

Aspect in Ancient Greek

A semantic analysis of the aorist and imperfective

Aspect in Ancient Greek
A semantic analysis of the aorist and imperfective

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van de Filosofie

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Chapter 1

Introduction

1.1 Tense and aspect

Compare the sentences in (1):

- (1) a. Peter is swimming in Barton Spring Pool.
- b. Peter was swimming in Barton Spring Pool.
- c. Peter swam in Barton Spring Pool.

Any speaker of English will agree that there is a difference in interpretation between the three sentences in (1). This is most easily formulated for the contrast between (1a) and (1b). Whereas the former states that there is a swimming event at the moment the sentence is uttered, the latter locates a swimming event in the past of the moment of utterance. These examples illustrate a difference in *tense* (here, present versus past tense), which Comrie (1985:9-13) defines as a grammaticalised location in time, most often with respect to the moment of utterance. When we compare (1b) and (1c), on the other hand, we find that they share their tense. Both sentences locate a swimming event in the past of the moment of utterance. Nevertheless, they clearly differ in interpretation. The former seems to describe the swimming event from within, as continuing, whereas the latter describes it from the outside, as completed. The difference between (1b) and (1c) is an *aspectual* one. According to Comrie (1976:1-6) aspect concerns “different ways of viewing the internal temporal constituency of a situation.” In our examples, this corresponds to viewing the event as continuing versus completed. Although it is relatively easy to state the difference between (1b) and (1c) in metaphorical terms, it is hard to give a precise formulation of it. Providing a precise formulation of the meaning of aspect is at the core of this thesis.

The analysis of meaning is the object of semantics. This discipline developed in the course of the 20th century to a full blown science due to the joint effort of philosophers, logicians and linguists. Its primary goal as set by the

groundbreaking work of Frege (1879, 1892, 1918-1919) and Montague (1970, 1973) is to derive the meaning of a compound expression in a systematic way from the meanings of its components. Over the last decades, due in particular to the work of Kamp (1981, 1993), the attention shifted to the analysis of larger stretches of discourse. My aim in this thesis is to add to this enterprise by exploring the semantic contribution of aspect to the meaning of sentences as a whole and its functioning in larger discourses. To achieve this, I approach the subject from the perspective of formal semantics. In this branch of semantics, meaning is captured in terms of truth conditions, following the adage *knowing the meaning of a sentence is knowing when it is true*. These truth conditions are represented in a formal language which has an exact model-theoretic truth definition. This is to ensure that the interpretation of one natural language sentence is not explained by means of another, which in turn needs to be explained, thus leading to an infinite regression. For example, to describe the difference in meaning between (1a) and (1b), which is a difference in tense, I used quite a number of present tense verb forms (*states, is, locates*). The definiendum occurs a number of times in the definiens! Formal-semantic approaches steer clear of this problem by a translation into a *formal* language with an exact model-theoretic interpretation. Examples of such formal systems are first-order predicate logic, typed lambda calculus, and Discourse Representation Theory (DRT). Following Russell, these formal representations of truth conditions are called *logical forms*. In the last few decades the methods of formal semantics have been applied to a wide range of phenomena in natural language semantics. This has resulted in highly sophisticated treatments of various topics, including tense and aspect.

Traditionally, research in formal semantics has concentrated on English. However, it isn't the meaning of aspect in English that is central to this thesis, but that in Ancient Greek. Ancient Greek is well known for its literary heritage, but more importantly for our purposes, it presents us a very rich aspect system. Following Comrie's definition, the language possesses three tenses: a present, a past, and a future tense. In addition to these tenses, it has three grammatical aspects: aoristic, imperfective, and perfect aspect. In this respect, it resembles the French system in size. However, Ancient Greek goes further than French, by extending its aspectual oppositions beyond the indicative forms. We find specialised aspectual forms not only in the indicative, but also in the subjunctive, optative, and imperative modes, as well as in the non-finite forms (infinitive and participle). Apart from its distribution, the Ancient Greek system is transparent as it shows a systematic coding of tense and aspect through the employment of separate morphemes. This means that tense and aspect are well distinguished morphologically. The morphemes act as a permanent reminder that the two categories should also be clearly distinguished in the semantic analysis. In sum, given its analytic morphol-

ogy and elaborate distribution, the Ancient Greek aspectual system presents a challenging test case for any theory of aspect.

I believe this challenge should be tackled by applying insights from formal semantics to Ancient Greek. I consider this not only fruitful for a better understanding of the Greek aspectual system, but I also believe that it will bring us closer to the ideal of a general theory of aspect. As such, this enterprise fits in with the recent development of applying formal-semantic methods to languages other than Western European ones (van Geenhoven 1998, Faller 2002, Grønn 2003, and Tonhauser 2006, among others).

Central to the discussion in this thesis is the opposition between imperfective and aoristic aspect in Ancient Greek. Like the English examples in (1b) and (1c), this concerns the contrast between presenting an event as continuing or completed. This aspectual distinction shows an interesting interaction with tense. In the indicative forms, the distinction is restricted to the past tense. With the present and the future tenses, we do not find distinct forms for imperfective and aoristic aspect. The only form available in the present tense is the one for imperfective aspect. Why should this be the case? Such interactions between tense and aspect are by no means restricted to Ancient Greek. We also observe them in English, for instance. As example (2) shows, substitution of the past tense by a present tense changes the interpretation in an unexpected way:

- (2) Peter swims in Barton Spring Pool.

This sentence does not express that there is a (single) swimming event at the moment of utterance, as the presence of the present tense might lead us to expect. Instead the sentence has to be interpreted as stating that Peter has the habit of swimming in Barton Spring Pool. This kind of tense-aspect interaction, in particular the absence of a form for the combination of present tense and aoristic aspect, receives a natural explanation in the approach developed in this thesis.

The most puzzling phenomenon about imperfective and aoristic aspect in Ancient Greek is the fact that the same verb form can get several interpretations. Aoristic aspect is often interpreted as indicating that the event described is completed, but it may also be used to refer to the beginning of an event. An example of the former interpretation is given in (3), of the latter in (4):

- (3) τό μευ νάκος ἐχθὲς ἔκλεψεν.
to meu nakos echthes eklepsen.
the.ACC I.GEN skin-coat.ACC yesterday steal.PST.AOR.3SG
‘‘He stole my skin-coat yesterday.’’ Theoc. *Id.* 5.2

- (4) μετὰ δὲ τοῦτο ἔδάκρυσεν.
meta de touto edakruse.
 after and that.ACC weep.PST.AOR.3SG
 “and after that he started to weep.”

Hdt. 7.45

This raises the question whether these interpretations are special instances of a basic meaning or constitute separate meanings. That is, is the aorist ambiguous between a meaning of completion and one of beginning, or does one and the same meaning result in different interpretations through the interaction with elements in the context? In my opinion, we should push the latter option as far as possible. This means that the main challenge set in this thesis is to find a way to deal with this variation in interpretation without postulating ambiguity.

The various interpretations of imperfective and aoristic aspect have been extensively discussed in the Ancient Greek grammatical tradition. Grammars of Ancient Greek are a rich source of information on this topic, but mainly from a descriptive point of view. From a theoretical point of view, they do not provide deeper insight in the actual semantics of the Ancient Greek aspectual system. It is common practice in grammars of Ancient Greek to first give a characterisation of the basic meaning of aoristic and imperfective aspect which is then followed by an overview of their specific interpretations. Whether these interpretations are seen as special instances of the basic meanings or as separate meanings is often left unclear. The degree to which they are related to the basic meanings varies from author to author, but so far no one has managed to systematically derive the specific interpretations from the basic ones. I will show that by using the ideas and tools that have been developed in the field of formal semantics we can achieve this. The result is an ambiguity-free semantics for aoristic and imperfective aspect from which the special interpretations can be derived through the interaction of several parameters.

As will become clear throughout this thesis, the topic of aspect touches on a variety of issues that are at the heart of the philosophy of language and formal semantics and pragmatics. In the proposed analysis coercion plays a crucial role: if the literal interpretation of an utterance does not make sense for some reason, the hearer reinterprets the utterance in such a way that it does. This reinterpretation strategy results from the Gricean Cooperative Principle (Grice 1975) which urges speakers to make adequate contributions to the conversation. Consequently the hearer is extremely hesitant to assume that the speaker utters nonsense. World knowledge turns out to play an important role in reinterpretation. This brings us to the problem how to integrate world knowledge in the semantic composition. We would like to adhere as much as possible to the Fregean Compositionality Principle, which states that the meaning of a compound expression is determined solely by the meanings of its

parts and the way these are put together. But can this be achieved if linguistic and extralinguistic information interact within reinterpretation processes? Furthermore, we venture into the various other fields including performatives (Austin 1976, 1962), competition between forms, and discourse semantics, as pioneered by Kamp.

Given that the study of Ancient Greek aspect inevitably raises all these issues, this thesis builds a bridge between Ancient Greek linguistics on the one hand and philosophy of language and formal semantics and pragmatics on the other. Since I believe this thesis may be of interest to both fields, I have gone to great effort to make it accessible for both audiences. For scholars of Ancient Greek, I have made sure that technicalities are often illustrated with diagrams and always summarised in natural language. For formal semanticists without knowledge of Ancient Greek, I have included transcriptions and glosses. In short, the aim of this thesis is not just to tackle a specific puzzle, but also to illustrate in general how fruitful a combination of these two fields is.

The remainder of this introductory chapter is organised as follows. Section 1.2 introduces the aspectual system of Ancient Greek in some more detail together with some of the terminology used throughout this thesis and makes some preliminary remarks concerning aspectual classes and logical forms. Section 1.3 describes the organisation of this thesis.

1.2 Before we start

1.2.1 The aspectual system of Ancient Greek

As I said, Ancient Greek has three aspects: aoristic, imperfective, and perfect aspect. It is the first (not the last!) that seems to correspond to what is called *perfective* aspect in other, notably Slavic, languages. In principle, I use the terms *aoristic* and *perfective* aspect interchangeably in this thesis. However, I often use the former when speaking about Ancient Greek in particular and the latter in cross-linguistic contexts.

As mentioned before, the opposition between aoristic and imperfective aspect is realised throughout the verbal paradigm. Table 1.1 gives an overview of the imperfective and aoristic forms of the verb λύειν *luein* ‘to loosen’. ἐ- *e-* is a past tense marker; -σα *-sa* is a marker for aoristic aspect.

In this thesis I concentrate on indicative forms, but I consider it a prerequisite for any theory of aspect in Ancient Greek that it can deal with the fact that we find the aoristic-imperfective opposition throughout the verbal paradigm.

		imperfective aspect		aoristic aspect	
finite	indicative (past tense)	ἔλυον	<i>elūon</i>	ἔλυσα	<i>elusa</i>
	subjunctive	λύω	<i>luō</i>	λύσω	<i>lusō</i>
	optative	λύοιμι	<i>luoimi</i>	λύσαιμι	<i>lusaimi</i>
	imperative	λῦε	<i>lue</i>	λῦσον	<i>luson</i>
nonfinite	participle	λύων	<i>luōn</i>	λύσας	<i>lusas</i>
	infinitive	λύειν	<i>luein</i>	λῦσαι	<i>lusai</i>

Table 1.1: The aoristic–imperfective distinction for the verb λύειν *luein* ‘to loosen’.

1.2.2 Notes on terminology

It may be instructive to note that at some points my terminology deviates from that used in standard grammars. First, most grammars use the word *tense* for what I call a *tense-aspect pair* (see e.g. Smyth 1984:412–413, Goodwin 1966:7).¹ As a consequence, they claim that Ancient Greek has seven *tenses*. I do not follow this use, but reserve the word *tense* for location in time (with respect to the moment of utterance), following Comrie (1985).

Second, *imperfective*, as I use it, is a purely aspectual notion, and is different from what the grammars call *imperfect*, which they use for (what I call) the combination of past tense and imperfective aspect. To avoid confusion, I do not use the term *imperfect*. Table 1.2 shows the traditional names for the tense-aspect pairs. I put these names in quotation marks to indicate that they deviate from my usage of the terms.

	present	past
imperfective	‘present’	‘imperfect’
aoristic	–	‘aorist’

Table 1.2: The traditional names for the tense-aspect pairs

Imperfective aspect, in my terminology, corresponds to what some grammars call *aspect expressed by the present stem*. They refer to the *aspectual* distinction imperfective versus aoristic as *present* versus aoristic (see, for example, Rijksbaron 2002:1-5, Rijksbaron et al. 2000:66). I don’t follow this terminology because it has the danger of leading to confusion about the contributions of tense and aspect.

¹This use of the word *tense* is not restricted to grammars of Ancient Greek, but quite general: About English we often hear that the present progressive and the simple present tense are two different *tenses*, the French Imparfait and Passé Simple are called two different past *tenses* etc.

1.2.3 Aspectual classes

I use the word *aspect* in a rather broad sense. It includes both grammatical aspect and aspectual classes or *Aktionsart*. The distinction between aoristic and imperfective aspect is a distinction in grammatical aspect. Most verbs in Ancient Greek come in two forms: aoristic and imperfective forms, clearly distinguished by specific morphemes. In this thesis I am primarily interested in grammatical aspect. But the verb itself, without grammatical aspect, also has certain properties that are relevant aspectually. On the basis of these properties, verbs (or I prefer to say: predicate-argument structures, that is, the verb with its arguments) are divided in aspectual classes or *Aktionsarten*. Given the complex interactions between grammatical aspect and aspectual class, I will say a few words about aspectual class here. The sole purpose of the remarks here is to facilitate understanding of the following chapters. More will follow when we go along.

Throughout this thesis I use infinitival expressions like *John run* to refer to the predicate-argument structure, that is, the verb with its arguments, abstracting away from tense and grammatical aspect. These expressions fall into various aspectual classes. One important division is that between the classes of bounded and unbounded predicates. Some predicates introduce inherent boundaries for eventualities, for example, *John eat an apple* and *John run two miles*. They belong to the class of *bounded* or *telic* predicates. Others do not introduce inherent boundaries, for example, *John run* and *John be blond*, and are called *unbounded* or *atelic*. Moreover, a subclass of the unbounded predicates is set apart as the *stative* predicates. Examples are *John be blond* and *John be at the pub*. One characteristic of stative predicates is that they do not combine with the progressive in English, as (5) shows (the asterisk indicates ungrammaticality):

- (5) a. *John is being blond.
b. *John is being at the pub.

In accordance with common practice (see e.g. de Swart 1998) I assume the following syntactic scope relations: tense outscopes grammatical aspect, which outscopes the predicate-argument structure:

- (6) TENSE (GRAM. ASPECT (predicate-argument structure))

The intricate interactions between grammatical aspect and tense and between grammatical aspect and aspectual class will be discussed at length in this thesis.

1.2.4 Logical form

Following the practice in formal semantics, I represent the truth conditions of a natural language sentence in a formal language which has an exact model-theoretic truth definition. Throughout this work I use the `typewriter` font for expressions in a formal language. The $\leadsto$ sign indicates the translation of a natural language expression into a formal language expression. For example, the natural language sentence (7a) translates as (7b) in predicate logic (ignoring tense and aspect):

- (7) a. John likes Mary and Mary likes John.
 b. $\leadsto \exists e \exists e' [\text{like}(e, j, m) \wedge \text{like}(e', m, j)]$

Example (7) shows another notational practices that I follow. I put square brackets around a formula that results from connecting two formulas, and round brackets around the arguments of a function. Furthermore, I use a Davidsonian event semantics in which every verb has an extra argument slot for an eventuality variable (e and e').² This is common to all formal theories to be discussed in this work, including my own account.

1.3 Organisation of the thesis

This thesis is organised as follows. Chapter 2 discusses the interpretations of aoristic and imperfective aspect commonly distinguished in grammars of Ancient Greek. Thus it provides the data for the analysis. The chapter concludes with an identification of the main challenge of this thesis.

Chapter 3 is devoted to theories of aspect that have been proposed in the formal-semantic literature. In section 3.2 I review four influential analyses for the semantics of imperfective and perfective aspect: Kamp's distinction between states and events, Krifka's distinction between homogeneous and quantised predicates, de Swart's aspectually sensitive tense operators, and Klein's and von Stechow's proposals in which the notion of *topic time* occupies a central position. I review the merits and shortcomings of each theory against the background of its applicability to Ancient Greek. I show that they all contain ingredients useful for the analysis of aspect in Ancient Greek, but that none can fully answer the challenge. The discussion of these four theories will prove to be instrumental for a more precise formulation of the problem central to this thesis. The idea of coercion, i.e. reinterpretation of an expression in order to avoid a semantic mismatch between its constituents, will come out as extremely useful for our purposes. Given its central position in the proposed analysis, I discuss this phenomenon in more detail in section 3.3.

²Following Bach (1986), I use the term *eventuality* as a cover term for all kinds of situations, events, actions, etc.

In chapter 4 I propose my analysis which integrates ingredients of the four theories about the perfective–imperfective distinction discussed. New to my analysis of the interpretations of aoristic and imperfective aspect is the central place taken by Egg’s Duration Principle. This principle, which states that information on the duration of an eventuality introduced by various linguistic expressions must be mutually compatible, is crucial in explaining how the various interpretations come about.

For expository reasons, the analysis of one of the interpretations of the aorist, the so-called *tragic* interpretation, is postponed to chapter 5. I show that this use is readily understood on the basis of the proposed semantics of aspect, once one recognises the tragic aorist as the use found in performatives.

In chapter 6 we go beyond the level of the sentence and move on to the effect of aspect on the temporal structure of discourse. I demonstrate how the semantics of aspect proposed in chapter 4 explains the often observed difference between aoristic and imperfective aspect in this respect. The proposed account treats the variation in the interpretation of aspect and the effect of aspect on the temporal structure of discourse as two sides of the same coin, whereas previous accounts in formal semantics tend to concentrate on one or the other of these two features of aspect interpretation.

In chapter 7 I compare the analysis developed in this thesis with two influential accounts proposed by classical scholars, the ones of Ruijgh and Sicking, and I show why my account is preferable.

In chapter 8 I present my conclusions.

Chapter 2

The interpretations of aoristic and imperfective aspect

2.1 Introduction

In the previous chapter I have laid down the object of this thesis: aspect in Ancient Greek, and more in particular the various interpretations of aoristic and imperfective aspect. In this chapter I discuss the interpretations received grammars of Ancient Greek distinguish for both aspects. The fact that both occur with several interpretations is the main problem of this thesis, which will be formulated in section 2.5.

2.2 The basic distinction: completed versus not-completed

One of the clearest formulations of the opposition between imperfective and aoristic aspect in Ancient Greek is found in Rijksbaron (2002:1). He claims that imperfective aspect indicates that an eventuality is *not-completed*, whereas aoristic aspect indicates the opposite, i.e. that it is *completed*. Similar ideas about imperfective aspect can be found in Smyth (1984:423) and Goodwin (1966:11), among others. Both grammars state that imperfective aspect indicates that an eventuality is *going on*. In this chapter I use notions like *completed* and *going on* descriptively. I aim to make explicit what they mean later in this thesis.

Let's illustrate this opposition with some examples. From now on, I use inter-letter spacing and ordinary capitals IPFV and AOR (rather than small capitals) in the interlinear gloss to highlight the relevant forms. See Appendix C.2 for the abbreviations used in the glosses. Consider the following example with imperfective aspect:

- (8) Kŭρος δὲ οὐπω ἤκεν, ἀλλ' ἔτι
Kuros de oupō hēken, all' eti
 Cyrus.NOM PRT not.yet be.present.PST.IPFV.3SG but still
 πρὸς ἡλαυνε
prosēlaune
 march.to.PST.IPFV.3SG
 “Cyrus was not yet present, but he was still marching on.”
 X. *An.* 1.5.12

The interpretation of (8) is that the marching is not yet completed, but still going on. I label this the *processual* interpretation of imperfective aspect. Although on this interpretation the imperfective is often translated into English with a progressive form, the two are not identical. One of the differences is that the former combines happily with stative predicates whereas the latter doesn't, as is illustrated by (9):¹

- (9) ἐβασίλευε δὲ Λυκομήδης τότε τῶν
ebasileue de Lukomēdēs tote tōn
 be.king.PST.IPFV.3SG PRT Lycomedes.NOM then the.GEN
 Σκυρίων
Skuriōn
 Scyrians.GEN
 “Lycomedes was at that time king of the Scyrians.” Plu. *Thes.* 35.6

Here the eventuality of being king is not completed, but going on. Note that we have an imperfective form (ἐβασίλευε, *ebasileue*) in Greek, but a simple form (‘was king’) rather than a progressive form (‘was being king’) in English.²

Aoristic aspect, by contrast, is used for completed eventualities. This is illustrated in (10), where the handing over of the reign is completed:

¹Some preliminary remarks about stativity and aspectual classes in general have been made in section 1.2.3. A in-depth discussion is postponed to chapters 3 and 4, in particular sections 3.3.1 and 4.2.

²βασιλεuein *basileuein* may be argued to be an unbounded, non-stative predicate (‘to rule as a king’), rather than stative predicate. However, we find the same use with βασιλεὺς εἶναι *basileus einaï*, which is literally ‘to be king’ and uncontroversially stative. For example:

- (i) καὶ Περδίκκας Ἀλεξάνδρου βασιλεὺς αὐτῶν ἦν ὅτε
kai Perdikkas Alexandrou basileus autōn ēn hote
 and Perdiccas.NOM Alexander.GEN king.NOM they.GEN be.PST.IPFV.3SG when
 Σιτάλκης ἐπῆει
Sitalkēs epēiei
 Sitalces.NOM come.upon.PST.IPFV.3SG
 “And Perdiccas, Alexander’s son, was their (= the Macedonians’) king at the time of the invasion by Sitalces.”
 Th. 2.99.6.

- (10) τελευτήσαντος δὲ Ἀλυάττεω ἐξεδέξατο
teleutēsantos de Aluatteō exedexato
 die.AOR.PTCP.GEN PRT Alyattes.GEN take.from.PST.AOR.3SG
 τὴν βασιλείην Κροῖσος
tēn basilēiēn Kroisos
 the.ACC reign.ACC Croesus.NOM
 “After Alyattes died, Croesus received the reign.” Hdt. 1.26.1

Similarly, in (11), the stealing of the coat is completed:

- (11) τό μευ νάκος ἐχθὲς ἔκλεψεν.
to meu nakos echthes eklepsen.
 the.ACC I.GEN skin-coat.ACC yesterday steal.PST.AOR.3SG
 “He (= Lacon) stole my skin-coat yesterday.” Theoc. *Id.* 5.2

I label the interpretation exemplified in (10) and (11) the *completive* interpretation of aoristic aspect.

The processual interpretation of imperfective aspect and the completive interpretation of aoristic aspect are generally considered to be their basic interpretations. Apart from these basic interpretations, several other interpretations are distinguished in the grammatical tradition. For imperfective aspect, these are the habitual, conative, and likelihood interpretations; for aoristic aspect, the ingressive, complexive, tragic, and generic interpretations. I will now turn to a discussion of these interpretations leaving open for the moment the question whether they should be treated as separate meanings or as special instances of the respective basic meanings.

2.3 Additional interpretations of the imperfective

2.3.1 The habitual interpretation

Imperfective aspect may be used to describe a habit or some other kind of regularity. The contrast between aoristic aspect and this interpretation of imperfective aspect is nicely illustrated by the following example:

- (12) δῶρά οἱ ἀνὰ πᾶν ἔτος ἐδίδου,
dōra hoi ana pan etos edidou,
 presents.ACC he.DAT PREP every.ACC year.ACC give.PST.IPFV.3SG
 καὶ τὴν Βαβυλῶνά οἱ ἔδωκε
kai tēn Babylōna hoi edōke
 and the.ACC Babylon.ACC he.DAT give.PST.AOR.3SG

“Every year he gave him presents and he gave him Babylon.”

Hdt. 3.160.2

In (12), aoristic aspect (ἔδωκε, *edōke*) is used to describe the single completed eventuality of giving Babylon. By contrast, imperfective aspect (ἐδίδου, *edidou*) is used for the habit of giving presents. In (12), an iterative adverbial is present: ἀνὰ πᾶν ἔτος *ana pan etos* ‘every year’. However, as (13) shows, this reading does not require such an adverbial:

- (13) ἐπειδὴ δὲ τὸ παιδίον ἐγένετο ἡμῖν, ἡ
epeidē de to paidion egeneto hēmin, hē
 when PRT the.NOM child.NOM exist.PST.AOR.3SG we.DAT the.NOM
 μήτηρ αὐτὸ ἐθήλαζεν
mētēr auto ethēladzen
 mother.NOM it.ACC suckle.PST.IPFV.3SG

“When the child was born to us, its mother suckled it.” Lys. 1.9

Here ἐθήλαζεν *ethēladzen* ‘suckle.IPFV’ has a habitual interpretation, as becomes clear from the context:

- (14) Πρῶτον μὲν οὖν, ὧ ἄνδρες, (δεῖ γὰρ καὶ ταῦθ’ ὑμῖν διηγήσασθαι) οἰκίδιον ἔστι μοι διπλοῦν, ἴσα ἔχον τὰ ἄνω τοῖς κάτω κατὰ τὴν γυναικωνίτιν καὶ κατὰ τὴν ἀνδρωνίτιν. ἐπειδὴ δὲ τὸ παιδίον ἐγένετο ἡμῖν, ἡ μήτηρ αὐτὸ ἐθήλαζεν ἵνα δὲ μή, ὁπότε λοῦσθαι δεοί, κινδυνεύη κατὰ τῆς κλίμακος καταβαίνουσα, ἐγὼ μὲν ἄνω διητώμην, αἱ δὲ γυναῖκες κάτω. καὶ οὕτως ἤδη συνειθισμένον ἦν, ὥστε πολλάκις ἡ γυνὴ ἀπῆει κάτω καθευδήσουσα ὥς τὸ παιδίον, ἵνα τὸν τιτθὸν αὐτῷ διδῶ καὶ μὴ βοᾷ. καὶ ταῦτα πολὺν χρόνον οὕτως ἐγίγνετο, καὶ ἐγὼ οὐδέποτε ὑπώπτευσα, ἀλλ’ οὕτως ἡλιθίως διεκείμην, ὥστε ὥμην τὴν ἐμαυτοῦ γυναῖκα πασῶν σωφρονεστάτην εἶναι τῶν ἐν τῇ πόλει.

“Now in the first place I must tell you, sirs (for I am obliged to give you these particulars), my dwelling is on two floors, the upper being equal in space to the lower, with the women’s quarters above and the men’s below. When the child was born to us, its mother suckled it; and in order that, each time that it had to be washed, she might avoid the risk of descending by the stairs, I used to live above, and the women below. By this time it had become such an habitual thing that my wife would often leave me and go down to sleep with the child, so as to be able to give it the breast and stop its crying. Things went on in this way for a long time, and I never suspected, but was simple-minded enough to suppose that my own was the chastest wife in the city.”

Lys. 1.9-10³

³Lamb’s (Lysias 2000) translation.

Similarly, in (15) the carrying of long spears is more plausibly interpreted as an habitual action than as referring to a (single) carrying eventuality that is still continuing:

- (15) Ἦν δὲ τοῦτον τὸν χρόνον ἔθνος
Ēn de touton ton chronon ethnos
 be.PST.IPFV.3SG PRT that.ACC the.ACC time.ACC nation.NOM
 οὐδὲν ἐν τῇ Ἀσίῃ οὔτε ἀνδριότερον οὔτε
ouden en tēi Asiēi oute andreioteron oute
 no.NOM in the.DAT Asia.DAT nor more.courageous.NOM nor
 ἀλκιμώτερον τοῦ Λυδίου. Ἡ δὲ μάχη
alkimōteron tou Ludiou. Hē de machē
 braver.NOM the.GEN Lydian.GEN the.NOM PRT battle.NOM
 σφέων ἦν ἀπ’ ἵππων, δόρατά τε
spheōn ēn ap’ hippōn dorata te
 they.GEN be.PST.IPFV.3SG from horses.GEN spears.ACC PRT
 ἐφ’ ὅρῳ μεγάλα καὶ αὐτοὶ ἦσαν
ephoreon megala kai autoi ēsan
 carry.PST.IPFV.3PL long.ACC and they.NOM be.PST.IPFV.3PL
 ἵππεύεσθαι ἀγαθοί
hippeuesthai agathoi
 manage.horse.IPFV.INF good.NOM

“At this time there was no nation in Asia more courageous or braver than the Lydian. They fought on horseback, carried long spears, and they were good at managing horses.” Hdt. 1.79.3

A final example of the habitual interpretation of imperfective aspect is given in (16):

- (16) Ἐπὶ γὰρ Λέοντος βασιλεύοντος καὶ Ἡγησικλέος
Epi gar Leontos basileuontos kai Hēgēsikleos
 during PRT Leon.GEN be.king.IPFV.PTCP.GEN and Hegesicles.GEN
 ἐν Σπάρτῃ τοὺς ἄλλους πολέμους
en Spartēi tous allous polemous
 in Sparta.DAT the.ACC other.ACC wars.ACC
 εὐτυχεόντες οἱ Λακεδαιμόνιοι
eutucheontes hoi Lakedaimonioi
 be.successful.IPFV.PTCP.NOM the.NOM Lacedaemonians.NOM
 πρὸς Τεγεήτας μόνους προσέπταιον
pros Tegeētas mounous proseptaion
 against Tegeans.ACC only.ACC bump.into.PST.IPFV.3PL
 “For when Leon en Hegesicles were kings of Sparta, the Lacedaemonians, while successful in all their other wars, suffered defeats only

against the Tegeans.”

Hdt. 1.65.1

Again, the imperfective form *προσέπταιον* *proseptaion* ‘suffered a defeat’ (lit. ‘bumped into’) should be interpreted habitually rather than as describing a single eventuality of suffering a defeat that is going on.

2.3.2 The conative and likelihood interpretations

Imperfective aspect can also be used to refer to eventualities that do not go beyond the stage of an attempt. This is the so-called *conative* interpretation. Consider the following example:

- (17) ἐπεθύμησε τῆς χλανίδος καὶ αὐτὴν
epethumēse *tēs* *chlanidos* *kai autēn*
 long.for.PST.AOR.3SG the.GEN garment.GEN and that.ACC
 προσελθὼν ὦ ν έ ε τ ο . ὁ δέ
proselthōn *ōneeto.* *ho* *de*
 go.to.AOR.PTCP.NOM buy.PST.IPFV.3SG the.NOM PRT
 Συλοσῶν ... λέγει· ἐγὼ ταύτην
Sulosōn ... *legei:* *egō* *tautēn*
 Syloson.NOM ... say.PRS.IPFV.3SG I.NOM that.ACC
 πωλέω μὲν οὐδενὸς χρήματος, δίδωμι δέ
pōleō *men oudenos chrēmatos, didōmi* *de*
 sell.PRS.IPFV.1SG PRT no.GEN money.GEN give.PRS.IPFV.1SG PRT
 ἄλλως
allōs
 for.nothing
 “He set his heart upon the garment, came forward and wanted to buy it. But Syloson said: ‘I don’t sell that one for any money, but I give it for free.’ ”
 Hdt. 3.139.2-3

It is clear from the continuation that the buying eventuality in the first sentence does not exceed the stage of an attempt: Syloson doesn’t sell the garment.

Some grammars (for example, Rijksbaron 2002:3) note that this interpretation occurs only with bounded predicates and results from the combination of the property boundedness and the basic interpretation of imperfective aspect as *going on*. The distinction between bounded and unbounded predicates, which was mentioned briefly in section 1.2.3 and will be discussed at greater length in chapters 3 and 4, is indeed relevant for this interpretation of imperfective aspect, as we will see.

Related to this interpretation is the *likelihood* interpretation (see, for example, Goodwin 1966:441, Rijksbaron 2002:17), which expresses that an eventuality was likely to occur, or threatened to occur. *ἐκαινόμην* *ekainomēn* ‘be

⁴Again, for the distinction between bounded and unbounded predicates, see the section 1.2.3. It will be explained at greater length in chapter 3 and 4, especially in sections 3.2.2 and 4.2.

μαθὼν δέ μιν Ἀρτάβανος ...
Mathōn *de min* *Artabanos* ...
 perceive.AOR.PTCP.NOM PRT him.ACC Artabanus.NOM
 δακρύσαντα εἶρετο τάδε· ... ὥς πολλὸν
dakrusanta *eireto* *tade:* ... *hōs pollon*
 weep.AOR.PTCP.ACC ask.PST.IPFV.3SG this.ACC how far
 ἀλλήλων κεχωρισμένα ἐργάσαιο νῦν
allēlōn *kechōrismena* *ergasao* *nun*
 one.other.GEN separate.PRF.PASS.PTCP.ACC do.PST.AOR.2SG now
 τε καὶ ὀλίγω πρότερον· μακαρίσας
te kai oligōi *proteron: makarisas*
 PRT PRT a.little.DAT before declare.happy.AOR.PTCP.NOM
 γὰρ σεωυτὸν δακρύεις.
gar *seōuton* *dakrueis.*
 because yourself.ACC weep.PRS.IPFV.2SG

“Then Xerxes declared himself happy, and after that he started to weep. Perceiving that he had begun to weep Artabanus questioned him saying: ‘What a distance is there between what you are doing now and a little while ago! After declaring yourself happy you weep.’”
 Hdt. 7.45-46.1

The basic function of aoristic aspect, to indicate completion, is not compatible with the present tense form δακρύεις *dakrueis* ‘weep.PRS’, which indicates that Xerxes is still crying at the moment of Artabanus’ utterance. Therefore, the aoristic form ἐδάκρυσε *edakruse* ‘weep.AOR’ has to be interpreted as indicating the beginning of the crying.

Another example of the ingressive interpretation of aoristic aspect is (20):

- (20) Ἀποθνήσκει δ’ οὖν Μάριος ...· καὶ μέγα
Apothnēiskei *d’ oun Marios* ...; *kai mega*
 die.PRS.IPFV.3SG PRT PRT Marius.NOM and great.NOM
 ἔσχε παρὰυτίκα τὴν Ῥώμην χάρμα καὶ
esche *parautika tēn Rōmēn* *charma kai*
 have.PST.AOR.3SG immediately the.ACC Rome.ACC joy.NOM and
 θάρσος
tharsos
 courage.NOM
 “Then Marius dies, and immediately great joy and courage took possession of Rome.”
 Plu. *Mar.* 46.6

The aorist form ἔσχε *esche* ‘have.AOR’ receives an ingressive interpretation and translates naturally as *took possession of*.

2.4.2 The complexive interpretation

The ingressive interpretation is not the only interpretation of aoristic aspect with unbounded predicates; it can also be read as indicating that the eventuality is completed. An example of this use is ἐβούλευσα *ebouleusa* ‘be senator.AOR’ in (21):

- (21) ἐγὼ γάρ, ὦ ἄνδρες Ἀθηναῖοι, ἄλλην μὲν
egō gar, ō andres Athēnaioi, allēn men
 I.NOM PRT VCP men.VOC Athenian.VOC other.ACC though
 ἀρχὴν οὐδεμίαν πώποτε ἥρξα ἐν τῇ
archēn oudemian pōpote ērxa en tēi
 office.ACC no.ACC ever rule.PST.AOR.1SG in the.DAT
 πόλει, ἐβούλευσα δέ.
polei, ebouleusa de
 state.DAT be.senator.PST.AOR.1SG PRT
 “I (= Socrates), men of Athens, never held any other office in the
 state, but I was a senator.” Pl. *Ap.* 32a

Here the speaker, Socrates, makes reference to the complete eventuality of being a senator rather than to the beginning.

I will restrict the label *complexive* to the interpretation of completion of the aorist with bounded predicates and will use *complexive* for the completion interpretation of the aorist with unbounded predicates as in (21). Whether the two interpretations are the same or different depends on the analysis of the semantics of the aorist. Since in the account I will defend in this thesis the combination of the aorist with bounded predicates is analysed differently than the combination with unbounded predicates, it is convenient to have distinct labels for the two.

2.4.3 The tragic interpretation

Many grammars (e.g., Kühner and Gerth 1898:163, Goodwin 1966:18) note that the form for past tense and aoristic aspect is sometimes used to refer to present eventualities. This use of the aorist, called *tragic* or *dramatic* aorist because it occurs mainly in drama, is often used in dialogues. The traditional view, as for instance found in Kühner and Gerth (1898:163-165), is that it describes a present eventuality as if it had already happened or begun. This use of the aorist is restricted to the first person and common with verbs of judgement or emotion in response to something said by someone else. In such cases it is claimed to indicate that the speaker had begun to make the judgement or feel the emotion before his interlocutor has finished speaking. An example is given in (22), where Iphigeneia reacts to Orestes’ proposal to

kill Thoas. Note that Greek uses a past tense form (ἤνεσα *ēnesa*), where we would use a present tense in English (*approve*).

- (22) Or. ἄρ' ἂν τύραννον διολέσαι δυναίμεθ' ἂν;
 Iph. δεινὸν τόδ' εἶπας, ξενοφονεῖν ἐπὶ λυδᾶς.
 Or. ἀλλ' εἴ σε σώσει καί με, κινδυνευτέον.
 Iph. οὐκ ἂν δυναίμην· τὸ δὲ πρόθυμον
ouk an dunaimēn; to de prothumon
 not PRT can.IPFV.OPT.1SG the.ACC PRT eagerness.ACC
 ἤνεσα.
ēnesa.
 approve.PST.AOR.1SG
 Or. “Could we murder the king?”
 Iph. “A fearful suggestion, for foreigners to kill their host!”
 Or. “But we must dare it, if it brings our safety.”
 Iph. “I could not; yet I approve your eagerness.” E. *I.T.* 1020-23⁵

On the traditional view the use of the form for aoristic aspect and past tense would be argued to indicate that Iphigeneia had already made her judgement before Orestes finished speaking.

In addition to verbs of judgments and emotions, this use of the aorist is found with verbs of saying, ordering, advising, and swearing. (23) is an example with a verb of swearing:

- (23) Or. ὅμοσον (εἰ δὲ μή, κτενῶ σε) μὴ λέγειν ἐμὴν χάριν.
 Phr. τὴν ἐμὴν ψυχὴν κατώμοσ', ἦν
tēn emēn psuchēn katōmos', hēn
 the.ACC my.ACC soul.ACC swear.PST.AOR.1SG that.REL.ACC
 ἂν εὐορκοῖμ' ἐγώ.
an euorkoīm' egō.
 PRT swear.truly.IPFV.OPT.1SG I.NOM
 Or. “Swear you are not saying this to humour me, or I will kill you.”
 Phr. “I swear by my life, an oath I would keep!” E. *Or.* 1516-7⁶

Again, a Greek past tense form (κατώμοσα *katōmosa*) is translated with an English present tense form (*swear*).

