was pushing/pushed a toy car to Jimmy. She/He giggled.
- 34 Michael was pushing/pushed a scooter to Charlotte. She/He winked.
- 35 Sally took/was taking a coat to Robert. She/He smiled.
- 36 Bethany was throwing/threw a frisbee to William. She/He squinted.
- 37 Nina was handing/handed a game to Joseph. She/He beamed.
- 38 Wendy chucked/was chucking a duster to Anthony. She/He grinned.
- 39 Louise was taking/took a flower to Gavin. She/He smiled.
- 40 Luke was passing/passed a book to Kate. She/He chuckled.
- 41 Mike pushed/was pushing a cart to Lynn. She/He winked.
- 42 Simon chucked/was chucking a paper aeroplane to Sarah. She/He laughed.
- 43 Julia was giving/gave a sweet to Cameron. She/He winked.
- 44 Stuart threw/was throwing a dish cloth to Nancy. She/He sneezed.
- 45 Maxine was chucking/chucked a hat to Kevin. She/He grinned.
- 46 Thomas sent/was sending a picture to Lisa. She/He beamed.
- 47 Ross was throwing/threw a snowball to Jane. She/He sneezed.
- 48 Emma passed/was passing a note to Darren. She/He sighed.

Stimuli used in Experiments 3a and 3b showing the grammatical aspect of the verb in presentations A/B and the lexical aspect of the items (Acc. = Accomplishment, Act. = Activity).

Practice items

- | | | |
|---|---|------|
| 1 | Sarah passed a lolly to Helen. She grinned. | Acc. |
| 2 | Graeme played in the park with Farrell. He laughed. | Act. |
| 3 | Paul was throwing a ball to Burt. He chuckled. | Acc. |

Was a lolly mentioned?

Test items are numbered

- | | | |
|---|--|------|
| 1 | Julia was standing/stood in a queue with Alison. She smiled. | Act. |
| 2 | Alan handed/was handing a bag of sweets to Nick. He grinned. | Acc. |
| 3 | Barry played/was playing on the wii with Stephan. He giggled. | Act. |
| 4 | Liam was taking/took a report to Gavin. He sighed. | Acc. |
| 5 | Emma watched/was watching at the match with Jenny. She frowned. | Act. |
| 6 | Alfie was running/ran in a race with Darren. He grinned. | Act. |
| 7 | Kath was tossing/tossed a biscuit to Ruth. She frowned. | Acc. |
| 8 | Carl was chucking/chucked a football shirt to Wayne. He giggled. | Acc. |

Was a bag of sweets mentioned?

- | | | |
|----|--|------|
| 9 | Helen was drinking/drank at the café with Linda. She giggled. | Act. |
| 10 | Simon studied/was studying at the college with Richard. He smiled. | Act. |
| 11 | Anne carried/was carrying a basket to Lynn. She laughed. | Acc. |
| 12 | Stephanie was giving/gave an ice-cream to Alison. She grinned. | Acc. |
| 13 | Joanne talked/was talking on the phone with Tracey. She sighed. | Act. |
| 14 | Josh brought/was bringing a coat to Kyle. He frowned. | Acc. |
| 15 | Nina was handing/handed a racquet to Gemma. She chuckled. | Acc. |
| 16 | Lewis was speaking/spoke at the bus stop with Jimmy. He frowned. | Act. |

Was a farm mentioned?

- | | | |
|----|--|------|
| 17 | Jack stood/was standing on the touch line with Dan. He sighed. | Act. |
| 18 | Dennis tossed/was tossing a football to Aaron. He groaned. | Acc. |
| 19 | Wendy chucked/was chucking a ball to Sheila. She sighed. | Acc. |
| 20 | Harriet was playing/played in the bedroom with Stephanie. She grinned. | Act. |
| 21 | Polly spoke/was speaking in the office with Amy. She laughed. | Act. |
| 22 | Bob gave/was giving a reading book to Dan. He chuckled. | Acc. |
| 23 | Bethany was throwing/threw a frisbee to Sabrina. She groaned. | Acc. |
| 24 | Michael was talking/talked in the meeting with Gary. He laughed. | Act. |

Was a baby's rattle mentioned?

- | | | |
|----|--|------|
| 25 | Sally took/was taking a sunhat to Brenda. She smiled. | Acc. |
| 26 | Maxine was studying/studied in the library with Rachael. She chuckled. | Act. |
| 27 | David drank/was drinking at the bar with Tony. He chuckled. | Act. |
| 28 | Harry was carrying/carried a bowl of cereal to Kevin. He smiled. | Acc. |
| 29 | Carol ran/was running along the road with Charlotte. She groaned. | Act. |
| 30 | Stuart threw/was throwing a dish cloth to Roger. He laughed. | Acc. |
| 31 | Luke was watching/watched at the match with John. He groaned. | Act. |

- 32 Alice was bringing/brought a cup of coffee to Polly. She giggled. Acc.
Was a library mentioned?
- 33 Gail stood/was standing at the bus stop with Beth. She smiled. Act.
- 34 Philip was tossing/tossed a bunch of keys to Joseph. He groaned. Acc.
- 35 Anne gave/was giving a sandwich to Liz. She grinned. Acc.
- 36 Josh was standing/stood by the swings with Ben. He sighed. Act.
- 37 Louise was taking/took a glass of juice to Tracey. She smiled. Acc.
- 38 Mike talked/was talking in the garage with Bob. He laughed. Act.
- 39 Sharon threw/was throwing a ball to Nancy. She groaned. Acc.
- 40 Stephen was handing/handed a jumper to Jimmy. He grinned. Acc.
Was a supermarket mentioned?
- 41 Alice was running/ran on the track with Joanne. She groaned. Act.
- 42 Kyle was playing/played on the x-box with John. He giggled. Act.
- 43 Jasmine tossed/was tossing a bag of crisps to Becky. She frowned. Acc.
- 44 Edward carried/was carrying a bag to Patrick. He smiled. Acc.
- 45 Grace drank/was drinking at the water tap with Claire. She giggled. Act.
- 46 Ross was throwing/threw a rubber to Matt. He laughed. Acc.
- 47 Harriet was watching/watched at the cinema with Julia. She frowned. Act.
- 48 Kevin took/was taking a screwdriver to Robert. He sighed. Acc.
Was a piano mentioned?
- 49 Mike spoke/was speaking at the concert with Jack. He frowned. Act.
- 50 Martha was talking/talked at the playgroup with Mary. She sighed. Act.
- 51 Rachael brought/was bringing a cold drink to Charlotte. She giggled. Acc.
- 52 Kay handed/was handing a skipping rope to Liz. She chuckled. Acc.
- 53 Josh ran/was running down the lane with Luke. He grinned. Act.
- 54 Eve was carrying/carried a tray to Kate. She laughed. Acc.
- 55 Barry watched/was watching at the races with Lewis. He groaned. Act.
- 56 Benjamin was giving/gave a pencil to Cameron. He chuckled. Acc.
Was a skipping rope mentioned?
- 57 Peter was drinking/drank at the bar with Ian. He chuckled. Act.
- 58 Mary played/was playing in the park with Jenny. She grinned. Act.
- 59 Richard was bringing/brought a cup of tea to Darren. He frowned. Acc.
- 60 Mavis was speaking/spoke in the corridor with Emma. She laughed. Act.
- 61 Helen studied/was studying in the classroom with Sheila. She chuckled. Act.
- 62 Maxine was chucking/chucked a cloth to Carol. She sighed. Acc.
- 63 Tom was studying/studied in the lesson with Wayne. He smiled. Act.
- 64 Simon chucked/was chucking a torch to Alfie. He giggled. Acc.
Was a classroom mentioned?

Table A 3.1 *Summary GLMM for (log odds) Selection of the Source: Effect for Grammatical Aspect (GA) Adults Experiment 1b*

Fixed effects	Estimated coefficient (<i>b</i>)	<i>SE</i>	<i>z</i>	Pr(> <i>z</i>)
(Intercept)	-0.43	0.22	-1.97	0.05
GA (imperfective)	1.51	0.22	6.82	<0.01
Random effects			Variance	<i>SD</i>
Participant:	(intercept)		0.39	0.62
	GA (slope)		0.45	0.67
Item:	(intercept)		1.26	1.12
	GA (slope)		0.57	0.76
1344 observations; 28 participants, 48 items				

Stories used in Experiments 4a and 4b. The grammatical aspect of the verb in presentations A/B is shown. Stimuli and questions are shown here with the prefix 4a: or 4b: for Experiments 4a and 4b respectively. Stimuli are shown in italics here but were presented in the same font as the rest of the stories in the actual presentation.

Practice story

A ride on the big wheel

The sounds and smells of the fairground filled the air. Sarah and Molly pushed their way through the crowds in their hurry to get to the big wheel.

1. Are Sarah and Molly at a fair?

“I’m so excited,” said Sarah, grinning at Molly.

“Me too,” said Molly, grinning back.

At last they got there.

“It’s bigger than I was expecting,” said Molly, looking up at the wheel towering above them. She was a little nervous now.

“Oh we’ll be fine,” replied Sarah, who was a bit more adventurous.

There was a big queue to go on the ride. The girls had to stand and wait for a long time.

“My bag is so heavy,” moaned Molly. She was beginning to regret saying she would go on the ride.

“I’ll carry it for you,” said Sarah, hoping to cheer her friend up. **4a:** *Only a moment later, Molly was handing her bag to Sarah.* **4b:** *Only a moment later, Molly was handing her bag to Sarah, she grinned.*

2. **4a:** Has Molly handed her bag to Sarah yet? **4b:** Who grinned Molly/Sarah?

The bag wasn’t really very heavy at all.

Finally they got to the front of the queue. *Sarah was stood on the same side as the ticket collector so Molly gave her ticket to Sarah.* **4a:** *The ticket was small and blue.* **4b:** *The ticket was small and blue, she smiled.*

3. **4a:** Has Molly given her ticket to Sarah yet? **4b:** Who smiled Molly/Sarah?

Suddenly a strong wind blew and the ticket fluttered up into the air before it floated off over the heads of the other people standing in the queue. Molly looked up at the ticket collector dismayed.

“Go on,” he said kindly, nodding in the direction of the carriage. “I know you had a ticket,” he added.

“That was lucky,” said Sarah to Molly as they squeezed into the carriage together.

“I know I hope this is going to be worth it!” said Molly, as the big wheel began to turn.

4. Do the girls get to go on the big wheel ride in the end?

Story 1

Getting tickets for the concert

Carol and Janet were best friends and they lived in a little seaside town. They had just heard that their favourite band Boyz Life was going to play a concert nearby. They really wanted to go but the trouble was they didn't have enough money for the tickets.

“We could make lemonade and sell it to people on the beach tomorrow to make some money,” suggested Carol.

“That's a really good idea,” said Janet.

1. Do the girls live by the sea?

Early the next morning in Janet's kitchen the girls started to make the lemonade to sell to people on the beach. *Janet took/was taking a lemon to Carol. 4a: The lemon was large and looked juicy. 4b: The lemon was large and looked juicy, she laughed.*

2. **4a:** Has Janet taken the lemon to Carol yet? **4b:** Who laughed Janet/Carol?

Carol squeezed the lemon and put the juice in a large jug on the table. *The girls worked well together and soon Janet was handing/handed the last lemon to Carol. 4a: The lemon was small and hard. 4b: The lemon was small and hard, she smiled.*

3. **4a:** Has Janet handed the lemon to Carol yet? **4b:** Who smiled Janet/Carol?

It was going to be difficult to get any juice out of this lemon! Carol squeezed hard and the last drops dripped into the jug.

At last they were finished making the lemonade and it was time to clear up. *Carol was tossing/tossed a dishcloth to Janet. 4a: The dishcloth was all soapy and wet. 4b: The dishcloth was all soapy and wet, she grinned.*

4. **4a:** Has Carol tossed the dishcloth to Janet yet? **4b:** Who grinned Carol/Janet?

Janet missed catching the dishcloth and it nearly landed in the jug!

“I hope you are better at selling lemonade than catching things!” laughed Carol, teasing her friend.

An hour later the girls were at the beach and getting ready for their big lemonade sale. Janet had set up a table. *Carol was bringing/brought a packet of cups to Janet. 4a:*

The cups had a picture of Boyz Life on them. 4b: The cups had a picture of Boyz Life on them, she grinned.

5. **4a:** Has Carol brought the cups to Janet yet? **4b:** Who grinned Carol/Janet?

Janet set the cups out in neat rows ready to pour lemonade into when people asked.

All day the girls waited for customers by their table but not a single person came. The sky was now grey and cloudy. Everyone had left the beach and gone home.

“We might as well just give the lemonade away and go home!” Janet said wearily.

So that’s just what they did. But, as they were packing up, Carol noticed somebody walking towards them with their hood up and their head down.

“Hey, would you like some free lemonade?” Carol called to the stranger.

“Why are you giving lemonade away?” asked the stranger, walking over to the girls.

6. Do the girls know who they are talking to?

The girls explained how they had wanted to buy tickets for the Boyz Life concert.

“Well I might be able to help you with that,” said the stranger, pulling down his hood and looking up for the first time.

“It’s you!” said both girls together as they recognised the lead singer of their favourite band!

“Yes, and these are for you,” he said, reaching into his pocket and pulling out two free tickets for the concert.

Story 2

Winning the go-cart race

Alfie and his friend Darren were slowly walking home from school together. They were talking about their arch enemies Wilf and Simon.

7. Do Alfie and Darren like Wilf and Simon?

As they passed a shop Alfie saw a poster in the shop window which said, go-cart race, 24th July, all go-carts must be home-made. Alfie looked at Darren.

“We could build a great go-cart together,” he said excitedly.

“Yeah, that would show Wilf and Simon who’s the best!” replied Darren, grinning.

So for the next few weeks, every evening after school, Alfie and Darren worked together building a go-cart in Alfie’s garage. *One evening Alfie brought/was bringing*

a screwdriver to Darren. **4a:** *The screwdriver was for fixing the go-cart wheels into place.* **4b:** *The screwdriver was for fixing the go-cart wheels into place, he chuckled.*

8. **4a:** Has Alfie brought the screwdriver to Darren yet? **4b:** Who chuckled Alfie/Darren?

Darren looked up and whispered to Alfie, “Did you hear something? I thought I heard voices outside.” The boys put down their tools and crept to the door and peeped out. They saw two boys running off down the road.

“I bet that was Wilf and Simon,” said Darren. “They’re making a go-cart for the race too and they will have wanted to see how good ours is.”

“Well I’m not bothered if they did see,” said Alfie. “Because, our go-cart is going to be better than theirs whatever they do!”

“But we still have so much to do!” said Darren, looking down at the half finished go-cart. **4a:** *Alfie carried/was carrying a large plank of wood to Darren.* **4b:** *Alfie carried/was carrying a large plank of wood to Darren, he laughed.*

9. **4a:** Has Alfie carried the wood to Darren yet? **4b:** Who laughed Alfie/Darren?

They needed to cut the wood to build the sides of the go-cart.

“We can do it,” Alfie said firmly, putting the wood down.

Finally the cart was ready and it just needed painting. *Darren was taking/took a can of red paint to Alfie.* **4a:** *The paint can was large and heavy.* **4b:** *The paint can was large and heavy, he smiled.*

10. **4a:** Has Darren taken the can of paint to Alfie yet? **4b:** Who smiled Darren/Alfie?

Unfortunately he dropped the paint can. But fortunately the can lid was on tight and the paint didn’t spill.

Only a week later the cart was finished and it looked fabulous. But now the boys had a problem. There was only enough room in the cart for one of them and they had to decide who was going to be the driver in the race. They tossed a coin to decide and Alfie won. Darren was a bit disappointed but he was not too bothered because Alfie was his best friend after all.

The race day finally arrived. The boys spotted Wilf and Simon at the race line up, Simon was getting into a large go-cart. Alfie was already in their go-cart ready to go. **4a:** *Darren threw/was throwing a good luck coin to Alfie.* **4b:** *Darren threw/was throwing a good luck coin to Alfie, he laughed.*

11. **4a:** Has Darren thrown the coin to Alfie yet? **4b:** Who laughed Darren/Alfie?

The coin landed in a muddy puddle and Darren thought, “Oh no, that’s not a good sign!”

But he needn't have worried, Alfie easily won the race. Alfie and Darren were so pleased with themselves they even offered to help Wilf and Simon build their cart next year!

12. After the race do Alfie and Darren try to make friends with Wilf and Simon?

Story 3

Finding a pet for Beth

Beth desperately wanted a pet. She was stood in her kitchen arguing with her Mum about it.

“But why can't I have a pet?” she wailed for the hundredth time. “Everyone else has got one in my class!” Beth's mum was exasperated.

“For the last time Beth, you can't have a pet because we don't know anyone who could look after it when we go on holiday!” she said crossly.

13. Does Beth's Mum want her to have a pet?

“But one of my friends could look after it!” argued Beth.

“I'm not discussing this anymore,” said her Mum, turning her back to Beth. Beth stood fuming for a moment then stalked off out of the house angrily slamming the front door behind her.

Beth walked round to her best friend Gail's house. Gail always knew how to cheer Beth up.

“Why don't you go and sit in the garden whilst I get a drink and a biscuit for us?” said Gail. Beth found a shady spot in the garden under an old apple tree and sat down. She thought about her problem as she waited for her friend.

4a: *A few minutes later Gail was carrying/carried a tray to Beth.* **4b:** *A few minutes later Gail was carrying/carried a tray to Beth, she smiled.*

14. **4a:** Has Gail carried the tray to Beth yet? **4b:** Who smiled Gail/Beth?

The tray had a packet of biscuits and two glasses of lemonade on it. As she crossed the garden, Gail almost tripped but she managed to steady herself and eventually put the tray down on the grass next to Beth. **4a:** *A warm breeze blew as Gail handed/was handing a glass of lemonade to Beth.* **4b:** *A warm breeze blew as Gail handed/was handing a glass of lemonade to Beth, she chuckled.*

15. **4a:** Has Gail handed the glass of lemonade to Beth yet? **4b:** Who chuckled Gail/Beth?

“Thanks Gail,” said Beth taking a sip.

4a: *A moment later, Gail was chucking/chucked a biscuit to Beth.* **4b:** *A moment later, Gail was chucking/chucked a biscuit to Beth, she grinned.*

16. **4a:** Has Gail chucked the biscuit to Beth yet? **4b:** Who grinned Gail/Beth?

The biscuit fell on the floor because Beth suddenly squealed and jumped up off the ground.

“Something’s bitten me!” she exclaimed, looking at her leg to see if she could see any bite marks. She found a little cut on her leg.

“What could have done that?” said Gail inspecting the graze. The girls searched around in the long grass near to where they had been sitting.

There, hiding behind a rock, was a crab!

“How did a crab get here?” said Gail puzzled.

“Maybe a seagull dropped it!” suggested Beth.

“Well it has had a lucky escape then!” laughed Gail.

The girls watched the crab. It stared up at them warily. Gail knew how to pick crabs up by the top of their shell. Beth was a bit nervous but she wanted to try holding the crab by its shell. *Gail carried/was carrying the crab to Beth.* **4a:** *The crab wiggled its claws in the air.* **4b:** *The crab wiggled its claws in the air, she chuckled.*

17. **4a:** Has Gail carried the crab to Beth yet? **4b:** Who chuckled Gail/Beth?

She dropped it on the grass but the crab wasn’t injured and Gail soon had hold of it again.

18. Do the girls find the crab again?

“I hope your mum lets you keep it as a pet!” said Gail smiling as she passed the crab back to Beth.

Story 4

Wanting to be the Goalie

Alan and his best friend Nick both played football for the same team. They were in the changing room getting ready for a match against St. Stevens. Alan played centre-back but secretly he'd always wanted to play Goalie. He'd never told anyone because his friend always played that position.

19. Does Alan play Goalie?

Alan reached into the kit bag and felt around for a shirt. *A moment later, Alan was throwing/threw a shirt to Nick.* **4a:** *The shirt was the green, goalie one.* **4b:** *The shirt was the green, goalie one, he grinned.*

20. **4a:** Has Alan thrown the shirt to Nick yet? **4b:** Who grinned Alan/Nick?

Nick missed and it got caught on a hook on the wall.

“I hope you catch better than that on the field,” said Alan half laughing. Alan carried on searching for his kit and found the Goalie gloves at the bottom of the bag. *Alan tossed/was tossing the Goalie gloves to Nick.* **4a:** *The gloves were large and new.* **4b:** *The gloves were large and new, he chuckled.*

21. **4a:** Has Alan tossed the gloves to Nick yet? **4b:** Who chuckled Alan/Nick?

Alan felt sad but he kept his feelings to himself.

The match started well. Alan made some good passes. His team was already 1 up 20 minutes into the game. There were storm clouds in the sky. It started to pour and the St. Stevens team made an attack. Their striker swerved around Alan and made a shot at the net. Alan watched helplessly as Nick flung himself into the air but he couldn't make the save! The home crowd groaned. Alan stared glumly at his boots as the whistle blew for half time.

In the changing room Alan sat on his own, most of the players were avoiding him. **4a:** *Nick was handing/handed a drink to Alan.* **4b:** *Nick was handing/handed a drink to Alan, he grinned.*

22. **4a:** Has Nick handed the drink to Alan yet? **4b:** Who grinned Nick/Alan?

“You know that wasn't your fault,” Nick said kindly. “It could have happened to anyone.” Alan didn't think so but he didn't say anything. He just sipped the juice.

The match restarted and suddenly the St. Stevens striker was in front of Alan again. Alan made a tackle. This time the striker didn't get past and instead knocked the ball off the side line. A moment later, Alan was throwing the ball to the mid-fielder. The ball was wet and muddy but his throw was good. It landed at the mid-fielders feet who raced up the pitch, swiftly passed it to their striker and he put it in the back of the net! 2-1. The crowd cheered wildly.

The final whistle blew and the boys piled into the changing room once more for their team debrief. **4a:** *Nick chucked/was chucking the Goalie gloves to Alan.* **4b:** *Nick chucked/was chucking the Goalie gloves to Alan, he chuckled.*

23. **4a:** Has Nick chucked the gloves to Alan yet? **4b:** Who chuckled Nick/Alan?

“You all played really well,” said the coach. “But the man of the match has to be Alan for that fantastic throw in, you know you should think about playing Goalie sometimes with throws like that!”

“If only you knew!” thought Alan, smiling.

24. Is the coach pleased with Alan?

Story 5Trying to get a camping badge

Gemma and Nina loved being girl guides. They especially liked getting badges. This weekend they were going to try to get their camping badge. To get this they had to put up a tent by themselves and camp all night on their own.

So, on Saturday afternoon their parents dropped them at a nearby camp site and waved them goodbye.

25. Do the girls get dropped off early in the morning?

“Well this is it then,” said Nina, a little nervously, “we’re on our own.”

“We can do this,” replied Gemma, grinning at her friend.

The girls soon found their pitch and began unpacking their rucksacks. Nina had brought the tent and Gemma had brought the tent poles. Nina unrolled the tent and laid it on the ground. **4a:** *Gemma brought/was bringing the tent poles to Nina.* **4b:** *Gemma brought/was bringing the tent poles to Nina, she laughed.*

26. **4a:** Has Gemma brought the tent poles to Nina yet? **4b:** Who laughed Gemma/Nina?

But, because she was in a hurry, she broke one of the poles.

“Don’t worry,” said Nina, digging into the bottom of her bag. “I’ve got some tape we can use to fix it.”

The girls had just got the tent up when the first spots of rain started to fall.

“It looks like it’s going to be a stormy night!” said Gemma. “So we’d better make sure the tent pegs are hammered in tight to stop the tent blowing away!” Nina dug into the bottom of her bag again and this time brought out a tent peg hammer.

“Just what we need,” said Gemma laughing. “Pass it to me and I’ll make a start.” **4a:** *Nina was throwing/threw the hammer to Gemma.* **4b:** *Nina was throwing/threw the hammer to Gemma, she smiled.*

27. **4a:** Has Nina thrown the hammer to Gemma yet? **4b:** Who smiled Nina/Gemma?

Suddenly a bolt of lightning lit the sky. The storm was getting closer so the girls worked as quickly as they could hammering in the tent pegs as the rain got heavier and the wind really began to blow.