2.4.4 The generic interpretation

Ancient Greek has a second use of the form for aoristic aspect and past tense that often receives a present tense translation in English: it is the aorist in de-

⁵Potter's (Euripides 1938) translation.

⁶Coleridge's (Euripides 1938) translation

scriptions of habits, procedures, and general truths. This use is called *generic* or *gnomic*. An example is given in (24):

- (24) ῥεχθὲν δέ τε νήπιος εἴ γινω
rechthen *de te nēpios egnō*
do.AOR.PASS.PTCP.ACC PRT PRT fool.NOM know.PST.AOR.3SG
“Once a thing has been done, the fool knows it.” *Il.* 17.32

The sentence states a general truth. Note that the past tense form $\epsilon\gamma\nu\omega$ *egnō* translates as a present tense form (*sees*).

In this and the previous sections I have shown that apart from a basic semantic opposition (for example in terms of completedness, cf. Rijksbaron 2002), many grammars distinguish various other uses or interpretations of aoristic and imperfective aspect. The existence of so many different interpretations for both aspects is the central problem of this thesis. This problem will be formulated more sharply in the final section of this chapter.

2.5 The challenge

The present chapter was devoted to the various interpretations of aoristic and imperfective aspect. We have seen that for bounded predicates aoristic aspect indicates that an eventuality is completed (completive interpretation). For unbounded predicates, it receives an ingressive or complexive interpretation. Furthermore, aoristic aspect can occur with a tragic or generic interpretation. We have seen that imperfective aspect may be used to express that an eventuality is going on (processual interpretation), but also to express a habit (habitual interpretation), an attempt (conative interpretation), or ‘likelihood’ (likelihood interpretation).

In order to understand the Ancient Greek aspect system, we must determine how these various interpretations come about. In principle, we could treat all these interpretations as separate, independent meanings. This, however, would come down to simply listing them and wouldn't provide insight in the system. Furthermore, it would leave a number of phenomena unaccounted for. One is that we find the same clustering of interpretations in language after language: the ingressive interpretation goes with the interpretation of completion, and the habitual interpretation with that of progression. This is for example found with the French *passé simple* and *imparfait* (see, for example, de Swart 1998), and with the perfective and imperfective forms of Russian (cf. Comrie 1976). If the various interpretations of one aspect represented independent meanings, it would remain unclear why these interpretations cluster together in the same way cross-linguistically. This would simply be a coincidence (apart from a historical connection). Moreover, the fact that the

ingressive interpretation is cross-linguistically restricted to unbounded predicates would be just a coincidence and receive no explanation. This restriction to unbounded predicates instead suggests that the ingressive interpretation emerges from the interaction between the meaning of the aorist and the “unbounded” feature, rather than being an independent interpretation. Even if we restrict our attention to Ancient Greek, the existence of these interpretations raises the questions what, for example, ingressivity and completion have in common that the two are expressed by the same morpheme, and why it is that we find the ingressive interpretation of the aorist only with unbounded predicates. An adequate theory of aspect should answer these questions, and it is hard to see how they can be answered if one considers the several interpretations as independent meanings. Rather, the phenomena point towards an account in which the various interpretations fall under a common, more abstract denominator. The differences in interpretation then fall out from of the interaction between this semantics and other (contextual) elements. Such an account is more likely to provide insight in the system and in particular to answer the just raised questions.

This, however, confronts us with a major challenge, since it is not easily seen how this can be done. Many grammars more or less try to relate the various interpretations to a basic meaning, but none of them manages to actually derive them from this meaning. This is the challenge I set myself in this thesis: to develop an approach to aspect that can deal with this variation in interpretation (and giving an answer to the just mentioned and similar questions) using an ambiguity-free semantics for aoristic and imperfective aspect.

To shape my analysis I make use of insights that have been developed in the formal-semantic literature in the last few decades. Therefore, the next chapter is devoted to those formal-semantic theories on the perfective (aoristic)-imperfective distinction from which I integrate elements in my own analysis.

Chapter 3

Aspect in formal semantics

3.1 Introduction

In the formal-semantic literature, the distinction between perfective (=aoristic) and imperfective aspect has received quite some attention. Examples are Kamp and Rohrer (1983) and de Swart (1998) on French, Paslawska and von Stechow (2003) on Russian, and Smith (1997) on the distinction cross-linguistically, to mention just a few. The next section presents a selective survey of the literature, focussing on those theories from which I integrate elements into the analysis to be developed in chapter 4.

In section 3.2.1 I discuss the position taken in several works by Kamp and co-workers (Kamp and Rohrer 1983, Kamp and Reyle 1993, Kamp, van Genabith, and Reyle 2005). Section 3.2.2 is devoted to Krifka's (1989b) approach of the perfective-imperfective distinction. The adaptations to the theory of Kamp et al. made by de Swart (1998) are discussed in section 3.2.3. Section 3.2.4 is devoted to Klein's (1994) proposal for the semantics of the perfective-imperfective distinction and Gerö and von Stechow's (2003) and Paslawska and von Stechow's (2003) formalisation and modification of it. I believe that a discussion of these analyses gives us a better understanding of the requirements a theory of perfective and imperfective aspect has to meet. In section 3.2.5 I will summarise these requirements.

The mechanism of coercion, reinterpretation of an expression in order to avoid a semantic mismatch between its constituents, will emerge from the discussion as extremely useful for our purposes. Given its central position in the analysis that I will propose in the next chapter, I discuss this phenomenon in more detail in section 3.3.

3.2 The perfective-imperfective distinction

3.2.1 Kamp *et al.*: events and states

The passé simple and imparfait are generally considered to be the French realisations of the perfective-imperfective distinction (cf. Vet 1994, but see de Swart 1998 (to be discussed in section 3.2.3) for a different view). An attempt to capture the difference in meaning between the two verb forms was one of the motivations for Kamp to develop a new discourse-based framework: Discourse Representation Theory (DRT). Since I will formulate my analysis in this framework, I first devote a section to its basic ideas. Then I discuss the treatment of aspect of Kamp *et al.* in terms of this framework. For a more extensive introduction to DRT the reader is referred to Kamp and Reyle (1993) and Geurts and Beaver (2007).

3.2.1.1 Discourse Representation Theory

As implied by its name, Discourse Representation Theory focuses on the interpretation of discourse rather than sentences in isolation. Its basic idea is that natural language utterances are interpreted in a continually evolving discourse. In the course of this interpretation process the hearer constructs a representation of the discourse encountered thus far. As the discourse unfolds, he incorporates the information conveyed by each subsequent sentence in the already established representation. This incremental interpretation procedure does justice to the fact that the interpretation of a sentence often depends on information given in the preceding discourse. This type of context dependence is clearly visible in sentences with anaphoric expressions, i.e. expressions that in some sense inherit their value from earlier expressions, their antecedents. Pronouns are clear cases of such expressions. Consider the following mini-discourse:

(25) John owns a dog. He likes it.

To interpret the second sentence, we need the context provided by the first. Otherwise, what would *he* refer to, or *it*? As it turns out, many expressions in natural language exhibit this type of context dependence and classical logic is not very well suited to deal with them. As (26) illustrates, in predicate logic we can easily represent the truth conditions of the first sentence, and of the whole

discourse, but what exactly is the contribution of the second sentence?^{1,2}

$$(26) \quad \begin{aligned} &\exists e \exists x [\text{own}(e, j, x) \wedge \text{dog}(x)] + \text{????} = \\ &\exists e \exists x \exists e' [\text{own}(e, j, x) \wedge \text{dog}(x) \wedge \text{like}(e', j, x)] \end{aligned}$$

To solve this problem of intersentential anaphora and some other problems concerning anaphora, dynamic semantics was developed in the early eighties. Besides Kamp's (1981) Discourse Representation Theory, Heim's (1982) File Change Semantics and Groenendijk and Stokhof's (1991) Dynamic Predicate Logic belong to this family of semantic theories as well. The defining characteristic of dynamic semantics is that *context change* replaces truth and reference as the central semantic notions. Thus, classical truth conditional semantics is now often referred to as *static* semantics.

The logical forms of DRT are called Discourse Representation Structures (DRSs). They consist of a set of discourse markers and a set of conditions. Discourse markers represent objects that are introduced as the discourse proceeds. They function in a way similar to variables in predicate logic, and I will use these terms interchangeably. Conditions come in various kinds. They encode descriptive information that is assigned to discourse markers.

Formally, a DRS K is an ordered pair $\langle U(K), \text{Con}(K) \rangle$, where $U(K)$, the universe of K , is a set of discourse markers and $\text{Con}(K)$ is a set of conditions. I opt for the familiar notation which depicts DRSs as two-compartment boxes with the universe on top and the conditions below. The DRS for the first sentence of (25) is (27):

$$(27) \quad \begin{array}{|c|} \hline e \ x \ y \\ \hline \text{john}(x) \\ \text{dog}(y) \\ \text{own}(e, x, y) \\ \hline \end{array}$$

The processing of this sentence introduces three discourse markers in the universe of the DRS. The discourse marker e for the eventuality, x introduced by

¹Admittedly, there are ways to deal with intersentential anaphora in classical semantics. One is to represent anaphoric expressions as free variables, which means that they are treated as referential expressions that get their interpretation from an assignment function. It is then assumed that assignment functions are somehow fixed by an (unspecified) pragmatic module that takes the context into account. I believe that this 'solution' pushes the real issue out of sight, into a pragmatic waste basket.

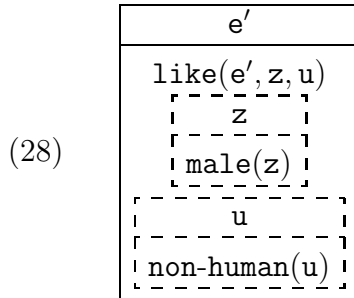
A second way to deal with intersentential anaphora within classical semantics is the E- (or D-) type strategy which is inspired by the observation that pronouns can often be paraphrased by a definite description constructed from material in the antecedent sentence (cf., for example, Neale 1990). I don't go into this strategy here, since it is not a very plausible option for anaphoricity in the realm of tense with which we are concerned in this thesis.

²In (26) I ignore the semantic contributions of tense and aspect.

the name *John* and y introduced by the indefinite NP *a dog*.³ These discourse markers will figure as the referents for these expressions for the remainder of the discourse. The idea is that indefinite expressions like *a dog* introduce discourse referents in the discourse. Definite expressions like *it* or *the dog*, on the other hand, pick up previously introduced referents, as we will see when we discuss the interpretation of the second sentence of (25). The descriptive information is encoded in the conditions $\text{john}(x)$, $\text{dog}(y)$, and $\text{own}(e, x, y)$. The semantics of DRT specifies that (27) is true in a model $\mathfrak{M}$ iff there is a function f that maps the discourse markers e , x , and y onto entities in the domain of $\mathfrak{M}$ in such a way that $f(x)$ has the property of having the name John and of owning $f(y)$, $f(y)$ has the property of being a dog and of being owned by $f(x)$, and $f(e)$ is an eventuality of owning between the two individuals.

Note that we don't need a conjunction in DRT, since it's already specified in the truth definition that a sequence of conditions gets the meaning that predicate logic would express by means of a conjunction. The same holds for existential quantification: the discourse markers in (27) get their existential import indirectly from the truth definition, which requires that *there be* a function that verifies the DRS in the model.

Let's now move on to the second sentence. It is interpreted in the context of the first sentence.⁴ Following the two-stage presupposition as anaphora version of DRT (van der Sandt 1992) (which is standard nowadays and which is adopted in this work), we first construct the preliminary representation of the second sentence:



This preliminary DRS contains three conditions. Apart from the simple condition $\text{like}(e', z, u)$, we find two complex conditions, the dashed boxes, corresponding to the anaphoric expressions *he* and *it*. These anaphoric expressions come, in contrast to indefinites like *a dog*, with a special instruction: they should link up to a previously established discourse referent. This is indicated by encoding them as a special type of condition which is itself constructed out

³I have chosen the traditional way of doing things in DRT by representing the proper name as a variable whose reference is restricted by a predicate rather than as a constant.

⁴This is a simplification. The real context for the interpretation of the second sentence does not only contain the information provided by the first sentence, but all background knowledge, including, for example, world knowledge.

of a DRS consisting of an anaphoric variable (z, u) and a condition ($\text{male}(z)$, $\text{non-human}(u)$).

We merge this preliminary DRS in (28) with (27), the representation of the context of (28). This merge (indicated by ' $\oplus$ ') is an operation which returns a new DRS the universe and conditions of which are the unions of the universes and conditions to be merged:

$$(29) \quad \begin{array}{|c|} \hline e \ x \ y \\ \hline \text{john}(x) \\ \text{dog}(y) \\ \text{own}(e, x, y) \\ \hline \end{array} \oplus \begin{array}{|c|} \hline e' \\ \hline \text{like}(e', z, u) \\ \text{---} z \text{---} \\ \text{---} \text{male}(z) \text{---} \\ \text{---} u \text{---} \\ \text{---} \text{non-human}(u) \text{---} \\ \hline \end{array} = \begin{array}{|c|} \hline e \ x \ y \ e' \\ \hline \text{john}(x) \\ \text{dog}(y) \\ \text{own}(e, x, y) \\ \text{like}(e', z, u) \\ \text{---} z \text{---} \\ \text{---} \text{male}(z) \text{---} \\ \text{---} u \text{---} \\ \text{---} \text{non-human}(u) \text{---} \\ \hline \end{array}$$

In the resulting DRS (the rightmost one in (29)) the anaphoric elements are not yet resolved. Resolution of anaphoric elements happens in the second stage, through the resolution algorithm which links anaphoric variables to their antecedents. In the present example, the condition

$$(30) \quad \begin{array}{|c|} \hline \text{---} z \text{---} \\ \hline \text{---} \text{male}(z) \text{---} \\ \hline \end{array}$$

indicates that we have to link z to a discourse referent already introduced in the discourse that represents a male individual. It is resolved to x by equating z to x . Similarly, u looks for a discourse referent that represents a non-human individual, and resolves to y :

$$(31) \quad \begin{array}{|c|} \hline e \ x \ y \ e' \\ \hline \text{john}(x) \\ \text{dog}(y) \\ \text{own}(e, x, y) \\ \text{like}(e', z, u) \\ \text{---} z \text{---} \\ \text{---} \text{male}(z) \text{---} \\ \text{---} u \text{---} \\ \text{---} \text{non-human}(u) \text{---} \\ \hline \end{array} \Rightarrow \begin{array}{|c|} \hline e \ x \ y \ e' \ z \ u \\ \hline \text{john}(x) \\ \text{dog}(y) \\ \text{own}(e, x, y) \\ \text{like}(e', z, u) \\ \text{male}(z) \\ \text{non-human}(u) \\ z = x \\ u = y \\ \hline \end{array}$$

(32)

e	x	y	e'
			$\text{john}(x)$
			$\text{dog}(y)$
			$\text{own}(e, x, y)$
			$\text{like}(e', x, y)$
			$\text{male}(x)$
			$\text{non-human}(y)$

The result, which can be simplified as (32), does not contain anaphoric conditions anymore. It is a resolved DRS to which the standard truth definition of DRT applies. It has the same truth conditions as the second line in (26), the representations of the full discourse in (static) predicate logic. The difference with static theories however is that the truth conditions only apply to the outcome of the resolution process. They capture the interpretation of the full discourse, not of isolated sentences. In this respect, the notion of meaning is crucially different. As a dynamic theory of meaning, DRT locates the meaning of individual sentences in the change that results from interpreting the sentence in a discourse. In other words, the meaning of a sentence is its context change potential.

Presuppositional expressions (for example, definite descriptions like *the dog* but also cleft-constructions and adverbs like *too* and *again*) are treated as anaphoric expressions on a par with pronouns (hence the name presupposition-as-anaphora). They induce information that has to be resolved in the context. More specifically, they search for an antecedent in the context. Like *it* in (25), *the dog* in (33) introduces the instruction to bind to a previously introduced discourse marker, with the difference that this time it is made explicit that the discourse marker has to represent a dog:

(33) John owns a dog. He likes the dog.

(34)

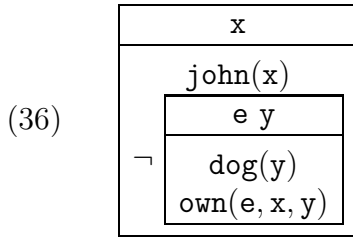
e	x	y	e'
			$\text{john}(x)$
			$\text{dog}(y)$
			$\text{own}(e, x, y)$
			$\text{like}(e', z, u)$
			$\text{male}(z)$
			$\text{dog}(u)$

As before, u resolves to y , the discourse marker that represents a previously introduced dog.

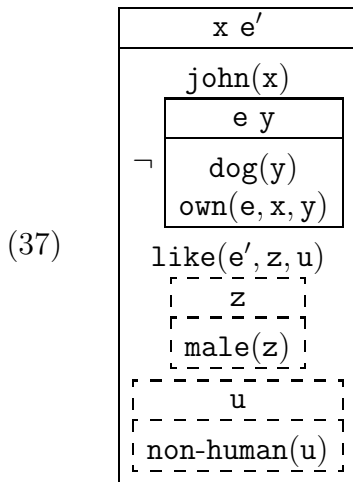
An important notion is that of accessibility. Consider the mini-discourse in (35), a slight modification of (25):

(35) John doesn't own a dog. *He likes it.

This mini-discourse is infelicitous if *a dog* is to be interpreted as the antecedent of *it* (this is what the asterisk is meant to indicate here). In DRT this is accounted for in the following way. Logical connectives, such as negation, yield complex conditions, that is conditions that are themselves constructed out of DRSs (like the conditions introduced by anaphoric expressions). For example, if K is a DRS, $\neg K$, the negation of K , is a complex condition. Thus we get a hierarchical structure where DRSs are embedded in other DRSs. For the first sentence of (35) we get:



The truth definition of DRT specifies that (36) is true in a model $\mathfrak{M}$ iff there is a function f that maps x to an entity in $\mathfrak{M}$ with the name *John* and this f cannot be extended to a function g that verifies the embedded DRS. Merging (36) with (28), the preliminary representation of the second sentence of (35), gives us (37):



As before, z and u look for antecedents to bind to and z binds to x . Things have changed for u , however. The discourse marker y is no longer accessible

for *u* to bind to, since it occurs in the universe of a DRS that is subordinated to the DRS in which the anaphoric condition with *u* occurs. It is important to note that the accessibility relation is not stipulated but follows from the semantics of DRT: the main DRS in (37) is accessible to the embedded DRS because every function that must be considered for the embedded DRS is an extension of the function for the main DRS, and it is for this reason that every discourse referent in the main DRS is also defined in the embedded DRS. The converse, however, does not hold. The life span of *y* is delimited by the scope of the negation operator. It is not defined in the main DRS and therefore not accessible for *z* to bind to. This explains why (35) is infelicitous if *a dog* is to be interpreted as the antecedent of *it*.

This leaves me with the notion of accommodation. In case a pronoun cannot find an antecedent, the sentence will not receive an interpretation. This is different for presuppositional expressions, in particular those that contain a high amount of descriptive information, like *the king of France*. If the context lacks an accessible antecedent, the descriptive information associated with the presuppositional expression will allow a co-operative hearer to establish a discourse marker and attach the associated conditions. This phenomenon is known as accommodation. The introduced discourse marker may then function as an antecedent for the presuppositional expression. This is why we are able to give an interpretation to (38) out of the blue:

(38) The king of France is bald.

This concludes my discussion of anaphora in the domain of individuals in DRT. We will now move on to anaphora in the domain of times.

3.2.1.2 Times, events, and states in DRT

Apart from pronouns, the need to take the context into account is also particularly urgent in the realm of tense and aspect. Kamp and Rohrer (1983) start their analysis of the French passé simple and imparfait from the observation that it is hard to state in truth-conditional terms what is the difference in meaning between the passé simple sentence (39a) and the imparfait sentence (39b):

- (39) a. *Marie téléphona.*
 Marie phone.PST.PFV.3SG
 “Marie made a phone call”
 b. *Marie téléphonait.*
 Marie phone.PST.IPFV.3SG
 “Marie was making a phone call”

However, in a discourse the contribution of aspect can be observed more clearly, as is illustrated with (40) and (41) (from Kamp and Rohrer 1983:253):

- (40) *Pierre entra.* *Marie t é l é p h o n a.*
 Pierre enter.PST.PFV.3SG. Marie phone.PST.PFV.3SG
 “Pierre entered. Marie made a phone call.”
- (41) *Pierre entra.* *Marie t é l é p h o n a i t.*
 Pierre enter.PST.PFV.3SG. Marie phone.PST.IPFV.3SG
 “Pierre entered. Marie was making a phone call.”

The most natural interpretation of (40) is that the two eventualities are consecutive: Marie starts telephoning after Pierre has come in. In (41), Marie is already talking on the phone when Pierre comes in. It seems that the choice of aspect affects the interpretation of the temporal relation.

Kamp et al. use (or actually develop) DRT to account for this observation. The following discussion is based on Kamp and Rohrer (1983) and Kamp and Reyle (1993). It is, however, reformulated in the two-stage presupposition-as-anaphora version of DRT introduced in section 3.2.1.1.

The interpretation of the temporal relations in (40) and (41) is put down to the combination of the contributions of tense and aspect. Let’s start with the contribution of tense. Following Partee (1973), Kamp et al. argue that tenses are anaphoric in nature, just like pronouns. In the same way in which in (25) *he* picks up *John* and *it* the dog introduced by the first sentence, the eventualities described in the second clauses of (40) and (41) are interpreted as temporally related to the ones described in the first sentences. As with pronouns, we need the information conveyed by the first sentence to interpret the second sentence.

The natural choice to deal with this context dependence is dynamic semantics. Static semantics would give us something like (42):⁵

$$(42) \quad \begin{aligned} &\exists e \exists t [\text{p_enter}(e) \wedge \tau(e) = t \wedge t \prec n] \wedge \\ &\exists e' \exists t' [\text{m_phone}(e') \wedge \tau(e') = t' \wedge t' \prec n] \end{aligned}$$

Here τ is a function that maps eventualities onto their runtime, i.e. the time they actually take up. (42) states that there is a time t before ($\prec$) the utterance time n (for now) which is the runtime of an eventuality e of Pierre entering and a second time t' before n which is the runtime of an eventuality e' of Marie phoning. What these truth-conditions do not capture is that the speaker makes reference to some particular time. (42) locates the phone call at an arbitrary time t' before the utterance time, not related to the time of Pierre’s entrance

⁵An overview of the symbols for temporal relations is given in Appendix C.3.

t , contrary to our interpretation of (40) and (41).⁶

Dynamic semantics, on the other hand, naturally captures the anaphoric feature of tense: eventualities described in an utterance are interpreted in the temporal setting established by the context.

If tense temporally relates eventualities described in a discourse to each other, the next question is how to get the specific temporal relations in (40) and (41). Since the only formal difference between the two mini-discourses is a difference in aspect, the difference in interpretation must come from the contribution of aspect. Kamp et al. relate the difference in interpretation to a difference between two classes of eventualities, states and events: sentences in the imparfait describe states, sentences in the passé simple events, and state-describing sentences connect to the context in a different way than event-describing sentences.

Before I set out how the two kinds of sentences connect to a discourse, two notions that feature prominently in the analysis have to be explained, those of *reference point* and *location time*. The reference point is the (contextually shifting) time to which the story has so far advanced. The location time is the time about which a statement is made. In sentences with temporal adverbials, such as (43), it's the temporal adverbial (here, *on Sunday*) that gives the location time of the eventuality.

(43) Mary was ill on Sunday.

To give a uniform account of sentences with and without temporal adverbials Kamp generalises the idea of a location time to the latter class of sentences. That is, the interpretation of sentences without temporal adverbial also involves a location time. We will see how this works later.

On the basis of examples like (43) and (44), Kamp et al. claim that events engage in a different temporal relation to their location time than states:

(44) Mary wrote a letter on Sunday.

The state-describing sentence (43) leaves open whether the whole illness takes place on Sunday or has already started on Saturday and continues until Monday. In contrast, for the event-describing sentence (44) to be true the whole eventuality of writing a letter has to take place on Sunday. This is shown in (45) (based on Dowty 1986:49):

- (45) a. Yes, Mary was ill on Sunday. In fact, she fell ill on Saturday and did not recover until Monday.
 b. Yes, Mary wrote a letter on Sunday. In fact, she began writing it on Saturday and did not finish it until Monday.

⁶Since the domain of person does not concern us in this work, I refrain from internally analysing predicates like *p_enter* (for *Pierre enter*) here and later.

Example (45a) is a normal discourse. By contrast, (45b) is anomalous.

This leads Kamp et al. to the generalisation in (i):

- (i) If a sentence describes an event, the time of the event is included in the location time; a state, on the other hand, overlaps with the location time.

Returning to our French mini-discourses, the first sentence of (40) and (41) is represented as (46):

$$(46) \quad \begin{array}{|c|} \hline n \ e_1 \ t_1 \ t_2 \\ \hline p_enter(e_1) \\ \tau(e_1) = t_1 \\ t_1 \subseteq t_2 \\ t_2 \prec n \\ \hline \end{array}$$

Since this sentence is in the passé simple, it describes an event e_1 .⁷ It is an event of Pierre entering. τ maps e_1 on its runtime t_1 , the time e_1 actually takes. Since e_1 represents an event, its runtime t_1 is included ($\subseteq$) in the location time t_2 .⁸ Furthermore, since the verb is in the past tense, the location time t_2 precedes the utterance time n .⁹

(46) functions as the context for the interpretation of the second sentences of (40) and (41). The preliminary DRSs of these sentences are (47) and (48), respectively:

$$(47) \quad \begin{array}{|c|} \hline e_2 \ t_3 \ t_4 \\ \hline m_phone(e_2) \\ \tau(e_2) = t_3 \\ t_3 \subseteq t_4 \\ t_4 \prec n \\ \text{[} t_5 \text{]} \\ \text{[} \rho(t_5, t_3) \text{]} \\ \hline \end{array}$$

⁷Throughout this work I use $e, e', e'', \dots, e_1, e_2, \dots$ as variables/discourse markers for eventualities in general when discussing theories that do not make an ontological distinction between events and states, and as variables for events specifically in the discussion of theories that do make such an ontological distinction, like the one discussed here.

⁸Here my notation deviates from Kamp et al., who have $e_1 \subseteq t_2$, which is equivalent to my $\tau(e_1) \subseteq t_2$. The reason for this deviation is to have a uniform representation of the various analyses discussed in this thesis, which I believe facilitates comparison.

⁹One may wonder why it's the location time and not the runtime of e_1 that tense locates with respect to the utterance time. I postpone the motivation for this to section 3.2.4.

$$(48) \quad \begin{array}{|c|} \hline s_1 \ t_3 \ t_4 \\ \hline m_phone(s_1) \\ \tau(s_1) = t_3 \\ t_3 \circ t_4 \\ t_4 \prec n \\ \boxed{\boxed{t_5}} \\ \boxed{\rho(t_5, t_3)} \\ \hline \end{array}$$

The difference between the two sentences is that the former (the one in the passé simple) describes an event e_2 whose runtime t_3 is included ($\subseteq$) in the location time t_4 , whereas the latter (the one in the imparfait) describes a state s_1 whose runtime t_3 overlaps ($\circ$) with the location time. Since the sentences are not discourse-initial, the past tense not only locates the location time t_4 before the utterance time n , but also introduces the instruction to temporally relate the time of the eventuality t_3 to a time previously established in the discourse, the reference point t_5 .¹⁰ This is the meaning of the dashed boxes in (47) and (48). Thus, two elements have to be resolved: both the reference point t_5 has to be determined and the temporal relation has to be specified (that is, the underspecified temporal relation ρ has to be made specific, for example, as $\prec$).

Merging the context representation in (46) with the preliminary representations for the second clauses gives (49) and (50):

$$(49) \quad (46) \oplus (47) = \begin{array}{|c|} \hline n \ e_1 \ t_1 \ t_2 \ e_2 \ t_3 \ t_4 \\ \hline p_enter(e_1) \\ \tau(e_1) = t_1 \\ t_1 \subseteq t_2 \\ t_2 \prec n \\ m_phone(e_2) \\ \tau(e_2) = t_3 \\ t_3 \subseteq t_4 \\ t_4 \prec n \\ \boxed{\boxed{t_5}} \\ \boxed{\rho(t_5, t_3)} \\ \hline \end{array}$$

¹⁰I have simplified the construction of the representation of the first sentence by assuming that tense in discourse-initial sentences does not introduce an instruction to bind to a previously introduced time. It is, of course, more natural to assume that it does introduce such an instruction, but that this time is made available by an accommodation process.

$$(50) \quad (46) \oplus (48) =$$

n	e ₁	t ₁	t ₂	s ₁	t ₃	t ₄
p_enter(e ₁)						
$\tau(e_1) = t_1$						
$t_1 \subseteq t_2$						
$t_2 \prec n$						
m_phone(s ₁)						
$\tau(s_1) = t_3$						
$t_3 \bigcirc t_4$						
$t_4 \prec n$						
t ₅						
$\rho(t_5, t_3)$						

In the second stage anaphoric elements are resolved. t_5 has to be identified with a previously established time and ρ has to be specified. In both resolutions the difference between states and events plays a role. Kamp and Reyle (1993:544-545) formulate the following rules:

- (ii) In a past time narrative, the time of the last mentioned *event* serves as reference point for the current sentence; times of states do not serve as reference point.
- (iii) Events succeed the reference point; states include the reference point.

Following (ii), t_5 binds to t_1 in both (49) and (50), since t_1 is the time of the last (and only) mentioned event. The specification of ρ , however, differs between the two DRSs. Following (iii), ρ is specified as $\prec$ in (49) (since we have to do with an event e_2) and to $\subseteq$ in (50) (since we have to do with a state s_1):

$$(51)$$

<table border="1" style="width: 100%;"> <thead> <tr> <th>n</th> <th>e₁</th> <th>t₁</th> <th>t₂</th> <th>e₂</th> <th>t₃</th> <th>t₄</th> </tr> </thead> <tbody> <tr><td>p_enter(e₁)</td></tr> <tr><td>$\tau(e_1) = t_1$</td></tr> <tr><td>$t_1 \subseteq t_2$</td></tr> <tr><td>$t_2 \prec n$</td></tr> <tr><td>m_phone(e₂)</td></tr> <tr><td>$\tau(e_2) = t_3$</td></tr> <tr><td>$t_3 \subseteq t_4$</td></tr> <tr><td>$t_4 \prec n$</td></tr> <tr><td style="border: 1px dashed black; text-align: center;">t₅</td></tr> <tr><td style="border: 1px dashed black; text-align: center;">$\rho(t_5, t_3)$</td></tr> </tbody> </table>	n	e ₁	t ₁	t ₂	e ₂	t ₃	t ₄	p_enter(e ₁)	$\tau(e_1) = t_1$	$t_1 \subseteq t_2$	$t_2 \prec n$	m_phone(e ₂)	$\tau(e_2) = t_3$	$t_3 \subseteq t_4$	$t_4 \prec n$	t ₅	$\rho(t_5, t_3)$	$\rho := \prec$ $t_5 := t_1$ $\Rightarrow$	<table border="1" style="width: 100%;"> <thead> <tr> <th>n</th> <th>e₁</th> <th>t₁</th> <th>t₂</th> <th>e₂</th> <th>t₃</th> <th>t₄</th> </tr> </thead> <tbody> <tr><td>p_enter(e₁)</td></tr> <tr><td>$\tau(e_1) = t_1$</td></tr> <tr><td>$t_1 \subseteq t_2$</td></tr> <tr><td>$t_2 \prec n$</td></tr> <tr><td>m_phone(e₂)</td></tr> <tr><td>$\tau(e_2) = t_3$</td></tr> <tr><td>$t_3 \subseteq t_4$</td></tr> <tr><td>$t_4 \prec n$</td></tr> <tr><td>$t_1 \prec t_3$</td></tr> </tbody> </table>	n	e ₁	t ₁	t ₂	e ₂	t ₃	t ₄	p_enter(e ₁)	$\tau(e_1) = t_1$	$t_1 \subseteq t_2$	$t_2 \prec n$	m_phone(e ₂)	$\tau(e_2) = t_3$	$t_3 \subseteq t_4$	$t_4 \prec n$	$t_1 \prec t_3$
n	e ₁	t ₁	t ₂	e ₂	t ₃	t ₄																													
p_enter(e ₁)																																			
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$$\begin{array}{c}
 (52) \quad \begin{array}{|l}
 \hline
 n \ e_1 \ t_1 \ t_2 \ s_1 \ t_3 \ t_4 \\
 \hline
 p_enter(e_1) \\
 \tau(e_1) = t_1 \\
 t_1 \subseteq t_2 \\
 t_2 < n \\
 m_phone(s_1) \\
 \tau(s_1) = t_3 \\
 t_3 \circ t_4 \\
 t_4 < n \\
 \boxed{t_5} \\
 \boxed{\rho(t_5, t_3)} \\
 \hline
 \end{array}
 \quad \begin{array}{l}
 \rho := \subseteq \\
 t_5 := t_1 \\
 \Rightarrow
 \end{array}
 \quad \begin{array}{|l}
 \hline
 n \ e_1 \ t_1 \ t_2 \ s_1 \ t_3 \ t_4 \\
 \hline
 p_enter(e_1) \\
 \tau(e_1) = t_1 \\
 t_1 \subseteq t_2 \\
 t_2 < n \\
 m_phone(s_1) \\
 \tau(s_1) = t_3 \\
 t_3 \circ t_4 \\
 t_4 < n \\
 t_1 \subseteq t_3 \\
 \hline
 \end{array}
 \end{array}$$

This yields the desired results. In (51), the representation of (40), the event of Marie telephoning follows the event of Pierre entering. In (52), the representation of (41), on the other hand, the state of Marie telephoning temporally includes the event of Pierre entering.

In accounting for the temporal relations in (40) and (41), we haven't used the part of (ii) that says that states do not serve as reference point. This clause is needed however for examples like (53) (based on Kamp and Reyle 1993:521):

(53) A man entered the White Hart. He was ill. Bill served him a beer.

The natural interpretation is that the serving of beer takes place after the entering, but not necessarily after the illness. This result is obtained in the following way. The first and last sentence describe events, the second describes a state. It follows from (ii) that the event of the first sentence serves as the reference point for the second as well as the third sentence. Following (iii), the illness (a state) described by the second sentence includes this event. The serving of beer (an event) described by the third sentence succeeds it. Thus, it is left open whether the serving of beer happens after or during the illness.

In Kamp, van Genabith, and Reyle (2005), the construction and resolution rules are slightly adapted. Although the account is similar in spirit to Kamp and Reyle (1993), the differences reflect an important shift in perspective. In their revised approach, the location time is assigned a more important role (in fact, we can see in (51) and (52) that in the earlier version it played no role at all to account for narrative progression). Now it's the location time rather than the runtime of the eventuality that serves as reference point. And similarly, it's the location time of the eventuality described by the current sentence that is related to this reference point, rather than the runtime of the eventuality. Hence, the temporal relation between eventualities is now mediated via location times. Moreover, states now include the location time rather than simply overlap with it. (i')–(iii') give the revised rules:

- (i') If a sentence describes an event, the time of the event is included in the location time; the time of a state includes the location time.
- (ii') Some salient location time serves as reference point for the current sentence.
- (iii') The location time of events succeeds the reference point; with states it includes the reference point.

This revised version gives the correct results for our French discourses (40) and (41), just as the earlier version did. Constructing the context DRS (representing the first sentence) and the preliminary DRSs (representing the second sentences) according to the revised rules and then merging them gives the left DRSs in (54) and (55):¹¹

(54)

n	e ₁	t ₁	t ₂	e ₂	t ₃	t ₄
p_enter(e ₁)						
$\tau(e_1) = t_1$						
$t_1 \subseteq t_2$						
$t_2 \prec n$						
m_phone(e ₂)						
$\tau(e_2) = t_3$						
$t_3 \subseteq t_4$						
$t_4 \prec n$						
[- t ₅ -]						
[- ρ(t ₅ , t ₄) -]						

$\rho := \prec$
 $t_5 := t_2$
 $\Rightarrow$

n	e ₁	t ₁	t ₂	e ₂	t ₃	t ₄
p_enter(e ₁)						
$\tau(e_1) = t_1$						
$t_1 \subseteq t_2$						
$t_2 \prec n$						
m_phone(e ₂)						
$\tau(e_2) = t_3$						
$t_3 \subseteq t_4$						
$t_4 \prec n$						
$t_2 \prec t_4$						

(55)

n	e ₁	t ₁	t ₂	s ₁	t ₃	t ₄
p_enter(e ₁)						
$\tau(e_1) = t_1$						
$t_1 \subseteq t_2$						
$t_2 \prec n$						
m_phone(s ₁)						
$\tau(s_1) = t_3$						
$t_3 \supseteq t_4$						
$t_4 \prec n$						
[- t ₅ -]						
[- ρ(t ₅ , t ₄) -]						

$\rho := \subseteq$
 $t_5 := t_2$
 $\Rightarrow$

n	e ₁	t ₁	t ₂	s ₁	t ₃	t ₄
p_enter(e ₁)						
$\tau(e_1) = t_1$						
$t_1 \subseteq t_2$						
$t_2 \prec n$						
m_phone(s ₁)						
$\tau(s_1) = t_3$						
$t_3 \supseteq t_4$						
$t_4 \prec n$						
$t_2 \subseteq t_4$						

¹¹Kamp, van Genabith, and Reyle (2005) may prefer to include a progressive operator in (55), to avoid the problem of the *imperfective paradox*. I postpone the discussion of this problem to the next section.

The preliminary representations differ in two respects from the previous ones: the temporal relation between states and location times ($\mathbf{t}_3 \supseteq \mathbf{t}_4$ rather than $\mathbf{t}_3 \circ \mathbf{t}_4$), and the fact that the eventuality's location time $\mathbf{t}_4$ rather than its runtime $\mathbf{t}_3$ is temporally related to the reference point $\mathbf{t}_5$. In the resolution stage there is a difference as well: $\mathbf{t}_5$ now binds to the location time of the first sentence $\mathbf{t}_2$ rather than to the runtime $\mathbf{t}_1$. The specification of ρ remains the same. The result of the resolution process is given in the right DRSs in (54) and (55) and graphically represented in Figures 3.1 and 3.2. In line with the natural interpretations of (40) and (41), in (54) the phone call follows the entrance, in (55) it includes it.