Finally the tent was secure and they crawled inside soaking wet and exhausted. It was very late now so it was pitch black in the tent and they couldn’t see a thing.

“I can’t find my dry clothes,” said Gemma, feeling around in the dark. Nina reached into the bottom of her bag again and found her torch. *Another streak of*

lightening briefly lit up the tent as Nina chucked/was chucking the torch to Gemma.

4a: *The torch was old and battered.* **4b:** *The torch was old and battered, she laughed.*

28. **4a:** Has Nina chucked the torch to Gemma yet? **4b:** Who laughed Nina/Gemma?

“Oh thanks Nina, what would I do without you!” said Gemma, catching it. She switched the torch on and found her things. *When she was finished changing Gemma threw/was throwing the torch back to Nina.* **4a:** *The torch was still shining brightly.*

4b: *The torch was still shining brightly, she chuckled.*

29. **4a:** Has Gemma thrown the torch back to Nina yet? **4b:** Who chuckled Gemma/Nina?

But Nina missed and the torch hit the floor and went out.

All night they lay in their tent in the dark with the storm raging outside.

30. Is the torch broken?

At last the first rays of sunlight appeared and the long night was over. They’d stayed out all night so they had earned their camping badges!

Story 6

Making a surprise birthday breakfast

Lewis and his twin brother Jimmy were going to make breakfast for their mum. It was her birthday. They wanted it to be a surprise. They had never made breakfast for her before. They wanted everything to be perfect.

31. Are the boys twins?

They crept quietly out of their bedroom and down the stairs. They didn’t say a word until they got to the kitchen.

“I’m so excited!” said Jimmy quietly. “Mum’s going to be so pleased with her surprise breakfast!”

“Not if we wake her up too soon she won’t!” Lewis whispered back.

They started to get the things they would need. **4a:** *Lewis was giving/gave a large frying pan to Jimmy.* **4b:** *Lewis was giving/gave a large frying pan to Jimmy, he grinned.*

32. **4a:** Has Lewis given the pan to Jimmy yet? **4b:** Who grinned Lewis/Jimmy?

They were going to make fried eggs on toast. Suddenly, he dropped the pan and it fell onto the floor with a loud clatter. The boys ran quickly to the bottom of the stairs and listened to hear if anyone had woken up. They didn’t hear anything. It was all still

quiet. They crept back to the kitchen and continued getting things ready. **4a:** *Lewis took/was taking a box of eggs to Jimmy.* **4b:** *Lewis took/was taking a box of eggs to Jimmy, he chuckled.*

33. **4a:** Has Lewis taken the eggs to Jimmy yet? **4b:** Who chuckled Lewis/Jimmy?

He was going to fry the eggs.

“I’ll make some toast and coffee whilst you fry the eggs,” he said quietly to Jimmy. “That way everything will be hot and ready at the same time.”

“She’ll be so pleased!” said Jimmy again, as he cracked an egg carefully on the side of the frying pan. He watched as the egg began to splutter in the hot fat.

Lewis told Jimmy that they needed to clear up as they went along. *Lewis was stood nearest to the bin so Jimmy was chucking/chucked the egg shells to Lewis.* **4a:** *The shells were sticky with bits of egg dripping from them.* **4b:** *The shells were sticky with bits of egg dripping from them, he smiled.*

34. **4a:** Has Lewis chucked the egg shells to Jimmy yet? **4b:** Who smiled Jimmy/Lewis?

Lewis caught the egg shells, tossed them into the bin and then washed his hands. Next he got a tray out of the cupboard and put the plate of toast he had made on it. All that was needed was to pop the eggs on top.

4a: *A minute later Jimmy was bringing/brought the fried eggs to Lewis.* **4b:** *A minute later Jimmy was bringing/brought the fried eggs to Lewis, he smiled.*

35. **4a:** Has Jimmy brought the eggs to Lewis yet? **4b:** Who smiled Jimmy/Lewis?

He slid the eggs out of the pan and put them onto the toast. Lewis put a cup of hot coffee onto the tray. Everything was perfect.

The boys very, very, carefully and quietly carried the tray up the stairs and into their parents’ bedroom.

“Surprise! Happy Birthday Mum!” they both shouted as they opened the door.

“Well this is a lovely surprise!” said their Mum as she peered through half-asleep eyes at the boys at the end of her bed.

36. Is the boy’s Mum cross with them for waking her up?

“But you are a bit early with breakfast aren’t you?” she continued, “We’ve only been asleep for an hour, it’s not my birthday yet, its 11.30 at night!”

Story 7Getting invited to a sleep over party

Jasmine and Becky had been best friends ever since they started school. Next week was going to be Jasmine's 8th Birthday and she was going to have a party. She was inviting all her friends.

37. Is it Becky's birthday next week?

Jasmine was giving/gave a party invitation to Becky. 4a: The invitation had pictures of pillows and sweets on it. 4b: The invitation had pictures of pillows and sweets on it, she smiled.

38. **4a:** Has Jasmine given the invitation to Becky yet? **4b:** Who smiled Jasmine/Becky?

"You will come to my sleepover party won't you Becky?" asked Jasmine.

"Of course I want to come!" said Becky, smiling. "But I don't think my mum will let me, you know what she's like!" she continued pulling a sad face. "I've thought about that!" said Jasmine grinning mysteriously.

Becky thought about the invitation and what Jasmine had said all day at school and she was still thinking about it as she walked home. As she opened her front door she saw her mum standing in the kitchen. She was talking loudly to someone on the telephone.

"Oh yes Mrs Wright, I'm sure Becky would love to come to Jasmine's sleepover. It's on Saturday you say about 6pm. Ok, Thank you again for inviting her," Becky overheard her mum say.

So that was what Jasmine had meant! She'd got her mum to phone Becky's mum to persuade her to let Becky come to the party! But instead of being pleased Becky's heart sank. The truth was she didn't want to go! She was frightened; she'd never been to a sleepover before. She slowly climbed the stairs to her bedroom wondering if she could think of an excuse.

Far too quickly Saturday came around and Becky found herself standing nervously on Jasmine's doorstep. She rang the doorbell and Jasmine opened the door. **4a:** *Since it was her birthday as well as her party, Becky was taking/took a birthday present to Jasmine.* **4b:** *Since it was her birthday as well as her party, Becky was taking/took a birthday present to Jasmine, she grinned.*

39. **4a:** Has Becky taken the birthday present to Jasmine yet? **4b:** Who grinned Becky/Jasmine?

Minutes later Becky was perched on Jasmine's large sofa surrounded by four other girls from her class. The others were all showing each other the sweets they had

brought for a midnight feast. **4a:** *Jasmine gave/was giving a drink to Becky.* **4b:** *Jasmine gave/was giving a drink to Becky, she chuckled.*

40. **4a:** Has Jasmine given the drink to Becky yet? **4b:** Who chuckled Jasmine/Becky?

Jasmine whispered into her ear.

“I’m so glad you’re here! Soon, we’re going to have a pillow fight and I need you on my team!” **4a:** *Moments later Jasmine tossed/was tossing a pillow to Becky.* **4b:** *Moments later Jasmine tossed/was tossing a pillow to Becky, she laughed.*

41. **4a:** Has Jasmine tossed the pillow to Becky yet? **4b:** Who laughed Jasmine/Becky?

Becky didn’t know what to do in a pillow fight! But she soon found out by watching the other girls and she had such a good time.

By midnight the girls were tucked up in their sleeping bags laying this way and that all over Jasmynes bedroom floor. There were empty sweet packets tucked under almost everyone.

42. Did the girls have a midnight feast?

Jasmine was lying next to Becky.

“Are you still awake?” she whispered softly to her friend.

“Yes,” said Becky, sleepily. “But only just!”

“I’m really glad you came,” said Jasmine.

“So am I!” said Becky.

Story 8

Building a tree House

Andrew and Patrick were going to build a tree house so they met at the edge of the woods. They were showing each other the tools they had brought for the job.

43. Have the boys come prepared to build a tree house?

Andrew handed/was handing a saw to Patrick. **4a:** *The saw had a long sharp edge.* **4b:** *The saw had a long sharp edge, he laughed.*

44. **4a:** Has Andrew handed the saw to Patrick yet? **4b:** Who laughed Andrew/Patrick?

“Great!” said Patrick. “I’ve brought a hammer and nails and some strong rope too to make a ladder,” he added.

“All we need to do now is to find a good tree!” said Andrew.

So, they set off into the woods to look for one. Patrick soon found an oak tree with a couple of footholds in the trunk and several low branches. He hauled himself up the trunk to the lowest branch. Then he sat with his legs dangling over the edge.

“This tree is perfect!” he shouted down to Andrew. Andrew looked up at Patrick sitting on the branch. All of a sudden the thought of climbing up and balancing in a tree didn’t seem to be such a good idea to him!

“Hmm, I’m not so sure, it looks a bit crooked,” he called up making an excuse because he didn’t want Patrick to know he was nervous.

“No it’s definitely perfect!” Patrick replied, “and I’ve spotted an old plank of wood close by we can use, I’m coming down so I can go and get it.”

He climbed down and a few minutes later Patrick gave/was giving the plank of wood to Andrew. 4a: The plank was slippy and heavy. 4b: The plank was slippy and heavy, he laughed.

45. **4a:** Has Patrick given the wood to Andrew yet? **4b:** Who laughed Patrick/Andrew?

“Can you pass this up to me?” he called over his shoulder as he climbed up the tree again. Andrew passed the plank up to him, relieved he didn’t have to balance in the tree with it.

“Can you pass me the pot of nails now?” Patrick called down.

A moment later, Andrew was carrying/carried the pot of nails to Patrick. 4a: The pot was old with a broken handle. 4b: The pot was old with a broken handle, he grinned.

46. **4a:** Has Andrew carried the nails to Patrick yet? **4b:** Who grinned Andrew/Patrick?

He dropped it and they spilled all over the grass.

“At least it was the nails that fell and not me!” thought Andrew, as he picked them up.

So that’s how the boys worked all afternoon, with Patrick in the tree and Andrew on the ground passing things up to him. **4a:** *Finally, they finished and Andrew was tossing/tossed the rope up to Patrick.* **4b:** *Finally, they finished and Andrew was tossing/tossed the rope up to Patrick, he smiled.*

47. **4a:** Has Andrew tossed the rope to Patrick yet? **4b:** Who smiled Andrew/Patrick?

Patrick tied one end to a branch and then let the other end dangle down so that Andrew could use it as a ladder. He was going to have to be brave and overcome his fear.

Andrew took the rope in his hands and started to climb. Moments later he was sitting next to Patrick enjoying the view.

“I thought you were never going to get up here!” laughed Patrick.

48. Does Andrew stay on the ground?

Table A4.1 *Mean Proportion of Ongoing Selections (and Standard Deviations) in the Two Grammatical Aspect and Two Intervening Text conditions*

Intervening text	Year Group	Grammatical Aspect		Overall
		Perfective	Imperfective	
Without	Year 3 ($n = 51$)	0.13 (.34)	0.26 (.44)	0.20 (.40)
	Year 4 ($n = 52$)	0.12 (.32)	0.42 (.49)	0.27 (.44)
	Year 5 ($n = 46$)	0.11 (.32)	0.47 (.50)	0.29 (.46)
	Year 6 ($n = 49$)	0.09 (.28)	0.39 (.49)	0.24 (.43)
	$N = 198$	0.11 (.32)	0.38 (.49)	0.25 (.43)
With	Year 3 ($n = 51$)	0.16 (.36)	0.24 (.43)	0.20 (.40)
	Year 4 ($n = 52$)	0.19 (.40)	0.33 (.47)	0.26 (.44)
	Year 5 ($n = 46$)	0.13 (.34)	0.29 (.46)	0.21 (.41)
	Year 6 ($n = 49$)	0.11 (.31)	0.24 (.44)	0.18 (.38)
	$N = 198$	0.15 (.36)	0.28 (.45)	0.21 (.41)
Total	$N = 198$	0.13 (.34)	0.33 (.47)	0.23 (.42)

Table A4.2 *Mean Proportion of Source Selections (and Standard Deviations) in the Two Grammatical Aspect and Two Intervening Text conditions*

Intervening text	Year Group	Grammatical Aspect		Overall
		Perfective	Imperfective	
Without	Year 3 ($n = 59$)	0.49 (.50)	0.54 (.50)	0.52 (.50)
	Year 4 ($n = 47$)	0.48 (.50)	0.50 (.50)	0.49 (.50)
	Year 5 ($n = 50$)	0.50 (.50)	0.62 (.49)	0.56 (.50)
	Year 6 ($n = 44$)	0.45 (.50)	0.59 (.49)	0.52 (.50)
	$N = 200$	0.48 (.50)	0.56 (.50)	0.52 (.50)
With	Year 3 ($n = 59$)	0.47 (.50)	0.51 (.50)	0.49 (.50)
	Year 4 ($n = 47$)	0.36 (.48)	0.44 (.50)	0.40 (.49)
	Year 5 ($n = 50$)	0.41 (.49)	0.49 (.50)	0.45 (.50)
	Year 6 ($n = 44$)	0.40 (.49)	0.43 (.50)	0.42 (.49)
	$N = 200$	0.42 (.49)	0.47 (.50)	0.44 (.50)
Total	$N = 200$	0.45 (.50)	0.52 (.50)	0.48 (.50)

Schemes for classifying the tense of extracted verb forms

Scheme for classifying verbs used previously for accomplishment items

	Tense	Example
Does the verb form end in <i>ing</i> ?: <i>handing, tossing, chucking, carrying, taking, giving, bringing, throwing</i>	Non finite	Verb form is *ing, it has no auxiliary verb immediately before it but is preceded by a tensed verb with a subject, for example /He said... .., <i>carrying</i> or I tried / <i>taking</i> other examples: <i>start(ed) *ing</i> ; <i>end(ed) up *ing</i> ; <i>before *ing</i> ; <i>when *ing</i>
	Past Progressive	<i>was(n't) *ing</i> ; <i>were(n't) *ing</i>
	Past Progressive (other meaning)	<i>was/were(n't) giving up</i>
	Past Progressive (modal)	<i>could(n't) *ing</i> ; <i>should(n't) *ing</i>
	Present Progressive	<i>am (not) *ing</i> <i>is(n't) *ing</i> <i>are(n't) *ing</i>
	Present Progressive (modal)	<i>can('t) *ing</i>

	Future Progressive	<i>will/won't be *ing</i> <i>going to be *ing</i>
	Past Perfect Progressive	<i>had(n't) been *ing</i>
	Present Perfect Progressive	<i>has/have(n't) been *ing</i>
	Future Perfect Progressive	<i>will/won't have been *ing</i>
	Conditional Progressive	<i>would(n't) be *ing</i> <i>would(n't) have been *ing</i>
Is the verb form <i>gave, took, brought, threw, handed, carried, tossed, chucked?</i>	Simple Past	<i>gave, took, brought, threw, handed, carried, tossed, chucked;</i> include <i>nearly gave, took, brought, threw, handed, carried, tossed, chucked;</i> <i>never gave, took, brought, threw, handed, carried, tossed, chucked;</i> <i>then gave, took, brought, threw, handed, carried, tossed, chucked;</i> <i>and gave, took, brought, threw, handed, carried, tossed, chucked;</i>
	Simple Past (other meaning)	<i>gave out</i> meaning broke <i>gave up</i> meaning stopped trying <i>took care</i> <i>took over</i> <i>all it took</i> <i>brought up</i> meaning raised or reared
	Simple Past (passive)	<i>was/were(n't) brought, handed, carried, tossed, chucked</i>

	Simple Past (conditional)	<i>If gave, took, brought, threw, handed, carried, tossed, chucked</i>
	Past Perfect	<i>had(n't) brought, handed, carried, tossed, chucked</i>
	Past Perfect (modal)	<i>should have brought, handed, carried, tossed, chucked</i> <i>would have brought, handed, carried, tossed, chucked</i>
	Present Perfect	<i>has/have(n't) brought, handed, carried, tossed, chucked</i>
	Present Perfect (other meaning)	<i>has/have(n't) brought up meaning reared or raised</i>
	Present Perfect (modal)	<i>must have brought, handed, carried, tossed, chucked;</i> <i>may have brought, handed, carried, tossed, chucked;</i> <i>may be brought, handed, carried, tossed, chucked;</i> <i>should have brought, handed, carried, tossed, chucked</i>
	Present Perfect (conditional)	<i>If... has been brought, handed, carried, tossed, chucked</i>
	Future Perfect	<i>will have brought, handed, carried, tossed, chucked</i>
	Future Perfect (passive)	<i>will be brought, handed, carried, tossed, chucked</i>
Is the verb form <i>taken, given thrown?</i>	Simple Past (passive)	<i>was/were(n't) taken, given, thrown;</i>
	Past Perfect	<i>had(n't) taken, given, thrown;</i>
	Past Perfect (other meaning)	<i>had(n't) given up, given birth, taken off</i>
	Past Perfect (modal)	<i>should have taken, given, thrown;</i> <i>would have taken, given, thrown</i>
	Past Perfect (passive)	<i>had(n't) been taken, given, thrown</i>

	Present Perfect	<i>has/have(n't)</i> taken, given, thrown;
	Present Perfect (other meaning)	<i>has/have(n't)</i> given up meaning stopped trying
	Present Perfect (passive)	<i>has/have(n't)</i> been taken, given, thrown;
	Present Perfect (conditional)	<i>If... has been</i> taken, given, thrown
	Future Perfect	<i>will have</i> taken, given, thrown
	Future Perfect (passive)	<i>will be</i> taken, given, thrown

Scheme for classifying verbs used previously for Activity items

	Tense	Example
Does the verb end in <i>ing</i> ?: <i>playing, studying, talking,</i> <i>standing, drinking,</i> <i>speaking, running</i>	Non finite	Verb form is *ing, it has no auxiliary verb immediately before it but is preceded by a tensed verb with a subject, for example /He heard....., <i>talking</i> or you had better be / <i>running</i> other examples: <i>start(ed) *ing;</i> <i>end(ed) up *ing;</i> <i>before *ing;</i> <i>when *ing</i>
	Past Progressive	<i>was(n't) *ing;</i> <i>were(n't) *ing</i>
	Past Progressive (modal)	<i>could(n't) *ing;</i> <i>should(n't) *ing</i>
	Present Progressive	<i>am (not) *ing;</i> <i>is(n't) *ing</i> <i>are(n't) *ing</i>
	Future Progressive	<i>will/won't be *ing</i> <i>going to be *ing</i>
	Past Perfect Progressive	<i>had(n't) been *ing</i>

	Present Perfect Progressive	<i>has/have(n't) been *ing</i>
	Future Perfect Progressive	<i>will/won't have been *ing</i>
	Conditional Progressive	<i>would(n't) be *ing</i> <i>would(n't) have been *ing</i>
Is the verb form <i>watched, ran, played, spoke, talked, stood, studied, drank?</i>	Simple Past	watched, ran, played, spoke, talked, stood, studied, drank; include <i>nearly</i> watched, ran, played, spoke, talked, stood, studied, drank; <i>never</i> watched, ran, played, spoke, talked, stood, studied, drank <i>then</i> watched, ran, played, spoke, talked, stood, studied, drank <i>and</i> watched, ran, played, spoke, talked, stood, studied, drank
	Simple Past (other meaning)	<i>role play</i>
	Simple Past (passive)	<i>was/were(n't) watched, played, talked, stood, studied</i>
	Simple Past (conditional)	<i>If</i> watched, ran, played, spoke, talked, stood, studied, drank
	Past Perfect	<i>had(n't) watched, played, talked, stood, studied</i>
	Past Perfect (modal)	<i>should have</i> watched, played, talked, stood, studied <i>would have</i> watched, played, talked, stood, studied
	Present Perfect	<i>has/have(n't) watched, played, talked, stood, studied</i>
	Present Perfect (modal)	<i>must have</i> watched, played, talked, stood, studied; <i>may have</i> watched, played, talked, stood, studied

		<i>may be</i> watched, played, talked, stood, studied <i>should have</i> watched, played, talked, stood, studied
	Present Perfect (conditional)	<i>If... has been</i> watched, played, talked, stood, studied
	Future Perfect	<i>will have</i> watched, played, talked, stood, studied
	Future Perfect (passive)	<i>will be</i> watched, played, talked, stood, studied
Is the verb form <i>spoken</i> , <i>run</i> , <i>drunk</i> ?	Simple Past (passive)	<i>was/were(n't)</i> spoken, run, drunk
	Past Perfect	<i>had(n't)</i> spoken, run, drunk
	Past Perfect (modal)	<i>should have</i> spoken, run, drunk; <i>would have</i> spoken, run, drunk
	Present Perfect	<i>has/have(n't)</i> spoken, run, drunk
	Present Perfect (modal)	<i>must have</i> spoken, run, drunk <i>may have</i> spoken, run, drunk; <i>may be</i> spoken, run, drunk; <i>should have</i> spoken, run, drunk
	Present Perfect (passive)	<i>has/have(n't) been</i> spoken, run, drunk
	Present Perfect (conditional)	<i>If... has been</i> spoken, run, drunk
	Future Perfect	<i>will have</i> spoken, run, drunk
	Future Perfect (passive)	<i>will be</i> spoken, run, drunk

Tense of Extracted Verb Forms Across Both Groups of Verbs by Year Group

Aspect	Tense	Y3		Y4		Y5		Y6		
		Frequency	%	Frequency	%	Frequency	%	Frequency	%	
Imperfective	Past Progressive	13	8.2	28	9.4	76	12.8	83	12.9	
	Past Progressive (other meaning)					2	0.3	2	0.3	
	Past Progressive (modal)					1	0.2	2	0.3	
	Present Progressive	7	4.4	15	5.1	22	3.7	26	4.0	
	Present Progressive (modal)	1	0.6	1	0.3	1	0.2			
	Future Progressive					3	0.5	4	0.6	
	Past Perfect Progressive					2	0.3	2	0.3	
	Present Perfect Progressive			3	1.0	9	1.5	9	1.4	
	Conditional Progressive	2	1.3	3	1.0	3	0.5	2	0.3	
	Perfective: Simple	Simple Past	96	60.8	164	55.2	307	51.7	317	49.2
Simple Past (other meaning)		2	1.3	2	0.7	7	1.2	13	2.0	
Simple Past (passive)		1	0.6	1	0.3	6	1.0	8	1.2	
Simple Past (conditional)				1	0.3	1	0.2	1	0.2	
Perfect		Past Perfect	4	2.5	9	3.0	13	2.2	14	2.2
		Past Perfect (other meaning)					2	0.3	3	0.5
		Past Perfect (modal)					2	0.3	2	0.3
		Past Perfect (passive)					3	0.5	3	0.5
		Present Perfect	3	1.9	4	1.3	4	0.7	8	1.2
		Present Perfect (other meaning)	1	0.6	1	0.3				
		Present Perfect (modal)	1	0.6	3	1.0	5	0.8	6	0.9
		Present Perfect (passive)					1	0.2	1	0.2
		Present Perfect (conditional)					1	0.2	1	0.2
		Future Perfect (passive)					1	0.2	1	0.2
Non Finite		27	17.1	62	20.9	122	20.5	136	21.1	
		158	100	297	100	594	100	644	100	