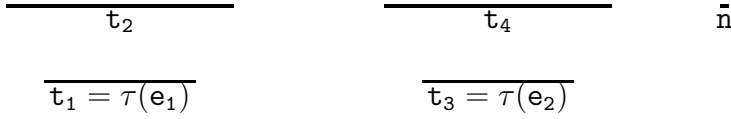


Figure 3.1: Graphical representation of (54)

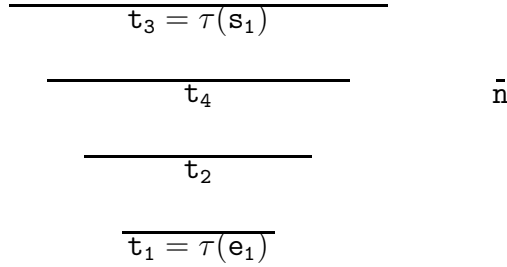


Figure 3.2: Graphical representation of (55)

The mediation via location times has the effect that there is no need anymore to assume a difference between states and events with respect to the possibility to serve as reference point (compare ii and ii'). We see this when we apply the new rules to (53). Without assuming a difference between states and events in this respect we get the correct result that the serving of beer happens after the entering but not necessarily after the illness. The reader may check this himself.

It is clear that in Kamp, van Genabith, and Reyle (2005) the location time plays a more important role than in Kamp and Reyle (1993): in the former but

not the latter the notion is used to account for the phenomenon of narrative progression. With its emphasis on the role of the location time the former account comes quite close to the account of Klein to be discussed in section 3.2.4.

Let's summarise and evaluate the DRT proposals of aspect discussed in the foregoing. As a dynamic framework, DRT is particularly suited to deal with the contribution aspect makes to a discourse. In the accounts discussed, the fact that we interpret the eventualities described in a discourse as temporally related to each other is ascribed to the anaphoric nature of tense. Aspect serves to specify this temporal relation. Here the distinction between events and states is crucial. Sentences in the passé simple (perfective aspect) describe events, sentences in the imparfait (imperfective aspect) describe states, and event-describing sentences connect to a discourse in a way different from state-describing sentences.

Two questions remain unanswered in these accounts. First, why is it that events and states behave differently? That is, we get the correct results because in the construction algorithm events are made to follow the reference point and states to include it, and events to be included in the location time and states to include it or, at least, overlap with it. But why do events and states engage in different temporal relations with the reference point and location time? What property of events and states (or eventive and stative predicates) accounts for this difference? In fact, it remains unclear what is the difference between states and events and therefore these proposals have little explanatory power. The second remaining question is how the ingressive interpretation of perfective aspect and the habitual interpretation of imperfective aspect come about. With the focus on the effect of aspect on the temporal structure of discourse, the DRT proposals discussed ignore these interpretations. It may be that the accounts help to understand the main distinction *completed* (perfective) versus *not-completed* (imperfective), but they do not solve the puzzle concerning the various interpretations of both perfective and imperfective aspect. It is this puzzle that is central to this thesis. Ideally, an account of aspect should give a uniform treatment of these two features of the interpretation of aspect, viz. the variety in interpretation and the effect on the temporal structure of discourse.

In the following subsection I will come back to the first question. I will discuss an alternative and less *ad hoc* account of the temporal phenomena the DRT accounts were concerned with, using Krifka's notions of homogeneous and quantised reference. In section 3.2.3 I will discuss an extension of DRT that deals with the second issue.

3.2.2 Krifka: quantised and homogeneous reference

Krifka's (1989a, 1989b, 1998) work aims at capturing the analogy between the mass-count distinction in the nominal domain and the atelic-telic distinction in the verbal domain. As such, his work has more to do with *Aktionsart* or aspectual class than with grammatical aspect (see section 1.2.3 for the notion of aspectual class). In Krifka (1989b), however, he devotes a section to grammatical aspect. Here, I will discuss his work only insofar as it relates to grammatical aspect.

In the account of Kamp et al., the perfective-imperfective distinction corresponds to the distinction between events and states. What constitutes the difference between events and states is left open.¹² Krifka (1989b) also relates grammatical aspect to aspectual class. He claims that the perfective-imperfective distinction corresponds to the telic-atelic distinction (1989b:179). In contrast to Kamp et al., the latter distinction applies at the level of the predicate only: there are telic and atelic predicates (of eventualities), but not telic and atelic eventualities (Krifka 1989a:91, Krifka 1998:207). Krifka's motivation for this is that intuitively one can describe one and the same eventuality using both a telic and an atelic predicate. A run eventuality of John, for example, can be described with the telic *John run a mile* as well as the atelic *John run*.¹³ If one would, however, assume the existence of telic and atelic eventualities and moreover assume that the denotation of a telic predicate is a set of telic eventualities, and the denotation of an atelic predicate a set of atelic eventualities, one would be forced to say that we have to do with two different eventualities (otherwise, one and the same eventuality would be both telic and atelic), which is technically possible (see for example Bach 1986), but maybe not very intuitive.

To capture the distinction between telic and atelic predicates in a formal way, Krifka structures the domain of eventualities as a join semi-lattice $\mathfrak{E}$ without bottom element (following Link 1983 for the nominal domain). That is:

- (56) $\mathfrak{E} = \langle E, \sqcup \rangle$, with E the set of eventualities and $\sqcup$ an operation on E (i.e. $\sqcup : E \times E \rightarrow E$) such that for all $e, e', e'' \in E$:
- (i) $e \sqcup e' = e' \sqcup e$ commutativity
 - (ii) $e \sqcup e = e$ idempotency
 - (iii) $e \sqcup (e' \sqcup e'') = (e \sqcup e') \sqcup e''$ associativity
 - (iv) There is no e such that for all $e' \ e \sqcup e' = e'$ no bottom

¹²It is not quite clear, for example, whether their distinction corresponds to the unstativestative distinction or to the telic-atelic distinction.

¹³Recall from section 1.2.3 that these infinitival expressions are meant to indicate the verbs with their arguments, without tense and grammatical aspect. Throughout this thesis, they are taken to translate in a formal language as predicates over eventualities.

element

(i), (ii), and (iii) together make the structure a join semi-lattice and (iv) ensures that there is no bottom element.

A part-of relation $\sqsubseteq$ can be defined in terms of the operation $\sqcup$:

$$(57) \quad e \sqsubseteq e' \text{ iff } e \sqcup e' = e'$$

The proper part-of relation is then defined as follows:

$$(58) \quad e \sqsubset e' \text{ iff } e \sqsubseteq e' \text{ and } e \neq e'$$

Krifka defines the distinction between telic and atelic predicates formally with the use of this proper part-of relation. He claims that telic predicates are quantised:¹⁴

$$(59) \quad \text{A property } P \text{ is quantised iff for all } e, e' \text{ if } P(e) \text{ and } e' \sqsubset e \text{ then } \neg P(e')$$

A predicate is quantised iff no eventuality that is a proper part of an eventuality in the extension of the predicate is also in its extension. For example, a proper part of an eventuality in the extension of the telic predicate *John build a house* is not likewise in the extension of *John build a house* (in the same way as a proper part of a bottle of water does not count again as a bottle of water).

Atelic predicates, on the other hand, are non-quantised (often called *homogeneous*). The predicate *John walk*, for example, is non-quantised, given that a part of an eventuality in the extension of this predicate is in its extension too, except when the parts get too small to count as walking (in the same way as a part of water still counts as water, up to the level of molecules). Krifka seems to require moreover that atelic predicates are cumulative.¹⁵ I postpone the discussion of cumulativity to a later point in this section.

With this formalisation of telicity Krifka immediately derives a number of phenomena that needed some stipulations in the DRT accounts discussed in the previous section. Let's first consider the interaction with time-frame adverbials like *on Sunday*.

- (60) a. Mary wrote a letter on Sunday.
 b. Mary was ill on Sunday.
 c. Mary wrote on Sunday

¹⁴Strictly speaking, quanticity is a property of properties, and a predicate is quantised in a derived sense only, viz. if it denotes a quantised property.

¹⁵ Krifka (1989a:90): "Basically, telic predicates can be reconstructed as quantised event predicates, and atelic predicates as event predicates which are strictly cumulative (or at least, non-quantised)." Krifka (1989b:158): "Die Atelizität wird umgekehrt durch die Kumulativität des verbalen Prädikats erfaßt werden." ("Atelicity, by contrast, will be captured by the cumulativity of the verbal predicate.")

We saw that for (60a) (= (44)) to be true, the whole writing eventuality has to take place within the Sunday, i.e. at the end of the day there has to be a letter. This does not hold for (60b) (= (43)): it is possible that Mary fell ill on Saturday and recovered on Monday. (60c) behaves the same as (60b) in this respect. Recall that Kamp et al. ‘explain’ this difference by postulating that states and events engage with the location time by means of different temporal relations. Krifka does not need to stipulate this (see Krifka 1989b:172-173). If we assume that a time-frame adverbial like *on Sunday* requires that there is an eventuality in the extension of the predicate whose runtime is included in the time denoted by the adverbial (independent of the predicate being telic or atelic), the correct interpretations follow directly from the fact that (60a) has a telic (= quantised) predicate, whereas (60b) and (c) have an atelic (= non-quantised) predicate. Since *Mary write a letter* is quantised, it is impossible that an eventuality in the extension of this predicate (e_1 in the upper part of Figure 3.3) is part of another eventuality in the extension of the predicate (for otherwise this latter eventuality would have a part (viz., the former eventuality) for which the predicate holds likewise, and, hence, the predicate would not be quantised). That is to say, eventualities in the extension of a telic predicate are always *maximal* with respect to this predicate. Therefore, from the fact that there is an eventuality in the extension of *Mary write a letter* whose runtime is included in the time denoted by *on Sunday*, it follows that the *maximal* eventuality is included in this time, which gives the correct interpretation for (60a).

Mary write or *Mary be ill*, on the other hand, are non-quantised, and therefore it is possible that eventualities in the extension of these predicates (e_1 in the lower part of Figure 3.3) are parts of eventualities of which the predicate holds as well (e_2 or e_3). In other words, eventualities in the extension of an atelic predicate do not have to be maximal with respect to this predicate. So, if it is asserted that there is an eventuality in the extension of *Mary be ill* whose runtime is included in the time denoted by *on Sunday*, it is left open whether this is the maximal illness eventuality or that the maximal eventuality includes the Sunday. This is exactly what we want.

In a similar way, this formalisation of telicity can account for the differential behaviour between telic and atelic predicates with respect to narrative progression. Consider again (53), repeated for convenience as (61):

(61) A man entered the White Hart. He was ill. Bill served him a beer.

We only have to assume that eventualities are introduced in the order in which they occurred to obtain the correct interpretation. Under this assumption, we get that there is an eventuality of the man being ill (e_2 in Figure 3.4) that follows his entrance (e_1), but this does not exclude the possibility (due to the fact that the predicate *be ill* is not quantised) that there is also a larger being

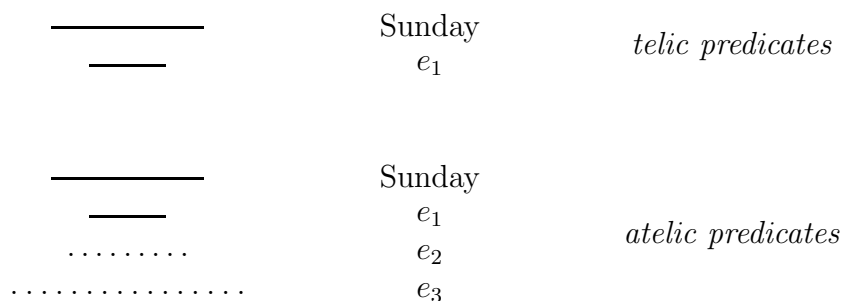


Figure 3.3: The interaction of telicity and time-frame adverbials

ill eventuality (e'_2 or e''_2) that includes the entering. For the same reason, we get that the serving of a beer (e_3) follows *an* eventuality of being ill (e_2), but this need not be the maximal (i.e. complete) eventuality of being ill. The serving of beer may be included in the complete eventuality of being ill. On the other hand, the serving of beer (e_3) must follow the entering (e_1), for both are quantised. (This is a somewhat simplified version of Krifka 1989b:175-176, in fact it's the account of Dowty 1986.) Again, there is no need to stipulate that the temporal relation of an eventuality with the location time or reference point depends on the aspectual class of the predicate (as is needed not only in Kamp et al., but also in accounts of similar spirit, for example, Hinrichs 1981, Partee 1984, and Hinrichs 1986 to be discussed in chapter 6 on the temporal structure of discourse). It is doubtful, however, whether it is possible to formulate a discourse rule like “eventualities are described in the order in which they take place” (on which this account crucially hinges) in a static framework (unless it is seen as a pragmatic rule, for example, a consequence of the Gricean principle “Be orderly”, cf. Grice 1975, Dowty 1986:58-59).

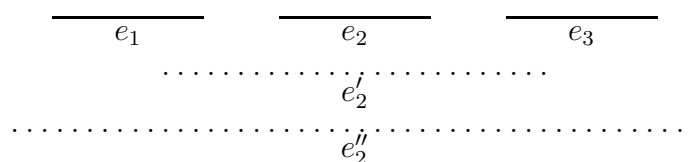


Figure 3.4: Telicity and narrative progression

What lies at the heart of the difference between the theories of Krifka and Kamp et al. is a different conceptualisation of eventualities. Kamp et al. seem to consider only maximal eventualities (with respect to a predicate)

eventualities (of this predicate). For otherwise, there is no reason to assume that states stand in a different relation with the location time than events, as we could just as well say that both states and events are included in the location time, as we have seen in this section. For Krifka non-maximal eventualities are eventualities too (otherwise every predicate would be telic according to his definition of telicity). That is, if e_2'' in Figure 3.4 corresponds to Mary's maximal illness (that is, the illness did not exist before the first dot nor after the last one), then Kamp et al. seem to consider only e_2'' to be an eventuality in the extension of *Marie be ill*, whereas for Krifka e_2 , e_2' , and e_2'' would all count. This proliferation of eventualities may be considered a drawback of Krifka's otherwise elegant account. The conceptualisation of eventualities of Kamp et al. probably resembles more closely the common sense view on eventualities.

Let's now turn to grammatical aspect. As I mentioned, Krifka relates the distinction between perfective and imperfective aspect to the distinction between telic and atelic predicates:

Der Unterschied zwischen Passé simple [the French perfective aspect] und Imparfait [the French imperfective aspect] liegt offensichtlich darin, daß Sätze im ersteren Aspekt telisch und Sätze im zweiten atelisch sind.

(The difference between passé simple and imparfait is obviously that sentences with the former aspect are telic and those with the latter atelic.) (Krifka 1989b:179)

But, of course, the passé simple in French and the aorist in Ancient Greek do not only occur with telic predicates, nor do we find imperfective aspect only with atelic predicates. Therefore, Krifka proposes that the semantics of perfective aspect is an operator that maps (telic or atelic) predicates to telic predicates, whereas the semantics of imperfective aspect maps (telic or atelic) predicates to atelic predicates. He uses typed lambda-calculus to formalise his account. Appendix A includes the definition of typed lambda-calculus, but gives a non-standard version that is adapted to my purposes. Readers not familiar with typed lambda-calculus are referred to Gamut (1991) or Dowty, Wall, and Peters (1981) for a proper introduction.

Krifka calls the perfective operator **AOR**. Let's start with a simplified version of **AOR**, **AOR'**, to get the gist of its working:

$$(62) \quad \text{AOR}' = \lambda P \lambda e [P(e) \wedge \forall e' [e \sqsubset e' \rightarrow \neg P(e')]]$$

AOR' maps a set of eventualities in the extension of a predicate on a subset: the set of (locally) maximal eventualities with respect to this predicate. That is, if e_2 , e_2' , and e_2'' from Figure 3.4 are in the extension of a predicate **P**, only e_2'' is in the extension of **AOR'(P)**. Note that **AOR'(P)** is a telic predicate and that **AOR'** has no effect when **P** is a telic predicate itself (since all eventualities

in the extension of a telic predicate are already maximal with respect to this predicate).

Unfortunately, in its simple form, this perfective operator won't do the job. The problem is the following: imagine that John sleeps from 1 to 2 o'clock and from 3 to 4 o'clock. Let's translate the non-quantised *John sleep* as the eventuality predicate **j_sleep**. The extension of **AOR'(j_sleep)** should include the two eventualities, the one from 1 to 2, e_1 , and the one from 3 to 4, e_2 , for both are locally maximal. Just like any other two eventualities, e_1 and e_2 together constitute a third eventuality, e_3 . Now the question is: is e_3 in the extension of **j_sleep**? Krifka seems to assume that atelic predicates, like *John sleep*, are not only non-quantised, but also cumulative (see footnote 15):

- (63) A property P is cumulative iff for all e, e' if $P(e)$ and $P(e')$ then $P(e \sqcup e')$

If one assumes that atelic predicates are cumulative, one has to accept that **j_sleep** holds of e_3 , too. But if **j_sleep** holds of e_3 and $e_1 \sqsubset e_3$, then **AOR'(j_sleep)** does not hold of e_1 . But if **AOR'(j_sleep)** does not hold of e_1 , **AOR'** does not do what it should do, since e_1 is locally maximal with respect to **j_sleep** and therefore we want it to be in the extension of **AOR'(j_sleep)**. To fix this, Krifka (1989b:180) proposes **AOR** instead of **AOR'**:

- (64) $\mathbf{AOR} = \lambda P \lambda e [P(e) \wedge \forall e' [(P(e') \wedge e \sqsubset e') \rightarrow \neg \mathbf{ECONV}(e')]]$ ¹⁶

AOR(P) holds of an eventuality e if **P** holds of this eventuality and all eventualities e' of which e is a proper part and of which **P** holds are not convex (**ECONV**). This revision is meant to ensure that in the above scenario e_1 and e_2 are in the extension of **AOR(j_sleep)**, by disregarding e_3 because it is not convex. Krifka does not define **ECONV**, the property convexity for eventualities, but he does define it in the temporal domain (Krifka 1989b:155):

- (65) t is convex iff for all t', t'' if $t' \sqsubseteq t$ and $t'' \sqsubseteq t$ then for all t''' such that $t' \preceq t''' \preceq t''$ it holds that $t''' \sqsubseteq t$

As this definition shows, a convex time is a time without interruptions, i.e. a time interval.¹⁷

This concludes the discussion of the **AOR** operator. Keep in mind that the problem with the simpler version, **AOR'**, arises because atelic predicates are assumed to be not only non-quantised, but also cumulative. I will return to this in section 4.5.

¹⁶I assume that "**ECONV**(e)" in the definition of Krifka is a typo and should be "**ECONV**(e')".

¹⁷Krifka assumes that the domain of times is structured as a join semi-lattice without bottom element, just like the domain of eventualities. As a consequence, not all times are intervals.

Let's now move on to imperfective aspect. For imperfective aspect, Krifka considers the progressive in English and for its semantics he provisionally proposes the operator *PROG* (Krifka 1989b:177):

$$(66) \quad \text{PROG} = \lambda P \lambda e \exists e' [e \sqsubseteq e' \wedge P(e')]$$

Just as *AOR*, *PROG* is a function from sets of eventualities onto sets of eventualities, but in contrast to *AOR*, *PROG* returns atelic predicates. *PROG*(*P*) holds of an eventuality *e* iff *e* is part of an eventuality *e'* of which *P* holds.

As Krifka notes himself, *PROG* glosses over the so-called *imperfective paradox* (Dowty 1979:133–135), since it assumes the existence of a (complete) eventuality for which *P* holds. For example, it assumes that for (67a) and its French equivalent (68a) to be true Max has to reach the other side of the street. This is not correct, as (67b) and (68b) show:

- (67) a. Max was crossing the street.
 b. Max was crossing the street when the car hit him.
- (68) a. *Max traversait la rue.*
 Max cross.PST.IPFV.3SG the street
 “Max was crossing the street.”
 b. *Max traversait la rue quand la voiture l’a écrasé.*
 Max cross.PST.IPFV.3SG the street when the car hit.PC.3SG him
 “Max was crossing the street when the car hit him.”

The imperfective paradox concerns the question: what is the status of the complete eventuality if it does not have to exist in the real world? Many attempts to answer the question have been made (e.g. Dowty 1979, Lascarides 1991, Asher 1992, Landman 1992, van Lambalgen and Hamm 2004) but so far no generally accepted solution to the paradox has been provided. Krifka makes some revisions to his provisional proposal but does not develop a full-fledged analysis of imperfective aspect that is not subject to the imperfective paradox. I will leave the imperfective paradox aside for the moment and evaluate Krifka's analysis from the perspective of the enterprise central to this thesis.

Krifka's analysis elegantly captures some of the interpretations of aoristic and imperfective aspect: for aoristic aspect, it can deal with the completive interpretation (completion with bounded predicates) and the complexive interpretation (completion with unbounded predicates). For the former, *AOR* is the identity mapping; for the latter, it returns a subset: the maximal eventualities of which the predicate holds. For imperfective aspect, Krifka's analysis captures the processual interpretation, the interpretation that an eventuality is *going on*. But what about the other interpretations of the two aspects we

encountered in 2.1? How do, for example, the ingressive interpretation of aoristic aspect and the habitual interpretation of imperfective aspect come about? Like Kamp et al., Krifka ignores these and it is not clear how his analysis can be extended to deal with them. The only option seems to be to assume an ambiguity between various operators. Aoristic aspect would then be ambiguous between AOR and an operator that captures the ingressive interpretation, and imperfective aspect between PROG and a habitual operator. I argued in section 2.5 that it is preferable to do without such ambiguity.

This shortcoming of the two accounts discussed brings us to the next analysis of the perfective-imperfective distinction, that of de Swart (1998). She deals explicitly with the variation in interpretation of perfective and imperfective aspect, and does not rely on an ambiguous semantics for the two.

3.2.3 De Swart: aspectually sensitive tense operators

The main objective of the DRT analysis of aspect discussed in section 3.2.1 was to account for the differences in behaviour between the *passé simple* and *imparfait* in discourse, that is, the fact that the former but not the latter moves the story forward. In section 3.2.2 we saw an alternative explanation of this phenomenon in terms of quantised and homogeneous reference. However, neither account can be the full story about perfective (=aoristic) and imperfective aspect, as they do not answer the challenge concerning the various interpretations of both aspects (cf. section 2.5).

De Swart (1998) sets herself the task of complementing the DRT account of the discourse behaviour of the French *passé simple* and *imparfait* with an account of how their various interpretations come about. There are striking similarities between the interpretations of the *passé simple* and *imparfait* in French and those of aoristic and imperfective aspect in Ancient Greek. As my main goal in this thesis is to account for the various interpretations of the two aspects in Ancient Greek, it is worthwhile taking a close look at de Swart's proposal. In her analysis, de Swart uses some ingredients from Krifka's account, and in this way, her proposal can be seen as a combination of the accounts of Kamp et al. and Krifka.

The remainder of this subsection is organised as follows: first I explain de Swart's (1998) account of aspectually sensitive tense operators (3.2.3.1), followed by a discussion of its applicability to Ancient Greek (3.2.3.2). We will see that de Swart's proposal, despite some very attractive features, runs into problems, especially when confronted with Ancient Greek.

3.2.3.1 Aspectually sensitive tense operators

Like Kamp et al. and Krifka, de Swart claims that the distinction between the *passé simple* and *imparfait* corresponds to a distinction in aspectual class. She

follows Krifka in treating sentences in the passé simple as quantised (=telic) and sentences in the imparfait as homogeneous (=atelic). For de Swart, however, quanticity is not only a property of predicates, as it is for Krifka, but also of eventualities. In her view the domain of eventualities consists of quantised and homogeneous eventualities. The class of homogeneous eventualities comprises what de Swart calls *states* and *processes*; quantised eventualities are called *events*. See Table 3.1 for the aspectual classifications used in the accounts discussed until now.¹⁸

		Kamp et al.	Krifka	De Swart	
stative	unbounded	states		homogeneous	states
non-stative			atelic		processes
	bounded	events	telic	quantised	events

Table 3.1: Aspectual class terminology according to author

The composition of aspect plays a crucial role in de Swart’s (1998) analysis. Therefore, before examining the passé simple and imparfait, let us first take a look at the overall structure of tense and aspect as assumed by de Swart.

Like Krifka, de Swart assigns grammatical aspects a semantics that maps properties of eventualities onto properties of eventualities, or equivalently, sets of eventualities onto sets of eventualities. Furthermore, tense takes scope over grammatical aspect. The semantics of tense introduces existential closure over the eventuality variable and locates the eventuality with respect to the utterance time.

Grammatical aspects are treated as operators that return sets of eventualities of a certain type, for example states. De Swart calls such operators *aspectual operators*. The effect of such aspectual operators is a change in the aspectual class of the predicate when the type of the input of the operator is different from that of the output. The English progressive, for example, is claimed to deliver sets of states:

- (69) a. John smiled.
 b. John was smiling.
 b'. [_s PAST [_s PROG [_p John smile]]]

¹⁸Again, for Krifka the classification is a classification of predicates only, for Kamp et al. and de Swart also of eventualities. I have chosen to identify Kamp et al.’s states with the class of unbounded rather than stative eventualities. The table is meant to leave implicit whether stative predicates are atelic or neither telic nor atelic in Krifka’s account. *Stative* and *bounded* in Table 3.1 are meant as theoretically neutral terms. Those are the terms I will use in the analysis to be developed in chapter 4.

The sentence in (69a) describes a process. Remember that the expression *John smile* in (69b') is meant to indicate the verb with its arguments, without tense and grammatical aspect. This expression refers to a set of processes, indicated by the subscript *p*. The progressive operator maps this set onto a set of states, as shown by the subscript *s*. Tense does not change the aspectual class, hence the subscript *s* again.

Not only do aspectual operators deliver outputs of a certain kind, they may also impose restrictions on the kind of sets of eventualities they take as their input. (70) serves to illustrate this:

(70) *John is being tall.

As has often been observed, the progressive normally does not combine with stative predicates. Most analyses (e.g. Dowty 1979, Moens 1987) reflect this by treating the progressive as an operator that requires a non-stative expression as its input. Thus, the semantics of the progressive maps sets of non-stative eventualities onto sets of stative eventualities. Given that *John be tall* is a stative expression, the ungrammaticality of (70) (indicated by the asterisk) is explained.

However, there seem to exist exceptions to this input requirement of the progressive. In (71a) we find such an apparent exception:

(71) a. #John is being funny.
 a'. [_s PRES [_s PROG [_{ns} C_{s→ns} [_s John be funny]]]]

In contrast to (70), (71a) is grammatical, in spite of the stative nature of *John be funny*. Its grammaticality is commonly explained through reference to the notion of *coercion*, which also occupies a central place in de Swart's analysis of the passé simple and imparfait. Coercion refers to the phenomenon that if there is a mismatch between the input requirements of an operator and the properties of its argument, the argument is reinterpreted in such a way that it satisfies the requirements (see section 3.3 for an indepth discussion). This reinterpretation allows the two to combine. This process is illustrated in Figure 3.5. In this figure, corresponding to the two vertical arrows, there are two ways in which the mismatch can be resolved.

Let's apply this to (71). The mismatch between the requirements of the progressive operator and the (stative) predicate *John be funny* is resolved by reinterpretation of the stative expression as a non-stative expression, corresponding, for example, to *John act funny* (see e.g. Moens 1987). That is, the class of the argument is *coerced* by the progressive operator into the required class. In (71a'), C_{s→ns} indicates this coercion operator from a set of stative to a set of non-stative eventualities (with the subscript *ns* for non-stative). After this reinterpretation, the progressive operator can apply. The stative expression *John be tall*, on the other hand, cannot be reinterpreted as a non-

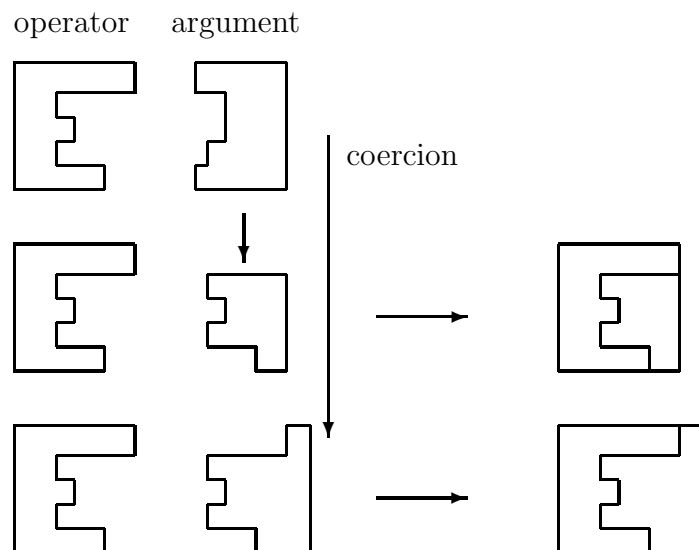


Figure 3.5: Coercion

stative expression, since it is hard to think of a process that is associated with being tall, which explains the contrast between (70) and (71a). Following the established convention, henceforth sentences that are only grammatical after reinterpretation (but not on a literal interpretation) are marked with a hash sign (#). It should be noted that the decision whether we are dealing with reinterpretation is often theory-dependent.

How does all this relate to the *passé simple* and *imparfait*? The fact that sentences in the *passé simple* always describe quantised eventualities whereas sentences in the *imparfait* describe homogeneous eventualities seems to suggest that the semantics of the *passé simple* and *imparfait* are aspectual operators that map sets of eventualities onto sets of quantised and homogeneous eventualities, respectively.¹⁹ De Swart indeed claims that the *passé simple* and *imparfait* are sensitive to the quantised versus homogeneous distinction, but she implements this in a different way.

De Swart argues that the *passé simple* and *imparfait* are not grammatical aspects, and hence do not correspond to aspectual operators, but rather to *aspectually sensitive past tense operators*, that is past tense operators with restrictions on the aspectual class of their input. The semantics of *passé simple* and *imparfait* are not functions from sets of eventualities onto sets of eventualities, but *select for* particular sets of eventualities, the *passé simple* for sets of quantised eventualities, the *imparfait* for sets of homogeneous eventual-

¹⁹In the spirit of Mourelatos (1981) (applied to Ancient Greek by Armstrong 1981), Bach (1986), and Krifka, with the difference that Krifka does not refer to homogeneous and quantised eventualities, but rather predicates of eventualities.

ities. If the input requirements are not met by the candidates, coercion comes into play: the inputs are reinterpreted in such a way that they do satisfy the requirements. If the requirements are satisfied, the tense operators can apply.

De Swart uses this idea of coercion to account for the variation in interpretation observed for the imparfait and passé simple. Let's see how this works. On her account, the two only make a temporal contribution in (72) and (73):²⁰

- (72) *Anne é t a i t malade.*
 Anne be.PST.IPFV.3SG ill
 "Anne was ill."
- (73) *Anne é c r i v i t une lettre.*
 Anne write.PST.PFV.3SG a letter
 "Anne wrote a letter."

Remember that the imparfait and passé simple are analysed as past tense operators. Since the input candidates of the two are of the required type (homogeneous and quantised, respectively), no coercion comes into play and hence there is no shift in aspectual class.

The situation is different in the following four examples (all from de Swart 1998). In these examples the requirements of the tense operators are not fulfilled: in (74) and (75) we have quantised predicates with the imparfait, in (76) and (77) homogeneous ones with the passé simple. In these cases coercion causes an aspectual shift.

- (74) *Un jour, je f a i s a i s mes courses chez l' épici er*
 One day I get.PST.IPFV.1SG my groceries at the grocery.store
quand je rencontra i Jean.
 when I meet.PST.PFV.1SG Jean
 "One day, I was shopping at the grocery store when I ran into Jean."
- (75) *A cette époque-là, je f a i s a i s mes courses chez*
 In those days I get.PST.IPFV.1SG my groceries at
l' épici er du coin.
 the grocery.store at.the corner
 "In those days, I shopped at the local grocery store."
- (76) *(Soudain,) Jeanne s u t la réponse.*
 (Suddenly,) Jeanne know.PST.PFV.3SG the answer
 "(Suddenly,) Jeanne knew the answer."
- (77) *Jeanne d'Arc f u t une sainte.*
 Jeanne d'Arc be.PST.PFV.3SG a saint

²⁰For reasons of uniformity, I use PST.IPFV and PST.PFV to gloss the imparfait and passé simple, respectively, even though this runs counter to de Swart's view.

“Jeanne d’Arc was a saint.”

(74) has a processual, (75) a habitual, (76) an ingressive, and (77) a complexive interpretation. (Notice the similarities with the interpretations of imperfective and aoristic aspect in Ancient Greek.) On de Swart’s analysis, these interpretations are the result of coercion triggered by the past tense operators.²¹ The variation in interpretation is the result of the different ways in which the aspectual mismatches can be resolved. A habitual and a processual interpretation resolve a mismatch for the imparfait, an ingressive and a complexive interpretation do this for the passé simple.

De Swart presents a number of arguments to analyse the passé simple and imparfait as aspectually sensitive tense operators rather than as aspectual operators. I will briefly discuss four of them.

The first reason is the fact that the passé simple and imparfait show up only in the past tense. This in contrast to, for example, the English progressive, which can be combined with past, present, and future tense. If one analyses the passé simple and the imparfait as aspectual operators, one has to explain this restriction, whereas it follows naturally from an analysis in terms of aspectually

²¹De Swart is the most explicit defender of this view on the passé simple and imparfait, but we find it in some of the work by Kamp as well. He discusses this view most explicitly in an unpublished research report on French:

As temporal operators PS [passé simple] and Imp [imparfait] coincide; both indicate that the episode described lies somewhere in the past of the utterance time. But as aspectual operators they are diametrically opposed, as VPs in the Imp always have a “stative” and those in the PS always have a “non-stative” interpretation. The circumstance that PS and Imp always put their aspectual signature on the VPs to which they are applied has important implications. It means that when these tenses combine with verb phrases of a different aspectual signature the result will be a VP with a different aspectual status, and therefore one whose meaning differs from that of the underlying untensed VP. The interpretation which is needed when the aspectual signatures of tensed and untensed VP clash is reminiscent of what we have said above about progressives such as *is being funny* – with the proviso that in the case of PS and Imp the need for reinterpretation arises when the aspectual class of the untensed VP does *not* agree with that of the result of applying the tense, whereas the progressive necessitates reinterpretation precisely when there is agreement (i.e. when the underlying VP is itself a stative). While reinterpretation is necessary both when a PS applies to a stative VP and when the Imp applies to a non-stative one, the reinterpretation strategies are quite different in the two cases.

Kamp (1992:45)

That Kamp has a coercion analysis in mind can be concluded from the fact that he compares the aspectual shifts that we find with the passé simple and imparfait with the *coercion* shift that the progressive provokes with stative expressions (from stative to non-stative), rather than with the shift that is *inherently* associated with the progressive (from non-stative to stative).

sensitive *past* tense operators.

Second, there are no distinct morphemes for tense and aspect within the *passé simple* and *imparfait* morphology. Instead temporal and aspectual information is encoded in a single morpheme. This favours an analysis that combines both contributions into one operator.

Third, on an analysis in terms of aspectual operators, the operators corresponding to *imparfait* and *passé simple* would in many cases apply vacuously. For the *imparfait* this would hold when the input is already a set of homogeneous eventualities, as in (72), and for the *passé simple* when the input is already a set of quantised eventualities, as in (73). According to de Swart, for reasons of economy, a language would use a neutral form in these cases rather than an aspectually marked form. On an analysis as aspectually sensitive tense operators, the operators corresponding to the *imparfait* and *passé simple* never apply vacuously as they always locate an eventuality with respect to the utterance time.

Finally, in contrast to the progressive in English, neither the *passé simple* nor the *imparfait* specifies one particular aspectual transition. We have seen that the *passé simple* may receive an ingressive interpretation or an interpretation of completion, and the *imparfait* a habitual or processual interpretation. At least intuitively, this fits well with a coercion analysis: the mismatch somehow has to be resolved, and it may be that there is more than one way in which this can be done.

In the next section I will apply de Swart's proposal to the Ancient Greek data. But let me first point at a problem for this coercion analysis that can already be observed in French. Since the various interpretations found are put down to coercion, the analysis predicts that we find special interpretations only in case of a mismatch between the requirements of the operator and the aspectual class of its argument. For some interpretations, this prediction is correct. It rightly predicts that we find the ingressive interpretation of the *passé simple* only with homogeneous predicates (the data at this point are the same in French and Ancient Greek). But it also predicts that the habitual interpretation of the *imparfait* would occur only in case of a mismatch, that is, with a quantised input, and this prediction is not borne out. We see in (78) that we also observe the habitual interpretation of the imperfective with homogeneous predicates, such as *I sleep*.

- (78) *Quand j' étais* *petit, je ne dors pas*
 When I be.PST.IPFV.1SG young I not sleep.PST.IPFV.1SG not
bien.
 well
 "When I was young I didn't sleep well."

It is important to note that in de Swart's account a reinterpretation operator

is inserted if and only if there is a conflict in aspectual class. Nothing else can trigger the coercion. That means that in (78), where there is no mismatch in aspectual class, the habitual interpretation cannot be accounted for. In the following section we will see that the proposal is faced with more problems when applied to Ancient Greek.

3.2.3.2 Applying de Swart (1998) to Ancient Greek

In the previous section I discussed the way in which de Swart (1998) accounts for the variation in interpretation of the *passé simple* and *imparfait*. These interpretations are ascribed to coercion triggered by tense operators. More precisely, her account consists of the following elements:

- (79)
- (i) the variation in interpretation of perfective and imperfective is the result of a coercion process;
 - (ii) this coercion is triggered by a mismatch in aspectual class;
 - (iii) this mismatch holds between the requirements of the tense operator and the input candidate, a predicate over eventualities;
 - (iv) the relevant aspectual class distinction for the perfective-imperfective distinction is quantised versus homogeneous.

We saw furthermore that there are striking similarities between the interpretations of imperfective and aoristic aspect in Ancient Greek and those of the *imparfait* and *passé simple* in French. In fact, apart from the generic and tragic interpretations of aoristic aspect, the range of interpretations is the same. These similarities strongly invite us to examine whether de Swart's account can be extended to Ancient Greek. I will show that this is not possible. Subsequently, I will explore several options that hold on to de Swart's idea that the perfective-imperfective distinction is sensitive to the quantised-homogeneous distinction (iv), but leave out the problematic parts of the analysis.²² It will, however, turn out that in this way one throws out the baby with the bath water.

Why can de Swart's analysis not be used to explain the Ancient Greek data? The reason for this lies in some crucial differences between the aspectual systems of French and Ancient Greek, in spite of the many similarities in interpretation. In French, the *imparfait* and *passé simple* can be analysed as past tense operators since they only occur in the past tense. In Ancient Greek the aorist-imperfective distinction is not restricted to the past tense. On the contrary, as we have seen it is found throughout the verb paradigm. Although in the indicative the distinction is largely restricted to the past tense,²³ outside

²²See also Bary (*to appear*) for an elaborate discussion of the possibility of applying de Swart's theory and modifications of it to Ancient Greek.