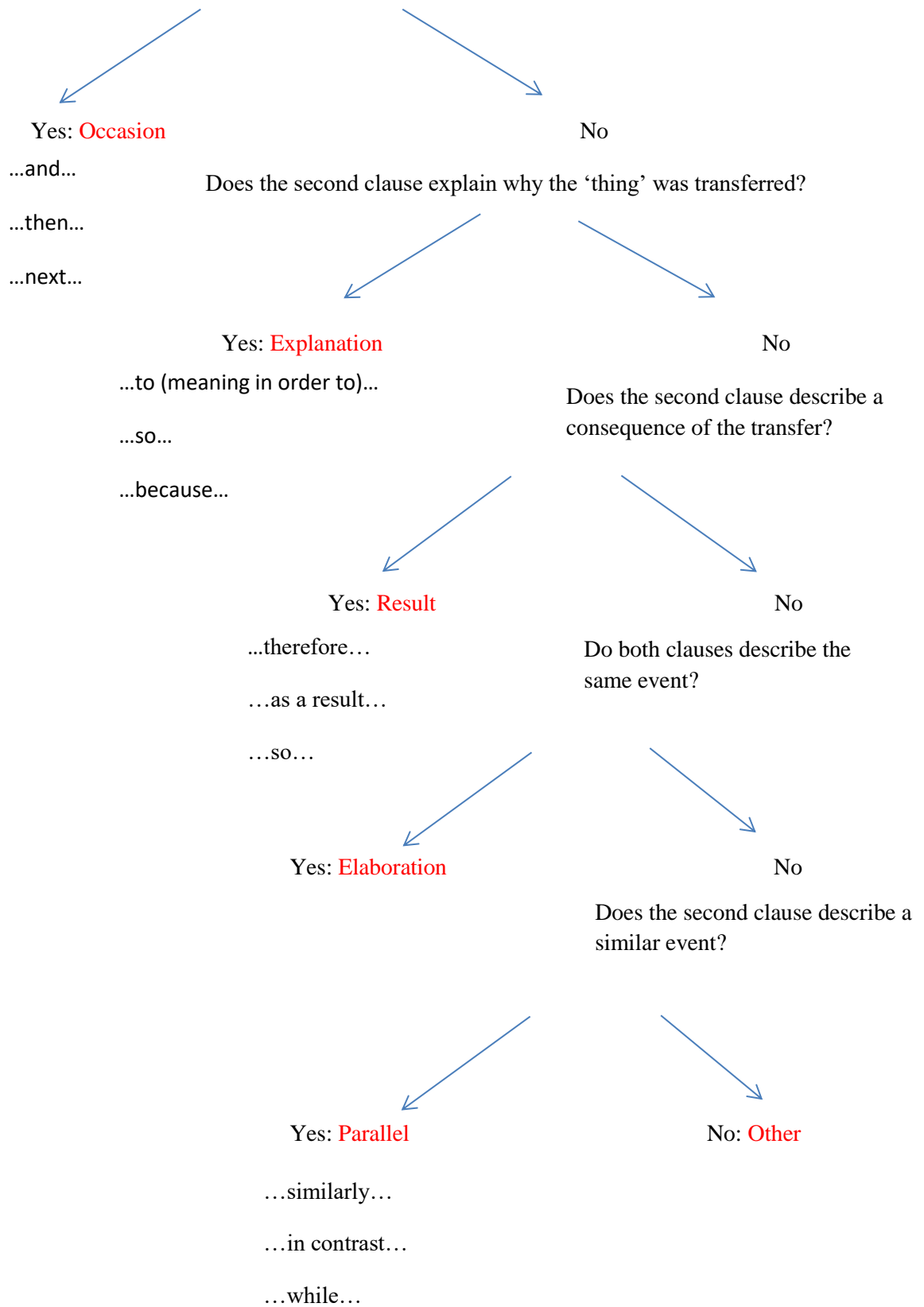
Scheme for classifying Source/Goal

Look at the verb extracted.

1. Who was doing the action? Code Blue, if not clear code no Source
2. What was being transferred? Code Green, if not clear code no item
3. Who received the item, where was it taken to? Code Red, if not clear code no Goal

Flow chart for classifying coherence relations

Does the event in the second clause imply that the first event has finished?



Transfer of possession verbs extracted within the frame X gave/was giving a Y to Z (33 instances all Simple Past). **Blue** = Source, **Green** = item, **Red** = Goal.

Context 1	Verb Extracted	Context 2	Coherence relation	Who is mentioned next
Granny	handed	the tin to her grandson . Ben took it with a smile, and then walked over to the cabinet.	Occasion	Goal
George	gave	a spoonful of medicine to the pig . The pig blew smoke from its nose and jumped about all over the place. Then it grew and grew.	Occasion	Goal
He opened the can in the kitchen and	handed	it to George . George poured the paint into the saucepan.	Occasion	Goal
The man	gave	some crusts of bread to Professor Pigeon . The bird picked them up and hopped over to her nest, where Tom saw there was a number of tiny pigeon eggs.	Occasion	Goal
The shopkeeper pulled the French horn down off the hook and	handed	it to me . But when Dad saw the price tag he put the brakes on the whole thing.	Occasion	Other
So I went upstairs and grabbed a big handful of thousand dollar bills and	brought	them down to Rodrick's room . I gave him the money, and he turned over the paper.	Occasion	Source
Tom	brought	the trolley to a stop . They were now just a few paces away from the doors.	Occasion	Other
Mom	brought	Manny over to the kitchen table . Then she put a seed, a raisin and a grape on a plate and told Manny to point to the thing that was the closest in size to the piece of thread he swallowed.	Occasion	Source
George took the cup back to the kitchen and added another spoonful of sugar. He stirred it again and	carried	it carefully in to Grandma . 'Where's the saucer?' she said. 'I won't have a cup without a saucer.'	Occasion	Goal
The next day, to pay Mr Twit back for the frog trick, Mrs Twit sneaked out into the garden and dug up some worms. She chose big long ones and put them in a tin and	carried	the tin back to the house under her apron . At one o'clock, she cooked spaghetti for lunch and she mixed the worms in with the spaghetti, but only on her husband's plate.	Occasion	Source
When Rowley came over to my house today, he	brought	a bunch of pictures from his trip with him . He said the best part of his holiday was when they went on a river	Occasion	Source

One night, when the old woman was asleep, he crept out of bed and	took	safari , and he showed me all these blurry pictures of birds and stuff. her walking-stick downstairs to his workshed . <u>There he stuck a tiny round piece of wood (no thicker than a penny) on to the bottom of the stick.</u>	Occasion	Goal
I	brought	my posters in to school today, and I have to say, <u>they came out pretty good.</u>	Occasion	Item
She	took	me down to Scotty's house and <u>explained the situation to his mother.</u>	Occasion	Other
After school today, Mom	took	me to the bookstore and <u>bought just about every Magick and Monsters book on the shelf.</u>	Occasion	Source
Grandma sipped the tea. 'It's not sweet enough,' she said. 'Put more sugar in.' George	took	the cup back to the kitchen and <u>added another spoonful of sugar.</u> He stirred it again and carried it carefully in to Grandma.	Occasion	Source
Rowley's birthday party is tomorrow, so Mom	took	me to the mall to get him a gift. <u>I picked out this cool video game that just came out,</u> and I handed it to Mom so she could pay for it.	Occasion	Item
Thomas Senior	took	himself off to Matron's office to have a doze. <u>As Matron snored away ... "ZZZZ, ZZZZ, ZZZZ, ZZZZ, ZZZZ" ... the Midnight Gang played games, shared sweets and told stories.</u>	Occasion	Goal
The kid who played Toto	brought	a stool and a pile of comic books on to the stage, and that totally ruined the whole 'dog' effect. <u>When it was time for the forest scene, me and the other Trees hopped into our positions.</u>	Occasion	Other
When I got to school today, I	took	my comics to Mr Ira's office. <u>He's the teacher who runs the school newspaper.</u>	Elaboration	Goal
There were lifts that	took	you to other lifts. <u>Mile-long corridors. Signs everywhere that Ben couldn't comprehend:</u>	Elaboration	Other
"Such a little beauty," she said as she	brought	the ring up to her eye for closer inspection. <u>"This is the first one I stole, back when I was a nipper."</u>	Elaboration	Source
" I	took	her out to the garden centre that time," protested Dad. <u>"It</u>	Explanation	Other

I picked out this cool video game that just came out, and I	handed	<u>was only because you needed someone to help you carry a load of bags of manure,</u> " said Mum.	Explanation	Goal
On Monday, Mom	took	<u>it to Mom so she could pay for it.</u> But Mom said I had to buy it with my OWN money.	Explanation	Goal
As he	gave	<u>me to her college so I could see what the campus was like,</u> and I have to admit it was actually kind of cool.	Parallel	Source
Next, the porter	took	<u>his order to Tootsie, his mouth began to water.</u>	Parallel	Other
The next day Mum	took	<u>Amber, George and Robin down to the operating theatre to start preparing everything. Meanwhile, Tom headed alone to the isolation ward to collect Sally.</u>	Result	Item
He	threw	<u>Henry and Peter to the Park. Henry felt very sad. He couldn't get rid of Peter, and he couldn't get Peter into trouble.</u>	Result	Goal
Raj's store was madly messy, but people came from miles away to shop there as he always	brought	<u>a handful over to everyone else's beds. "Thanks, George," said Tom.</u>	Other	Source
This summer Abe moved away to California and	took	<u>putting up Christmas decorations.</u>	Other	Other
He	gave	<u>the Cheese Touch with him. I just hope someone doesn't start the Cheese Touch up again, because I don't need that kind of stress in my life any more.</u>	Other	Source
And finally, just for fun, he	gave	<u>some to his pony, Jack Frost... (picture of pony getting bigger)</u>	Other	Other
		<u>some to Alma, the nanny goat...(picture of goat running about and getting bigger)</u>	Other	Other

Transfer of possession verbs extracted within the frame X gave/was giving Z Y (71 instances, 3 Past Progressive).					
Tense	Context 1	Verb Extracted	Context 2	Coherence relation	Who is mentioned next
Past Progressive	It was lovely to realise that while the fat farmer was sitting up there on the hill waiting for them to starve, he	was also giving	them their dinner without knowing it. <u>'Keep digging.'</u> said Mr Fox.	Elaboration	Other
Past Progressive	"Hugh had kidney failure and Jack	was giving	his twin brother one of his kidneys . <u>They were both in hospital for a while because of their operations.</u>	Elaboration	Other
Past Progressive	He looked to the wings where the ever-smiling Flavio	was giving	him an encouraging grin . <u>Please, make the ground open up now...</u> It didn't. There was no choice but to do something. Anything.	Other	Other
Simple Past	Then she handed her friend the flowers	and gave	her a peck on the cheek . <u>As this chapter of Sally's life ended, another began:</u>	Occasion	Goal
Simple Past	She	gave	him a fierce look . <u>Ben squirmed</u> . "I do, of course I do..."	Occasion	Goal
Simple Past	Well, that	gave	Rodrick the idea he was looking for . <u>Rodrick told Mom and Dad he was going to do his science experiment on the effect of "zero gravity" on the human spine.</u>	Occasion	Goal
Simple Past	I gave Manny a toy helicopter and I	gave	Rodrick a book about rock bands . <u>Rodrick gave me a book, too, but of course he didn't wrap it.</u> The book he got me was "Best of L'il Cutie".	Occasion	Goal
Simple Past	George put on a nurse's hat	and handed	the girl a bundle wrapped up in a blanket . <u>Sally felt the bundle move and opened it out to reveal Professor Pigeon under there.</u>	Occasion	Goal
Simple Past	Then the porter	handed	the girl a piece of rope with a handle at the end . <u>At first Sally looked completely mystified about what was happening.</u>	Occasion	Goal
Simple Past	And I guess that	gave	him the idea he was looking for . <u>Rowley got singled out first.</u>	Occasion	Other

Simple Past	Well, it turns out Mr Huff	gave	Rodrick's class the EXACT same assignment when he was in my grade. <u>Rodrick dug around in his junk drawer and found his old paper.</u>	Occasion	Other
Simple Past	But then Mom knocked at my door	and handed	me a pirate costume, with an eye patch and a hook and everything. <u>Rowley showed up around 6:30 wearing his knight costume,</u> but it didn't look ANYTHING like it looked yesterday.	Occasion	Other
Simple Past	He knew all about how I started the joke, and he	gave	me a speech about "respect" and "decency" and all that. <u>But luckily Mr Roy got one crucial fact wrong,</u> and that was the identity of the person we were playing the joke on.	Occasion	Source
Simple Past	When I rescued her, she	gave	me my first and last kiss." <u>"Whatever happened to Rosie?"</u> The porter hesitated for a moment. "Soon after that night her heart stopped beating.	Occasion	Other
Simple Past	The hen	gave	him an idea. <u>Quickly, he uncorked the medicine bottle and poured some of the brown stuff into the spoon.</u>	Occasion	Goal
Simple Past	But the woodwinds were right behind us, and that idiot Jake McGough stepped on the back of my shoe	and gave	me a flat tyre. <u>I had to put my horn down to fix my shoe,</u> and when I did the last kid in the woodwind section went through the stage door and let it shut behind him.	Occasion	Goal
Simple Past	Mom was mad that I tried to put one over on her like that, so she	gave	me a punishment. <u>But I got that out of the way before dinner.</u>	Occasion	Goal
Simple Past	The only things we could salvage were a couple of mints that were wrapped in cellophane, and the toothbrushes Dr Garrison	gave	us. <u>I think next Halloween I'll just stay home and mooch some Butterfingers from the bowl Mom keeps on top of the refrigerator.</u>	Occasion	Goal
Simple Past	"As much as I love this balloon you	gave	me, <u>I wondered if I could swap it for a pink one."</u>	Occasion	Goal
Simple Past	I was really nervous when I	handed	Mom the money. <u>But she took it without even blinking.</u>	Occasion	Goal

Simple Past	Then Rowley's parents	gave	him their present. <u>And guess what? It was a diary.</u>	Occasion	Item
Simple Past	I guess that's why they	gave	him the axe. <u>As soon as I heard the news, I knew I had to try out.</u>	Occasion	Other
Simple Past	And sure enough, the next time Rowley came downstairs, he	gave	it a big kick. <u>Well, that did it.</u> Rowley started blubbering like a baby, and I couldn't quiet him down.	Occasion	Other
Simple Past	So after Mom	gave	us a speech about "responsibility" and "trust" and all that, they took off.	Occasion	Source
Simple Past	So that night she	brought	me a pen and paper and <u>had me write Curtis a letter,</u> which I did.	Occasion	Goal
Simple Past	Tonight, Grandpa	gave	us our salad, and I acted like I was gonna eat it. But then I just stuffed it all in my pocket when no one was looking.	Occasion	Goal
Simple Past	I	gave	him the money, and <u>he turned over the paper.</u>	Occasion	Goal
Simple Past	George	handed	Sally back the bunch of flowers and <u>instantly the girl looked like a bride on her wedding day.</u>	Occasion	Goal
Simple Past	The porter	then handed	Tom a bunch of flowers and <u>pushed him towards Sally.</u>	Occasion	Source
Simple Past	Then she	handed	her friend the flowers and <u>gave her a peck on the cheek.</u>	Occasion	Source
Simple Past	Then he	handed	me a roll of paper towels and <u>told me to get to work.</u>	Occasion	Source
Simple Past	So last year Mom	handed	Rodrick forty bucks and <u>told him to go out and pick up some more stuff for the front porch.</u>	Occasion	Source
Simple Past	George	gave	each of them some medicine, and <u>this is what happened...(picture of cows much bigger) Then the sheep...(picture of the sheep getting bigger)</u>	Occasion	Goal
Simple Past	"Well, the doctor	gave	me my test results last week, and <u>I told you I was fine.</u> That was a lie. I'm not fine."	Occasion	Goal

Simple Past	So they	gave	him some bananas as a reward. <u>Well, now Rory was going around thinking he was some sort of monkey genius or something.</u>	Occasion	Goal
Simple Past	Mom	handed	us \$ 1,000 each to get us started. <u>I thought I had struck it rich.</u> But then she explained that each Mom Buck was only worth a penny of real money.	Occasion	Goal
Simple Past	I will say one thing for sure, though, and it's that I won't be using the money Mom	gave	me to buy stamps. <u>I got a picture from my pen pal, Mamadou, in the mail yesterday,</u> and that pretty much killed any chance of me writing back to HIM.	Occasion	Goal
Simple Past	We have the book fair at school this week, and this morning Mom	gave	me twenty dollars to spend. <u>I THOUGHT I was allowed to pick whatever I wanted,</u> but it turns out Mom expected me to spend the money on BOOKS.	Occasion	Goal
Simple Past	"There was one of my special snoozy pellets that Dr Lupperts	gave	me pushed inside each of those chocolates." <u>'Well done for remembering she liked the purple ones the best,' said Amber.</u>	Occasion	Other
Simple Past	The sleeping tonic I	gave	the guards at the Tower will be wearing off soon. <u>"I'm really sorry, it's a long story," said Ben.</u> Granny sat on Ben's bed and looked him up and down.	Occasion	Other
Simple Past	The sleeping-tonic chocolate cake I	gave	the guards will be wearing off very soon." <u>The pair crawled further up the pipe.</u>	Occasion	Source
Simple Past	And from the look Mom	gave	me when she came back in the house, <u>I kind of get the feeling she's not gonna hold me to that honesty pledge any more.</u>	Occasion	Goal
Simple Past	But Mrs French said I had to start with the BASICS, and she	gave	me a "Beginner's Songbook" <u>that looked like it was older than Mrs French. All the things in that thing were really corny,</u> and it was hard for me to get into them.	Occasion	Item

Simple Past	Granny waved	and gave	Ben a little smile, which his grumpy face just about permitted him to reluctantly return. “Right one of us will pick you up tomorrow morning at around eleven,” said Dad, keeping the engine running.	Occasion	Other
Simple Past	The porter	then handed	Amber a large metal ring, which she placed on Sally’s finger. Despite it not being gold and too big and clearly from a shower curtain, a tear rolled down Sally’s cheek.	Occasion	Goal
Simple Past	He	handed	the old lady the balloon that was closest to her. It was one he had swiped several beds earlier.	Elaboration	Item
Simple Past	But I	gave	him a wicked pinch underneath the desk before he could finish his sentence. I couldn’t believe my luck.	Elaboration	Goal
Simple Past	I felt pretty bad, because Mrs French	gave	me homework every time she visited, but I NEVER practised in between lessons.	Elaboration	Goal
Simple Past	On Christmas, when Uncle Charlie	gave	me my gift, it was NOT what I asked for. He must’ve walked into the toy store and picked up the first thing he saw that had the word “Barbie” on it.	Elaboration	Item
Simple Past	Tom’s father was not so good at such moments,	and gave	his son a manly pat on the back. “Good to see you, son,” he said. Tom’s mum and dad had deep tans from being out in the desert, and were dressed in clothes better suited to being there.	Elaboration	Source
Simple Past	Rodrick	gave	me a book, too, but of course he didn’t wrap it. The book he got me was “Best of L’il Cutie”.	Elaboration	Source
Simple Past	The porter	gave	Tom a dinner plate to pass to Sally. It had been drawn on with black felt-tip pen to make it look like a steering wheel.	Elaboration	Item
Simple Past	It	gave	her great pleasure to watch him eating worms. ‘I find it rather bitter,’ Mr Twit said. ‘It’s got a distinctly bitter flavour. Buy the other kind next	Elaboration	Other

Simple Past	George	gave	time.’ Tom a look, as if to say “don’t go there”. As for Amber, she looked extremely annoyed at being asked the question.	Elaboration	Other
Simple Past	I thought Mr Winsky would make us do a bunch of chin-ups or jumping jacks or something to prove we were up for the job, but he just	handed	us our belts and badges on the spot. Mr Winsky said the openings were for a special assignment.	Elaboration	Source
Simple Past	Dad	gave	Uncle Joe this big speech about the 150th Regiment and the role it played at Gettysburg, and spent about a half hour describing the whole battle.	Elaboration	Source
Simple Past	It was clear she wasn’t going to be pushed another millimetre unless she	gave	the boy some proper answers. “I still don’t understand why this child started the secret gang in the first place all those years ago.” “You don’t normally get to know all the secrets of the Midnight Gang until you are a full member,” replied the girl.	Explanation	Goal
Simple Past	He strapped the belt to the siren	and gave	it a tug to make sure it was secure.	Explanation	Item
Simple Past	Raj rushed out from behind the counter	and gave	Ben a big hug. “Oh, Ben, I am so so sorry. I hadn’t seen her for a while, and I guessed she wasn’t well.”	Explanation	Source
Simple Past	Man, I should have known there was a catch when Mom	gave	me that costume. I told Mom there was no WAY we were taking Manny with us, because we were going to hit 152 houses in three hours.	Result	Goal
Simple Past	“Yes, the doctor	gave	me the test results. I’m as fit as a butcher’s dog.”	Result	Goal
Simple Past	I forgot to get a gift for Rowley, so I just slapped a bow on the “L’il Cutie” book Rodrick	gave	me. And that seemed to do the trick.	Result	Other

Simple Past	The woman scooped him up,	and gave	him the biggest hug. Tom's father was not so good at such moments, and gave his son a manly pat on the back.	Parallel	Other
Simple Past	I	gave	Mom and Dad their gifts. I get them the same kind of thing every year, but parents eat that stuff up.	Parallel	Source
Simple Past	I	gave	Manny a toy helicopter and I gave Rodrick a book about rock bands. Rodrick gave me a book, too, but of course he didn't wrap it. The book he got me was "Best of L'il Cutie".	Parallel	Source
Simple Past	Then Scotty	handed	me this shirt that was covered with all these sparkly sequins, and he told me that it was my costume.	Parallel	Source
Simple Past	This diet	gave	him (Bunce) a tummy-ache and a beastly temper. Bean was a turkey and apple farmer.	Parallel	Source
Simple Past	All he really wanted was to spend time with Mum and Dad, but time was the one thing they	never ever gave	him. "No. Mother and Father are abroad," answered Tom.	Other	Goal
Simple Past	Are you sure my feet are tied properly to the ground?' she gasped. 'If those strings around my ankles break it'll be goodbye for me!' And that's what	gave	Mr Twit his second nasty idea. 'There's enough pull on here to take me to the moon!' Mrs Twit cried out.	Other	Other
Simple Past	What's going on around here? Why hasn't anyone	brought	me my morning cup of tea? It's bad enough having to sleep in the yard with rats and mice but I'll be blowed if I'm going to starve as well! No tea! No eggs and no bacon! No buttered toast!	Other	Other
Simple Past	In fact, I saw a kid walking down the hall with an Underpants Bandits book earlier this week, and an eighth-grader	gave	him an atomic wedgie. I'm not usually a big fan of scary stories, because when I read them I end up having nightmares.	Other	Other

Transfer of possession verbs extracted within a mixed prepositional frame (all Simple Past).

Context 1	Verb Extracted	Context 2	Preposition	Coherence relation	Who is mentioned next Goal
Tom turned his head	and took	one last look at his friends. Sally smiled back, but Thews yanked Tom's arm and the tall doors swung open and shut.	at	Occasion	Goal
As Robin placed one of his CDs into his player, the others	took	their respective places in the operating theatre. The music started.	in the	Occasion	Other
He stirred the sugar well	and carried	the cup into the living-room. Grandma sipped the tea.	into	Occasion	Other
Ben couldn't believe his eyes as Granny	took	out a tin of cabbage soup from the scooter's basket. She glanced around theatrically then pulled back her arm in readiness to smash the tin through the jeweller's shop window.	from	Occasion	Goal
Then I went down to Rodrick's room	and took	the CD off his rack. You're not allowed to bring personal music players to school, so we had to wait to use it until after lunch when the teachers let us outside.	off	Occasion	Goal
Mrs Gregg	took	the two boys under her wings and hugged them. 'Don't worry,' she said. 'I can mince it all up very fine and you won't even know the difference.'	under	Occasion	Source
She	took	the music player away from me and started chewing us out. But I think she had the wrong idea about what we were doing back there.	away from	Occasion	Source
But I	took	one look at it and knew something was seriously wrong. First of all the poem wasn't typed out.	at	Occasion	Source
I	took	one look at the picture on the CD and told Rowley that Joshie was supposed to be for six-year-old girls, but he didn't believe me.	at	Occasion	Source
The bedroom had nothing more to offer, so George	carried	the enormous saucepan downstairs again and trotted into the laundry-room where the shelves were full of all kinds of house-hold items. The first one he took down was a large box of superwhite for automatic washing-machines.	into	Occasion	Other