²³The situation of the future is somewhat unclear: Kühner and Gerth (1898:154,177) note that there are distinct forms for aoristic and imperfective aspect in the passive forms of the

the indicative, there are special forms for aoristic and imperfective aspect in every mood (optative, subjunctive, imperative) as well as for participles and infinitives (cf. Table 1.1 in section 1.1). What is more, in contrast to French, Ancient Greek has clearly distinct morphemes for tense and aspect. The morpheme for past tense is the augment $\epsilon\text{-}$ *e-* prefixed to the verb stem. This morpheme is obligatory in all and only past tenses. It occurs in combination with all grammatical aspects: with the past tense of the imperfective, with the past tense of the aoristic, and with the past tense of the perfect. It is absent in the non-past tenses of the indicative, in the non-indicative finite forms and in the non-finite forms. As for aspect, different verbs realise the imperfective-aoristic opposition morphologically in different ways (first (sigmatic) aorist versus second aorist), but whatever way it is realised, it is done uniformly throughout a verb's paradigm.

The fact that the imperfective-aoristic distinction in Ancient Greek is present throughout the verb paradigm makes it impossible to analyse aorist and imperfective as aspectually sensitive past tense operators. Such an analysis could only work for the past tense of the indicative, as in non-indicative forms no temporal contribution is made, while we do find distinct aoristic and imperfective forms. In other words, aorist and imperfective cannot be analysed as past tense operators, or, for that matter, any kind of tense operators.

So, the temporal part of de Swart's account, (iii), is problematic for Ancient Greek. What if we leave out this part but hold on to the other ingredients of de Swart's account: the various interpretations come about through a coercion process that solves a mismatch in aspectual class (i+ii), and imperfective and aorist are sensitive to the homogeneous-quantised distinction (iv).

This immediately gives rise to the question: what operator, if not tense, triggers the coercion that results in the various interpretations of the aorist and imperfective? Given that the aspectual opposition is present throughout the paradigm, it must be something that all verb forms have in common. There is, however, no such candidate. We would arrive at a variant of de Swart's proposal in which all verb forms have their own aspectually sensitive operators. For example, the subjunctive of the aorist would be analysed as an aspectually sensitive modal operator rather than as a combination of an aspectual and a modal operator. And likewise, the optative of the aorist would be analysed as a different modal operator with the same aspectual sensitivity rather than as the combination of the same aspectual operator with a different modal operator. Such a move would obscure the contribution of aspect.

An alternative would be to introduce aspectually sensitive vacuous operators, operators that make no contribution apart from imposing restrictions on the aspectual class of the input. It is clear that this wouldn't be a serious option for de Swart, as her objection to operators that are sometimes vacuous

future tense.

certainly extends to operators that are always vacuous. More importantly, it would be a strange move conceptually. The situation would be as follows. We have a clearly visible morpheme and a clear semantic contribution, but instead of relating the two, we would say that the semantics of the morpheme itself is vacuous and we would attribute the observed semantic contribution to a coercion operator. (Note that we cannot say that the coercion operator corresponds to the morpheme, since coercion operators are not morphologically expressed by definition.)

Actually, the fact that Ancient Greek has a distinct morpheme for aspect forms a serious drawback for all three options of the coercion approach discussed (de Swart's analysis and the two adapted versions): they all entail that aoristic and imperfective morphology are semantically vacuous (in the first two versions the semantic effect of choosing either one would be attributed entirely to aspectual restrictions from other sources, in the latter to the restrictions of the (vacuous) aspectual operator itself). Note that this problem holds not only for Ancient Greek, but for all languages in which the aspectual opposition is found throughout the paradigm, like, for instance, the Slavic languages.

In sum, not only the temporal part, but also the coercion element of de Swart's proposal turns out to be untenable for Ancient Greek. Recall furthermore that the latter part of the analysis already causes a problem for French: it wrongly predicts that the habitual interpretation of the imparfait occurs only with quantised predicates. That this prediction is also falsified by the Ancient Greek data can be seen from (80) (= (13)), (81) (= (15)), and (82):

- (80) ἐπειδὴ δὲ τὸ παιδίον ἐγένετο ἡμῖν, ἡ
epeidē de to paidion egeneto hēmin, hē
 when PRT the.NOM child.NOM exist.PST.AOR.3SG we.DAT the.NOM
 μήτηρ αὐτὸ ἐθῆλαζεν
mētēr auto ethēladzen
 mother.NOM it.ACC suckle.PST.IPFV.3SG
 “When the child was born to us its mother suckled it.” Lys. 1.9
- (81) Ἡ δὲ μάχη σφέων ἦν ἀπ’
Hē de machē spheōn ēn ap’
 the.NOM PRT battle.NOM they.GEN be.PST.IPFV.3SG from
 ἵππων, δόρατά τε ἐφόρεον μεγάλα καὶ
hippōn dorata te ephoreon megala kai
 horses.GEN spears.ACC PRT carry.PST.IPFV.3PL long.ACC and
 αὐτοὶ ἦσαν ἵππεύεσθαι ἀγαθοί
autoi ēsan hippeuesthai agathoi
 they.NOM be.PST.IPFV.3PL manage.horse.IPFV.INF good.NOM
 “They (= the Lydians) fought on horseback, carried long spears, and they were good at managing horses.” Hdt. 1.79.3.

- (82) ἐν δεξιᾷ δὲ καὶ ἐν ἀριστερᾷ αὐτοῦ τε καὶ τῶν
en dexiai de kai en aristerai autou te kai tōn
 in right.DAT PRT and in left.DAT him.GEN and the.GEN
 ἵππέων πελτασταῖς χώρα ἦν.
hippeōn peltastais chōra ēn
 horsemen.GEN targeteers.DAT place.NOM be.PST.IPFV.3SG
 “To the right and left of him (= Cyrus) and the cavalry was the (usual)
 place for the targeteers.” X. *Cyr.* 8.5.10

In (80) and (81) process predicates (*the mother suckle it, they carry long spears*) are interpreted habitually; in (82) we even have a habitual interpretation of a stative predicate. This shows that the habitual interpretation of imperfective aspect is not restricted to quantised predicates.

Why not drop the coercion part of de Swart’s analysis (i+ii) as well? What happens when we hold on to the idea that perfective and imperfective aspect are sensitive to the quantised-homogeneous distinction (iv), but pursue to treat them as aspectual operators rather than aspectually sensitive operators, an option briefly mentioned above in section 3.2.3.1?^{24,25}

The obvious drawback of this approach is that one loses the main advantage of de Swart’s analysis. Her use of coercion was an elegant way to handle variation in interpretation without assuming ambiguity. If perfective and imperfective aspect are instead analysed as aspectual operators, we must assume more than one operator corresponding to perfective aspect (for example, Krifka’s AOR for the interpretation of completion and a second operator for the ingressive interpretation), and similarly for imperfective aspect (for example, Krifka’s PROG for the processual interpretation, and a second one for the habitual interpretation). In this way we end up with an ambiguous semantics for perfective and imperfective aspect, despite the fact that the operators corresponding to the perfective have something in common (their outputs are quantised predicates), just like those corresponding to the imperfective (they deliver homogeneous predicates). Given my challenge to develop an ambiguity-free semantics for perfective and imperfective aspect, this option won’t do.

The aspectual operator option has a second disadvantage when compared to the coercion approach. Only the latter explains the restriction of the ingressive interpretation of the perfective to homogeneous (=atelic) predicates. Since it attributes the meaning effects we find with the perfective and imper-

²⁴This is the position I defend in Bary (2006).

²⁵A comparison to the English progressive may clarify the difference between an aspectual operator and a coercion approach: on an aspectual operator approach, the shifts we find with the perfective and imperfective are comparable with the shift that is *inherently* associated with the progressive (from non-stative to stative predicates), whereas on a coercion approach these shifts are comparable with the *reinterpretation of the input* (from stative to non-stative predicates) that occurs when the predicate-argument structure is stative.

fective to coercion, we expect to find ‘special’ interpretations only in case of an aspectual mismatch. That is, for the perfective, we expect it only when its input is homogeneous. This appealing feature is lost on an account in terms of aspectual operators. If, for example, the input is already a set of quantised eventualities but not of starting eventualities, the aspectual operator option wrongly predicts that the function corresponding to the ingressive interpretation of the perfective can map it onto a set of starting eventualities to yield an ingressive interpretation. So, whereas the aspectual operator option rightly predicts that if its input is homogeneous there *must* be a special interpretation, it wrongly predicts that if the input is quantised there *can* be a special interpretation.

Note the asymmetry between perfective and imperfective aspect in this respect. The ingressive interpretation of perfective aspect is restricted to homogeneous predicates. This restriction follows from a coercion approach, but needs an independent explanation on an aspectual operator approach. On the other hand, we have seen that the habitual and processual interpretations of imperfective aspect are not restricted to quantised eventualities. This is a problem for a coercion approach, but not for an aspectual operator approach. It is a desideratum of any analysis of perfective and imperfective aspect that it can handle this asymmetry.

All variants of de Swart’s (1998) account discussed in this section have in common that the perfective and imperfective induce a change in aspectual class (either inherently or by coercion). They share this property with Krifka’s account (section 3.2.2), and in a way also with the account of Kamp et al. (section 3.2.1). Admittedly, although the crucial difference between the *passé simple* and *imparfait* is analysed as a difference in aspectual class, the latter account does not pay much attention to the composition of aspect. Instead it uses this distinction in aspectual class to account for a difference in narrative progression. De Swart, on the other hand, exploits it to account for another phenomenon concerning the perfective and imperfective: the variation in interpretation. The fact that in all three accounts the difference between perfective and imperfective aspect comes down to a difference in aspectual class makes them representatives of what we may call *one-component theories* of aspect (following Smith 1997 who calls the theory she proposes a two-component theory). In a one-component theory the distinction between bounded (telic) and unbounded (atelic) and the distinction between perfective and imperfective are semantically the same; what differs is the level at which these notions apply: perfective and imperfective are grammatical aspects (or, as de Swart would say, aspectually sensitive tense operators) whereas boundedness (telicity) is a notion at the level of the predicate argument structure, the predicate with its argument slots filled. Grammatical aspect has scope over the predicate argument structure and may change the aspectual class of the predicate.

My aim in this thesis is to account for the variation in interpretation of aoristic (perfective) and imperfective aspect by means of an ambiguity-free semantics for the two. In this section I have shown that a one-component theory cannot help us out in this respect. In such a theory the difference between perfective and imperfective aspect corresponds to a difference in aspectual class. As a consequence, the semantics of perfective and imperfective aspect end up vacuous if the shift in aspectual class is attributed to coercion, that is to aspectual restrictions from other sources. Conversely, if it's not attributed to coercion, but to perfective and imperfective aspect themselves, we must assume an ambiguous semantics of the two in order to deal with the variation in interpretation. This does not only hold for Ancient Greek, but for all languages in which the perfective-imperfective opposition is found throughout the verbal paradigm.

The extensive discussion of de Swart's proposal in this section has taught us the following things for our own analysis: (i) coercion can be useful for dealing with the variation in interpretation found with aoristic and imperfective aspect; (ii) in order to implement it, we must assign an element as a trigger of this coercion; (iii) we want aoristic and imperfective aspect to make semantic contributions of their own; (iv) we want to be able to handle the asymmetry in distribution of 'special' interpretations between perfective and imperfective aspect. As should be clear by now, we cannot combine these ingredients in a one-component theory. In section 3.2.4 I will therefore investigate a two-component theory, a theory in which the contribution of grammatical aspect is not primarily a shift in aspectual class.

3.2.4 Klein, von Stechow: topic time

The theories of Kamp, Krifka, and de Swart discussed in sections 3.2.1, 3.2.2, and 3.2.3, respectively, all represent one-component theories of aspect. In such theories the primary contribution of grammatical aspect is a shift in aspectual class. As such they are different from the theories to be discussed in this section, those of Klein and von Stechow et al. In these two-component theories the function of grammatical aspect is to locate an eventuality temporally with respect to the *topic time* (Klein 1994) or *reference time* (Gerö and von Stechow 2003, Paslawska and von Stechow 2003). Topic time and reference time correspond more or less to what Kamp et al. call *location time*. It is the time to which the speaker refers with his utterance, the time about which he speaks. More often than not this particular time is recoverable from the context.

Klein (1994) claims that imperfective aspect indicates that the topic time is properly included in the runtime of the eventuality, called the situation time. Perfective aspect, on the other hand, indicates that the time of the eventuality

is included in the topic time.²⁶ I will use t_{TT} and $\tau(e)$ rather than Klein's TT and TSit, for the topic time and the eventuality time, respectively, to have a uniform representation of the various accounts discussed in this thesis.²⁷ τ still is the function that maps eventualities onto their runtime.

- (83) imperfective: $\tau(e) \supset t_{TT}$
 perfective: $\tau(e) \subseteq t_{TT}$

This may remind the reader of the account of Kamp et al. discussed in section 3.2.1. But apart from a small difference with respect to the temporal relations (Kamp and Reyle 1993 and Kamp, van Genabith, and Reyle 2005 have $\tau(s) \circ t$ and $\tau(s) \supseteq t$ for states (imperfective aspect), respectively), there is also a more important difference between the two accounts (but see p. 65): in one-component theories, such as the ones of Kamp et al. and de Swart, the link between grammatical aspect and the temporal relation between the topic time (location time) and the runtime of the eventuality is only indirect: grammatical aspect primarily changes aspectual class, aspectual class determines the relation between the topic time and the time of the eventuality, and in this way grammatical aspect indirectly influences the relation between the topic time and the time of the eventuality. In Klein's two-component account, on the other hand, locating the eventuality with respect to the topic time is the primary contribution of grammatical aspect.

I will now briefly discuss Klein's (1994) view on tense. Like Kamp et al., he claims that it establishes a temporal relation between the topic time and the time of utterance (TU, here n). Present tense indicates that the topic time includes the utterance time, past tense, that it (completely) precedes it, and future, that it (completely) follows it:

- (84) present: $t_{TT} \supseteq n$
 past: $t_{TT} \prec n$
 future: $t_{TT} \succ n$

Klein puts some effort in arguing that tense concerns the relation between topic time and utterance time, rather than between eventuality time and utterance time.²⁸ For this he uses the following example:

- (85) a. What did you notice when you looked into the room?
 b. There was a book on the table. It was in Russian.

²⁶This is based on Klein (1994:118). On pp. 99-108 he assigns perfective aspect a different temporal relation: the topic time overlaps with, but is not (properly or improperly) included in the eventuality time ($t_{TT} \circ \tau(e) \wedge t_{TT} \not\subseteq \tau(e)$).

²⁷Since Klein does not formalise his account, I use italics (the style used for modeltheoretic entities) rather than the **typewriter** font (used for expressions in the formal language) in the representations of the temporal relations he assigns to grammatical aspect and tense.

²⁸What follows is the motivation I referred to in footnote 9.

Suppose that (85a) is a question of a judge in a court room and (85b) the answer of a witness. The judge's question fixes the topic time, the time about which the witness is asked to speak. If the book was in Russian at some time in the past, it is still in Russian at the time of utterance. This means that if tense would concern the relation between the time of the eventuality and the time of utterance, we would expect to have a present tense in the second part of the answer (*it is in Russian*), since the time of the eventuality of the book being in Russian overlaps with the utterance time. By contrast, the topic time *is* completely in the past of the utterance time. The fact that in the second sentence of (85b) a past tense is used, is therefore taken as an argument that tense concerns the relation between utterance time and topic time. As a consequence, the relation between eventuality time and utterance time is only indirect, mediated via the topic time: Aspect relates eventuality time to topic time and tense relates topic time to utterance time.

Klein's proposal correctly predicts that sentences with imperfective and perfective aspect behave differently in this respect. Whereas in (85) (with imperfective aspect according to Klein) it is possible that the eventuality of the book being in Russian overlaps with the utterance time, in (86) (with perfective aspect according to Klein), it is not.

(86) Mary wrote the letter.

Klein's theory explains this in the following way: if t_{TT} precedes n and $\tau(e)$ includes t_{TT} (imperfective aspect), it is possible that $\tau(e)$ includes n as well, but if $\tau(e)$ is included in t_{TT} (perfective aspect) this is not possible. This is represented graphically in the upper part of Figure 3.6.

It should be noted that this argument is not compulsory if one accepts non-maximal eventualities (with respect to a predicate) as eventualities (in the extension of the predicate) in the way Krifka does. If the distinction between perfective and imperfective aspect is a distinction between quantised and homogeneous predicates (in line with Krifka 1989b and de Swart 1998), we get the correct results as well, without mediation of a topic time. This is illustrated in the lower part of Figure 3.6. Given the definition of homogeneous reference, the existence of an eventuality e of which a homogeneous predicate (imperfective aspect) holds does not preclude the existence of a larger eventuality e' of which the predicate holds that includes the time of utterance. This, however, is impossible with quantised predicates (perfective aspect).

Gerö and von Stechow (2003) and Paslawska and von Stechow (2003) (henceforth von Stechow et al.) adopt Klein's semantics for tense and aspect and formalise it in a typed lambda-calculus. In their accounts aspect still concerns the relation between topic time and eventuality time, but an aspect morpheme does not correspond one-to-one to such a temporal relation. More specifically, they claim the following temporal relations to be of importance

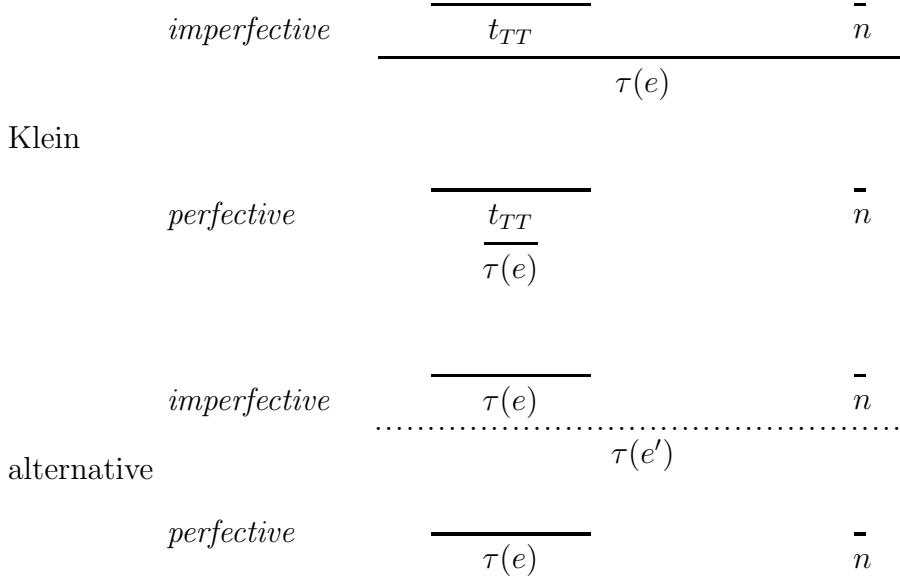


Figure 3.6: Two accounts for the different behaviour of perfective and imperfective aspect with respect to n .

for aspect cross-linguistically:²⁹

$$\begin{aligned}
 (87) \quad \text{INCLUDED} &= \lambda P \lambda t \exists e [\tau(e) \supseteq t \wedge P(e)] \\
 \text{INCLUDES} &= \lambda P \lambda t \exists e [\tau(e) \subseteq t \wedge P(e)] \\
 \text{POST} &= \lambda P \lambda t \exists e [\tau(e) \prec t \wedge P(e)]
 \end{aligned}$$

As before, P is a variable for predicates of eventualities. **INCLUDED**, **INCLUDES**, and **POST** take a predicate of eventualities and return a predicate of times. **INCLUDES**, for example, maps the set of eventualities in the extension of P onto the set of times that include the runtime of an eventuality of which P holds. Note that here, in contrast to de Swart's account, aspect rather than tense introduces the existential quantifier that binds the eventuality variable. The topic time is rendered as a variable t that ends up free in the semantic composition. It gets its value from the assignment function which is assumed to be fixed by the context. This is one of the static ways of rendering intersentential anaphora (see footnote 1). Note that whereas in account of Kamp et al. the anaphoric feature of tense is captured in terms of an anaphoric reference point, in von Stechow et al. it's the topic time (comparable to the location time of

²⁹Paslawska and von Stechow (2003) adopt the same convention as I do in the present work by using e as a variable for eventualities and t for times. In Gerö and von Stechow (2003), on the other hand, e is a variable for both events and times (no distinction is made between states and times) and τ maps events and times to times (if e is a time, τ is the identity mapping).

Kamp et al.) that is treated as an anaphor. I will return to this difference in chapter 6 on discourse.

Paslawska and von Stechow (2003) claim that the Russian perfective aspect is ambiguous between **INCLUDES** and **POST**. The 2003 paper by Gerö and von Stechow is mainly devoted to the perfect in Ancient Greek, but also discusses Greek aoristic and imperfective aspect. It claims that aoristic aspect in this language corresponds to **INCLUDES** and imperfective to **INCLUDED**.

Thus far the account of von Stechow et al. basically resembles Klein's with some lambda-glue for the semantic composition. Things get fuzzy, however, when it comes to aspectual class. After stating that imperfective aspect in Ancient Greek corresponds to **INCLUDED**, Gerö and von Stechow (2003:263) continue as follows:

As a consequence, the embedded Vendlerian Aktionsart must have the subinterval property. If the VP expresses a state or an activity, this raises no problems. But if it is an accomplishment or achievement, we must stativize it by means of semantic operations such as the Progressive, Habituality, Iterativity, or Modality (e.g., Possibility).

In other words, they claim that it follows from the semantics of imperfective aspect, that is from **INCLUDED**, that imperfective aspect can only combine with unbounded predicates (= predicates that have the 'subinterval property').³⁰ This argument is not valid, however. At first sight at least, there is no reason why the runtime of an eventuality that makes a bounded predicate true cannot include the topic time. The remainder of the text quoted leads to a second problem. Gerö and von Stechow speak of Progressive, Habituality, Iterativity and Modality as if these are coercion operators, i.e. operators that solve a mismatch. If this were so, we would expect these operators to come into existence only in case of an aspectual clash, that is, with bounded predicates. Crucially, we have seen in section 3.2.3 that this is not the case: we find the habitual interpretation with bounded as well as unbounded predicates. (Recall that this was a problem for de Swart's account, as well.)

In a similar way Gerö and von Stechow claim that perfective aspect puts restrictions on the aspectual class of the predicate it combines with. They claim that it follows from the semantics of perfective aspect, that is from **INCLUDES**, that it combines only with bounded predicates. Again, it is not immediately clear why this should be the case. Why can't the runtime of an eventuality that makes an unbounded predicate true be included in the topic time? The proposed restriction requires more motivation. Nevertheless, in contrast to the restriction of imperfective aspect, which made the wrong predictions, this

³⁰In the Vendlerian classification state and activity predicates are unbounded and accomplishment and achievement predicates are bounded.

second restriction will turn out to be of use in accounting for the Greek data (chapter 4).

Paslawska and von Stechow (2003), who focus on Russian, take a different stance on the aspectual class restrictions imposed by grammatical aspects. They differ from Gerö and von Stechow in two respects: (i) only perfective aspect exhibits a selectional restriction for a certain aspectual class, and (ii), this restriction is not claimed to follow from **INCLUDES**, but is presented as a second independent contribution of Russian perfective morphology. The first point is an improvement with respect to Gerö and von Stechow, but the second point raises the question why two independent semantic contributions would be combined in a single morpheme.

Note that de Swart's (1998) and von Stechow et al.'s accounts of grammatical aspect consist of exactly the same elements: a temporal relation between the eventuality time and the topic time/location time, and an aspectual class restriction. What differs is which element has primacy. In de Swart's account it's the aspectual class from which the temporal relation is stipulated to follow (following Kamp et al.). In Gerö and von Stechow (2003) it's the other way around: the aspectual class restrictions are claimed to follow from the temporal relations. And in Paslawska and von Stechow (2003), both contributions are independent for perfective aspect, whereas imperfective aspect only makes a temporal contribution.

In both de Swart's and Gerö and von Stechow's account it is unclear why a certain aspectual class and a certain temporal relation between eventuality time and topic time would go hand in hand. In the latter account it is clear that aspectual classes are needed in addition to temporal relations to account for the data (I will explain this at greater length in sections 4.4 and 4.9), but from a theoretical point of view it is not clear why temporal relations would bring along aspectual class restrictions. In de Swart's account it is not even clear why the distinction in aspectual class alone is not enough to deal with the data (see section 3.2.2 where I discussed this point for the accounts of Kamp et al.).

To conclude this section, let's see what von Stechow et al. have brought us. An improvement with respect to de Swart's account is that perfective and imperfective morphology are not treated as semantically vacuous: perfective aspect corresponds to **INCLUDES**, imperfective to **INCLUDED**. It is less clear how their account can deal with the variation in interpretation for perfective and imperfective aspect. The habitual interpretation of imperfective aspect seems to be ascribed to a coercion process that solves a mismatch in aspectual class, but we have seen that this makes the wrong predictions. Gerö and von Stechow don't discuss the various interpretations of aoristic aspect and it is unclear how they could handle, for example, the ingressive interpretation. Finally, it is unclear why the temporal contribution of aspect would impose

restrictions on the aspectual class of the predicate it combines with.

3.2.5 Taking stock

In the previous sections I have discussed five classes of theories on grammatical aspect. I started in section 3.2.1 with the DRT account of Kamp et al. (Kamp and Rohrer 1983, Kamp and Reyle 1993, Kamp, van Genabith, and Reyle 2005), in which aspectual phenomena are considered only insofar as they have an effect on temporal reference. The distinction between what they call states and events was used to account for the different temporal behaviour of the imparfait and passé simple in discourse. In section 3.2.2, I showed that Krifka's (1989b) account can deal with a whole range of data relating to grammatical aspect using the distinction between homogeneous and quantised reference. In section 3.2.3 I discussed de Swart's (1998) account and various adaptations of it. They exploit the distinction between homogeneous and quantised reference to account for the variation in interpretation of the passé simple and imparfait. Section 3.2.4 was devoted to the theories of Klein (1994) and von Stechow et al. (Gerö and von Stechow 2003, Paslawska and von Stechow 2003). In these theories grammatical aspect concerns the temporal relation between the time of the eventuality and the topic time. Von Stechow et al. complement this contribution of aspect with aspectual class restrictions. In this respect, this account can be seen as a combination of Klein (1994) and de Swart (1998).

The first three theories are one-component theories, as grammatical aspect primarily concerns aspectual class. They differ in the phenomena for which they offer an account in terms of aspectual classes. The theories of Klein (1994) and von Stechow et al. are two-component: grammatical aspect does not (primarily) change aspectual class, but locates the eventuality temporally with respect to the topic time.

This said, it is time to weaken the distinction between the two approaches somewhat. First, whereas Krifka uses only aspectual class to deal with grammatical aspect and Klein only temporal relations, the other three accounts discussed, the ones of Kamp, de Swart and von Stechow et al., all contain both a temporal relation and an aspectual class element. The latter three differ only in which element has primacy. Moreover, we can wonder whether the theory of Kamp et al. is truly one-component in spirit. In de Swart's account aspectual classes play a crucial role as a mismatch therein triggers reinterpretation. In Kamp et al., however, with its focus on temporal reference, the distinction between events and states is of less importance, and one may even ask whether it is crucial. When the distinction between states and events in this account reduces to the different temporal relations they come with, it comes close to Klein's proposal.

Although it may be useful to bring some order in the vast literature on

aspect, a classification of theories of aspect is not the aim of this thesis. Rather the aim is to answer the challenge I set in section 2.5 to account for the various interpretations of imperfective and aoristic aspect in Ancient Greek without resorting to ambiguity. The discussion in the first part of this chapter has helped us on our way to meet this challenge. It has made it clear what are the useful and problematic parts of each theory when applied to the Ancient Greek aspectual system. Let me recapitulate the crucial points. The discussion of the DRT of Kamp et al. approach has made it clear that if we want to deal with the effects of aspect in discourse, the natural choice is dynamic semantics. De Swart's approach in terms of coercion seems to be useful for dealing with the variation in interpretation, but if we use it the way she does we end up with a vacuous semantics for aoristic and imperfective morphology in Ancient Greek. A good point of the accounts by Klein and von Stechow et al. is that grammatical aspect is not semantically vacuous. The downside is that it is not clear how their accounts can handle interpretative variation. Moreover, if we use the idea of coercion we must specify what kind of mismatch is solved by the coercion process. We have seen in section 3.2.3 that for imperfective aspect this cannot be a mismatch in aspectual class. For aoristic aspect it may be a mismatch in aspectual class, but then we must answer the question, left unaddressed by von Stechow et al., how this aspectual class restriction follows from the semantics of aoristic aspect.

Now, it's the challenge to find an account that combines the advantages of each of these theories but leaves out the problematic parts. In chapter 4 I will offer such an account. But I will first go deeper into the subject of coercion, as this concept will play a crucial role in my analysis.

3.3 Aspectual coercion

The phenomenon of coercion has already been discussed briefly in section 3.2 in relation to de Swart (1998). Since it will play a prominent role in my analysis of the interpretations of aoristic and imperfective aspect, I will now take a closer look at this phenomenon. Again, the discussion is not meant as a comprehensive overview of the literature on this topic. In fact, I discuss only two approaches: Moens and Steedman's, because they were the first to discuss aspectual coercion as a topic in its own right, and Egg's, because his Duration Principle features prominently in the analysis I propose in chapter 4.

Since any theory on aspectual coercion comes with an aspectual classification, I start with a brief overview of the aspectual classifications used in the analyses discussed, in order to facilitate the understanding of this discussion. The actual classification I use myself is not introduced until section 4.2.

3.3.1 Aspectual classifications

Aspectual classifications are based on a number of tests that check the compatibility of a predicate with a certain linguistic environment in a literal interpretation (that is, without reinterpretation). The results of these tests are interpreted as reflecting properties of the predicates tested and these properties together constitute a classification. In the following I will first discuss the classifications and then the tests on which they are based.

The properties relevant in the classifications used in the coercion analyses discussed here are *stativity*, *boundedness*, *telicity*, and *punctuality*. Until now I have used *telicity* and *boundedness* interchangeably, but from now on I will use Egg's (2005) terminology, in which the two are distinguished. I will return to this point at the end of this section.

Without providing definitions, the following are some preliminary characterisations of what these notions refer to: Stative predicates can be true of a moment; bounded predicates introduce inherent boundaries for eventualities; telic predicates are predicates with which a poststate is associated; and finally, punctual predicates refer to eventualities with extremely short or no duration or without inner structure.

Table 3.2 shows which of these four properties play a role in the coercion accounts discussed. A + sign indicates that the property is relevant in the classification at hand.

	stativity	boundedness	telicity	punctuality
Moens and Steedman	+		+	+
De Swart	+	+		
Egg	+	+	+	

Table 3.2: Aspectual properties according to different authors

The combination of these properties results in the classifications displayed in Table 3.3.³¹ The rightmost column gives an example of each of the six classes of predicates that result if one would accept all four properties as relevant for aspectuality.

Let's now turn to the tests. I will only discuss some of the tests proposed in the literature (see Dowty 1979 for an extensive discussion). Keep in mind that whether a sentence is acceptable on a literal interpretation or is in need of reinterpretation (indicated by the # sign) is at least partially theory dependent.

Stative predicates (like *John be in the pub*) and punctual predicates (like *John cough*) have in common that they combine readily with time point adver-

³¹I intend to leave open in this table whether stative predicates are atelic (as in Egg 2005) or the notion of telicity is simply not applicable to stative predicates (as in Moens and Steedman 1988).

				Moens & Steedman	de Swart	Egg	
stative				stative	stative	stative	<i>John be in the pub</i>
non-stative	unbounded			process	process	process	<i>John run</i>
	bounded	atelic	non-punctual		event	intergressive	<i>John play the sonata</i>
			punctual	point			<i>John cough</i>
		telic	non-punctual	culminated process		change	<i>John go to the pub</i>
			punctual	culmination			<i>John arrive</i>

Table 3.3: Aspectual classifications

bials ((88a) and (88b)), but don't go with the progressive on a literal reading ((89a) and (89b)). Other predicates, for example process predicates (like *John run*), exhibit the opposite behaviour ((88c) versus (89c)).

- (88) a. John was in the pub at ten.
 b. John coughed at ten.
 c. #John ran at ten.
- (89) a. *John was being in the pub.
 b. #John was coughing.
 c. John was running.

Example (88c) makes no sense on a literal reading, only on an ingressive reinterpretation, that is the interpretation that John *started* running at ten. Likewise, (89b) makes sense only on an iterative reinterpretation. (89a) cannot be reinterpreted and is simply unacceptable.

Stative and punctual predicates behave differently on the compatibility with the simple present tense, as (90) illustrates.

- (90) a. John is in the pub.
 b. #John coughs.

Example (90a) is fine on a literal interpretation, but (90b), and non-stative predicates in general, must undergo a habitual reinterpretation.

For- and *in*-adverbials distinguish between bounded and unbounded predicates. Bounded predicates are fine with *in*-adverbials on a literal reading, but not with *for*-adverbials. For unbounded predicates, the reverse situation holds.

- (91) a. John ran for an hour.
 b. #John played the sonata for an hour.
- (92) a. #John ran in one hour.
 b. John played the sonata in an hour.

(91b) must undergo reinterpretation since the bounded predicate *John play the sonata* combines with a *for*-adverbial. There are two options: a progressive or an iterative reinterpretation. I will come back to this example in the next section. (92a), where the unbounded *John run* combines with an *in*-adverbial, makes sense only if world knowledge supports the reinterpretation of the unbounded predicate as a bounded predicate (*run a specific distance*), for example, if we know that John runs a particular distance every day.

The perfect is sensitive to telicity. Only telic predicates combine happily with the perfect. (93a) is in need of reinterpretation, whereas (93b) is fine:³²

³²Moens and Steedman would claim that (93b) involves reinterpretation, too, since in

- (93) a. #John has played the sonata.
b. John has gone to the pub.

A final remark on aspectual classifications. In most classifications the class of telic predicates (predicates with which a poststate is associated) and the class of bounded predicates (predicates that introduce inherent boundaries for eventualities) are considered to be co-extensive. Egg (1994, 1995) argues that in fact they are not: the whole class of bounded predicates is compatible with *for*-adverbials, but only some of them (the telic ones) combine readily with the perfect. It is important to note that Egg uses the word *boundedness* for what Krifka calls *telicity*. As I said, I will follow Egg's terminology, and from now on use *boundedness* even in the context of Krifka's account.

3.3.2 Moens and Steedman's Aspectual Network

Moens and Steedman (Moens 1987, Moens and Steedman 1986, 1988) propose an aspectual classification which they consider to be flexible rather than fixed, allowing transitions between aspectual classes. The classes and the transitions constitute an *Aspectual Network*, cf. Figure 3.7, where the permissible shifts are indicated with arcs.

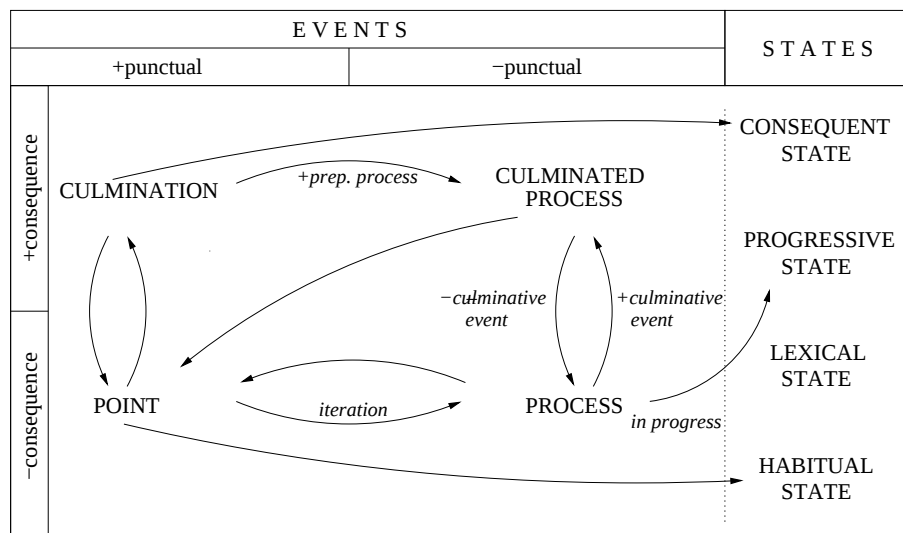


Figure 3.7: Moens and Steedman's Aspectual Network

Some of these transitions are the result of input restrictions of temporal adverbials or grammatical aspects. Moens and Steedman were the first to use

their analysis the perfect is restricted to culminated process predicates, that is *punctual* telic predicates.

the term *coercion* for this phenomenon.

Moens and Steedman relate the aspectual classes and the shifts between them to a complex event structure which they call a *nucleus*, consisting of a preparatory process, a culmination point, and a consequent state.

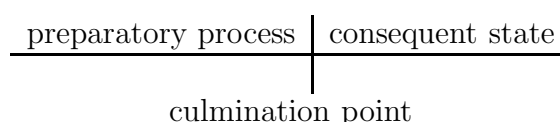


Figure 3.8: Nucleus (Moens and Steedman 1988:13)

Predicates of different aspectual classes are interpreted as describing eventualities that consist of different parts of nuclei: culminated process predicates refer to the whole nucleus, process predicates to the preparatory process, culmination predicates to the combination of culmination point and consequent state, and points to the culmination point only (Moens 1987:65). Aspectual transitions are then automatically related to the nucleus as well: they often consist of adding or removing part of the nucleus structure.

Let's consider some examples. According to Moens and Steedman's analysis, the progressive requires process predicates. Thus (94a) is fine, but (94b) and (94c) involve coercion.

- (94) a. Harry was running.
 b. #Harry was hiccupping.
 c. #Harry was reaching the top.

Harry hiccup is a point predicate. As we can see in Figure 3.7 a point predicate can be reinterpreted as a process predicate by giving it an iterative interpretation. Only then the selectional restrictions of the progressive operator are fulfilled. The resulting interpretation is that an iteration of hiccupping eventualities by John was in progress.

Harry reach the top is a culmination predicate. We can read off the figure that there is no direct path through the network from culmination predicates to process predicates. Instead there are two paths that both consist of two steps. The most plausible path is the one in which the culmination predicate is first turned into a culminated process by adding a preparatory process, and then the culminated process predicate is turned into a process predicate by 'stripping off' the culmination point. Thus, (94c) describes the preparatory process of John reaching the top as going on. A reinterpretation path via the point class is in principle possible too, although it is not likely as it would involve an iterative eventuality of reaching the top.

This last example illustrates the prominent role of world knowledge in reinterpretation phenomena. A mismatch in aspectual class indicates that

reinterpretation is involved, but how the mismatch is resolved, i.e. which path through the network is chosen, is determined by world knowledge. In the following section I zoom in on one instance of world knowledge influencing reinterpretation phenomena, viz. knowledge concerning the typical duration of eventualities.

3.3.3 Egg's Duration Principle

Egg devotes the last chapter of his 2005 book to the role of knowledge concerning the typical duration of eventualities in reinterpretation phenomena. His Duration Principle states that information on the duration of an eventuality that is introduced by various linguistic expressions must be consistent. This principle has a twofold function in reinterpretation phenomena: (i) it guides the choice for a specific reinterpretation operator from the set of feasible reinterpretations in the case of coercion triggered by other sources, and (ii) it triggers its own reinterpretations.

Let's first consider an example of the first function (from Egg 2005:204):

- (95) a. Max played the 'Flying Dutchman' on his stereo for 5 months.
b. Max played the 'Flying Dutchman' on his stereo for 10 minutes.

According to Egg's analysis, *for*-adverbials require unbounded predicates, but *Max play the 'Flying Dutchman' on his stereo* is a bounded predicate. This mismatch in aspectual class has to be solved by an intervening coercion operator. From an aspectual point of view, there are at least two coercion operators that could solve the mismatch: a progressive and an iterative operator. Egg (2005:94-97) defines these operators as follows:

$$(96) \quad \text{PROGR} = \lambda P \lambda e \exists e' [P(e') \wedge \tau(e) \sqsubset \tau(e')]$$

$$(97) \quad \text{ITER} = \lambda P \lambda e \exists E [\cup E = e \wedge \neg P(e) \wedge \forall e' [e' \in E \rightarrow P(e')]]$$

Both operators are functions from predicates of eventualities onto predicates of eventualities. **PROGR** resembles Krifka's **PROG** operator, (66). **ITER**(**P**) is true of an eventuality *e* iff there is a set of eventualities *E* whose convex closure (this is expressed by ' $\cup$ ') is *e* and **P** does not hold for *e* but does hold for all eventualities in *E*.³³ Crucial for (95) is the effect of the two operators on the duration associated with the predicate. There are eventualities in the extension of **PROGR**(**P**) that are shorter than the shortest eventuality in the extension of **P**, but no eventualities that are longer than the longest eventuality

³³The convex closure of a set of eventualities is the smallest convex eventuality such that all eventualities in the set are part of this eventuality. However, as in Krifka's account (see section 3.2.2), the notion of convexity for eventualities is not defined and it is hard to see what it should mean.

in the extension of *P*. We say that the progressive operator shortens the typical duration associated with the predicate. Conversely, in the extension of *ITER(P)* we find eventualities that are longer than the longest in the extension of *P*, but no eventualities that are shorter than the shortest. The iterative operator lengthens the typical duration associated with the predicate.

Both operators are compatible with bounded predicates and return unbounded predicates. So from an aspectual point of view both qualify as intervening operators. However, both (95a) and (95b) have only one interpretation. For (95a) only an iterative reinterpretation is available, for (95b) only a progressive. This is accounted for in the following way. As we have seen, both operators affect the duration associated with the predicate that undergoes coercion. The typical duration associated with the predicate *Max play the 'Flying Dutchman' on his stereo* is some hours (this is how long Wagner operas take). The typical duration associated with the predicate that results if the iterative operator is applied to the predicate *Max play the 'Flying Dutchman' on his stereo* is longer. The progressive operator has the opposite effect. The Duration Principle states that the information on the duration of an eventuality provided by various sources must be compatible. For (95), this means that typical duration associated with the predicate must be compatible with the information provided by the *for*-adverbials. For (95a), the information is compatible on an iterative reinterpretation, for (95b), on a progressive interpretation. In this way the Duration Principle constrains the range of feasible reinterpretations.

As I mentioned, the Duration Principle also triggers its own reinterpretations. Egg (2005:190) illustrates this with (98):

(98) #Max played soccer on the beach for three months.

(98) has an iterative interpretation. This reinterpretation is not motivated by an aspectual mismatch: *for*-adverbials select for unbounded predicates and *Max play soccer on the beach* is of this kind. Egg claims that the reinterpretation is instead triggered by an attempt to avoid a violation of the Duration Principle. The extension of the predicate *Max play soccer on the beach* does not contain an eventuality with a duration of three months. This clash between the information on duration provided by the predicate and the *for*-adverbial can be solved by the intervention of an iterative operator, since, as in the previous example, this operator lengthens the typical duration associated with the predicate. Thus the Duration Principle is an additional licensing condition for reinterpretation.

In this section I have discussed the role of the Duration Principle in reinterpretation phenomena. In sections 4.5 and 4.7 we will see that this principle plays a role in the Ancient Greek aspectual system as well. I will claim that it is responsible for the choice between the ingressive and complexive interpreta-

tion of aoristic aspect and for the emergence of the habitual interpretation of imperfective aspect in this language.

The discussion of formal theories on aspect in this chapter has provided us with the equipment for tackling the Ancient Greek aspectual system with which I am going to start in the next chapter.

Chapter 4

An analysis of aoristic and imperfective aspect

4.1 Introduction

In chapter 2 we have seen that both aoristic and imperfective aspect in Ancient Greek are associated with several interpretations. In the previous chapter I have discussed the relevant formal-semantic theories of perfective (=aoristic) and imperfective aspect, some of which dealt explicitly with such variation in interpretation. I have shown that in spite of their merits each has its specific problems. In this chapter I will present an account of the interpretations of aoristic and imperfective aspect in Ancient Greek that combines the good elements from the theories discussed above but avoids the problems they encountered. A central place is taken up by Egg's Duration Principle, discussed in section 3.3.3. The proposed account deals with the variation in interpretation without postulating ambiguity for aoristic and imperfective aspect and in this way answers the challenge I set in section 2.5.

The discussion of the discourse effect of aspect in section 3.2.1 has shown us that the natural choice to deal with this feature of aspect is a dynamic framework. An explicit treatment of the discourse effect of aspect in Ancient Greek is not provided until chapter 6 and in the current chapter we could in principle have used a static framework. Nevertheless, I have chosen to formulate my account in DRT already in this chapter. In this way we will have a uniform representation of the proposal throughout the thesis. Furthermore, I adopt Montague's strategy to introduce lambda-abstraction and application into the language which enables me to explicate how the meanings of the parts of an expression combine to the meaning of the expression as a whole. The resulting fusion of two important frameworks for natural language semantics, DRT and Montague Semantics, makes it possible to build up meanings systematically from the level of morphemes to the level of texts. The syntax and semantics

of this language is given in Appendix A.

The chapter is organised as follows: I first present the aspectual classification I assume (section 4.2). Then, in section 4.3, I show how the semantics von Stechow et al. propose for perfective and imperfective aspect directly yields the completive interpretation of the former and the processual interpretation of the latter. In section 4.4 I demonstrate why aoristic aspect requires bounded predicates, the question left unaddressed in the account of von Stechow et al. In section 4.5 we see that Egg's Duration Principle accounts for the choice between the ingressive and complexive interpretation of aoristic aspect and in section 4.7 that the same principle is also responsible for the emergence of the habitual interpretation of imperfective aspect. Section 4.6 is an excursion into the consequences of restricting aspectual classes to the level of predicates. In section 4.8 I demonstrate that the proposed semantics for imperfective aspect accounts for the difference between progressive and imperfective aspect with respect to their ability to combine with stative predicates. In section 4.9 I show how an intensionalised version of the semantics accounts for the conative interpretation of imperfective aspect. Section 4.10 summarises my account.

4.2 Aspectual classes

In this section I present the aspectual classification assumed in my analysis. Following the theories discussed in the previous chapter, I adopt a Davidsonian event semantics, that is, I assume that verbs are represented as predicates with an additional argument slot for an eventuality variable. Furthermore, I adopt the idea that grammatical aspects work on predicates of eventualities (as do de Swart, Krifka, and von Stechow et al.). As I am interested in the interaction between grammatical aspect and aspectual class, my aspectual classification is restricted to predicates of eventualities. I do not go beyond that level. My classification is based on two properties of predicates of eventualities: boundedness and stativity.

For the property of boundedness, I adopt Krifka's definition of quanticity (cf. (59)):

- (99) A property P is bounded iff for all e, e' if $P(e)$ and $e' \sqsubset e$ then $\neg P(e')$

This definition states that the extension of a bounded predicate never contains an eventuality as well as one of its proper parts. This makes, for example, *John write a letter* a bounded predicate, in contrast to, for example, *John be in the pub* or *John waltz*. Parts of eventualities in the extensions of the latter predicates may be in their extensions as well, and therefore they are unbounded.

The last two predicates are distinguished by the property of stativity. If a

stative predicate like *John be in the pub* is true of an eventuality e , it is true of *all* eventualities that are part of e . Non-stative predicates like *John waltz* do not have this property, since an eventuality has to consist of at least three steps before it counts as a *John waltz* eventuality. They are what Egg (2005) calls *interval-based*. I define stativity as follows:

- (100) A property P is stative iff (i) for all e, e' if $P(e)$ and $e' \sqsubset e$ then $P(e')$, and (ii) it is not the case that for all e such that $P(e)$ there is no e' such that $e' \sqsubset e$

The first clause, based on Egg's (2005:59) definition of interval-basedness, captures the above-mentioned idea that stative predicates are fully divisive, whereas non-stative predicates are not. The second clause adds that stative predicates are non-punctual, that is, some eventualities in the extension of such a predicate have parts. The addition of this clause guarantees that all bounded predicates are non-stative. Without it, punctual predicates (predicates that apply only to eventualities without parts) would be both bounded and stative.

Table 4.1 shows the tripartition induced by these two properties of predicates. We have stative predicates, bounded predicates, and predicates that are unbounded but non-stative, for which I use the term *process predicates* in line with de Swart.

stative	unbounded	stative
non-stative		process
	bounded	bounded

Table 4.1: Aspectual classes of predicates

In my analysis of aoristic and imperfective aspect only the property of boundedness plays a role (sections 4.4 and 4.5). I need the property of stativity for comparing the English progressive and the Greek imperfective (section 4.8).

In my classification I only classify predicates of eventualities, not eventualities themselves. In this respect, I follow Krifka and deviate from, for example, de Swart and Egg, who assume different sorts of eventualities on top of a distinction at the predicate level. In the latter accounts bounded predicates, for example, have the property described in (99) and also refer to a set of bounded eventualities. My first problem with such an approach is that it is not clear to me which criterion has primacy in such accounts: is a predicate bounded because it has the property in (99) or because it refers to a set of bounded eventualities? My second objection is that I don't see why we need an ontological distinction on top of the distinction for predicates, at least not

for the data I am concerned with. If an ontological distinction would prove to make things easier, I would not hesitate to adopt it, but I don't think it would. On the contrary, and this is my main objection, it makes the formulation of operators that cause a shift in aspectual class much more complicated, as we will see in section 4.6. For these reasons, I will restrict the distinction to the level of predicates.

As a consequence of restricting aspectual class distinctions to the level of the predicate, a mismatch in aspectual class cannot be formalised as a type-theoretic or sortal clash in the way de Swart (1998) and Egg (2005) implement it. Instead we need an alternative way to do this, which I will present in section 4.6.

4.3 Completed vs. going on: the completive and processual interpretations

The evaluation of one-component theories of aspect (theories in which the primary contribution of aspect is a change in aspectual class) in section 3.2.3 has demonstrated that such theories, when adapted to the Ancient Greek data, end up with a vacuous semantics for aoristic and imperfective aspect (on a coercion approach) or are forced to postulate an ambiguity for the two (on a non-coercion approach). Therefore, I propose a two-component theory of aspect, that is, a theory in which the primary contribution of grammatical aspect is something different from a change in aspectual class. I follow Klein's (1994) proposal in positing that grammatical aspect concerns the relation between the time of the eventuality and the topic time. More precisely, I adopt a semantics for imperfective and aoristic aspect that is very similar to von Stechow et al.'s *INCLUDED* and *INCLUDES* (see (87)), respectively (see below for the differences). Formulated in terms of DRSs I propose:

$$\begin{array}{ll}
 (101) \quad \text{a.} & \text{IMP} \rightsquigarrow \lambda P \lambda t \left[\frac{e}{\tau(e) \supset t} \right] \oplus P(e) \quad = \text{IMP} \\
 & \text{b.} & \text{AOR} \rightsquigarrow \lambda P \lambda t \left[\frac{e}{\tau(e) \subseteq t} \right] \oplus P(e) \quad = \text{AOR}
 \end{array}$$

Three remarks on the notation. First, as one can see, IMP and **IMP** are not used interchangeably. IMP stands for the imperfective markers (morphemes) used in natural languages, whereas **IMP** abbreviates the translation of IMP into our formal language. Second, ' $\tau(e) \supset t$ ' reads as ' t is a non-final subset of $\tau(e)$ ' (see Appendix C.3). Third, whereas it is easiest to keep thinking of e and t as variables over eventualities and times, respectively, they are actually constants

for registers for eventualities and times, respectively. This is a consequence of the way in which DRT and typed lambda-calculus are fused, following Muskens (1996). For the same reason, P is a variable over dynamic rather than normal static predicates of eventualities. The reader is however advised not to pay too much attention to this as I will continue speaking of e as a variable over eventualities etc. myself as well throughout this thesis, except for Appendix A where I provide the formal system.

As for the content of (101), the semantics of imperfective and aoristic aspect maps properties of eventualities onto properties of times. More in particular, the semantics of the imperfective maps properties of eventualities P onto the property of being a non-final part of the runtime of an eventuality of which P holds. Similarly, the semantics of the aorist maps properties of eventualities P onto the set of times that include the runtime of an eventuality of which P holds. After combining (101) with the semantic contribution of tense, the time to which the eventuality time stands in the specified temporal relation ends up to be the topic time, the time about which we speak (we will see how this works in due course). Thus, grammatical aspect concerns the relation between the time of the eventuality and the topic time. A graphic representation of the semantic contribution of grammatical aspect is given in Figure 4.1.

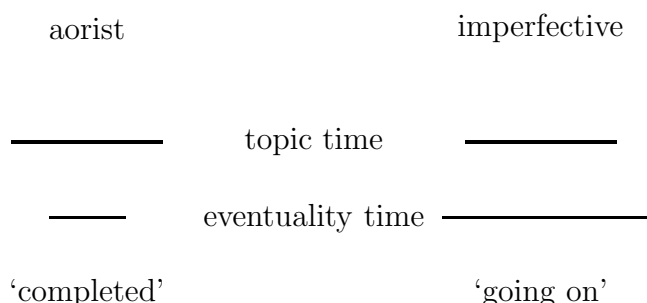


Figure 4.1: The semantics of aorist and imperfective

This semantics of aspect directly yields what Ancient Greek grammars consider the basic opposition between imperfective and aoristic aspect: *going on* versus *completed* (see section 2.1). Imperfective aspect indicates that the eventuality is going on at the moment about which we speak, that is, the eventuality's run time includes the topic time. Aoristic aspect, by contrast, indicates that the eventuality takes place within the time about which we speak: its runtime is included in the topic time.¹ I labeled these the *processual* inter-

¹Note that both the words 'completed' and 'complete' can be used to describe the meaning of the aorist on my account. Both 'the eventuality is completed within the topic time' and 'the complete eventuality lies within the topic time' are in accordance with my pro-

pretation of imperfective aspect and the *completive* interpretation of aoristic aspect.²

The temporal relation I assign to imperfective aspect deviates from the one proposed by von Stechow et al. ($\tau(e) \supseteq t_{TT}$). The reason for this deviation is the following. The intuition that imperfective aspect indicates that the eventuality is ‘going on’ is not captured by the semantics of von Stechow et al. A necessary ingredient for capturing this intuition is a continuation of the eventuality after the end of the topic time, a constellation that the semantics of von Stechow et al. allows for but does not require. For bounded predicates, von Stechow et al. can save their analysis by the insertion of a progressive coercion operator, as we will see in section 4.8. This, however, does not work for unbounded predicates. In (102), for example, von Stechow et al.’s semantics does not account for the intuition that the running is ‘not yet completed’:

- (102) *Pierre courait.*
 Pierre run.PST.IPFV.3SG
 “Pierre was running”

By contrast, this intuition is captured if we assign imperfective aspect a semantics which entails that the topic time is a non-final part of the time of the eventuality, cf. (101a).

As for tense, following Kamp et al., Klein, and von Stechow et al., I take it to make reference to some particular time (the topic time) and to temporally locate this time with respect to the moment of utterance. The analyses of Kamp et al. and von Stechow et al. differ from that of Klein (see (84)) with respect to the temporal relation assigned to the present tense. I will follow the former two and claim that with the present tense the topic time *is* rather than *includes* the utterance time.³ I propose the following semantics for the three tenses present, past, and future:

$$\begin{aligned}
 (103) \quad a. \quad \text{PRESENT} &\rightsquigarrow \lambda Q \left[\boxed{\phantom{t_{TT} = n}} \oplus Q(t_{TT}) \right] && = \text{PRES} \\
 & \quad \quad \quad \boxed{t_{TT} = n} \\
 b. \quad \text{PAST} &\rightsquigarrow \lambda Q \left[\boxed{\phantom{t_{TT} \prec n}} \oplus Q(t_{TT}) \right] && = \text{PAST} \\
 & \quad \quad \quad \boxed{t_{TT} \prec n}
 \end{aligned}$$

positional, which indicates that the question whether the aorist has to do with completeness or completedness (see, e.g., Comrie 1976:18–19) turns out to be a non-issue once one considers the notions as relative with respect to a reference point.

²I will discuss the complexive interpretation of the aorist, that is, the interpretation of completion with unbounded predicates, in sections 4.4 and 4.5. As I will show there, the semantics of the aorist in (101b) on its own does not suffice to deal with this interpretation.

³See section 5.3, footnote 2 for the motivation of this decision.

$$c. \quad \text{FUTURE} \rightsquigarrow \lambda Q \left[\frac{}{\mathbf{t}_{\text{TT}} \succ \mathbf{n}} \oplus Q(\mathbf{t}_{\text{TT}}) \right] = \text{FUT}$$

The semantics of tense takes a property of times Q and returns a proposition. For the past tense, for example, the property of times Q is mapped onto the proposition that the topic time precedes the moment of utterance and that Q holds of the topic time. As for the topic time, I follow von Stechow et al. in this chapter and treat the topic time as a free variable $\mathbf{t}_{\text{TT}}$ that is assumed to get its value from an assignment function that is fixed by the context. We have seen that this is one of the static ways of handling intersentential anaphora. On such an account the way in which the topic time is determined on the basis of the context is not specified. Since I believe, however, that a full account should provide a specification of the process, I switch to a proper treatment of anaphora in chapter 6 on discourse. As I said before, in this chapter I formulate my account in DRT to make it possible to provide a proper treatment of the topic time later on.

Let's apply this semantics of tense and aspect to two of the examples of the processual interpretation of imperfective aspect given in section 2.1 and repeated below for convenience. (105) is the semantic representation of the first clause of (104).

- (104) *καὶ Περδίκκας Ἀλεξάνδρου βασιλεὺς αὐτῶν*
kai Perdikkas Alexandrou basileus autōn
 and Perdiccas.NOM Alexander.GEN king.NOM they.GEN
ἦν ὅτε Σιτάλκης ἐπῆει
ēn hote Sitalkēs epēiei
 be.PST.IPFV.3SG when Sitalces.NOM come.upon.PST.IPFV.3SG
 “And Perdiccas, Alexander’s son, was their (=the Macedonians’) king
 at the time of the invasion by Sitalces.” Th. 2.99.6.

$$\begin{aligned}
 (105) \quad & \text{PAST}(\text{IMP}(\lambda e \frac{}{\mathbf{p_king}(e)}))) \\
 &= \lambda Q \left[\frac{}{\mathbf{t}_{\text{TT}} \prec \mathbf{n}} \oplus Q(\mathbf{t}_{\text{TT}}) \right] (\lambda P \lambda t \left[\frac{\mathbf{e}}{\tau(\mathbf{e}) \supset \mathbf{t}} \oplus P(\mathbf{e}) \right] (\lambda e \frac{}{\mathbf{p_king}(e)})) \\
 &\equiv \frac{\mathbf{e}}{\mathbf{p_king}(e)} \\
 &\quad \tau(\mathbf{e}) \supset \mathbf{t}_{\text{TT}} \\
 &\quad \mathbf{t}_{\text{TT}} \prec \mathbf{n}
 \end{aligned}$$

$\lambda e \boxed{\text{p_king}(e)}$ in (105) is the translation of *Perdiccas be king of the Macedonians*, a predicate over eventualities. To keep things simple, I will not go beyond this level of detail. The semantics of the imperfective takes the property denoted by this predicate as its input. It returns the set of times that include the runtime of an eventuality with this property. This set of times is the input for the semantics of the past tense. The past tense specifies that the topic time which is before the utterance time is one of the times in this set. The second line of (105) reduces to the last line with the help of lambda conversion and merging (see (219) in Appendix B for the intermediate steps in the reduction). The last line reads as follows: there is an eventuality of Perdiccas being king of the Macedonians that temporally includes the topic time, which precedes the utterance time. The topic time is determined by the temporal subordinate clause as the time of the invasion by Sitalces. Thus, the semantics provided for (104) corresponds to its natural interpretation: at the time about which we speak there is an eventuality going on of Perdiccas being king.⁴ Figure 4.2 represents the outcome graphically.

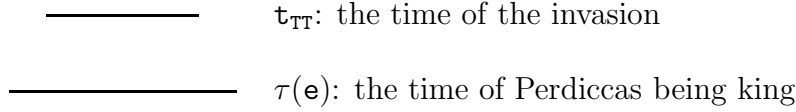


Figure 4.2: Graphical representation of (105)

In the same way the proposed semantics for tense and aspect gives us (107) for the second clause in (106):

- (106) Kῦρος δὲ οὐπω ἦκεν, ἅλλ’ ἔτι
Kyros de oupō hēken, all’ eti
 Cyrus.NOM PRT not.yet be.present.PST.IPFV.3SG but still
 πρὸς ἡλαυνε
proselaine
 march.to.PST.IPFV.3SG
 “Cyrus was not yet present, but he was still marching on.”
 X. An. 1.5.12

⁴My definitions of boundedness and stativity force me to accept non-maximal eventualities (with respect to a predicate) as eventualities (of that predicate) as well (otherwise, all predicates would be unbounded and non-stative) (cf. the discussion in section 3.2.2 of the different conceptualisations of eventualities in Krifka and Kamp et al.). The consequence for (104) is that *e* is not necessarily the locally maximal being king eventuality, since the predicate is unbounded. It may be that *e* is part of a larger eventuality of which the predicate holds. This makes no difference for the interpretation, however, since the effect is the same: the eventuality is not completed within the topic time.

$$\begin{aligned}
 (107) \quad & \text{PAST}(\text{IMP}(\lambda e \boxed{\begin{array}{c} \text{ } \\ \text{c_march}(e) \end{array}}))) \\
 &= \lambda Q \boxed{\begin{array}{c} \text{ } \\ \text{t}_{\text{TT}} \prec \text{n} \end{array}} \oplus Q(\text{t}_{\text{TT}})] (\lambda P \lambda t \boxed{\begin{array}{c} e \\ \tau(e) \supset t \end{array}} \oplus P(e)) (\lambda e \boxed{\begin{array}{c} \text{ } \\ \text{c_march}(e) \end{array}})) \\
 &\equiv \boxed{\begin{array}{c} e \\ \tau(e) \supset \text{t}_{\text{TT}} \\ \text{c_march}(e) \\ \text{t}_{\text{TT}} \prec \text{n} \end{array}}
 \end{aligned}$$

In (106), the topic time is fixed by the context as a time when Clearchus is riding through Menon's army. (107) specifies that (106) is true iff there is an eventuality of Cyrus marching that temporally includes the topic time (a time when Clearchus is riding through the army), which precedes the utterance time. This gives the correct truth conditions: at the end of the topic time, the eventuality *e* is still continuing, which yields the effect of 'going on'.

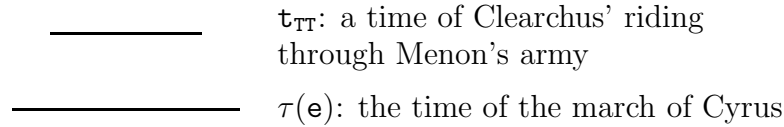


Figure 4.3: Graphical representation of (136)

There are two remaining cases concerning imperfective aspect that deserve some closer attention: the imperfective with stative predicates and the imperfective with bounded predicates. I will discuss them in section 4.8 and 4.9, respectively.

But let us first have a look at aoristic aspect. Following the same recipe as above, the proposed semantics of tense and aspect gives (109) for (108) (= (11)), an example of the completive interpretation of the aorist:

$$\begin{aligned}
 (108) \quad & \begin{array}{cccccc}
 \tau\acute{o} & \mu\epsilon\upsilon & \nu\acute{\alpha}\chi\omicron\varsigma & \epsilon\chi\theta\grave{\epsilon}\varsigma & \xi\ \chi\ \lambda\ \epsilon\ \psi\ \epsilon\ \nu. \\
 to & meu & nakos & echthes & eklepsen. \\
 \text{the.ACC I.GEN skin-coat.ACC yesterday steal.PST.AOR.3SG} \\
 \text{"He (= Lacon) stole my skin-coat yesterday."} & \text{Theoc. Id. 5.2}
 \end{array}
 \end{aligned}$$

$$\begin{aligned}
 (109) \quad & \text{PAST}(\text{AOR}(\lambda e \boxed{\begin{array}{c} \text{ } \\ \text{l_steal}(e) \end{array}}))) \\
 &= \lambda Q \boxed{\begin{array}{c} \text{ } \\ \text{t}_{\text{TT}} \prec \text{n} \end{array}} \oplus Q(\text{t}_{\text{TT}})] (\lambda P \lambda t \boxed{\begin{array}{c} e \\ \tau(e) \subseteq t \end{array}} \oplus P(e)) (\lambda e \boxed{\begin{array}{c} \text{ } \\ \text{l_steal}(e) \end{array}}))
 \end{aligned}$$

$$\equiv \begin{array}{|c|} \hline e \\ \hline l_steal(e) \\ \tau(e) \subseteq t_{TT} \\ t_{TT} \prec n \\ \hline \end{array}$$

Here, the topic time is denoted by the adverbial ἐχθές *echthes* ‘yesterday’.⁵ (109) specifies that (108) is true iff the whole stealing eventuality takes place on the day before Comatas’ utterance, which is the desired result. Figure 4.4 represents this graphically.

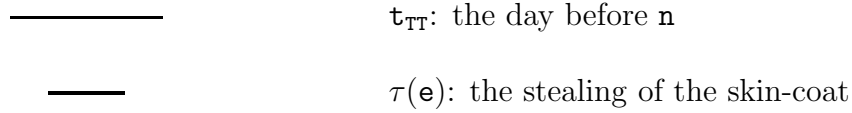


Figure 4.4: Graphical representation of (109)

This concludes my discussion of the processual and completive interpretations. We have seen that they follow directly from the proposed semantics of imperfective and aoristic aspect, respectively. In the remainder of this chapter I will show that with some additional principles and mechanisms we can also derive the other interpretations.

4.4 Selectional restriction of the aorist

The semantics of the aorist proposed in the previous section does not in itself account for the complexive interpretation of aoristic aspect (completion with unbounded predicates). This may come as a surprise given that it can deal with the completive interpretation (completion with bounded predicates), as we have seen. The reason for this lies in the conceptualisation of eventualities that I am forced to assume given my definition of stativity and boundedness. Like Krifka (see section 3.2.2), I am obliged to accept non-maximal eventualities with respect to a predicate as eventualities of this predicate (otherwise, all predicates would be bounded). Aoristic aspect states that there is an eventuality e to which the predicate applies whose runtime is included in the topic time. For bounded predicates this entails that the maximal, that is, complete eventuality is included in the topic time, since eventualities in the extension of a bounded predicate are by definition maximal with respect to the predicate. This entailment does not hold for unbounded predicates. An eventuality in the extension of an unbounded predicate need not be maximal with respect to

⁵This is a simplification. See Reyle et al. (2007:578–582) for a discussion of the temporal relations involved in the semantics of time-frame adverbials such as *yesterday*.

the predicate, and, hence, from the existence of an eventuality that makes an unbounded predicate true and that is included in the topic time, it cannot be concluded that the maximal eventuality is included in the topic time as well. This is illustrated on the left-hand side of Figure 4.5. The dotted line indicates the possibility of a larger eventuality to which the predicate applies.

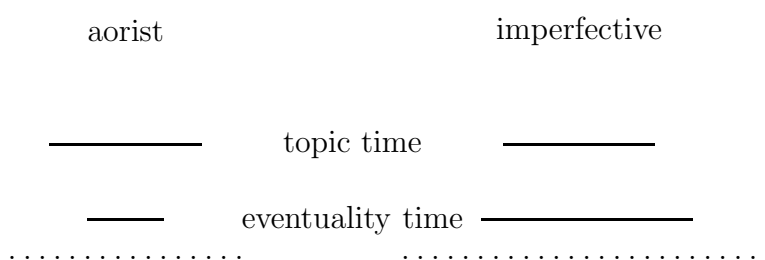


Figure 4.5: Aorist and imperfective with unbounded predicates

So, on the basis of its semantics (101b) we would expect that the aorist can also be used if the maximal eventuality includes the topic time, as long as some eventuality of the right kind is included in the topic time. This, however, is not the case. Hence, for the interpretation of completion with unbounded predicates, the semantics of the aorist (101b) does not suffice. The interpretation we want to get is that the maximal eventuality is included in the topic time, whereas the semantics gives us only that *some* eventuality is included in the topic time.

This problem can be solved by restricting the aorist to bounded predicates. This means that if the aorist is confronted with an unbounded predicate, a coercion operator comes into play that maps the unbounded predicate onto a bounded one. In the next section we will see that one of these coercion operators, the maximality operator, yields the complexive interpretation. There I will also show that a restriction of the aorist to bounded predicates at the same time explains the restriction of the ingressive interpretation of the aorist to unbounded predicates.

The right-hand side of Figure 4.5 shows that for imperfective aspect the semantics given in (101a) *is* enough to yield the processual interpretation, even with unbounded predicates. For it may be that the eventuality that includes the topic time is not maximal with respect to the predicate, but this makes no difference for the interpretation: the maximal eventuality will also include the topic time, so we still get the interpretation that the eventuality is going on.

Now that I have shown that the semantics of the aorist (101b) is not enough to account for the data and argued that adding an aspectual class restriction would be useful, it is time to ask where this restriction comes from. What is

the rationale behind it? This question Gerö and von Stechow (2003) don't give an answer to. Instead, they simply state that the aspectual class restriction follows from the semantics of the aorist (see section 3.2.4).

I claim that the rationale behind the proposed restriction of the aorist to bounded predicates is that without this restriction some situations describable by the imperfective of a predicate P could be expressed using the aorist of P as well. This would be the case when an eventuality e to whose runtime $\text{IMP}(P)$ applies has at least one part e' that is also in the extension of P and this second eventuality is so small that its runtime is located within the topic time. Figure 4.6 illustrates this situation. In this situation the imperfective of P can be used

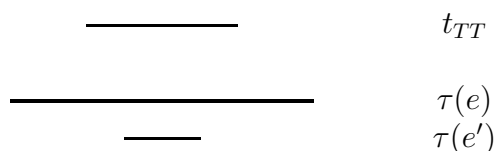


Figure 4.6: Overlap between aorist and imperfective with unbounded predicates

as there is a P eventuality whose runtime includes the topic time, viz. e . But without further constraint the aorist could be used, as well, for there is also a P eventuality whose runtime is included in the topic time, viz. e' .

This unwanted potential overlap between imperfective and aorist is ruled out if the aorist is restricted to bounded predicates. Eventually, this restriction represents an instance of ‘pragmatic strengthening’, which removes semantic overlap between competing instantiations of the same grammatical feature (here, aspect) (compare this for example with the division of labour between definite and indefinite NPs as proposed by Hawkins 1991). In contrast, the imperfective does not restrict the aspectual class of its argument.

Of course, this restriction of aoristic aspect to bounded predicates does not mean that the aorist does not occur with unbounded predicates. Actually, we have seen examples of the aorist with unbounded predicates in section 2.1 (examples (19) to (21)). Rather, it means that in those cases a literal interpretation is not available and reinterpretation is needed in order to make sense of the sentence. More specifically, the unbounded predicate must be reinterpreted as a bounded predicate. In the next section I will show that such reinterpretations can be analysed as the result of coercion operators that intervene between the semantics of the aorist and its argument. The ingressive and complexive interpretation of the aorist will be shown to come about in this way.

4.5 Aorist and coercion: the ingressive and complexive interpretations

In section 4.3 I proposed a semantics for aoristic and imperfective aspect that directly yields the completive interpretation of the former and the processual interpretation of the latter. In this section I will tackle the ingressive and complexive interpretation of aoristic aspect. Section 4.7 is devoted to the habitual interpretation of imperfective aspect and in section 4.9 we turn to the conative and likelihood interpretation of this aspect.

Actually, we already have all the ingredients for the analysis of these interpretations. The analysis consists of (i) the semantics of aoristic and imperfective aspect (section 4.3), (ii) the selectional restriction of the aorist for bounded predicates (section 4.4), and (iii) Egg's Duration Principle (section 3.3.3). We just have to put them together.

In section 2.1 we have seen that with unbounded predicates, the aorist may have an ingressive and a complexive interpretation. I propose that these interpretations emerge as an attempt to avoid an threatening mismatch between the selectional restriction of the aorist for bounded predicates and the aspectual class of its argument.

Let me illustrate how this works. The selectional restriction of the aorist for bounded predicates causes reinterpretation when the aorist is confronted with an unbounded predicate. The mismatch between the restriction of the operator, AOR, and its argument, the predicate, is avoided by the intervention of coercion operators that map unbounded predicates onto bounded predicates. As a result the complexive and ingressive interpretations arise.

The former interpretation, the interpretation of completion with unbounded predicates, is obtained by the use of a coercion operator that maps the set of eventualities in the extension of a predicate P onto the set of locally maximal P eventualities. This is exactly what AOR', the simpler version of Krifka's (1989b) AOR, does (cf. section 3.2.2). To avoid confusion (I don't use AOR' for the semantics of the aorist itself) I rename the operator MAX.

$$(110) \quad \text{MAX} = \lambda P \lambda e \left[\begin{array}{c} \boxed{e'} \\ \boxed{e \sqsubseteq e'} \end{array} \rightarrow \boxed{\neg \left[\boxed{} \oplus P(e') \right]} \right] \oplus P(e)$$

Its effect is illustrated in Figure 4.7. Imagine that e_1 is a sleeping eventuality of John from the moment he falls asleep to the moment he wakes up, and that e_2 , e_3 , and e_4 are parts of this eventuality. These parts are themselves also sleeping eventualities of John. They are not maximal sleeping eventualities of

John, however. *MAX*, the interpretation of **MAX**, maps the set of all sleeping eventualities of John $\{e_1, e_2, e_3, e_4\}$ on the set of maximal sleeping eventualities of John $\{e_1\}$.

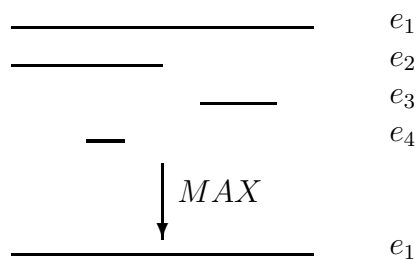


Figure 4.7: The effect of the maximality operator

MAX always returns bounded predicates. For bounded predicates it is the identity mapping: due to the property of boundedness, all eventualities in the extension of *P* are in the extension of **MAX**(*P*) as well, and no other.

Note that I use the simpler version of Krifka's **AOR** operator. Why can I do that? Recall from section 3.2.2 that Krifka was compelled to work with a more complex version of the maximality operator because of the existence of non-convex eventualities. The problem was the following. In the scenario that John sleeps from 1 to 2 and then again from 3 to 4, one requires of a maximality operator that the two eventualities, the one from 1 to 2, e_1 , and the one from 3 to 4, e_2 , are in the extension of the predicate that results from applying the maximality operator to the predicate, for both are locally maximal. If we assume that unbounded predicates are cumulative (63), as Krifka does, this is not what **MAX** gives us, since e_3 , the sum of e_1 and e_2 , is due to the cumulativity in the extension of *j_sleep* (for *John sleep*) too. But if *j_sleep* holds of e_3 and e_1 is a proper part of e_3 , then **MAX**(*j_sleep*) does not hold of e_1 . But then **MAX** does not do what it should do. Note that the argument, and hence the need for complication, rests on the assumption that unbounded predicates are cumulative. Given that I don't share this assumption, but instead define boundedness in terms of (partial) divisivity (99), I can say that e_3 in this scenario is not in the extension of *j_sleep* (something which is not against our intuitions). For this reason I can stick with the simple maximality operator **MAX**, which is a welcome result, as the notion of convexity for eventualities that is involved in the complex definition is conceptually unclear (recall that Krifka himself doesn't provide a definition). I will return to **MAX** in the next section.

Let's first consider the effect of the maximality operator in combination with the semantics of the aorist. The intervention of the maximality coercion

operator between the aorist operator and the predicate P makes that the aorist of P is only true of the topic time if a (locally) maximal P eventuality is included in the topic time, not just if any P eventuality is included in the topic time. As we have seen in the previous section, this is exactly what we want for the complexive interpretation of the aorist. Let's see how this works for (111) (= (21)), an example of the complexive interpretation. The logical form is given in (112) (for the full semantic derivation, see (220) in Appendix B):

- (111) ἐγὼ γάρ, ὦ ἄνδρες Ἀθηναῖοι, ἄλλην μὲν ἀρχὴν
egō gar, ō andres Athēnaioi, allēn men archēn
 I.NOM PRT VCP men.VOC Athenian.VOC other.ACC PRT office.ACC
 οὐδεμίαν πώποτε ἥρξα ἐν τῇ πόλει,
oudemian pōpote ērxa en tēi polei,
 no.ACC ever rule.PST.AOR.1SG in the.DAT state.DAT
 ἐβούλεσα δέ.
ebouleusa de
 be.a.senator.PST.AOR.1SG PRT
 “I, men of Athens, never held any other office in the state, but I was
 a senator.” Pl. *Ap.* 32a

$$\begin{aligned}
 (112) \quad & \text{PAST}(\text{AOR}(\text{MAX}(\lambda e \boxed{\text{i_senator}(e)}))) \\
 &= \lambda Q \left[\boxed{t_{TT} \prec n} \oplus Q(t_{TT}) \right] (\lambda P \lambda t \left[\boxed{\tau(e) \subseteq t} \oplus P(e) \right] \\
 &\quad (\lambda P \lambda e \left[\boxed{\begin{array}{c} e' \\ e \sqsubseteq e' \end{array}} \rightarrow \neg \left[\boxed{} \oplus P(e') \right] \right] \oplus P(e)) (\lambda e \boxed{\text{i_senator}(e)})) \\
 &\equiv \boxed{\begin{array}{c} e \\ \text{i_senator}(e) \\ \boxed{\begin{array}{c} e' \\ e \sqsubseteq e' \end{array}} \rightarrow \neg \boxed{\text{i_senator}(e')} \\ \tau(e) \subseteq t_{TT} \\ t_{TT} \prec n \end{array}}
 \end{aligned}$$

The predicate $\lambda e \boxed{\text{i_senator}(e)}$ is the translation of the predicate *I be a senator*. (112) states that (111) is true iff the whole eventuality of the speaker being a senator is included in the topic time, which is here the whole life of the speaker until the moment of utterance.