“Something or someone’s in here. I know it,” whispered Matron as her torch	threw	light on the darkest corners of the room in the hospital basement. “It looks like a load of old junk to me,” replied Mr Thews. “Let’s move on.”	on	Occasion	Other
While he was spluttering, the superior officer	took	the walkie-talkie from PC Fudge. “Yep. Uh-huh. Right. Thank you,” he said. He turned to Ben and Granny.	from	Occasion	Goal
The man	took	out a pencil from his breast pocket. He then held one end and tapped the boy’s head with it.	out from	Occasion	Goal
George picked up the heavy three-quarters full saucepan	and carried	it out of the back door. He crossed the farmyard and headed straight for the shed alongside the henhouse. He knew his father wouldn’t be there. He was out haymaking in one of the meadows. George entered the dusty old shed and put the saucepan on the bench.	out of	Occasion	Goal
On the bus ride to school, I	took	Rodrick’s paper out of my bag. But I took one look at it and knew something was seriously wrong.	out of	Occasion	Goal
I	took	some bandages from home, and I wrapped up my hand to make it look like it was hurt.	from	Occasion	Goal
He	took	a knife from his pocket and with one quick slash he cut through the strings holding Mrs Twit’s ankles to the iron ring. She went up like a rocket. ‘Help!’ she screamed. ‘Save me!’	from	Occasion	Goal
Without making a sound, he	took	his bike out of the garage, and cycled to Granny’s house one last time. Snow was falling. It crunched under the wheels of the bike.	out of	Occasion	Source
Luppers	took	the thermometer out of the boy’s mouth and pulled the flowers out of the vase. Green water with bits of brown bobbing around in it lurked at the bottom.	out of	Occasion	Source
George	took	an enormous saucepan out of the cupboard and placed it on the kitchen table. ‘George!’ came the shrill voice from the next room. ‘What are you doing?’	out of	Occasion	Source
I didn’t know how much I had actually eaten until Mom	took	it down off the fridge on Christmas Eve. When Mom accused me of eating all the candy, I denied it.	down off	Occasion	Goal

And then Manny	brought	it into day care for show-and-tell. <u>Anyway, I don't think Mom was too happy about getting that phone call.</u>	into	Occasion	Other
When their heads bobbed out of the water, Ben Matron	took	the snorkel out of his mouth for a moment. <u>"Are you OK, Granny?"</u>	out of	Occasion	Goal
	gave	one last swivel-eyed look at the children, before switching off the light. <u>The ward descended into darkness.</u>	at	Occasion	Other
Mom	took	a look at Rowley's big toe, and she seemed pretty concerned.	at	Result	Source
He paid his money and we let him inside, and me and Rowley	took	our positions in the Hall of Screams. <u>The Hall of Screams was basically a bed with me and Rowley on either side of it.</u>	in the	Elaboration	Goal
This was George's Marvellous Medicine Number Four, and when it had boiled for a couple of minutes, George once again	carried	a cupful of it out into the yard. <u>Mr Kranky ran after him.</u> Mrs Kranky followed more slowly.	into	Elaboration	Other
George	took	a good look at Grandma. <u>She certainly was a very tiny person.</u>	at	Elaboration	Goal
So, to start with we shall have four plump young ducks.' He	took	them from the shelf. <u>'Oh, how lovely and fat they are!'</u>	from	Elaboration	Goal
So he	took	a giant leap into the unknown, and decided to follow them. <u>Tom felt like a super-spy.</u>	into	Elaboration	Source
None of these parts of his body moved in time or sequence, and for the next five minutes he	threw	his body around the dance floor in a style that can only be called unforgettable: <u>as much as you might want to forget it, you can't.</u>	around	Elaboration	Other
After Marvellous Medicine Number Three had been boiled and stirred, George	took	a cupful of it out into the yard to try it on another chicken. <u>Mr Kranky ran after him,</u> flapping his arms and hopping with excitement.	into	Elaboration	Other
The boy	threw	his arms round the new Doctor of Fun's waist. <u>"I am so happy for you!"</u> he exclaimed. "Oh, thank you!" replied the man as	round	Explanation	Source

		the other children rushed over to hug him too.				
Snake	took	one look at the Gruffalo. <u>'Oh crumbs!' he said, 'Goodbye, little mouse,'</u> And off he slid to his logpile house.	at	Result	Source	
Owl	took	one look at the Gruffalo. <u>'Oh dear!' he said, 'Goodbye, little mouse,'</u> And off he flew to his treetop house.	at	Result	Source	
Fox	took	one look at the Gruffalo. <u>'Oh help!' he said, 'Goodbye, little mouse,'</u> And off he ran to his underground house.	at	Result	Source	
'Yes, Ma'am, I'm coming,' said the big woman, and she	took	a second jar from the shelf. <u>If she takes one more, she'll see us, thought Mr Fox.</u>	from	Result	Goal	
Grandma sipped some tea but never	took	her eyes from the little boy who stood before her. <u>'Never grow up,' she said. 'Always down.'</u>	from	Parallel	Goal	
She snatched the cup out of little George's hand	and carried	it high up out of reach. <u>'Drink it up, Grandma,' Mr Kranky said, grinning hugely. 'Lovely tea.'</u>	out of	Other	Other	
And in all the commotion, I	threw	Manny's "gift" in the garbage. <u>But something tells me Mom wouldn't have stopped me this time.</u>	in the	Other	Source	

Figures A5.2-A5.4 show the frequency with which Goals and Sources were re-mentioned in the coherence relations following the perfective expression of the three transfer of possession structures individually.

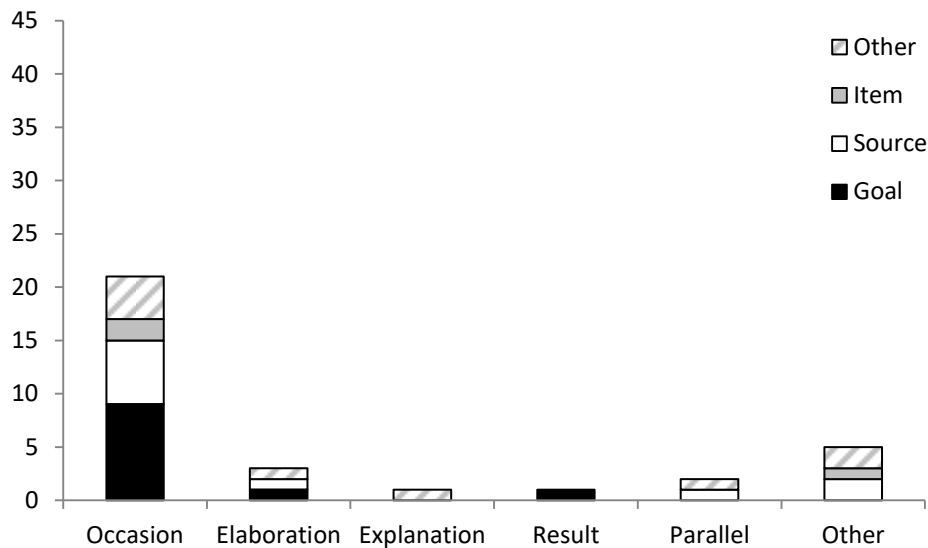


Figure A5.2 Re-mention frequencies across coherence relations for perfective expressions of X_{source} took Z to Y_{goal} (33 examples)

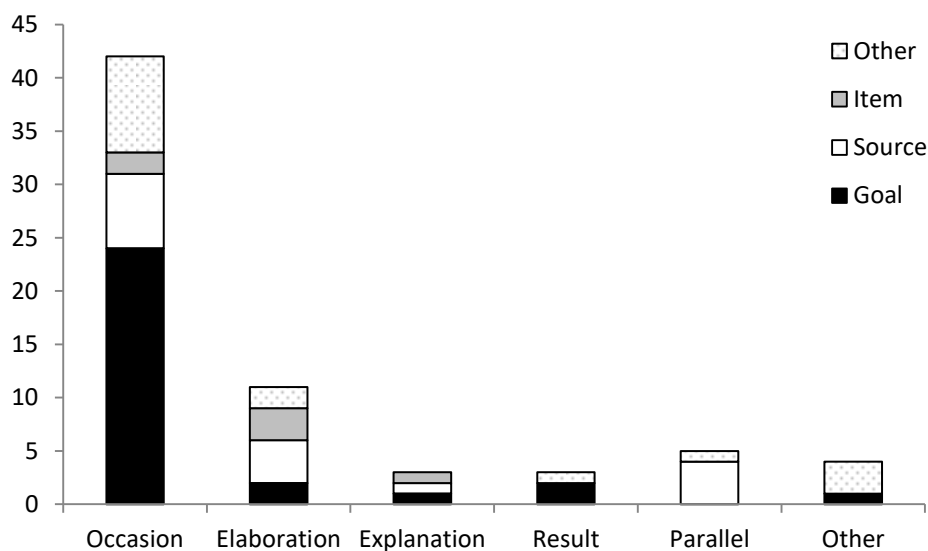


Figure A5.3 Re-mention frequencies across coherence relations for perfective expressions of X_{source} took Z_{goal} the Y (68 examples)

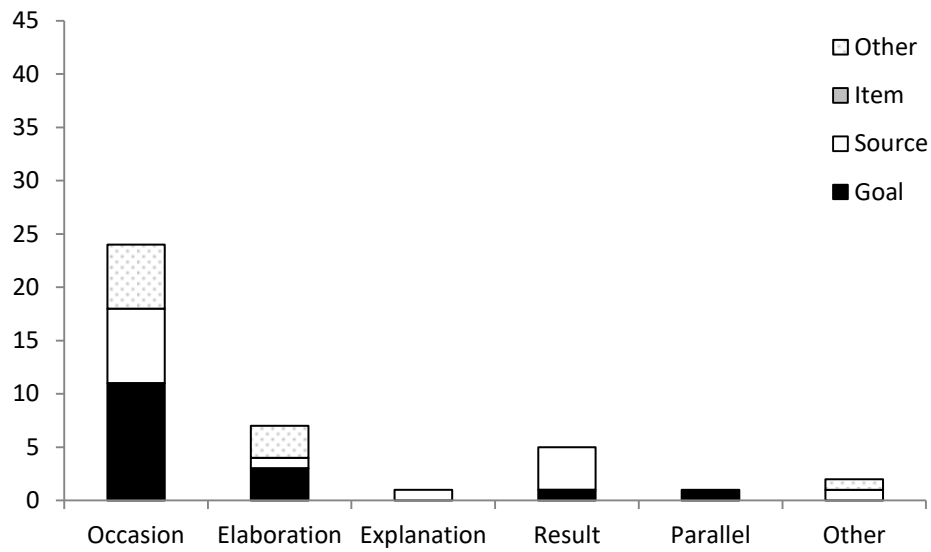


Figure A5.4 Re-mention frequencies across coherence relations for perfective expressions of X_{source} took Z preposition Y_{goal} (40 examples)

- Arnold, J. E. (2001). The effect of thematic roles on pronoun use and frequency of reference continuation. *Discourse Processes, 31*(2), 137-162.
- Arnold, J. E., Brown-Schmidt, S., & Trueswell, J. (2007). Children's Use of Gender and Order-of-Mention during Pronoun Comprehension. *Language and Cognitive Processes, 22*(4), 527-565.
- Arnold, J. E., Eisenband, J. G., Brown-Schmidt, S., & Trueswell, J. C. (2000). The rapid use of gender information: evidence of the time course of pronoun resolution from eyetracking. *Cognition, 76*, 13-26.
- Au, T. K. F. (1986). A verb is worth a thousand words: The causes and consequences of interpersonal events implicit in language. *Journal of Memory and Language, 25*(1), 104-122.
- Barr, D., Levy, R., Scheepers, C., & Tily, H. (2013). Random effects structure for confirmatory hypothesis testing: Keep it maximal. *Journal of Memory and Language, 68*(3), 255-278.
- Bates, D., Mächler, M., Bolker, B., & Walker, S. (2015). Fitting Linear Mixed-Effects Models Using lme4. *Journal of Statistical Software, 67*(1).
- Becker, R. B., Ferretti, T. R., & Madden-Lombardi, C. J. (2013). Grammatical aspect, lexical aspect, and event duration constrain the availability of events in narratives. *Cognition, 129*(2), 212-220.
- Cain, K., & Oakhill, J. (2011). Matthew Effects in Young Readers: Reading Comprehension and Reading Experience Aid Vocabulary Development. *Journal of Learning Disabilities, 44*(5), 431-443.
- Carreiras, M., Carriedo, N., Alonso, M. A., & Fernández, A. (1997). The role of verb tense and verb aspect in the foregrounding of information during reading. *Memory & Cognition, 25*(4), 438-446.