In sum, the complexive interpretation of the aorist comes about due to the selectional restriction of the aorist operator for bounded predicates which induces a coercion operator if the aorist is confronted with an unbounded predicate. I have shown that the maximality operator can function as such a coercion operator. This operator yields the complexive interpretation that a maximal eventuality satisfying the predicate is included in the topic time, the time about which we speak.

The complexive interpretation is not the only interpretation of the aorist that arises with unbounded predicates. This combination can also lead to an ingressive interpretation. I claim that this interpretation emerges in a way similar to the complexive interpretation. It is also the result of a coercion operator that solves the mismatch between the selectional restriction of the aorist and the aspectual class of the predicate. This time the relevant coercion operator is an ingressive operator that maps a set of eventualities in the extension of a predicate, for example *John be king*, to a set of begin eventualities of John being king. For this purpose I provisionally propose the operator INGR as defined in (113):

$$(113) \quad \text{INGR} = \lambda P \lambda e \left[\begin{array}{c} \boxed{\begin{array}{c} t \ e' \\ \tau(e) = \text{IB}(t) \\ \tau(e') = t \\ \boxed{\begin{array}{c} t' \ e'' \\ \neg \left[\begin{array}{c} t \subset t' \\ t' = \tau(e'') \end{array} \right] \oplus P(e'') \end{array} \end{array} \right] \oplus P(e') \end{array} \right]$$

A begin eventuality of kind *P* is formalised as an eventuality *e* whose runtime $\tau(e)$ is the initial bound (IB) of an interval *t* that is the runtime of an *P* eventuality *e'*.⁶ The negative condition in (113) furthermore guarantees that no *P* eventuality starts before an eventuality in the extension of INGR(*P*). Otherwise, *e* in Figure 4.8 would count as a starting eventuality of *P* if *P* is true of *e'* but also of *e''*, contrary to what we want.

INGR is only a provisional ingressivity operator. For one thing, it assumes the existence of eventualities without duration, which may not correspond to our idea of eventualities.⁷ A further complication is that, intuitively, whether

⁶The initial bound function (IB) maps an interval (a convex set of times) *t* on the latest moment (a singleton set of times) just before *t*. See also Dowty (1979:140).

⁷See Kamp (1980) for a discussion of the logic of change. If one does not accept event-

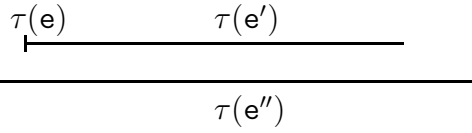


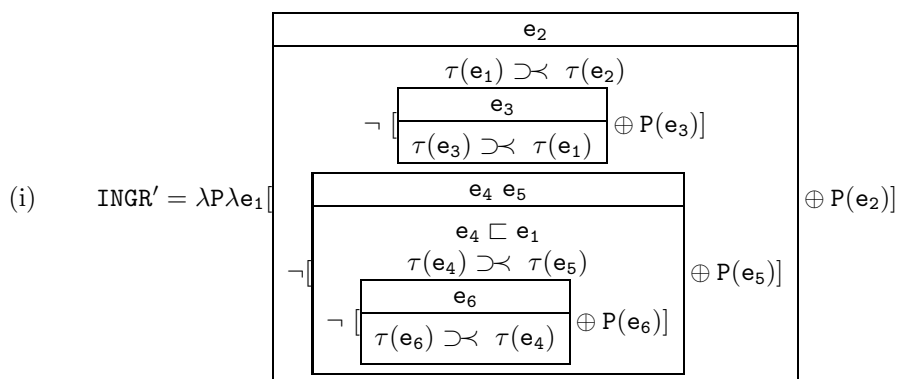
Figure 4.8: The contribution of the complex condition in (113)

something counts as a begin eventuality of some other eventuality is not just a matter of standing in the right temporal relation to it. We wouldn't say that a clock striking in Hong Kong counts as a begin eventuality of Beatrix being queen in the Netherlands just because the former happens immediately before the latter. Rather there has to be a causal connection between the two eventualities. A study of causality, however, goes way beyond this dissertation. Therefore, I will work with **INGR**, which will do for our purposes since it captures the temporal facets of the ingressive interpretation.

Let's look at the effect of the ingressive operator when used as a coercion operator intervening between the aorist operator and a predicate. In (114), the first sentence of (19), ἐδάκρυσεν *edakruse* 'weep.AOR' has an ingressive interpretation (as is clear from the continuation, see (19)). The logical form of the second clause is given in (115) (again, the full derivation is found in Appendix B (221)):

- (114) ἐνθαῦτα ὁ Ξέρξης ἑωυτὸν
enthauta ho Xerxēs heōuton
 then the.NOM Xerxes.NOM himself.ACC

alities without duration, one may prefer **INGR'** proposed in Bary and Egg (2007):



INGR' resembles Dowty's (1979:144) BECOME. INGR'(P) holds of an eventuality *e* iff *e* is the locally smallest eventuality that does not abut on a preceding P eventuality but abuts on a following P eventuality. This operator presupposes three-valued logic.

Hdt. 7.45

The fact that both **MAX** and **INGR** solve mismatches between the aorist operator and unbounded predicates raises the question how the interpreter chooses between these two coercion operators. Here the Duration Principle

(cf. section 3.3.3) comes into play. This is due to the fact that **MAX** and **INGR** influence the duration associated with the predicate in different ways. **MAX** raises the lower limit of the duration associated with an unbounded predicate and leaves the upper limit the same. For example, the duration associated with the predicate *John be king* ranges from seconds (since it is a stative predicate, and hence fully divisive) to a whole life. The duration of maximal being king eventualities, however, ranges from, let's say, weeks to a whole life. **INGR** returns predicates with which no duration is associated. It lowers the upper limit, and for non-stative predicates it lowers the lower limit as well (stative predicates can already be true of moments themselves).

The fact that the effects of the two operators on duration are different is crucial for the choice between them, since information on duration from various linguistic sources must be compatible, as stated by the Duration Principle. The aorist morphology introduces the duration information that the time of the eventuality is included in the topic time. The information introduced by the predicate, that is, the typical duration associated with the predicate, must be compatible with this information. This means that there must be eventualities in the extension of the predicate whose duration is at least as short as the topic time. Whether this is the case may be different for the predicates that result from the application of **MAX** and **INGR**, respectively.

Let me illustrate this with a few examples. In (116) (= (20)) we have an ingressive interpretation of the aorist.

- (116) Ἀποθνῄσκει δ' οὖν Μάριος ... καὶ μέγα
Apothnēiskei d' oun Marios ... ; kai mega
 die.PRS.IPFV.3SG PRT PRT Marius.NOM and great.NOM
 ἔσχε παραυτίκα τὴν Ῥώμην χάρμα καὶ
esche parautika tēn Rōmēn charma kai
 have.PST.AOR.3SG immediately the.ACC Rome.ACC joy.NOM and
 θάρσος
tharsos
 courage.NOM
 “Then Marius dies, and immediately great joy and courage took pos-
 session of Rome.” Plu. *Mar.* 46.6

Depending on whether ingressive or complexive reinterpretation is involved, we get the logical form in (117a) or (117b) (where λe j_have_r(e) is the predicate for *great joy and courage have Rome*):

$e \quad t' \quad e'$	
$j_have_r(e')$ $\tau(e) = IB(t')$ $\tau(e') = t'$	
$=$ $\sqsubset$	$t'' \quad e''$
	$t' \subset t''$ $t'' = \tau(e'')$ $j_have_r(e'')$
	$\tau(e) \subseteq t_{TT}$ $t_{TT} \prec n$

.	topic time
.	complexive interpretation
	ingressive interpretation

Figure 4.9: Choosing between an ingressive and complexive interpretation

Note that the original predicate would not violate the Duration Principle, since stative predicates are compatible with time point adverbials such as *immediately*. This predicate, however, is not of the required aspectual class, as the aorist selects for bounded predicates. As a result, a literal interpretation is not available and we have to choose between an ingressive and a complexive interpretation.

In example (111) the topic time was longer. It was the whole life of the speaker, Socrates. As a result, there a complexive interpretation was possible. Purely on the basis of the semantics, however, an ingressive interpretation would be possible too, for the beginning of being a senator can also be included in the time span of a whole life. Why is it that the natural interpretation is the complexive one? This is probably due to the fact that the complexive interpretation is stronger. It entails the ingressive interpretation: if the complete eventuality of being a senator is included in the topic time, the beginning must be included in the topic time as well. It's a common phenomenon that the interpreter chooses the strongest interpretation available. This principle is often referred to as the Strongest Meaning Hypothesis (Dalrymple et al. 1998).

Let's now have a second look at (114), the continuation of which is given in (118):

- (118) μαθὼν δέ μιν Ἀρτάβανος ...
Mathōn de min Artabanus ...
 perceive.AOR.PTCP.NOM PRT him.ACC Artabanus.NOM
 δακρύσαντα εἶρετο τάδε ... ὥς πολλόν
dakrusanta eireto tade: ... hōs pollon
 weep.AOR.PTCP.ACC ask.PST.IPFV.3SG this.ACC how far
 ἀλλήλων κεχωρισμένα ἐργάσαο νῦν
allēlōn kechōrismena ergasao nun
 one.other.GEN separate.PRF.PASS.PTCP.ACC do.PST.AOR.2SG now
 τε καὶ ὀλίγω πρότερον μακαρίσας
te kai oligōi proteron. Makarisas
 PRT PRT a.little.DAT before declare.happy.AOR.PTCP.NOM
 γὰρ σεαυτὸν δακρύεις.
gar seōuton dakrueis.
 because yourself.ACC weep.PRS.IPFV.2SG
 “Perceiving that he had begun to weep Artabanus questioned him
 saying: ‘What a distance is there between what you are doing now
 and a little while ago! After declaring yourself happy you weep.’ ”
 Hdt. 7.46.1

In (114) the choice between an ingressive and a complexive interpretation of ἐδάκρυσεν *edakruse* ‘weep.AOR’ cannot be made decisively on the basis of the sentence itself. The adverbial μετὰ τοῦτο *meta touto* ‘after that’ is compatible

with both interpretations. On the basis of the principle that an interpreter chooses the strongest interpretation available, we may at first prefer a complexive interpretation. It is only after interpreting the continuation (118) (with the present tense form δακρύεις *dakrueis*) that we know that Xerxes is still crying at the moment of Artabanus' speech and hence that a complexive interpretation is not available, for it would state that the whole (=maximal) crying eventuality is included in a topic time before the time of Artabanus' speech and hence that the crying is finished by that time.⁸

The need to wait for more information before a choice from several coercion operators can be made is quite common. Consider (119), an example of coercion outside the realm of aspect:

(119) #John began a novel.

Sentences like (119) are discussed extensively by Pustejovsky (1991, 1993, 1995). He claims that the verb *begin* denotes a relation between individuals and activities (properties of individuals). In (119), however, the second argument of *begin* is an NP and does not denote an activity. This mismatch is solved by mapping the NP semantics to a novel-related activity. On Pustejovsky's account the information what are the permissible novel-related activities is provided by the semantic entry of the word *novel*. The entry contains among other things information about the origin of novels (someone writes them) and the purpose of novels (someone reads them). Given these two novel-related activities the mismatch in (119) can be resolved in two ways: (119) can be read as that John began to read a novel and that he began to write a novel. Knowing nothing about John, both are optional. If, however, the story continues with (120), we know that the novel-related activity John is involved in is one of writing.

(120) He writes a page a day.

Sometimes it isn't even clear from the sentence itself that coercion is needed. To see this, let's first consider the famous example (121) from Nunberg (1979):

(121) The ham sandwich is sitting at table 20.

It is clear that *the ham sandwich* in (121) cannot refer to the sandwich itself, since sandwiches don't sit at tables. Rather the expression is reinterpreted as referring to the person who ordered a ham sandwich. But let's now have a look at (122) (from Egg 2005:122):

⁸Here I assume that with a sequence of aorists, the topic time of the eventuality at hand follows upon the topic time of the last mentioned eventuality. I will return to this in chapter 6, which is devoted to the way the topic time of a sentence is determined in a discourse.

(122) The ham sandwich is nice.

Here a literal interpretation is available, since nice can be a property of sandwiches. If the sentence continues with (123), however, we in retrospect interpret *the ham sandwich* as referring to the person who ordered the sandwich.

(123) He smiles.

The examples (119) to (123) show that coercion operators are not always inserted instantaneously. Therefore, it shouldn't come as a surprise that in the realm of aspect too, the final choice between various coercion operators is sometimes postponed until after the interpretation of the following sentences.

Let's recapitulate the discussion of aoristic aspect and coercion. Aoristic aspect always has the meaning assigned to it in section 4.3. It furthermore requires bounded predicates. If it is confronted with an unbounded predicate, coercion comes into play. Two coercion operators, **MAX** and **INGR**, corresponding to the complexive and ingressive interpretation, respectively, can be used to solve the mismatch. The Duration Principle guides the choice between them. If both interpretations are available, the stronger one, hence the complexive, is chosen.

Note that we now get the correct result for the problem discussed at the beginning of section 4.4 concerning the aorist with unbounded predicates. The problem was that on the basis of the semantics of the aorist alone we would expect that the aorist could also be used when an arbitrary part of an eventuality is included in the topic time (as long as the predicate holds of this part). With the proposed account we get the correct result that the aorist can only be used if the start of the eventuality or the maximal eventuality is included in the topic time.

In the next section I will discuss two issues concerning my choice to restrict aspectual classes to the level of the predicate. First I use the maximality operator to defend this choice. Then I discuss a consequence of this choice.

4.6 Aspectual classes as properties of predicates

As stated in section 4.2, I assume that there are bounded and unbounded predicates, but not bounded and unbounded eventualities. In this respect I deviate from, for example, de Swart (1998) and Egg (2005), to mention just two, in whose accounts a bounded predicate not only satisfies the definition in (99) but also refers to a set of bounded eventualities. As announced in section 4.2, I will show that this combination needlessly complicates the formulation of operators that cause a shift in aspectual class. I will do this on the basis of

the maximality operator.

If one assumes with de Swart (1998) and Egg (2005) that a bounded predicate refers to a set of bounded eventualities and an unbounded predicate to a set of unbounded eventualities, one and the same eventuality cannot be in the extension of both a bounded and an unbounded predicate. A consequence for the maximality operator, which is supposed to return bounded predicates, is that no eventuality can be both in the extension of an unbounded predicate P and in the extension of the predicate that results from applying the maximality operator to P . In particular, this means that MAX cannot be used as maximality operator, since the set of eventualities to which $\text{MAX}(P)$ refers is a subset of the set of eventualities to which bare P refers.

In order to formulate an operator that captures the idea of maximality but meets this requirement one often resorts to temporal or spatiotemporal equivalents of eventualities, that is, eventualities that are identical with respect to time or time and space, respectively. The idea is that, whereas it is not possible for one and the same eventuality to be in the extension of both a bounded and an unbounded predicate, it is possible that of two eventualities that are (spatio)temporally identical one is in the extension of a bounded predicate, and the other in the extension of an unbounded predicate. A natural candidate for a maximality operator is then (124), the dynamic equivalent of Egg's (2005:95) operator:

$$(124) \quad \text{MAX}' = \lambda P \lambda e \left[\begin{array}{c} \boxed{e'} \\ \hline \tau(e) = \tau(e') \\ \hline \boxed{ \begin{array}{c} \boxed{e''} \\ \hline e' \sqsubseteq e'' \end{array} \rightarrow \neg \left[\begin{array}{c} \boxed{} \\ \hline \oplus P(e'') \end{array} \right] } \end{array} \right] \oplus P(e')$$

Here τ is the function that maps eventualities on their (spatio)temporal trace. Note that e is in the extension of $\text{MAX}'(P)$ and e' , its (spatio)temporal equivalent, in that of P .

There are two problems with MAX' , however, one more serious than the other. First, MAX' , in contrast to MAX , is not the identity mapping for bounded predicates. It is possible that for a bounded predicate P eventualities in the extension of $\text{MAX}(P)$ are not in the extension of P . This is not too problematic for my enterprise: since the maximality operator functions as a coercion operator that comes into play only with unbounded predicates, its effect with bounded predicates is of no importance. What is more problematic is that MAX' , again in contrast to MAX , need not return a bounded predicate.

MAX' would behave the same as MAX in these two respects if we would assume that eventualities that coincide spatiotemporally are identical. Note, however,

that this is not a way out for those theories which assume that bounded predicates refer to a set of bounded eventualities and unbounded ones to a set of unbounded eventualities (for if two eventualities are identical, they cannot be in different sets). Crucially, it are exactly these theories that need to work with spatiotemporal equivalents in the first place.

Given that this problem is not restricted to the maximality operator, but is observed with many operators that cause a shift in aspectual class,⁹ I don't make an ontological distinction between bounded and unbounded eventualities, only between bounded and unbounded predicates.

As a consequence, on my account no type-theoretic or sortal mismatch is involved in the coercion phenomena discussed in this chapter. In this respect I deviate from de Swart (1998) and Egg (2005), who do model coercion in terms of such a mismatch. In de Swart's account, the passé simple, for example, requires an input of type $\langle \mathbf{l}, \mathbf{t} \rangle$, with $\mathbf{l}$ the type for bounded eventualities and $\mathbf{t}$ the type of truth values, that is, a function from bounded eventualities to truth values, or, in other words, a property of bounded eventualities. If the input candidate is not of this type, coercion comes into play. In my account, on the other hand, only a mismatch between *properties* of predicates plays a role. The aorist operator requires predicates with the property of boundedness, and if the predicate does not have this property, we get coercion.

One way to explicitly force the mismatch is by incorporating the selection restriction of the aorist in its semantics. The result is (125):

$$(125) \quad \text{AOR} \rightsquigarrow \lambda P \lambda t \left[\frac{e}{\tau(e) \subseteq t} \oplus P(e) \oplus \mathbf{BD}(P) \right] =$$

$$\lambda P \lambda t \left[\frac{e}{\tau(e) \subseteq t} \oplus P(e) \oplus \left(\frac{e' \ e''}{e'' \sqsubset e'} \oplus P(e'') \right) \rightarrow \neg \left(\frac{}{} \oplus P(e'') \right) \right]$$

Now, if P is an unbounded predicate, we get a contradiction: the sentence DRS, and therefore the sentence it represents, is not true in any model (and *a fortiori*, the DRS that results from merging the sentence DRS with the context DRS will not be true in any model). Nevertheless, the hearer is willing to make sense of the sentence and reinterprets the predicate as a bounded predicate (by interpreting it as maximal or as referring to the beginning).

It may be more intuitive, however, to assume a short-cut here. Rather than completing the whole interpretation process, including the merge of sentence and context DRS, the hearer detects the inconsistency online. This idea

⁹For example Egg's (2005:95) progressive operator (96) in section 3.3.3.

is modelled in underspecification formalisms like the Constraint Language for Lambda Structures (Egg, Koller, and Niehren 2001, Egg 2005) or Underspecified Discourse Representation Theory (Reyle 1993, Reyle, Rossdeutscher, and Kamp 2007), which are designed to give a more principled account of ambiguity and reinterpretation. I leave it to future research to implement my account in such a formalism.

Let's instead turn to imperfective aspect, which imposes no aspectual class restrictions on its argument.

4.7 Imperfective and coercion: the habitual interpretation

In section 4.5 we have seen that with aoristic aspect, the Duration Principle guides the choice for a specific coercion operator from the set of permissible operators. Coercion is triggered by a mismatch in aspectual class. Imperfective aspect, on the other hand, does not impose aspectual class restrictions. It combines happily with bounded as well as unbounded predicates. Nevertheless, the Duration Principle plays a role with imperfective aspect too, although a different one: it triggers coercions by its own. In this section I will argue that this is how the habitual interpretation comes about. Note the similarity with the functions of the Duration Principle in English (section 3.3.3): there, too, the Duration Principle can guide independently motivated coercion and trigger its own coercions.

We have seen in section 4.3 that imperfective aspect indicates that the time of the eventuality includes the topic time and that this semantics directly yields the interpretation that the eventuality is going on, the processual interpretation. If the topic time is longer than the time associated with the predicate, however, a literal, that is, processual, interpretation is not available. The mismatch in duration can then be solved by the intervention of a coercion operator that lengthens the time associated with the predicate. This is exactly what a habitual operator does: the time of a habit of a certain kind is longer than the time of single occurrences of eventualities of this kind. Figure 4.10 serves to illustrate this.

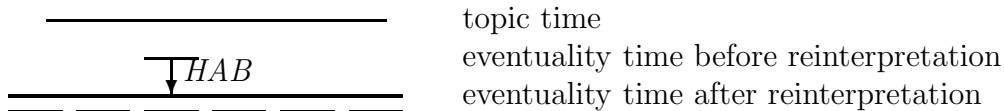
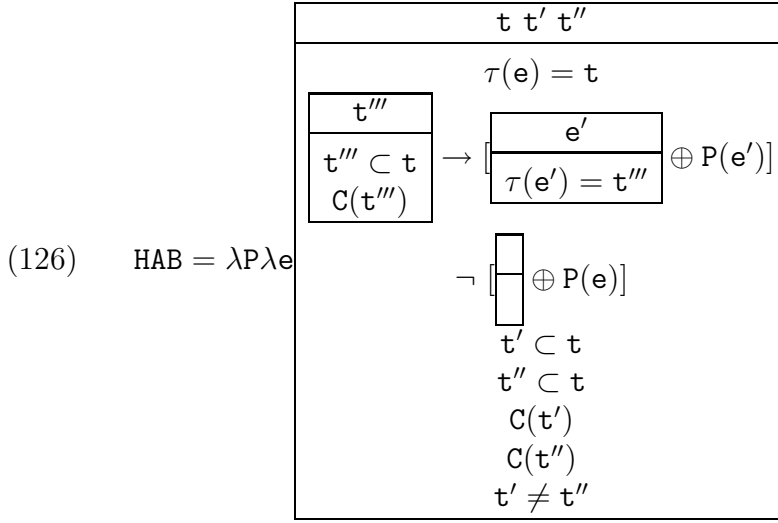


Figure 4.10: Habitual reinterpretation

Like ingressivity, habituality is a complex issue and I provisionally propose the operator **HAB** as defined in (126):



$HAB(P)$ is true of an eventuality e if every contextually relevant (this is indicated by the C) subset t''' of the runtime t of e is the runtime of a P eventuality e' . John has the habit of snoring, for example, if he snores at all relevant times, i.e. all times during which he sleeps. Moreover, it is required that e itself be a non- P eventuality (this addition is needed for unbounded predicates), and that there be at least two different contextually relevant subsets of t (to exclude that there may be a habit without there being a single occurrence of the relevant eventuality).

HAB has the same problem as $INGR$ that it's only the time of the eventuality that determines whether an eventuality counts as a habit, contrary to our intuitions. Moreover, this C is of course a black box, the choice for at least two contextually relevant times is arbitrary, and it may be better to relax the universal quantification to *most*. But crucially for our purposes, the time associated with $HAB(P)$ is longer than the time associated with P , which is exactly what we want.

The habitual interpretation of imperfective aspect emerges from the insertion of the habituality operator that avoids an impending clash in duration. Let me illustrate this with (127) (= (16)) (see also (222) in Appendix B):

- (127) Ἐπὶ γὰρ Λέοντος βασιλεύοντος καὶ Ἡγήσικλέος
Epi gar Leontos basileuontos kai Hēgēsikleos
 during PRT Leon.GEN be.king.IPFV.PTCP.GEN and Hegesicles.GEN
 ἐν Σπάρτῃ τοὺς ἄλλους πολέμους
en Spartēi tous allous polemous
 in Sparta.DAT the.ACC other.ACC wars.ACC
 εὐτυχεόντες οἱ Λακεδαιμόνιοι
eutucheontes hoi Lakedaimonioi
 be.successful.IPFV.PTCP.NOM the.NOM Lacedaemonians.NOM

πρὸς Τεγεήτας μούνους προσέπταιον
pros Tegeētas mounous proseptaion
 against Tegeans.ACC only.ACC bump.into.PST.IPFV.3PL
 “For when Leon en Hegesicles were kings of Sparta, the Lacedaemo-
 nians, while successful in all their other wars, suffered defeats only
 against the Tegeans.” Hdt. 1.65.1

$$\begin{aligned}
 (128) \quad & \text{PAST}(\text{IMP}(\text{HAB}(\lambda e \boxed{}))) \\
 & \quad \boxed{\text{l_bump}(e)} \\
 &= \lambda Q \boxed{} \oplus Q(\mathbf{t}_{\text{TT}})] (\lambda P \lambda t \boxed{} \oplus P(e)) \\
 & \quad \boxed{\mathbf{t}_{\text{TT}} \prec n} \quad \boxed{\frac{e}{\tau(e) \supset t}} \\
 & \quad \boxed{\begin{array}{c} \mathbf{t} \ \mathbf{t}' \ \mathbf{t}'' \\ \hline \tau(e) = \mathbf{t} \\ \boxed{\frac{\mathbf{t}'''}{\mathbf{t}''' \subset \mathbf{t} \ C(\mathbf{t}''')}} \rightarrow \boxed{\frac{e'}{\tau(e') = \mathbf{t}'''} \oplus P(e')} \\ \neg \boxed{} \oplus P(e) \\ \mathbf{t}' \subset \mathbf{t} \\ \mathbf{t}'' \subset \mathbf{t} \\ C(\mathbf{t}') \\ C(\mathbf{t}'') \\ \mathbf{t}' \neq \mathbf{t}'' \end{array}} \\
 & \quad (\lambda P \lambda e \boxed{}) \quad (\lambda e \boxed{\text{l_bump}(e)}) \\
 & \quad \boxed{\begin{array}{c} \mathbf{e} \ \mathbf{t}' \ \mathbf{t}'' \ \mathbf{t}''' \\ \hline \tau(e) = \mathbf{t}' \\ \boxed{\frac{\mathbf{t}'''}{\mathbf{t}''' \subset \mathbf{t}' \ C(\mathbf{t}''')}} \rightarrow \boxed{\frac{e'}{\tau(e') = \mathbf{t}'''} \text{l_bump}(e')} \\ \neg \boxed{} \\ \text{l_bump}(e) \\ \mathbf{t}'' \subset \mathbf{t}' \\ \mathbf{t}''' \subset \mathbf{t}' \\ C(\mathbf{t}'') \\ C(\mathbf{t}''') \\ \mathbf{t}'' \neq \mathbf{t}''' \\ \tau(e) \supset \mathbf{t}_{\text{TT}} \\ \mathbf{t}_{\text{TT}} \prec n \end{array}} \\
 & \quad \equiv
 \end{aligned}$$

In (127) the topic time is the time that Leon and Hegesicles were kings in Sparta. The imperfective states that the time of an eventuality that satisfies the predicate includes the topic time, but the time of suffering a defeat (or literally, bumping into someone) is typically shorter than the rule of kings. This mismatch is solved by the habitual coercion operator, since the time associated with the habit of suffering defeats can include the rule of kings.

An advantage of this account over that of de Swart (1998) in which a habitual reinterpretation was triggered by a mismatch in aspectual class (see section 3.2.3), is that it predicts correctly that the habitual interpretation of the imperfective occurs with bounded as well as unbounded predicates. In (129) (= (82)), we even have an example with a stative predicate:

- (129) ἐν δεξιᾷ δὲ καὶ ἐν ἀριστερᾷ αὐτοῦ τε καὶ τῶν
en dexiai de kai en aristerai autou te kai tōn
 in right.DAT and in left.DAT him.GEN PRT and the.GEN
 ἵππέων πελτασταῖς χώρα ἦν.
hippeōn peltastais chōra ēn.
 horsemen.GEN targeteers.DAT place.NOM be.PST.IPFV.3SG
 “To the right and left of him (= Cyrus) and the cavalry was the
 (usual) place for the targeteers.” X. *Cyr.* 8.5.10

In (129) the topic time is the time during which Cyrus waged wars, which is in the order of years, and hence longer than the time of targeteers being in a specific position. With the habitual operator an impending violation of the Duration Principle can be avoided, because this operator considerably lengthens the typical duration of the predicate.

The same explanation is available for the French sentence in (130) (= (78)):

- (130) *Quand j' étais petit, je ne dormais pas*
 When I be.PST.IPFV.1SG young I not sleep.PST.IPFV.1SG not
bien.
 well
 “When I was young I didn’t sleep well.”

The duration of sleeping uneasily is shorter than the duration of adolescence, but the duration of the habit of sleeping uneasily need not be. In both (129) and (130) the predicate is unbounded, so the habitual interpretation cannot be attributed to coercion triggered by a selectional restriction of imperfective aspect for unbounded predicates. It can, however, be attributed to coercion triggered by the Duration Principle.

Especially telling is (131), where it is clear that the habitual interpretation really emerges from a mismatch in duration.

- (131) Ἦν δὲ τοῦτον τὸν χρόνον ἔθνος
Ēn de touton ton chronon ethnos
 be.PST.IPFV.3SG PRT that.ACC the.ACC time.ACC nation.NOM
 οὐδὲν ἐν τῇ Ἀσίῃ οὔτε ἀνδριότερον οὔτε
ouden en tēi Asiēi oute andrēioteron oute
 no.NOM in the.DAT Asia.DAT nor more.courageous.NOM nor
 ἀλκιμώτερον τοῦ Λυδίου. Ἡ δὲ μάχη
alkimōteron tou Ludiou. Hē de machē
 braver.NOM the.GEN Lydian.GEN the.NOM PRT battle.NOM
 σφέων ἦν ἀπ’ ἵππων, δόρατά τε
spheōn ēn ap’ hippōn dorata te
 they.GEN be.PST.IPFV.3SG from horses.GEN spears.ACC PRT
 ἐφόρεον μεγάλα καὶ αὐτοὶ ἦσαν
ephoreon megala kai autoi ēsan
 carry.PST.IPFV.3PL long.ACC and they.NOM be.PST.IPFV.3PL
 ἵππεύεσθαι ἀγαθοί
hippeuesthai agathoi
 manage.horse.INF.IMP good.NOM
 “Now at this time there was no nation in Asia more courageous or
 braver than the Lydian. They fought on horseback, carried long
 spears, and they were skillful at managing horses.” Hdt. 1.79.3.

We can see that the duration associated with the predicate determines whether we get a habitual reinterpretation or not. The time associated with being brave is much longer than the time associated with carrying spears. Therefore, a literal interpretation is available for the former but not for the latter, which therefore receives a habitual reinterpretation.¹⁰ The example also shows that it is understandable that de Swart ascribes the habitual interpretation of the imperfective to a mismatch in aspectual class, since examples with stative predicates are hard to find. I claim that this is because most stative predicates are associated with a duration with a high upper limit, so the need for reinterpretation does not occur so often.

In a static framework, a mismatch in duration can be made explicit by restricting the models of evaluation to those models that respect our knowledge concerning the duration of eventualities. This can be done by means of meaning postulates. One such postulate, for example, could represent our knowledge that the duration of sleeping (for a human being) ranges from minutes to one day. The result is that (130), for example, is contradictory on a literal interpretation, since it isn’t true in any model that satisfies the meaning postulate. A hearer will nevertheless try to make sense of the utterance by

¹⁰Here I assume that the topic time of the first clause is passed on to the following clauses. We will see in chapter 6 that this is common for a series of imperfectives.

giving the predicate a habitual reinterpretation.

In a dynamic framework, like DRT, however, there is no need for meaning postulates that represent our knowledge concerning the duration of eventualities in order to get a contradiction. Since a context update is always an intersection with the background knowledge, which also contains knowledge about the typical duration of eventualities, we automatically end up without models if the interpretation of the utterance is in conflict with the duration of eventualities.

After this discussion of the habitual interpretation, we are left with the conative and likelihood interpretation of imperfective aspect. Before discussing these, however, I first consider the imperfective with stative predicates.

4.8 Imperfectivity versus progressivity

In this section I will discuss a remarkable difference between the processual interpretation of imperfective aspect and the progressive in English: in contrast to the latter, the former combines happily with stative predicates (see p. 12). The unwillingness of the English progressive to combine with stative predicates is commonly explained by arguing that the progressive of a stative predicate does not mean more than the predicate itself (one of the first explanations along these lines is found in Taylor 1977:206). This is indeed the case if one assigns Krifka's *PROG* (= (66)), given in its dynamic form in (132), to the progressive:

$$(132) \quad \text{PROG} = \lambda P \lambda e \left[\frac{e'}{e \sqsubseteq e'} \oplus P(e') \right]$$

PROG maps predicates of eventualities onto predicates of eventualities.¹¹ It follows from this semantics of the progressive in combination with the definition of stativity in (100) that a sentence with a stative predicate in the simple form and the same sentence with the predicate in the progressive form have the same truth conditions: for all stative predicates *P*, for all eventualities *e*, (i) if *PROG*(*P*) applies to *e*, *P* applies to it as well, and conversely, (ii) if *P* applies to *e*, *PROG*(*P*) applies to it as well.¹² Thus, the two sentences have the same

¹¹Existential quantification over the eventuality variable *e* is introduced later in the composition, as in de Swart's (1998) account. In this respect this semantics of the progressive deviates from (101a), the semantics I propose for the imperfective.

¹²The truth conditions are also the same if the semantics of the progressive has a proper part rather than a part relation, as we find for example in Egg (2005), see (96). Although (ii) does not hold in that case (not always if an eventuality *e* is in the extension of a stative predicate *P*, it is also in the extension of *PROG*(*P*), for *e* may be maximal with respect to *P* (for maximality, see section 4.5)), it is still the case that if an eventuality *e* is in the extension of a stative predicate *P* *there is* an eventuality *e'* that is in the extension of *PROG*(*P*) (for if *e* is not

truth conditions. The common reasoning is that in such cases, for reasons of economy, a language user will prefer the simpler, that is, the non-progressive, form.

Since the imperfective, unlike the progressive, does combine with stative predicates, it is a plus for an analysis if it assigns a semantics to the imperfective that does add a meaning element to these predicates. This is the case for the semantics that I proposed for the imperfective in (101a). Apart from a change in type (if P is a predicate over eventualities, $\text{IMP}(P)$ is a predicate over times), which already ensures that $\text{IMP}(P)$ and P are not true of the same individuals in the domain, the temporal relation to the topic time is a meaning element that is absent in the bare predicate.¹³ This difference between the semantics of the imperfective and the progressive explains why the former but not the latter combines with stative predicates. As should be clear, I don't follow Krifka (1989b) who considers the progressive an instance of imperfective aspect (cf. section 3.2.2).

My claim is that grammatical aspects determine the relation between the time of the eventuality and the topic time. As a consequence, strictly speaking in my view the progressive is not a grammatical aspect. Instead it corresponds more to the coercion operators that I introduced to account for the habitual interpretation of the imperfective and the ingressive and complexive interpretations of the aorist. Like these operators, the progressive operator is a function from predicates of eventualities onto predicates of eventualities, the difference being that the progressive operator is morphologically realised whereas coercion operators, by definition, are not.¹⁴

This discussion of the difference between the progressive and the imperfective sheds new light on the fact that there are no aspectually neutral forms in Ancient Greek as there are in English. In Greek one has to choose between imperfective and aoristic forms. This is explained in the present account by

maximal with respect to P e is e' ; if it is maximal and if we assume that maximal eventualities in the extension of a stative predicate have proper parts, which seems a reasonable thing to do, there is a different eventuality e' , of which $\text{PROG}(P)$ holds).

¹³In connection to note 12: the main difference between the conditions $\mathbf{t}_{\text{TT}} \subseteq \tau(\mathbf{e})$ (from imperfective aspect) and $\mathbf{e} \sqsubset \mathbf{e}'$ (from the progressive) is that $\mathbf{t}_{\text{TT}}$ in the former is an anaphor whereas $\mathbf{e}$ in the latter is existentially quantified over. For this reason the step from P to $\text{PROG}(P)$ holds even with the proper part instead of the part relation (note 12), but this step is not possible for imperfective aspect since the topic time is fixed rather than flexible.

¹⁴Now that the difference between the progressive and the imperfective is explained by putting the notion of topic time in the semantics of the imperfective, but not in that of the progressive, one might wonder about the role of topic times in the English tense and aspect system. It seems implausible that topic times play a role in languages with a perfective-imperfective distinction, but not in languages like English. I think that the topic time plays a role in the interpretation of English sentences too, but that the relation between topic time and time of the eventuality is not morphologically expressed (by grammatical aspect). This is a topic for further research.

the fact that imperfective and aoristic aspect make a semantic contribution with any predicate. With aspectually neutral forms the eventuality would not be related to the topic time. The progressive, on the other hand, does not determine the relation to the topic time. Given its semantics in (132) it does not make a semantic contribution with stative predicates and as a result is superfluous.

One may raise the following objection to this explanation of why the imperfective, in contrast to the progressive, does combine with stative predicates: the reason that the imperfective does combine with stative predicates is that in Greek, in contrast to English, there are no aspectually neutral forms that could be chosen instead. Note, however, that my explanation goes further as it explains *why* there are no aspectually neutral forms in Ancient Greek, the reason being that the imperfective and aorist always make a semantic contribution.

4.9 The conative and likelihood interpretations

After the discussion of the interaction between imperfective aspect and stative predicates in the previous section, let's now turn to the interaction with bounded predicates. Imperfective aspect indicates that an eventuality described by the predicate is going on at the time about which we speak, the topic time. Intuitively, this semantics can handle the conative interpretation of imperfective aspect, the use of imperfective aspect for eventualities that do not proceed further than an attempt (see section 2.1), which is restricted to bounded predicates. The intuitive explanation of this use is as follows: Since one restricts one's claim to a specific time and says about that time that an eventuality is going on, no claim is made that the eventuality will ever be completed. For stative predicates this is not relevant, given that a part of an eventuality that makes a stative predicate true also makes the predicate true (cf. (100)). So even if the eventuality is not completed, there is still an eventuality to which the predicate applies. To a high degree, the same holds for unbounded non-stative predicates, due to their partial divisivity (cf. (99) and (100)).¹⁵ But for bounded predicates (cf. (99)), it is not the case that if there is an eventuality of the relevant kind in progress there is also an eventuality to which the predicate applies. To illustrate this, compare the French examples in (133) and (134):

- (133) a. *Max courait.*
 Max run.PST.IPFV.3SG
 "Max was running"

¹⁵That it is a high degree can be concluded from the fact that (133a) entails (133b): an arbitrary part of running still counts as running.

- b. *Max a couru.*
Max run.PST.PC.3SG
“Max has run”
- (134) a. *Max traversait la rue.*
Max cross.PST.IPFV.3SG the street
“Max was crossing the street”
- b. *Max a traversé la rue.*
Max cross.PST.PC.3SG the street
“Max has crossed the street”

(133a), with an unbounded predicate, entails (133b). By contrast, (134a), with a bounded predicate, does not entail (134b). A part of running counts as running, but a part of crossing the street does not count as crossing the street. In line with Rijksbaron (2002), I claim that the conative interpretation of imperfective aspect should be understood in this way. Let me illustrate this with (135) (= (17)):

- (135) ἐπεθύμησε τῆς χλανίδος καὶ αὐτήν
epethumēse tēs chlanidos kai autēn
long.for.PST.AOR.3SG the.GEN garment.GEN and that.ACC
προσελθὼν ὠνέετο. ὁ δὲ
proselthōn ōneeto. ho de
go.to.AOR.PTCP.NOM buy.PST.IPFV.3SG the.NOM but
Συλοσῶν ... λέγει· ἐγὼ ταύτην
Sulosōn ... legei: egō tautēn
Syloson.NOM ... say.PRS.IPFV.3SG I.NOM that.ACC
πωλέω μὲν οὐδενὸς χρήματος, δίδωμι δὲ
pōleō men oudenos chrēmatos, didōmi de
sell.PRS.IPFV.1SG PRT no.GEN money.GEN give.PRS.IPFV.1SG but
ἄλλως
allōs
for.nothing
“He (= Darius) set his heart upon the garment, came forward and wanted to buy it. But Syloson said: ‘I don’t sell that one for any money, but I give it for free.’ ” Hdt. 3.139.2-3

According to my analysis the imperfective aspect of ὠνέετο *ōneeto* ‘buy’ indicates that the buying is going on at the topic time, a time immediately following the coming forward. This intuitively captures the fact that the first sentence states nothing with respect to the completion of this eventuality.

Unfortunately, this attractive feature of the informal analysis is lost if we make explicit in the way I did what this *going on at the topic time* means.

Consider (136), which gives the semantics for (135):

$$\begin{aligned}
 (136) \quad & \text{PAST}(\text{IMP}(\lambda e \boxed{\text{d_buy}(e)}))) \\
 &= \lambda Q[Q(\mathbf{t}_{\text{TT}}) \oplus \boxed{\mathbf{t}_{\text{TT}} \prec \mathbf{n}}](\lambda P \lambda t [P(e) \oplus \boxed{e \text{ } \tau(e) \supset \mathbf{t}_{\text{TT}}}] \\
 & \quad (\lambda e \boxed{\text{d_buy}(e)})) \\
 &\equiv \boxed{\begin{array}{c} e \\ \text{d_buy}(e) \\ \tau(e) \supset \mathbf{t}_{\text{TT}} \\ \mathbf{t}_{\text{TT}} \prec \mathbf{n} \end{array}}
 \end{aligned}$$

In contrast to the natural language sentence (135), the logical form (136) does entail that there is a (complete) eventuality e of which the predicate holds, which is clearly not what we want. We hit here upon the notorious problem of the imperfective paradox, which I have already briefly discussed in section 3.2.2 and which was shown to be a challenge for the English progressive as well.

I don't have a solution to the imperfective paradox. I believe that such a solution goes beyond the scope of this work and deserves a study of its own, as witnessed by the many attempts found in the literature. However, in order not to neglect the imperfective paradox completely, I will show how one specific proposal to solve the imperfective paradox (for the English progressive) can be integrated into my account of imperfective aspect. This is the account of Dowty (1979:145–150). The solution involves an ‘intensionalisation’ of the semantics of imperfective aspect. To put it simply, the imperfective now indicates that there is an eventuality to which the predicate applies in the normal, not the actual, course of eventualities. The formalisation of this new imperfective operator IMP' is given in (137):

$$(137) \quad \text{IMP}' = \lambda P \lambda t \boxed{\begin{array}{c} \boxed{w'} \\ \text{Inert}_t(w_0, w') \end{array} \rightarrow \boxed{\begin{array}{c} e \\ \tau(e) \supset t \end{array} \oplus P(w')(e)}]$$

A crucial part of IMP' is the notion of inertia worlds. $\text{Inert}_t(w_0, w')$ reads as: w' is an inertia world for the actual world w_0 at time t , which means that w' is exactly like world w_0 up to and including t and after t the course

of eventualities happens in a way most compatible with the past course of eventualities. (137) states that in all these inertia worlds there is an eventuality of which P holds and that temporally includes $\mathbf{t}$. Crucially it does not state that there is an eventuality of which P holds in the actual world.

As before, the time to which the eventuality stands in the specified temporal relation ends up to be the topic time, due to the semantic contribution of tense. We see this if we apply IMP' to (135) (for the full derivation see (223) in Appendix B):

$$\begin{aligned}
 (138) \quad & \text{PAST}(\text{IMP}'(\lambda w \lambda e \boxed{\text{d_buy}(e, w)}))) \\
 &= \lambda Q [Q(\mathbf{t}_{\text{TT}}) \oplus \boxed{\mathbf{t}_{\text{TT}} \prec \mathbf{n}}] \\
 & \quad (\lambda P \lambda t \boxed{\begin{array}{c} w' \\ \text{Inert}_{\mathbf{t}}(w_0, w') \end{array}} \rightarrow \boxed{\begin{array}{c} e \\ \tau(e) \supset t \end{array}} \oplus P(w')(e)) \\
 & \quad (\lambda w \lambda e \boxed{\text{d_buy}(e, w)})) \\
 &\equiv \boxed{\begin{array}{c} \begin{array}{c} w' \\ \text{Inert}_{\mathbf{t}_{\text{TT}}}(w_0, w') \end{array} \rightarrow \begin{array}{c} e \\ \text{d_buy}(e, w') \\ \tau(e) \supset \mathbf{t}_{\text{TT}} \end{array} \\ \mathbf{t}_{\text{TT}} \prec \mathbf{n} \end{array}}
 \end{aligned}$$

(138) specifies that (135) is true iff in every inertia world w' of w_0 at the topic time $\mathbf{t}_{\text{TT}}$ there is a d_buy eventuality e whose runtime $\tau(e)$ is a superinterval of the topic time $\mathbf{t}_{\text{TT}}$ such that $\mathbf{t}_{\text{TT}}$ is not a final part of $\tau(e)$ (note that the temporal relation is the same as before, with IMP). This is illustrated in Figure 4.11. In other words, (135) is true iff in the normal course of eventualities after the topic time there is an eventuality of Darius buying the garment. This solves the problem of the imperfective paradox since it does not commit itself to the existence of a buying eventuality in the actual world.¹⁶

Recall that every inertia world w' of the actual world w_0 at the topic time $\mathbf{t}_{\text{TT}}$ is identical to w_0 up to and including $\mathbf{t}_{\text{TT}}$. Therefore, by making a claim

¹⁶The question remains why the natural English translation is *wanted to buy* rather than *was buying*.

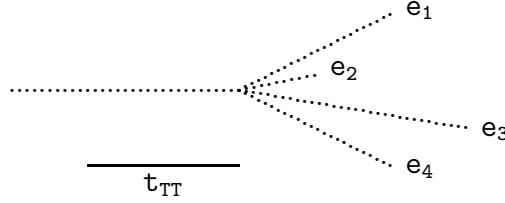


Figure 4.11: Imperfective aspect intensionalised

about what happens in the inertia worlds during t_{TT} , a claim is made about the actual world during t_{TT} as well. In this way, the intuition is captured that this t_{TT} , which is the topic time, is the time ‘about which we speak’, since it is only as far as t_{TT} is concerned that (by saying something about the inertia worlds) something is said about the actual world.¹⁷ This nice consequence of IMP' is absent in IMP .

Note that this intensionalisation of the imperfective operator does not affect its interpretation with unbounded predicates. For an unbounded predicate P we get that if $IMP(P)$ is true of the topic time, and hence in all inertia worlds there is a P eventuality e of whose runtime $\tau(e)$ the topic time is a non-final subset, it is (due to the divisivity of P) probable that in those worlds there is also a P eventuality e' temporally included in the topic time, and this eventuality takes place in the actual world as well (due to the fact that all these inertia worlds are identical to the actual world up to and including the topic time). This is illustrated in Figure 4.12. This result is exactly what we want, for the imperfective paradox is restricted to bounded predicates.

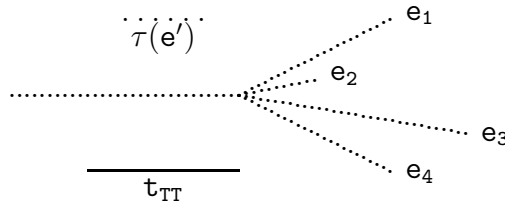


Figure 4.12: Imperfective aspect intensionalised for unbounded predicates

A possible objection to this intensionalisation of the semantics of imperfective aspect may be that as a result imperfective aspect does something completely different from aoristic aspect, (101b). This objection does not hold,

¹⁷Admittedly, by saying something about the inertia worlds, we also say something about the actual world *before* the topic time. The crucial thing, however, is that we don't say something about the actual world *after* the topic time.

however, since if we wish, we can easily intensionalise the semantics of the aorist as well:

$$(139) \quad \text{AOR}' = \lambda P \lambda t \left[\begin{array}{|c|} \hline \begin{array}{|c|} \hline w' \\ \hline \text{Inert}_t(w_0, w') \\ \hline \end{array} \\ \hline \end{array} \rightarrow \left[\begin{array}{|c|} \hline e \\ \hline \tau(e) \subseteq t \\ \hline \end{array} \oplus P(w')(e) \right] \right]$$

The result, however, is identical to what we get with the simple semantics, proposed earlier. Since all inertia worlds are identical to the actual world until the end of the topic time, it follows from the fact that there is a P eventuality included in the topic time in all inertia worlds that there is such an eventuality in the actual world.

The foregoing discussion shows how Dowty's solution of the imperfective paradox can be integrated in the semantics of imperfective and aoristic aspect. In order to keep formulas simple, I will return to the simple, non-intensional semantics for the remainder of this work. It should be noted that this has no effect on the proposed analyses as they can all be reformulated in the intensional semantics without affecting the results.¹⁸

Before we leave the subject of the imperfective paradox, I will discuss a different way to avoid this paradox, proposed by Gerö and von Stechow (2003). It is interesting to see how they deal with the paradox, since I have adopted their semantics of imperfective and aoristic aspect. I will try to show that an analysis along the lines described above is superior to their account.

The imperfective paradox is probably the reason why Gerö and von Stechow (2003) propose their selectional restriction of imperfective aspect to unbounded predicates (see section 3.2.4). The (implicit) reasoning behind this restriction seems to be the following: The problem of the imperfective paradox arises only with bounded predicates. By restricting imperfective aspect to unbounded predicates, no problem will arise.

But then the question is what to do with the cases where the imperfective seemingly combines with a bounded predicate. The straightforward answer is to introduce for these cases a coercion operator that maps the bounded predicate onto an unbounded predicate. For this purpose, Gerö and von Stechow (2003) propose the operator PROG' which, like my IMP' , is based on Dowty's (1979) semantics for the English progressive.¹⁹

¹⁸This also holds for examples that involve habitual coercion, since a proper habituality operator returns unbounded predicates.

¹⁹I have reformulated their account in DRT and adapted the use of variables to my own notational conventions.

$$(140) \quad \text{PROG}' = \lambda P \lambda e \left[\begin{array}{c} \boxed{\begin{array}{c} w' \\ \text{Inert}_{\tau(e)}(w_0, w') \end{array}} \rightarrow \left[\begin{array}{c} t \ e' \\ \tau(e) \supset t \\ \tau(e') \subseteq t \end{array} \oplus P(w')(e') \right] \end{array} \right]$$

The main difference with my account is that I intensionalise the semantics of the imperfective itself, whereas they capture the intensional element with an additional operator. As a result imperfectivity comes on top of progressivity in their account. For (134a) we get the logical form in (141) (for INCLUDED, see (87); for the full derivation, see (224) in Appendix B):

$$(141) \quad \text{PAST}(\text{INCLUDED}(\text{PROG}'(\lambda w \lambda e \left[\begin{array}{c} \boxed{} \\ m_cross(e, w) \end{array} \right])))$$

$$= \lambda Q \left[\begin{array}{c} \boxed{} \\ t_{TT} \prec n \end{array} \oplus Q(t_{TT}) \right] (\lambda P \lambda t \left[\begin{array}{c} e \\ \tau(e) \supseteq t \end{array} \oplus P(e) \right]$$

$$(\lambda P \lambda e \left[\begin{array}{c} \boxed{} \\ \begin{array}{c} \boxed{w'} \\ \text{Inert}_{\tau(e)}(w_0, w') \end{array} \rightarrow \left[\begin{array}{c} t \ e' \\ \tau(e) \supset t \\ \tau(e') \subseteq t \end{array} \oplus P(w')(e') \right] \end{array} \right]$$

$$(\lambda w \lambda e \left[\begin{array}{c} \boxed{} \\ m_cross(e, w) \end{array} \right])))$$

$$\equiv \left[\begin{array}{c} e \\ \begin{array}{c} \boxed{w'} \\ \text{Inert}_{\tau(e)}(w_0, w') \end{array} \rightarrow \begin{array}{c} t \ e' \\ m_cross(e', w') \\ \tau(e) \supset t \\ \tau(e') \subseteq t \end{array} \\ \tau(e) \supseteq t_{TT} \\ t_{TT} \prec n \end{array} \right]$$

Without going in too much detail, notice that the imperfective and progressive operators contribute three temporal relations in total. Stacking these temporal relations gives the wrong result that the complete eventuality of crossing the street e' can be included in the topic time t_{TT} (see Figure 4.13). This completely undoes the intended ‘going on’ interpretation of imperfective aspect.

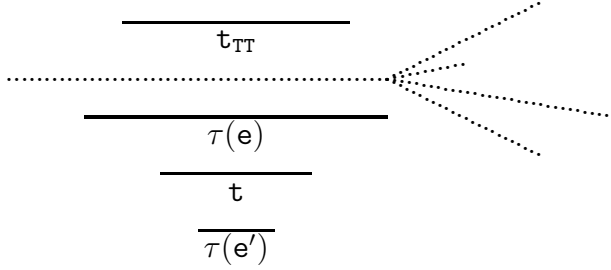


Figure 4.13: Stacking imperfectivity and progressivity according to Gerö and von Stechow (2003)

We can solve this problem by changing the temporal relations of the progressive as in (142):

$$(142) \quad \text{PROG}'' = \lambda P \lambda e \left[\begin{array}{c} \boxed{\begin{array}{c} \mathbf{w}' \\ \text{Inert}_{\tau(e)}(\mathbf{w}_0, \mathbf{w}') \end{array}} \rightarrow \left[\begin{array}{c} \mathbf{e}' \\ \tau(\mathbf{e}') \supset \tau(e) \end{array} \oplus P(\mathbf{w}')(\mathbf{e}') \right] \end{array} \right]$$

As Figure 4.14 shows, we now get the correct result that the complete crossing the street eventuality $\mathbf{e}'$ includes the topic time. This captures the ‘going on’ interpretation. Furthermore, the analysis is not subject to the imperfective paradox, since it does not commit itself to the existence of the complete eventuality in the actual world.

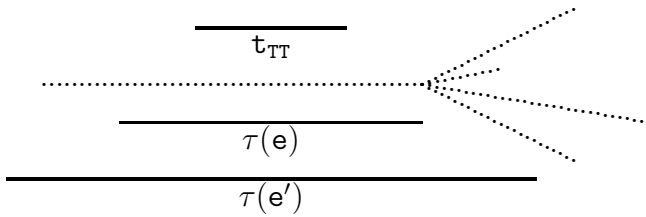


Figure 4.14: Adapted version of 4.13

The difference between my account and this account is the following. Whereas I do not assume an aspectual class restriction for imperfective aspect and modify the semantics of imperfective aspect itself to avoid the imperfective paradox, Gerö and von Stechow do assume such a restriction and introduce a coercion operator between the imperfective operator and a bounded predicate

to avoid the paradox. Why is it that I prefer my account over theirs?

First, it is not clear in Gerö and von Stechow's account why imperfective aspect would be restricted to unbounded predicates, a problem already mentioned in section 3.2.4. They state that this restriction follows from the fact that with imperfective aspect the topic time is included in the eventuality time, but this is not true. It is clear that the restriction to unbounded predicates is useful for avoiding the imperfective paradox, but without an independent motivation this restriction is quite *ad hoc*.

Second, in my account the difference between bounded and unbounded predicates with respect to the imperfective paradox follows from the semantics of the imperfective itself. The imperfective operator IMP' suffices on its own to account for the fact that (133a) entails (133b), while (134a) does not entail (134b). Gerö and von Stechow's account, on the other hand, implies that something different is going on in (133a) than in (134a), as a coercion operator is involved in the latter but not the former. Note that apart from the imperfective paradox there is no motivation for assuming this coercion operator. We end up with two temporal relations that both intend to capture the same idea, viz. that an eventuality of the type described by the predicate is *going on*, whereas IMP' shows that we can do with one.²⁰ We could try to formulate a progressive operator that does not introduce temporal relations of its own, but it is not clear to me what this operator should look like.

²⁰Although this stacking of imperfectivity and progressivity is found most explicitly in Gerö and von Stechow (2003), we find a similar idea in Kamp and Reyle (1993), de Swart (1998), and Kamp, van Genabith, and Reyle (2005). Let me illustrate it with the last account. The logical form they assign to (i) is roughly (ii) (Kamp et al. 2005:78):

- (i) A man was pulling his gun.

(ii)	$n \ s \ t_1 \ t_2$
	$\text{PROG}(\lambda e \ m_pull(e))(s)$
	$\tau(s) = t_1$
	$t_1 \supseteq t_2$
	$t_2 \prec n$

They don't specify what this PROG is, aware of the problem of the imperfective paradox, but it probably contains some temporal relation. (ii) specifies that the runtime of progressive state t_1 includes the location time ($\approx$ topic time) t_2 . But what reasons do we have to think that this is the correct temporal relation? The natural language sentence (i) seems to give us only the information that the complete pulling event, rather than the progressive state, includes this time. It gives no information about the relation between the progressive state and the location time. Since we already have a progressive operator, the inclusion relation between eventuality time and location time is superfluous. The source of the problem is the same as in Gerö and von Stechow (2003): both accounts want to stick to the idea that aspect has to do with the temporal relation between eventuality time and topic time (either direct, as in von Stechow et al., or indirect via aspectual classes, as in Kamp et al.), but want to avoid the imperfective paradox.

Because of these problems, I don't follow Gerö and von Stechow's account of the imperfective paradox. I think the solution instead has to be found in the semantics of the imperfective operator itself and I have proposed a way to achieve this.

Apart from the conative interpretation, the intensional version of the imperfective operator is also needed to account for the likelihood interpretation, the interpretation that something threatened to happen, as exemplified in (143) (= (18)):

- (143) μεταρσία ληφθεῖς'
 metarsia *lēphtheis'*
 raised.from.the.ground.NOM take.AOR.PASS.PTCP.NOM
 ἐκ αἰνόμενον ξίφει
 ekainomēn *xiphei*
 kill.PST.IPFV.PASS.1SG sword.DAT

 ἀλλ' ἐξέκλεψεν ...
 all' exeklepsen ...
 but snatch.PST.AOR.3SG

 Ἄρτεμις
 Artemis
 Artemis.NOM

“having been lifted high in the air I (= Iphigeneia) was about to be killed by the sword; but Artemis snatched me away.”

E. I. T. 27-28

The situation here is a bit more complicated than with the conative interpretation, though, since coercion is involved. *I be killed* is naturally classified as a punctual predicate. If *punctual* is taken in the strong sense here, meaning that a predicate is punctual if it refers to a set of eventualities without duration, there is a clash between the semantics of the imperfective and its argument: the imperfective indicates that the topic time is properly included in the runtime of the eventuality, which is impossible if the runtime is a moment.²¹ As with the habitual reinterpretation, the mismatch is a durational one. And as before, the hearer nevertheless tries to give a sensible interpretation to the utterance. The reinterpretation path – to use Moens and Steedman's terminology – involved in (143) is the same as in English sentences like (94c), here repeated as (144):

- (144) Harry was reaching the top.

²¹Egg (2005:chapter 6) provides a way to deal with these kind of data without resorting to eventualities without duration.

In (144), some eventuality that may result in reaching the top, but not the reaching itself is in progress. In the same way, in (143) some eventuality that may result in being killed is in progress, not the being killed itself.²² The coercion operator involved here maps the set of eventualities in the extension of a predicate *P* onto the set of preparatory eventualities for the eventualities in the extension of *P*. The crucial thing is that such an operator extends the time associated with the predicate and thus solves the mismatch in duration. The insertion of this coercion operator between the imperfective operator and the predicate results in the truth conditions that the topic time is included in a preparatory eventuality that leads to an eventuality of the kind described by the predicate in the normal course of eventualities: the eventuality (of dying, of reaching the top) ‘was about to happen’. Since the subject in (143) in contrast to (144) supposedly doesn’t want the eventuality to happen, we get the interpretation that it threatened to happen.²³ To conclude this discussion of the likelihood interpretation I emphasise that we need the intensional *IMP'* rather than *IMP* to avoid being committed to the existence of an actual dying or reaching eventuality.

In this section I have argued that the conative and likelihood interpretations in Ancient Greek should be understood in the same terms as the effects found with the combination of the progressive with bounded and punctual predicates in English.

4.10 Conclusion

Let me recapitulate my account of the various interpretations of aoristic and imperfective aspect, which is also graphically represented in Figure 4.15. The aorist and imperfective are grammatical aspects and determine the relation between the topic time and the eventuality time. More specifically, the aorist indicates that the eventuality time is included in the topic time, the imperfective that the eventuality time includes the topic time. This semantics of aorist

²²If one prefers to classify *I be killed* as a non-punctual predicate, that’s fine with me too. Then the being killed itself (which now consists of several phases) *is* in progress, which yields the same interpretation as the account given here where the preparatory eventuality of a punctual eventuality is in progress. Similarly, I wouldn’t have a problem with classifying *Darius buy the garment* as punctual, referring to the sole moment of giving the money, and saying that preparatory coercion is involved here, since the resulting interpretation is the same.

²³The duration associated with the predicate is not the only factor that determines whether a sentence is traditionally classified as an example of the conative or of the likelihood interpretation. Other properties of the predicate play a role as well, for example whether the subject is an intentional agent. If it is, as in (135), the example is classified as conative. If it’s not, as in (143), we may get the interpretation that something threatened to occur. From an aspectual point of view, however, this difference is not relevant.

and imperfective on its own yields the completive interpretation of the aorist and the processual interpretation of the imperfective.

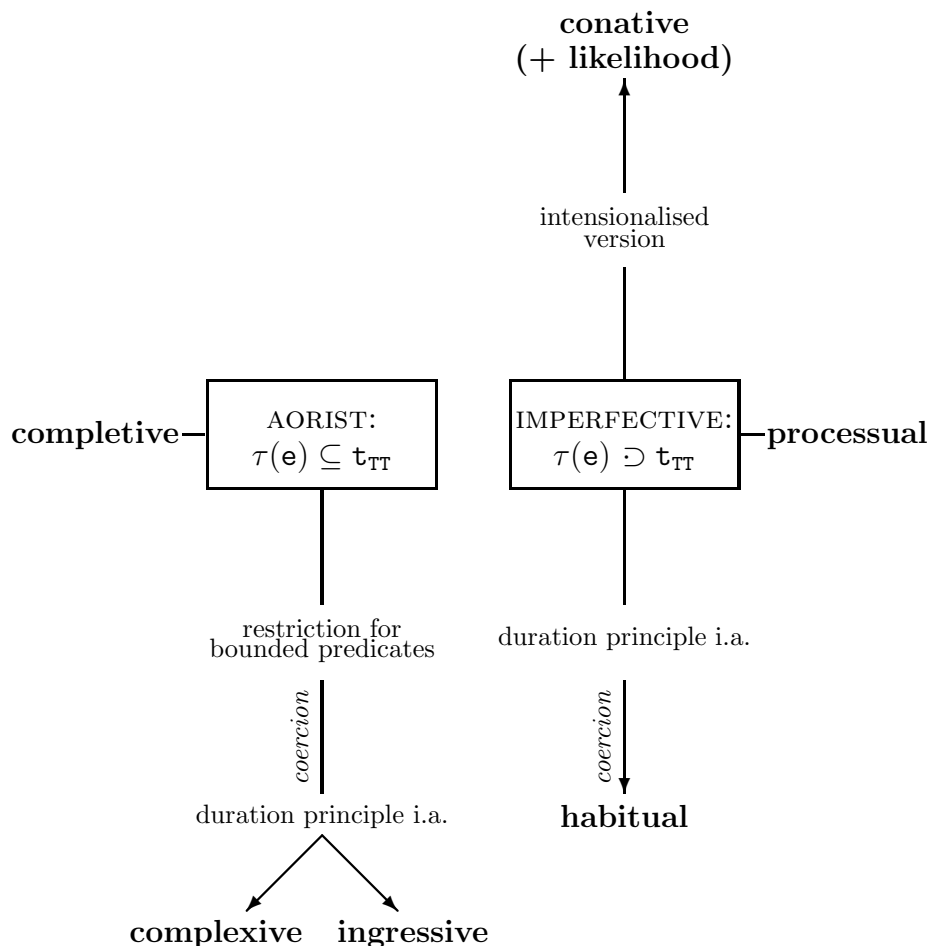


Figure 4.15: Overview of the interpretations of aorist and imperfective 1

Furthermore, I have argued that the aorist is restricted to bounded predicates as to rule out a potential overlap between the use of aorist and imperfective. This selectional restriction of the aorist operator triggers reinterpretation when it is confronted with an unbounded predicate. In such cases an intervening coercion operator solves the mismatch between the operator and the argument. I have introduced two operators for this purpose: the ingressive operator, which yields the ingressive interpretation, and the maximality operator, which yields the complexive interpretation. The Duration Principle plays a crucial role in the choice between the two operators, as each has a different effect on the duration associated with the predicate. If the topic time is short,

an ingressive interpretation is chosen, since the ingressive operator shortens the time associated with the predicate. If the topic time is long, both interpretations are available, but a complexive interpretation may be favoured on the basis of a general preference for stronger interpretations.

I have argued that in contrast to the aorist, the imperfective does not impose an aspectual class restriction on its argument. It combines equally well with bounded and unbounded predicates. Nevertheless, the Duration Principle does play a role here as well: not only does it guide the choice among the various feasible reinterpretations (as it does with the aorist); it can also trigger its own reinterpretations. This is how the habitual interpretation of the imperfective comes about. If the topic time is longer than the typical duration associated with the predicate, the mismatch is solved by the intervention of a habitual coercion operator, which lengthens the time associated with the predicate.

To capture the conative interpretation, we must adapt our semantics of the imperfective in such a way that there is no commitment to the existence of a complete eventuality of the kind described by the bare predicate in the actual world. I have indicated a way to do this in section 4.9. The likelihood interpretation then is the result of a coercion process with punctual predicates. The imperfective indicates that the topic time is included in an eventuality's runtime, which is impossible for punctual eventualities. As with an habitual reinterpretation, this mismatch in duration is solved by a coercion operator, this time a coercion operator that returns preparatory eventualities.

The proposed account combines the semantics of perfective and imperfective aspect of von Stechow et al., de Swart's idea of coercion in this domain, and Egg's Duration Principle. Moreover, it integrates Krifka's AOR operator in the form of a maximality operator that yields the complexive interpretation, and it is formulated in Kamp's DRT framework. Crucially, the account combines the insights but leaves out the problematic parts of each of these previous accounts. I use de Swart's idea of coercion, but, by adopting the semantics of imperfective and aoristic aspect of von Stechow et al., I do not end up with a vacuous semantics of the aspects. Furthermore, my account explains why the ingressive interpretation of the aorist is restricted to unbounded predicates (for only here is there a mismatch in aspectual class). At the same time it explains why the habitual interpretation of imperfective aspect is not restricted to bounded predicates (for the habitual interpretation is triggered by a mismatch in duration rather than aspectual class), a point that was problematic for de Swart's account. Moreover, it offers an explanation for the restriction of the aorist for bounded predicates, which was missing in the account of von Stechow et al. A final and previously unmentioned advantage is that the account explains why we find a reinterpretation that lengthens the time associated with the predicate with the imperfective (the habitual interpretation), and a

reinterpretation that shortens the time associated with the predicate with the aorist (the ingressive interpretation). This follows directly from the semantics of the aorist and imperfective: the imperfective states that the topic time is included in the eventuality time, so the eventuality time should be long enough; the aorist states that the eventuality time is included in the topic time, so the eventuality time should be short enough. It should be clear by now that my account has multiple advantages over the mentioned accounts. The one thing I have not yet exploited are the opportunities of dynamic semantics. This is left for chapter 6.

In this chapter, I have shown how the proposed ambiguity-free semantics for imperfective and aoristic aspect accounts for the processual and habitual interpretation of the former and the completive, ingressive, and complexive interpretation of the latter. In the next chapter I will demonstrate that it also explains the so-called tragic interpretation of the aorist.

Chapter 5

Aspect and performativity: the tragic aorist

5.1 Introduction

In this chapter I will show that the semantics of aoristic aspect proposed in chapter 4 also explains the so-called tragic use of the aorist (see section 2.4.3). Let me first recapitulate what this interpretation is. It is the use of a form for past tense and aoristic aspect to refer to present eventualities found with a restricted class of verbs (verbs of judgement, emotion, saying, ordering, advising) and in the first person only. Examples are (145) and (146):

- (145) Or. ἄρ' ἂν τύραννον διολέσαι δυναίμεθ' ἄν;
Iph. δεινὸν τόδ' εἶπας, ξενοφονεῖν ἐπήλυδας.
Or. ἀλλ' εἴ σε σώσει καμέ, κινδυνευτέον.
Iph. οὐκ ἂν δυναίμην· τὸ δὲ πρόθυμον
 ouk an dunaimēn to de prothumon
 not PRT can.IPFV.OPT.1SG the.ACC PRT eagerness.ACC
 ἤνεσα.
 ēnesa
 approve.PST.AOR.1SG
Or. “Could we murder the king?”
Iph. “A fearful suggestion, for foreigners to kill their host!”
Or. “But we must dare it, if it brings our safety.”
Iph. “I could not; yet I approve your eagerness.” E. *I.T.* 1020-23
- (146) Or. ὅμοσον (εἰ δὲ μή, κτενῶ σε) μὴ λέγειν ἐμὴν χάριν.

Phr. τήν	ἐμὴν	ψυχὴν	κατ' ὅσους	
<i>tēn</i>	<i>emēn</i>	<i>psuchēn</i>	<i>katōmos'</i>	
the.ACC	my.ACC	soul.ACC	swear.PST.AOR.1SG	
ἥν	ἃν	εὐορκοῖμ'	ἐγώ.	
<i>hēn</i>	<i>an</i>	<i>euorkoim'</i>	<i>egō</i>	
that.REL.ACC	PRT	swear.truly.IPFV.OPT.1SG	I.NOM	
Or. "Swear you are not saying this to humour me, or I will kill you."				
Phr. "I swear by my life, an oath I would keep!"			E. <i>Or.</i> 1516-7	

In both (145) and (146) a past tense form (*ἤνεσα ēnesa* and *κατώμοσα katōmosa*, respectively) is translated in English with a present tense (*approve*, *swear*).

The characterisation of the tragic aorist given above immediately points out the requirements of an adequate analysis. An analysis of this phenomenon should explain (i) that a past tense form is interpreted as describing a present eventuality, (ii) that aoristic aspect is used, (iii) that it is restricted to the above-mentioned class of verbs and (iv) that it is restricted to the first person.

5.2 Previous approaches

Traditional approaches to this use of the aorist can roughly be divided in two groups: one that takes the (past) tense feature of the verb form as the starting point, and the other that gives primacy to the (aoristic) aspect feature.

Kühner and Gerth (1898) are the most elaborate representatives of the first group. They claim that all occurrences of the tragic aorist have in common 'that a statement relating to the present is expressed as if it had already happened or begun' (Kühner and Gerth 1898:163: "dass ein auf die Gegenwart bezüglicher Ausspruch als ein bereits geschehener oder eingetretener ausgedrückt wird"). This could be true for verbs of judgement and emotion. (145), for instance, could simply be an example of the ingressive interpretation of the aorist: the beginning of the approval is then situated in the past of Iphigeneia's utterance time. It is, however, implausible that in (146), for example, the swearing started in the past.

For this reason, Moorhouse (1982) proposes to neglect the past tense feature of the verb form and to understand the use from its aoristic aspect feature, which makes him a representative of the second group. He claims that the tragic aorist (Moorhouse 1982:195)

may best be explained as arising from the punctual aspect, and as bringing to the fore the instantaneous nature of the occurrence: hence it is suitable for a sudden feeling, or act of comprehension, especially as expressed in quick repartee. The substitution of a

present tense (with its durative emphasis) in such cases would be inappropriate aspectually. So far as the time of the occurrence is concerned, it should be taken as contemporary; an attempt to refer all examples to the past, even the most immediate, cannot succeed.

Moorhouse seems to relate the phenomenon of the tragic aorist to the lack of a form for aoristic aspect and present tense in Ancient Greek (see section 1.2.2). He seems to suggest that in some cases this very form would be the most appropriate form, but that in its absence Greek may choose the form that is appropriate aspectually, although not with respect to time. I will work out this suggestion in the account I propose.

The two traditional approaches, the temporal and the aspectual, share two problems: they fail to account for the facts that the tragic aorist occurs only with a restricted class of verbs and only with the first person (requirements (iii) and (iv) above).

Lloyd (1999) proposes an alternative account that does not suffer from these two problems. He claims that sentences with a tragic aorist can invariably be analysed as performatives. The notion of performativity originates from Austin (1962) to distinguish sentences like (147) from sentences like (148):

- (147) a. I apologize for my behaviour.
- b. I swear I am not guilty.
- c. I name this ship the *Queen Elisabeth*.
- (148) a. I am blond.
- b. He apologized for his behaviour.
- c. I swore I was not guilty.

According to Austin, the peculiar thing about the sentences in (147) is that they are not used to *say* things (as are the sentences in (148)), but rather to actively *do* things: they do not describe the world, but change it. He calls such sentences *performative* sentences and the ones in (148) *constative*. The paradigm cases of performative sentences have the following properties: they contain a performative verb (for example, *apologize*, *swear*, *name*, *sentence*, *bet*, but not, for example, *be*), can collocate with *hereby* (*I hereby apologize*), and are in the first person indicative simple present tense. With respect to the last property, note that changing the person or tense, as in (148b) and (148c), immediately makes the sentences descriptive (constative) rather than performative.

Lloyd's proposal does not suffer from the problems of the more traditional approaches. On the contrary, an analysis of sentences with the tragic aorist as performatives elegantly accounts for the fact that we find this use of the aorist only in the first person and only with this restricted class of verbs.¹ The

¹An interpretation of the tragic aorist in terms of performativity carries with it that

proposal has its own problem, however. It does not explain why the form for past tense and aoristic aspect is used in performatives. To clarify the problem, let me have a closer look at Lloyd's view.

If we analyse sentences with the tragic aorist as performatives, Greek has two ways to express performatives: with the (past tense) aorist and with the (imperfective) present tense. An example of the latter is given in (149):

- (149) ὅ μ υ υ μ ι Γαῖαν Ἐλίου θ' ἁγνὸν
omnumi *Gaian* *Ḥēliou* *th' hagnon*
 swear.PRS.IPFV.1SG Earth.ACC Helios.GEN and holy.ACC
 σέβας)
sebas)
 worship.ACC
- θεοὺς τε πάντας ἐμμενεῖν ἃ σου
theous *te* *pantas emmenein* *ha* *sou*
 god.ACC and all.ACC abide.in.FUT.INF what.REL.ACC you.GEN
 κλύω.
kluō
 hear.PRS.IPFV.1SG

"I swear by Earth, by the holy worship of Helios, and by all the gods
 that I will do as I hear from you." E. *Med.* 752-753.

So, for the act of swearing, we find both the form for aoristic aspect and past tense as in (146) and the form for imperfective aspect and present tense as in (149). Lloyd (1999:26) argues that the function of the tragic aorist is 'to distance the speaker from the full force of the present tense performative'. It is not clear, however, where this distancing effect of the tragic aorist comes from. Is it a contribution of the past tense or of the aoristic aspect feature? In the former scenario, it is left unexplained why we do not have a tragic (past) imperfective alongside a tragic aorist. But in the latter, it is not clear what element of the general meaning of aoristic aspect leads to a distancing effect in the case of performatives. *Prima facie* there is no link between aoristic aspect and distancing. What is more, as Lloyd (1999:26) notes himself, it is not clear why the aorist should not be employed as a distancing device with other types of verbs.

In short, Lloyd's proposal falls short to explain why aoristic aspect is used in performatives, and hence, does not meet the second requirement for analyses of

the use of the past aoristic form of the *second* person with verbs of saying, that is placed under the same header by some grammars (e.g., Smyth 1984:432), is treated as a different phenomenon. Moorhouse (1982:196) and Lloyd (1999:44) agree that with these forms, in contrast to the first person forms, there is (immediate) past time reference.

the tragic aorist posed above. He does not relate performativity to the meaning of aoristic aspect. In fact, he presents his analysis as opposed to analyses that try to explain the tragic aorist in terms of aspect. In the analysis of the tragic aorist that I propose below I will follow Lloyd's idea that the tragic aorist concerns the use of the aorist that we find in performatives, but I will fill the gap in his account by showing that the aorist is the aspect to be expected with performatives. In this way, my analysis meets the second requirement.