- Chambers, C. G., & Smyth, R. (1998). Structural Parallelism and Discourse Coherence: A Test of Centering Theory. *Journal of Memory and Language*, 39(4), 593-608.
- Chin, I., & Naigles, L. (2017). The Role of Caregivers' Tense and Aspectual Distinctions on Children's Later Acquisition. In Proceedings of the 40th annual Boston Iniversity Conference on Language Development (Vol. 1, pp. 61). Boston: Cascadilla Press.
- Comrie, B. (1976). *Aspect : an introduction to the study of verbal aspect and related problems*: Cambridge ; New York : Cambridge University Press.
- Dalal, D. K., & Zickar, M. J. (2012). Some Common Myths About Centering Predictor Variables in Moderated Multiple Regression and Polynomial Regression. *Organizational Research Methods*, 15(3), 339-362.
- Dowty, D. R. (1979). *Word meaning and Montague grammar: The semantics of verbs and times in generative semantics and in Montague's PTQ* (Vol. 7): Reidel, Boston: Springer.
- Ehrlich, M., & Remond, M. (1997). Skilled and less skilled comprehenders: French children's processing of anaphoric devices in written texts. *British Journal of Development Psychology*, 15, 291-308.
- Elbro, C., Oakhill, J., Megherbi, H., & Seigneuric, A. (2017). Aspects of Pronominal Resolution as Markers of Reading Comprehension: The Role of Antecedent Variability. *Reading and Writing: An Interdisciplinary Journal*, 30(4), 813-827.
- Engelen, J. A. A., Bouwmeester, S., de Bruin, A. B. H., & Zwaan, R. A. (2013). Eye movements reveal differences in children's referential processing during

- narrative comprehension. *Journal of Experimental Child Psychology*, 118, 57-77.
- Ferretti, T. R., Kutas, M., & McRae, K. (2007). Verb Aspect and the Activation of Event Knowledge. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 33(1), 182-196.
- Ferretti, T. R., Rohde, H., Kehler, A., & Crutchley, M. (2009). Verb Aspect, Event Structure, and Coreferential Processing. *Journal of Memory and Language*, 61(2), 191-205.
- Francey, G., & Cain, K. (2014). Effect of Imagery Training on Children's Comprehension of Pronouns. *The Journal of Educational Research*, 108(1), 1-9.
- Fukumura, K., & van Gompel, R.P.G. (2010). Choosing anaphoric expressions: Do people take into account likelihood of reference? *Journal of Memory and Language*, 62(1), 52-66.
- Fukumura, K., & van Gompel, R. P. G. (2015). Effects of order of mention and grammatical role on anaphor resolution. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 41(2), 501-525.
- Gernsbacher, M. A. (1989). Mechanisms that improve referential access. *Cognition*, 32, 99-156.
- Gernsbacher, M. A., & Hargreaves, D. J. (1988). Accessing Sentence Participants: The Advantage of First Mention. *Journal of Memory and Language*, 27, 699-717.
- Grüter, T., Takeda, A., Rohde, H., & Schafer, A. j. (2018) Intersentential coreference expectations reflect mental models of events. *Cognition*, 177, 172-176.

- Goikoetxea, E., Pascual, G., & Acha, J. (2008). Normative study of the implicit causality of 100 interpersonal verbs in Spanish. *Behavior Research Methods, 40*(3), 760-772.
- Graesser, A., McNamara, D., & Kulikowich, J. (2011). Coh- Metrix: Providing Multilevel Analyses of Text Characteristics. *Educational Researcher, 40*(5), 223-234.
- Hartshorne, J., Nappa, R., & Snedeker, J. (2015). Development of the first-mention bias. *Journal of Child Language, 42*(2), 423-446.
- Hendriks, P., Koster, C., & Hoeks, J. C. J. (2014). Referential choice across the lifespan: why children and elderly adults produce ambiguous pronouns. *Language, Cognition and Neuroscience, 29*(4), 391-407.
- Johnson, B. W., & Fey, M. E. (2006). Interaction of lexical and grammatical aspect in toddlers language. *Journal of Child Languag., 33*(2), 419-435.
- Johnson-Laird, P. N. (1983). *Mental models: Towards a cognitive science of language, inference, and consciousness*: Harvard University Press.
- Järvikivi, J., Pyykkönen-klauck, P., Schimke, S., Colonna, S., & Hemforth, B. (2013). Information structure cues for 4- year- olds and adults: tracking eye movements to visually presented anaphoric referents. *Language and Cognitive Processes, 1-16*.
- Järvikivi, J., van Gompel, R. P. G., Hyönä, J., & Bertram, R. (2005). Ambiguous Pronoun Resolution: Contrasting the First-Mention and Subject-Preference Accounts. *Psychological Science, 16*(4), 260-264.
- Kaiser, E., & Trueswell, J. C. (2008). Interpreting Pronouns and Demonstratives in Finnish: Evidence for a Form-Specific Approach to Reference Resolution. *Language and Cognitive Processes, 23*(5), 709-748.

- Karmiloff-smith, A. (1985). Language and cognitive processes from a developmental perspective. *Language and Cognitive Processes*, 1(1), 61-85.
- Kehler, A., Kertz, L., Rohde, H., & Elman, J. L. (2008). Coherence and Coreference Revisited. *Journal of Semantics: An International Journal for the Interdisciplinary Study of the Semantics of Natural Language*, 25(1), 1-44.
- Kehler, A., & Rohde, H. (2013a). Aspects of a theory of pronoun interpretation. *Theoretical Linguistics*, 39(3-4), 295-309.
- Kehler, A., & Rohde, H. (2013b). Aspects of a theory of pronoun interpretation. *Theoretical Linguistics*, 39(3-4), 295-309.
- Kintsch, W. (1988). The Role of Knowledge in Discourse Comprehension: A Construction-Integration Model. *Psychological Review*, 95(2), 163-182.
- Klein, W., & Li, P. (2009). *The expression of time [electronic resource]*: Berlin ; New York, : Mouton de Gruyter.
- Madden, C. J., & Ferretti, T. R. (2009). Verb aspect and the mental representation of situations. In *The Expression of Time* (Vol. 3, pp. 217-231). Berlin, Germany: Mouton de Gruyter.
- Madden, C. J., & Therriault, D. J. (2009). Verb aspect and perceptual simulations. *The Quarterly Journal of Experimental Psychology*, 62(7), 1294-1303.
- Madden, C. J., & Zwaan, R. (2003). How does verb aspect constrain event representations? *Memory and Cognition*, 31(5), 663-672.
- Magliano, J. P., & Schleich, M. C. (2000). Verb aspect and situation models. *Discourse processes*, 29(2), 83-112.
- Megherbi, H., & Ehrlich, M.-F. (2005). Language Impairment in Less Skilled Comprehenders: The On-Line Processing of Anaphoric Pronouns in a

- Listening Situation. *Reading and Writing: An Interdisciplinary Journal*, 18(7-9), 715-753.
- Montag, J. L., & Macdonald, M. C. (2015). Text Exposure Predicts Spoken Production of Complex Sentences in 8- and 12-Year-Old Children and Adults. *Journal of Experimental Psychology: General*, 144(2), 447-468.
- Morrow, D. G. (1985). Prepositions and Verb Aspect in Narrative Understanding. *Journal of Memory and Language*, 24(4), 390-404.
- Mozuraitis, M., Chambers, C. G., & Daneman, M. (2013). Younger and Older Adults Use of Verb Aspect and World Knowledge in the Online Interpretation of Discourse. *Discourse Processes*, 50(1), 1-22.
- Oakhill, J. V. & Cain, K. (2012). The precursors of reading ability in young readers: Evidence from a four-year longitudinal study. *Scientific Studies of Reading*, 16, 91-121.
- Oakhill, J., & Yuill, N. (1986). Pronoun resolution in skilled and less-skilled comprehenders: Effects of memory load and inferential complexity. *Language and speech*, 29(1), 25-37.
- Pyykkonen, P., Matthews, D., & Jarvikivi, J. (2010). Three- year- olds are sensitive to semantic prominence during online language comprehension: A visual world study of pronoun resolution. *Language and Cognitive Processes*, 25, 115-129.
- R Development Core Team. (2014). R: A language and environment for statistical computing. Vienna, Austria; 2014. ISBN 3-900051-07-0.
- Rohde, H. (2008). Coherence- driven effects in sentence and discourse processing. Ph.D. thesis, UC San Diego.
- Rohde, H., & Horton, W. S. (2014). Anticipatory looks reveal expectations about discourse relations. *Cognition*, 133(3), 667-691.

- Rohde, H., & Kehler, A. (2013). Grammatical and information-structural influences on pronoun production. *Language and Cognitive Processes, 29*(8), 1-16.
- Rohde, H., Kehler, A., & Elman, J. L. (2006). *Event structure and discourse coherence biases in pronoun interpretation*. Paper presented at the The proceedings of the 27th annual meeting of the cognitive science society.
- Salomon, M. M., Magliano, J. P., & Radvansky, G. A. (2013). Verb aspect and problem solving. *Cognition, 128*(2), 134-139.
- Shirai, Y., & Andersen, R. W. (1995). The acquisition of tense- aspect morphology: A prototype account. *Language, 71*(4), 743-762.
- Shirai, Y. (2010). Semantic Bias and Morphological Regularity in the Acquisition of Tense- Aspect Morphology: What Is the Relation. *Linguistics: An Interdisciplinary Journal of the Language Sciences, 48*(1), 171-194.
- Silva, M., & Cain, K. (2015). The relations between lower- and higher-level oral language skills and their role in the prediction of early reading comprehension. *Journal of Educational Psychology, 107*, 321-331.
- Smyth, R. (1994). Grammatical Determinants of Ambiguous Pronoun Resolution. *Journal of Psycholinguistic Research, 23*(3), 197-229.
- Song, H. J., & Fisher, C. (2005). Who's "she"? Discourse Prominence Influences Preschoolers' Comprehension of Pronouns. *Journal of Memory and Language, 52*(1), 29-57.
- Stein, N. L. (1982). The definition of a story. *Journal of Pragmatics, 6*(5), 487-507.
- Stevenson, R. J., Crawley, R. A., & Kleinman, D. (1994). Thematic roles, focus and the representation of events. *Language and Cognitive Processes, 9*(4), 519-548.

- Tomasello, M. (2003). *Constructing a language [electronic resource] : a usage-based theory of language acquisition*. Cambridge, MA: Harvard University Press.
- Truitt, T., & Zwaan, R. (1997). *Verb aspect affects the generation of instrumental inferences*. Paper presented at the 38th annual meeting of the Psychonomic Society, Philadelphia.
- Vendler, Z. (1967). *Linguistics in philosophy*. Ithaca, NY: Cornell University Press.
- Wagner, L. (2001). Aspectual influences on early tense comprehension. *Journal of Child Language*, 28(3), 661-681.
- Wagner, L. (2009). Il never grow up: continuity in aspect representations. *Linguistics*, 47(5), 1051-1074.
- Weist, R., Atanassova, M., Wysocka, H., & Pawlak, A. (1999). Spatial and temporal systems in child language and thought: a cross-linguistic study. *First language*, 19(3)(57), 267-312.
- Weist, R., Lyytinen, P., Wysocka, J., & Atanassova, M. (1997). The interaction of language and thought in children's language acquisition: a crosslinguistic study. *Journal of Child Language*, 24(1), 81-121.
- Yap, F., Chu, P., Yiu, E., Wong, S., Kwan, S., Matthews, S., Shirai, Y. (2009). Aspectual asymmetries in the mental representation of events: Role of lexical and grammatical aspect. *Memory & Cognition*, 37(5), 587-595.
- Yuill, N., & Oakhill, J. (1988). Understanding of anaphoric relations in skilled and less skilled comprehenders. *British Journal of Psychology*, 79(2), 173-186.
- Yuill, N., & Oakhill, J. (1991). *Children's problems in text comprehension: An experimental investigation*: Cambridge University Press.
- Zhou, P., Crain, S., & Zhan, L. (2014). Grammatical aspect and event recognition in children's online sentence comprehension. *Cognition*, 133(1), 262-276.

Zwaan, R. A., & Radvansky, G. A. (1998). Situation Models in Language Comprehension and Memory. *Psychological Bulletin*, 123(2), 162-185.