Rijksbaron (2002) by and large follows Lloyd's account in the latest edition of his book, but, in contrast to Lloyd, he does relate this use to the basic value of completion that he assigns to the aorist. I will show that in order to give a full-fledged account of the phenomenon, we need the semantics of tense and aspect proposed in section 4.3.

In what follows, I will present a revised view on the tragic aorist. The essential ingredient in this analysis is the lack of a form for aoristic aspect and present tense in Ancient Greek. I first argue that this lack is due to a tension between the semantic values of the two. Then, I show that this missing form would be the optimal form for performatives. To illustrate the special aspectual behaviour of performatives I examine which verb forms are used in performatives across languages. Finally, I will present the actual proposal.

5.3 A semantic tension between aoristic aspect and present tense

Why does Ancient Greek not have a form for aoristic aspect and present tense? The answer to this question will be an important ingredient of my explanation and interpretation of the tragic aorist. The short answer is that the possibilities of using a form for the combination of aoristic aspect and present tense are very restricted for semantic reasons. Recall from chapter 4 (4.3) that aoristic aspect indicates that the eventuality time is (improperly) included in the topic time, and present tense that the topic time is the utterance time. From this it follows that with the combination aoristic aspect and present tense, the eventuality time is (improperly) included in the utterance time. In other words, a clause with an aoristic present tense verb would only be true if the whole eventuality described would occur within the utterance time (including the option that the time of the eventuality coincides with the utterance time). This, however, is rarely the case. The exceptionality becomes even clearer if the utterance time is conceived of as punctual, as is often assumed (see, for example, Paslawska and von Stechow 2003:322 and Kamp and Reyle 1993:539, 514). Then proper inclusion in the utterance time is impossible, the only option left being coincidence of eventuality time and utterance time, and for this the eventuality time must be (conceived of as) punctual itself, too. Such

eventualities are rare, however. So the reason that Ancient Greek does not have a form for aoristic aspect and present tense is that there is little use for it.²

Support for this view may be found in the development of the Ancient Greek tense and aspect system. It has been argued, for example by Hewson and Bubenik (1997), that Ancient Greek originally had a binary tense system with distinct forms for past and non-past tense, the latter covering the meaning of the present and future tense in a ternary tense system. On this view, the form for aoristic aspect and non-past tense is what later became the form for a genuine future tense. This hypothesis explains the morphological similarity between the (sigmatic) aorist and (sigmatic) future. But how did this form for aoristic aspect and non-past tense develop into a future tense? This development is explained neatly if we assume the tension between aoristic aspect and present tense argued for above: in principle, the form for aoristic aspect and non-past tense could be used to refer to the present time as well as to the future. But, as I have shown, the possibilities for using aoristic aspect to refer to the present time are very restricted for semantic reasons. For this reason, the form for non-past tense and aoristic aspect was in fact almost exclusively used for future time reference and began to be felt as a future tense. From there it developed into a genuine future tense.³

In sum, there is no form for the combination present tense and aoristic aspect because there is a tension between their semantic contributions: there are very few situations that hold exactly at the moment of speaking. But although there is little use for this combination, from a semantic perspective the combination is not completely impossible. In the next section I will show that performatives represent one of the few cases where we would expect the form for aoristic aspect and present tense, the form that is missing in Ancient

² This explanation of the lack of a form for aoristic aspect and present tense hinges on the assumption that the present tense states that the topic time *is*, rather than *includes* the utterance time. As I have mentioned in section 4.3 the former option is pursued by Kamp et al. and von Stechow et al., the latter by Klein. The reason that I followed the former is exactly that this makes it easy to see why there is no form for the combination of aoristic aspect and present tense. If, on the other hand, the contribution of the present tense is that the topic time includes the moment of utterance, this absence cannot be accounted for, at least not in a straightforward way. In fact, we would predict that the form for aoristic aspect and present tense can even be used if the eventuality time does not overlap with the utterance time at all, for we have the conditions $\tau(e) \subseteq t_{TT}$ and $n \subseteq t_{TT}$ which allows that $\tau(e)$ does not overlap with n .

³ As Eystein Dahl (p.c.) has pointed out to me, Hewson and Bubenik's (1997) hypothesis of the relationship between the (sigmatic) aorist and (sigmatic) future in Ancient Greek is somewhat controversial within the Indo-European research community, despite its advantages. Tichy (2006:307–308, 311–318), for example, assume that the Ancient Greek sigmatic future derives from an independent sigmatic *voluntative*. This, however, does not affect the above given explanation for the lack of the form for aoristic aspect and present tense in terms of a semantic tension.

Greek.

5.4 The semantics of performatives

In the previous section I have shown that the form for aoristic aspect and present tense is the expected form when the time of the eventuality and the utterance time coincide. This coincidence is rare, but we do find it with performatives. Let's have a look again at the examples of performatives that I presented above:

- (150) a. I apologize for my behaviour.
 b. I swear I am not guilty.
 c. I name this ship the *Queen Elisabeth*.

It is clear that in (150) the eventuality time and utterance time coincide, since the eventualities of apologizing, swearing, and naming referred to *are* exactly the utterances of the sentences themselves. The peculiar status of such sentences had already been observed by Koschmieder (1929, 1930, 1945) long before Austin, as witnessed by the following citation (from Koschmieder 1945:22):

Ich war bei der Untersuchung der Funktion der sog. "Tempora" in Hebräischen durch den Fall *bērachti'ōpō* = "ich segne ihn hiermit" darauf aufmerksam geworden, daß es sich hierbei um einen Sonderfall handelt, in dem nämlich das Aussprechen des Satzes nicht nur von der Handlung spricht, sondern auch eben die betr. Handlung ist.

(When investigating the function of the so-called "tempora" in Hebrew, I noticed that in the case of *bērachti'ōpō* = "I hereby bless him" something special is going on, in that the utterance of the sentence not only mentions the action, but also is the action.)

Koschmieder coins the phenomenon *Koinzidenzfall*. In line with this, Lemmon (1962) states that performative sentences are self-verifiable: by uttering a performative sentence, the speaker automatically makes it true (in this respect, Lemmon deviates from Austin who claims that performatives do not have a truth value (that is, they are neither true, nor false), as they do something rather than describe something).

I have shown that the optimal form for performatives is the combination of present tense and aoristic aspect, since eventuality time and utterance time coincide. But this combination does not exist in Ancient Greek. How does Greek get around this problem? Before I answer this question, I will first discuss the form of performatives in some other languages: English, Hebrew, Slovenian, Polish, and Russian.

5.5 Performatives across languages

Let's see which tense-aspect combination is chosen for performatives cross-linguistically, starting with English. Although this language does not have a distinction between perfective (=aoristic) and imperfective aspect, we can still see that performatives are special aspectually. We have already seen in section 3.3.1 that non-stative predicates in the simple (=non-progressive) present tense do not receive a literal interpretation, but are interpreted habitually. (151), for example, is interpreted as describing a habit rather than a single running eventuality.

(151) Lizet runs the Brabant half-marathon.

There exist a few exceptions to this generalization, however. One of them is the class of performatives. The sentences in (150) have non-stative predicates in the simple present tense, but are nevertheless naturally interpreted as referring to a single eventuality. I don't aim to explain this here, but I only want to point at the exceptional status performatives have in English. Let's now look at performatives in languages that do have a distinction between perfective and imperfective aspect.

Biblical Hebrew is an interesting language with regard to the relation between aspect and performatives, since aspect is grammaticalised (it has a distinction between perfective and imperfective aspect, traditionally called *perfect* and *imperfect*, respectively), but tense is not (see, for example, Koschmieder 1929:58-71).⁴ The absence of tense in Hebrew makes it possible to investigate which aspect a language uses for performatives if there is no tense interference. And indeed, as we might expect, Hebrew uses perfective aspect (Koschmieder 1930:354, Koschmieder 1945:22).⁵

(152) *bēraktî* *'ōtô*
 bless.PFV.1SG he.ACC
 "I (hereby) bless him"

Biblical Hebrew

Slovene is a language with grammatical tense and aspect. It has a binary tense system: a form for past and a form for non-past tense. The combination of non-past tense and perfective aspect usually gets a future interpretation, but it is also the form most often used in performatives. See (153) (from Greenberg 2006):

⁴But see Joosten (2002), for example, for a different view on the verb forms in Biblical Hebrew.

⁵The transliteration is Rogland's (2001:244).

- (153) *prisežem*
 swear.NPST.PFV.1SG
 “I swear” *Slovene*

The situation in Polish and Russian is somewhat more complicated. Like Slovene, both languages have a binary tense system (past vs. non-past) and a perfective-imperfective distinction. The use of perfective aspect in performatives, however, is restricted (in Russian even more so than in Polish). Perfective aspect is found in some performatives (as in (154) and (155)), but as a rule, imperfective aspect is used (as in (156) and (157)).

- (154) *poproszę* *o to szklankę.*
 ask.NPST.PFV.1SG for this glass
 “I ask for this glass.” *Polish*
- (155) *poproshu* *vstatj*
 ask.NPST.PFV.1SG stand-up.INF
 “I ask to stand up” *Russian*
- (156) *dziękuje*
 thank.NPST.IPFV.1SG
 “I thank” *Polish*
- (157) *Ja blagodaru*
 I.NOM thank.NPST.IPFV.1SG
 “I thank” *Russian*

How should we explain the fact that imperfective aspect is used in the majority of cases, although perfective aspect would be more appropriate? The explanation probably runs along the following lines. In the majority of cases where reference is made to the present time, imperfective aspect (and non-past tense) is used. For this reason, imperfective aspect (and non-past tense) is felt as *the* form for present time reference and is also used where it is aspectually inappropriate. Moreover, in the majority of cases where the form for perfective aspect and non-past tense is used, reference is made to the future time. For this reason, the form for perfective aspect and non-past tense is felt as a future tense and is not easily used for present-time reference.

The difference between Slovene on the one hand and Russian and Polish on the other hand may then be explained as follows (following a suggestion in Koschmieder 1930:354-355). Apart from a grammaticalised binary tense system, all three languages have a periphrastic future. Whereas Slovene, however, has a periphrastic future for both perfective and imperfective aspect, Russian and Polish have such a verb form only for imperfective aspect (since the form for non-past tense and perfective aspect is already used with reference to fu-

ture time for perfective aspect).⁶ Since Slovene has this periphrastic future as a second form that can be used for perfective future time reference, the second above-mentioned factor (the form perfective-present is used for future time reference in the majority of cases) is stronger in Polish and Russian than in Slovene: the existence of this form in Slovene makes that the ratio present reference : future reference for the form perfective aspect and non-past tense is not as skewed in Slovene as it is in Polish or Russian.

After having seen that performatives cross-linguistically exhibit remarkable behaviour as far as tense and aspect are concerned, let us now return to Ancient Greek.

5.6 The tragic aorist revisited

We have seen in section 5.2 that Lloyd (1999) interprets the so-called tragic aorist, a remarkable use of the form for past tense and aoristic aspect, in terms of performativity, and that this interpretation has two advantages over the traditional analyses in terms of tense or aspect: it explains the restriction to the first person and to a certain class of verbs. We have, however, also seen that an important question remains unanswered on his analysis: why is the aorist used in performatives? It is this question that I answer here. All the preparations have been done in the previous sections. Let's simply put the ingredients together.

In section 5.4 I showed that aoristic aspect is the aspect to be expected in performatives. To put it more precise, in performatives we would expect the form for aoristic aspect and present tense, since utterance time and eventuality time coincide. In section 5.3 I had already argued that Greek does not have this form since there is little use for it. Now the question is how does Greek express performatives, given that the optimal form does not exist? We know the answer already from section 5.2: Greek can choose both the form for imperfective aspect and present tense and the form for aoristic aspect and past tense. For the act of swearing, for example, we find both ὅμνῃμι *omnumi* 'swear.PRS.IMP' (149) and ὅμοσα *ōmosa* 'swear.PST.AOR' (146). The explanation then is as follows: In absence of the optimal form, Greek can choose between two suboptimal forms: If ὅμνῃμι is chosen, the (present) tense feature is given primacy and the (imperfective) aspect feature is taken for granted, whereas if ὅμοσα is chosen, it is the other way around: the (aoristic) aspect feature gets primacy and the (past) tense is taken for granted. Notice that the latter choice is what is traditionally called the tragic aorist. Thus, the tragic aorist is the use of a form for aoristic aspect and past tense in performatives, where the optimal form would have been the non-existing combination aorist-

⁶Compare the reference grammars on <http://www.seelrc.org/projects/grammars.ptml>.

present. The past tense feature is not interpreted: it is taken for granted in the absence of the optimal form. As should be clear by now, we do not have to assume an ambiguity in the semantics of the aorist to deal with this use of the aorist. It is the very semantics of the aorist proposed in chapter 4 that accounts for it. Viewed this way, the tragic aorist is not a mysterious use at all.

The present account establishes the link between aoristic aspect and performativity that is missing in Lloyd's account. As such, my account shows an improvement with respect to his. But it has a second advantage. Until now, I have been talking about performatives as if they are all explicit, that is, contain a performative verb that indicates their *force* (that is, indicates whether the act performed by uttering the sentence is an oath, promise, warning, etc.). But it is just as possible to perform an act by uttering a sentence *without* such a performative verb, as Austin notices himself (Austin 1976:243ff). To use Austin's example, the act of warning can be performed by the use of the explicit performative *I warn you that this bull is dangerous*, but also by saying simply *This bull is dangerous*. Let's call the latter sort *implicit* performatives. Similarly, in Greek the act of swearing can be performed with a verb of swearing (as we have seen in (146) and (149)) or without such a verb, as in (158):⁷

- (158) μὰ τῇν ...
 ma tēn ...
 PRT the.ACC
- Νίκην Ἀθηναῖν ...
 Nikēn *Athēnan* ...
 Nike.ACC Athene.ACC
- οὐκ ἔστιν ὅστις σοι πατὴρ
 ouk estin *hostis* *soi* *patēr*
 not be.PRS.IPFV.3SG any.one.NOM you.DAT father.NOM
- θνητῶν, τέκνον,
 thnētōn, *teknon*
 mortal.GEN child.VOC
- ἀλλ' ὅσπερ ἐξέθρεψε, Λοξίας
 all' hosper *exethrepse,* *Loxias*
 but the.one.who.NOM bring.up.PST.AOR.3SG Loxias.NOM
- ἄναξ.
 anax.
 lord.NOM

⁷Another example is E. *I.T.* 746.

“By Athena Nike . . . , your father is not a mortal, but the one who who brought you up, lord Loxias.” E. *Ion* 1528-31

That Creusa performs an oath in (157) is clear from the swearing particle $\mu\alpha$ *ma*.

If Lloyd is right and the function of the tragic aorist is ‘to distance the speaker from the full force of the present tense performative’, we expect this distancing effect not to be restricted to explicit performatives. The force of implicit performatives may be in need of being weakened, too. But, contrary to what we expect on Lloyd’s account, the aorist is not used as a distancing device with such performatives. On my account, however, this is exactly what we expect: a characteristic of explicit performatives is the coincidence of the time of the eventuality described by the finite verb and the utterance time, which demands aoristic aspect. Implicit performatives don’t have this feature, so there is no reason to expect aoristic aspect there.

An objection to the account proposed here may be that it claims that the tragic aorist should not be interpreted as referring to the past, even though morphologically it is a past tense form. By way of an answer, I only point at the fact that the tragic aorist is not an anomaly in this respect, that is, it is not the only use of the aorist indicative that is morphologically, but not semantically a past tense. The same thing is observed with the so-called *gnomic* or *generic* aorist, the use of the aorist indicative in general truths, proverbs and similes (see section 2.4.4). An indication that this latter use of the aorist is not a past tense semantically, comes from the mode of the subclauses: verbs in the subclauses modifying the main clause are in the subjunctive – as when the main clause is in the present tense – rather than the optative – as in the case of the common (past) aorist indicative (Rijksbaron 2002:31).

5.7 Conclusion

In this chapter I have shown that the tragic aorist is the use of the aorist that we find in performatives. Furthermore, I have demonstrated on the basis of the semantics of tense and aspect developed in chapter 4 that the optimal form for performatives would be the combination of present tense and aoristic aspect, since eventuality time and utterance time coincide. This form, however, does not exist in Ancient Greek. In the absence of the optimal form, two suboptimal forms are equally good: the form for present tense and imperfective aspect and the form for past tense and aoristic aspect. The latter is what is traditionally called the tragic aorist. This analysis of the tragic aorist satisfies all four criteria formulated in section 5.1. Once the tragic use had been unveiled as the use of the aorist in performatives, the semantics of tense and aspect developed in chapter 4 did the rest.

Chapter 6

The temporal structure of discourse

6.1 Introduction

In the two previous chapters I have presented an analysis of the various interpretations of aoristic and imperfective aspect. For this I have been mainly (though not exclusively) concerned with isolated sentences. In the present chapter I go beyond the level of the sentence and move on to the level of discourse.

It has often been observed that the choice of aspect affects the interpretation of the temporal relations between eventualities described in a discourse (for Ancient Greek, see, for example, Schwyzler and Debrunner 1950:297-301, Hettrich 1976, Ruijgh 1985, Ruijgh 1991, Rijksbaron 2002:11-14). In section 3.2.1, we have already touched upon this phenomenon, discussing the analysis of aspect of Kamp et al. which was developed to account for this very phenomenon.

In the account to be presented in this chapter, the variation in aspect interpretation and the effect of aspect on the temporal structure of discourse are not seen as independent phenomena. On the contrary, I am going to use the semantics of aoristic and imperfective aspect developed in chapter 4 to account for the common temporal patterns found in Ancient Greek discourse. Apart from this semantics, we need one additional ingredient to explain the observed patterns: a specification of how the topic time of an utterance is determined. It is here that the dynamic feature of DRT, which I haven't exploited until now, will become essential. In chapter 4 I have already mentioned for specific cases what the topic time was, without providing a general heuristic. Technically, the topic time was simply treated as a free variable that receives its value from the context in a way that was not specified. In the present chapter, I will provide a more principled treatment of the topic time. I will treat it as an

anaphor that looks for an antecedent in the context to bind to and I will specify the default binding rules. It will turn out that these rules, in combination with the semantics of aoristic and imperfective aspect, straightforwardly explain the temporal patterns found in Ancient Greek discourse.

Before formulating the analysis in section 6.3, in the next section I will first give an overview of the common temporal patterns found in Ancient Greek.

6.2 Temporal patterns

The choice for a certain aspectual form affects the interpretation of the temporal relation between the eventualities described. A sequence of aorist indicative forms, for example, often leads to the interpretation that the eventualities happen in the order in which they are mentioned (cf. Rijksbaron 2002:13). An eventuality mentioned later is interpreted as succeeding the eventualities mentioned before, as in (159):

- (159) ... ἄ π έ θ α ν ε κάλλιστα, καί μιν Ἀθηναῖοι
 ... *apethane* *kallista*, *kai min* *Athēnaioi*
 die.PST.AOR.3SG very.finely and he.ACC Athenians.NOM
 δημοσίῃ τε ἔ θ α ψ α ν ...
dēmosiēi *te ethapsan* ...
 at.public.expense PRT bury.PST.AOR.3PL
 “... he died very finely, and the Athenians buried him at public
 expense ...” Hdt. 1.30.5

Here, the burying is interpreted as happening after the death. In this example the interpretation of succession can of course not with certainty be attributed to the aspect choice, since world knowledge already tells us that this is the normal order of events. In (160), however, world knowledge doesn’t help us establishing the temporal relation in a unique way (building temples may be a way of thanking for recovery just as recovery may be the result of building temples):

- (160) καί δύο τε ἀντί ἑνός νηούς τῇ
kai duo *te anti* *henos* *nēous* *tēi*
 PRT two.ACC PRT instead.of one.GEN temples.ACC the.DAT
 Ἀθηναίῃ οἰκοδόμησε ὁ Ἀλυάττης ἐν
Athēnaiēi *oikodomēse* *ho* *Aluattēs* *en*
 Athena.DAT build.PST.AOR.3SG the.NOM Alyattes.NOM in
 τῇ Ἀσσησῶ, αὐτός τε ἐκ τῆς νούσου
tēi *Assēsōi*, *autos* *te ek* *tēs* *nousou*
 the.DAT Assessos.DAT self.NOM PRT from the.GEN illness.GEN

ἀνέστη.

anestē.

rise.from.PST.AOR.3SG

“Alyattes built not one but two temples of Athena at Assesos, and recovered from his illness.” Hdt. 1.22.4

Nevertheless, the natural interpretation of (160) is that the recovery follows the building process.¹

With a sequence of imperfective forms, on the other hand, the interpretation is often that the described eventualities overlap, as in (161) and (162) (cf. Rijksbaron 2002:12):

- (161) δμῶες πρὸς ἔργον πάντες ἴεσαν χέρας·
dmōes pros ergon pantes hiesan cheras.
 slaves.NOM to work.ACC all.NOM send.PST.IPFV.3PL hands.ACC

οἱ μὲν σφαγεῖον ἔφερον,
hoi men sphageion epheron,
 some.NOM PRT sacrificial.bowl.ACC bring.PST.IPFV.3PL

οἱ δ' ἤρουν κανᾶ,
hoi d' ēiron kana,
 some.NOM PRT take.up.PST.IPFV.3PL baskets.ACC

ἄλλοι δὲ πῦρ ἀνῆπτον ἀμφί τ'
alloi de pur anēpton amphi t'
 others.NOM PRT fire.ACC kindle.PST.IPFV.3PL round PRT
 ἐσχάρας
escharas
 hearths.ACC

λέβητας ὀρθοῦν· πᾶσα δ'
lebētas orthoun. pasa d'
 cauldrons.ACC set.upright.PST.IPFV.3PL whole.NOM PRT
 ἐκτύπει στέγη
ektupei stegē
 drone.PST.IPFV.3SG roof.NOM

“The slaves all set their hands unto the work. Some brought the bowl of slaughter, some took up the baskets; the fire some kindled, and the cauldrons set over the hearths: with tumult rang the roofs.” E. *El.* 799-802

¹Lacking native speakers of Ancient Greek, we would not be completely sure about this, were it not that it is indicated in the previous sentences in the story that Athena's temple has to be rebuilt in order for Alyattes to recover.

- (164) καὶ ἅμα ἐφθέγγοντο πάντες
kai hama ephthegxanto pantes
 and at.the.same.time utter.a.sound.PST.AOR.3PL all.NOM
 οἶον τῷ Ἐνυαλίῳ ἐλελίζουσι, καὶ
hoion tōi Enualīōi elelidzousi, kai
 such.as.ACC the.DAT Enyalios.DAT raise.cry.PRS.IMP.3PL PRT
 πάντες δὲ ἔθεον.
pantes de etheon.
 all.NOM PRT run.PST.IMP.3PL
 “At the same time they all set up the sort of war-cry which they raise

to Enyalios, and next all were running.”

X. An. 1.8.18

This is labelled the *immediative* use of imperfective aspect by Rijksbaron (2002:17).

Notwithstanding these common patterns, in practice, any aspect combination occurs with almost any temporal relation, as a small corpus study of the first 85 sections of Herodotus’ *Histories* book 1 reveals (see Bary 2007). It is, for example, possible to go back in time with the aorist, even when no time adverbial is present, as (165) illustrates:

- (165) διαφέρουσι δέ σφι ἐπὶ ἴσης τὸν
diapherousi *de sphi* *epi isēs* *ton*
 prevail.IPFV.PTCP.DAT PRT they.DAT PREP equal.GEN the.ACC
 πόλεμον τῷ ἑκτῷ ἔτεϊ συμβολῆς
polemon tōi hektōi eteï sumbolēs
 war.ACC the.DAT sixth.DAT year.DAT encounter.GEN
 γενομένης συνήνεικε ὥστε, τῆς
genomenēs *sunēneike* *hōste, tēs*
 take.place.AOR.PTCP.GEN happen.PST.AOR.3SG that the.GEN
 μάχης συνεστεώσης, τὴν ἡμέρην ἐξαπίνης
machēs sunesteōsēs, tēn hēmerēn exapīnēs
 battle.GEN be.joined.PRF.PTCP.GEN the.ACC day.ACC suddenly
 νύκτα γενέσθαι. Τὴν δὲ μεταλλαγὴν ταύτην τῆς
nukta genesthai. Tēn de metallagēn tautēn tēs
 night.ACC be.AOR.INF the.ACC PRT change.ACC that.ACC the.GEN
 ἡμέρης Θαλῆς ὁ Μιλήσιος τοῖσι Ἴωσι
hēmerēs Thalēs ho Milēsios toisi Iōsi
 day.GEN Thales.NOM the.NOM Milesian.NOM the.DAT Ionians.DAT
 προγόρευσεν ἔσεσθαι, οὖρον προθέμενος
proēgoreuse esesthai, ouron prothēmenos
 foretell.PST.AOR.3SG be.FUT.INF bound.ACC fix.AOR.PTCP.NOM
 ἐνιαυτὸν τοῦτον ἐν τῷ δὴ καὶ ἐγένετο ἡ
eniauton touton en tōi dē kai egeneto hē
 year.ACC that.ACC in REL.DAT PRT PRT be.PST.AOR.3SG the.NOM
 μεταβολή.
metabolē
 change.NOM

“They were still warring with equal success, when it happened, at an encounter which occurred in the sixth year, that during the battle the day was suddenly turned to night. Thales of Miletus had foretold this loss of daylight to the Ionians, fixing it within the year in which

the change did indeed happen.”

Hdt. 1.74.2²

The prediction of the eclipse takes place before the eclipse itself, although it is mentioned later.

Finally, sometimes an eventuality described does not belong to the story told. In such cases the temporal relation between this eventuality and the other eventualities described is of no importance. This phenomenon is restricted to the aorist, as is also observed by Ruijgh (1991:201), who describes this use of the aorist as ‘la *simple constatation* d’une action *isolée* du passé’ (‘the simple constatation of an isolated action in the past’).³ I label this the *autonomous* use of the aorist. Eventualities described with imperfective aspect, on the other hand, are always interpreted as temporally related to other eventualities. (166) and (167) illustrate the autonomous use of the aorist:

- (166) Ἀνέθηκε δὲ ἐκφυγὼν τὴν
Anethēke de ekphugōn tēn
 offer.PST.AOR.3SG PRT escape.from.AOR.PTCP.NOM the.ACC
 νοῦσον δεύτερος οὗτος τῆς οἰκίης ταύτης ἐς
nouson deuterōs houtos tēs oikiēs tautēs es
 illness.ACC second.NOM that.NOM the.GEN house.GEN that.GEN to
 Δελφοὺς κρητῆρά τε ἀργύρεον μέγαν καὶ ὑποκρητηρίδιον
Delphous krētēra te argureon megan kai hupokrētēridion
 Delphi bowl.ACC PRT silver.ACC great.ACC and stand.ACC
 σιδήρεον κολλητόν, θέης ἄξιον διὰ πάντων
sidēreon kollēton, theēs axion dia pantōn
 iron.ACC welded.ACC view.GEN worth.ACC through all.GEN
 τῶν ἐν Δελφοῖσι ἀναθημάτων, Γλαύκου τοῦ
tōn en Delphoisi anathēmatōn, Glaukou tou
 the.GEN in Delphi.DAT offerings.GEN Glaucus.GEN the.GEN
 Χίου ποίημα, ὃς μόνος δὴ πάντων
Chiou poiēma, hos mounos dē pantōn
 Chian.GEN product.ACC who.NOM only.NOM PRT all.GEN
 ἀνθρώπων σιδήρου κόλλησιν ἐξεύρε.
anthrōpōn sidērou kollēsīn exeure.
 men.GEN iron.GEN soldering.ACC discover.PST.AOR.3SG
 “He (= Alyattes) was the second of his family to make an offering to
 Delphi (after recovering from his illness) of a great silver bowl on a
 stand of welded iron, this being the most worth seeing among all the

²The translation of this and the next two Herodotus’ passages is Godley’s (Herodotus 1963).

³Ruijgh’s account about Ancient Greek aspect in general and this use of the aorist in particular is discussed in chapter 7.

offerings at Delphi, being the work of Glaucus the Chian, the only one of all men who discovered how to weld iron.”

Hdt. 1.25.2

- (167) Κατ' αὐτὸν δὲ Κροῖσον τάδε ἐγίνετο.
Kat' auton de Kroison tade egineto.
 with self.ACC PRT Croesus.ACC this.NOM happen.PST.IPFV.3SG
 Ἦν οἱ παῖς, τοῦ καὶ πρότερον
Ēn hoi pais, tou kai proteron
 be.PST.IPFV.3SG he.DAT son.NOM REL.GEN PRT before
 ἐπεμνήσθη, τὰ μὲν ἄλλα ἐπιεικής,
epemnēsthē, ta men alla epieikēs,
 mention.PST.AOR.1SG the.ACC PRT other.ACC fitting.NOM
 ἄφωνος δέ.
aphōnos de.
 mute.NOM PRT

“With Croesus the following happened. He had a son, whom I have already mentioned, fine in other respects, but mute.”

Hdt. 1.85.1

In (166), the eventuality of the discovery is not temporally linked to the other eventualities in the discourse. It is related only to the moment of utterance. Similarly, in (167), the eventuality of mentioning is not temporally linked to the eventualities previously described.

Molendijk (1990) observes the same phenomenon for the passé simple in French. An example is given in (168) (from Molendijk 1990:251):

- (168) *En 1982, il s' installa dans la ville même*
 in 1982 he oneself install.PST.PFV.3SG in the town same
où Charles Martel a r r ê t a les Arabes. Il y
 where Charles Martel stop.PST.PFV.3SG the Arabs. He there
rencontra son épouse future.
 meet.PST.PFV.3SG his wife future

“In 1982 he went to live in the same town where Charles Martel stopped the Arabs. There he met his future wife.”

The eventuality described in the second clause, the stopping of the Arabs by Charles Martel, is presented solely from the perspective of the moment of utterance. As in Greek, we do not find such examples with the imparfait.

In this section I have given an overview of some common patterns found in Ancient Greek discourse. The question now is how to account for them. On the one hand, we want to explain the regularities. On the other, it is clear that an adequate account should have a certain degree of flexibility since there are

plenty of examples that deviate from the common patterns. This flexibility, however, should not be captured in terms of a flexible semantics for the aorist and imperfective itself. Their semantics should remain constant throughout the examples. In the next section we will see that an anaphoric account of the topic time ensures the flexibility needed.

6.3 Analysing the patterns

6.3.1 Determining the topic time

The account I propose in order to explain the temporal patterns described in the previous section consists of the following two components:

1. the by now familiar semantics of aoristic and imperfective aspect: the aorist contributes the information that the time of the eventuality is included in the topic time ($\tau(\mathbf{e}) \subseteq \mathbf{t}_{\text{TT}}$), the imperfective that the topic time is a non-final subset of the time of the eventuality ($\tau(\mathbf{e}) \supset \mathbf{t}_{\text{TT}}$);
2. the default rules of how the topic time of a sentence is determined by its context. Let's number the sentences in a discourse $1 \dots n$ and let the sentence we interpret be i . Then $\mathbf{t}_{\text{TT}i}$, the topic time of sentence i , is by default:
 - (a) a time immediately following the eventuality time of the previous sentence $\tau(\mathbf{e})_{i-1}$ if that sentence has aoristic aspect: $\tau(\mathbf{e})_{i-1} \rhd \mathbf{t}_{\text{TT}i}$;
 - (b) the topic time of the previous sentence, $\mathbf{t}_{\text{TT}i-1}$, if that sentence has imperfective aspect: $\mathbf{t}_{\text{TT}i-1} = \mathbf{t}_{\text{TT}i}$.

In section 6.3.3 I will show how these rules yield the patterns found. But first I will show how I implement these rules in a so-called *pushing* account and explain why I prefer such an account over a *pulling* account.

6.3.2 Pushing versus pulling

More often than not the time about which the speaker makes his utterance is recoverable from the context in which the sentence is used. I model this by treating this time, the topic time, as an anaphor: it binds to a time that

has been previously introduced in the discourse.^{4,5} It is for this very reason that I have adopted the dynamic framework of DRT. As a consequence of the topic time being an anaphor, the time to which t_{TTi} binds, that is, by default a time immediately following $\tau(e)_{i-1}$ if sentence $i-1$ has aoristic aspect, has to be made available in the interpretation process of sentence $i-1$ already. This is done in the following way: an aoristic sentence introduces not only the eventuality it describes into the discourse context, but also a new time, which follows the eventuality and acts as the default topic time for the eventuality of the new sentence. Imperfective sentences do not introduce such a subsequent point. They pass their own topic time on to the next sentence. Thus aoristic, but not imperfective, aspect pushes the topic time further, so to speak. Accounts like this one are called *pushing* accounts. Earlier examples of pushing accounts are the ones of Hinrichs (1981, 1986) and Partee (1984) for English, to which the present one comes quite close.⁶

This account deviates from the account of Kamp et al., discussed in section 3.2.1, in several respects. Their account is a *pulling* rather than pushing account. On pulling accounts sentences do not push the time forward. Moreover, not the topic time itself, but the reference point, is treated as an anaphor. Recall that tense on their account introduces the instruction to temporally relate the location time of the eventuality at hand to a time previously mentioned in the discourse. Thus, two elements have to be resolved: the reference point has to be determined and the temporal relation has to be specified. The reference point is by default the location time of the last mentioned eventuality, the temporal relation is succession for events, and inclusion for states.

The two types of accounts explain the phenomenon of narrative progression in different ways. Let me illustrate the difference with (169) (= (40)):

⁴It has been argued that tenses cannot be treated as anaphors in general. The behaviour of tense in attitude reports has been put forward as a counterexample to the anaphoric nature of tense (e.g. von Stechow 1995). This is due to the fact that tense interpretation in such contexts involves egocentric *de se* binding (Lewis 1979), which forms a tension with anaphoricity in most frameworks. Bary and Maier (2009) show, however, that tenses in attitude reports are anaphoric just as well and propose an extension of DRT in which the tension between the two features of tense interpretation is resolved. In this extension updates of the common ground are accompanied by updates of each relevant agent's attitudinal state. The proposed framework can capture both the *de se* feature and the anaphoric feature of tense interpretation at the same time and thus shows that the behaviour of tense in attitude reports is not a counterexample to the anaphoric nature of tense. See also Kamp (2006).

⁵In this context it is interesting to note that according to Ruijgh (1991:212, n. 10) and Beekes (1995:226) the past tense morpheme (the augment $\dot{e}$ - *e*-) probably comes from a temporal anaphoric pronoun with the value 'at that time'.

⁶One difference is that in the present account it's grammatical aspect that determines whether a new time is introduced to act as topic time for the next sentence, whereas in Hinrich's and Partee's accounts this is determined by aspectual class (that is, whether the sentence describes an event or state).

- (169) *Pierre e n t r a.* *Marie t é l é p h o n a.*
 Pierre enter.PST.PFV.3SG. Marie phone.PST.PFV.3SG
 “Pierre entered. Marie phoned.”

The second sentence of (169) is interpreted in the context of the first sentence. Pushing and pulling accounts differ with respect to the representation they assign to the first sentence. We are familiar with (170) (= (46)), the representation on the pulling account of Kamp et al.:

(170)

n e_1 t_1 t_2
$p_enter(e_1)$ $\tau(e_1) = t_1$ $t_1 \subseteq t_2$ $t_2 \prec n$

Pushing accounts, on the other hand, let the first sentence introduce an additional time compared to pulling accounts, viz. a time t_3 immediately following the time of the eventuality t_1 :

(171)

n e_1 t_1 t_2 t_3
$p_enter(e_1)$ $\tau(e_1) = t_1$ $t_1 \subseteq t_2$ $t_1 \supset\prec t_3$ $t_2 \prec n$

The two accounts also differ with respect to the preliminary representation of the second sentence. The pulling account of Kamp et al. gives (172), my pushing account (173):

(172)

e_2 t_3 t_4
$m_phone(e_2)$ $\tau(e_2) = t_3$ $t_3 \subseteq t_4$ $t_4 \prec n$ t_5 $\rho(t_5, t_4)$

(173)

e_2 t_4 t_6
$m_phone(e_2)$
$\tau(e_2) = t_4$
$t_4 \subseteq t_5$
$t_4 \supset \prec t_6$
$\boxed{t_5}$
$\boxed{t_5 \prec n}$

Both representations contain an anaphoric condition, marked by the dashed boxes, that has to be resolved. On the pulling account, the reference point t_5 has to be bound and the temporal relation ρ has to be specified. On the pushing account, on the other hand, the topic time t_5 is the anaphor that has to be bound.

Merging the representations of the two sentences, as in (174) and (175), results in the DRSs in which we try to find antecedents for the anaphors. On the pulling account, the default is that t_5 binds to t_2 and ρ is specified as $\prec$ (see (i')–(iii') on p. 37):

(174) (170) $\oplus$ (172) =

n e_1 t_1 t_2 e_2 t_3 t_4
$p_enter(e_1)$
$\tau(e_1) = t_1$
$t_1 \subseteq t_2$
$t_2 \prec n$
$m_phone(e_2)$
$\tau(e_2) = t_3$
$t_3 \subseteq t_4$
$t_4 \prec n$
$\boxed{t_5}$
$\boxed{\rho(t_5, t_4)}$

$\rho := \prec$
 $t_5 := t_2$
 $\Rightarrow$

n e_1 t_1 t_2 e_2 t_3 t_4
$p_enter(e_1)$
$\tau(e_1) = t_1$
$t_1 \subseteq t_2$
$t_2 \prec n$
$m_phone(e_2)$
$\tau(e_2) = t_3$
$t_3 \subseteq t_4$
$t_4 \prec n$
$t_2 \prec t_4$

On the pushing account, on the other hand, t_5 binds by default to t_3 (rule 2a):

$$(175) \quad (171) \oplus (173) =$$

n	e ₁	t ₁	t ₂	t ₃	e ₂	t ₄	t ₆
$p_enter(e_1)$ $\tau(e_1) = t_1$ $t_1 \subseteq t_2$ $t_1 \supset\prec t_3$ $t_2 \prec n$ $m_phone(e_2)$ $\tau(e_2) = t_4$ $t_4 \subseteq t_5$ $t_4 \supset\prec t_6$ t_5 $t_5 \prec n$							

$t_5 := t_3$
 $\Rightarrow$

n	e ₁	t ₁	t ₂	t ₃	e ₂	t ₄	t ₆
$p_enter(e_1)$ $\tau(e_1) = t_1$ $t_1 \subseteq t_2$ $t_1 \supset\prec t_3$ $t_2 \prec n$ $m_phone(e_2)$ $\tau(e_2) = t_4$ $t_4 \subseteq t_3$ $t_4 \supset\prec t_6$ $t_3 \prec n$							

The reader may check himself that in both ways we obtain the desired result that the telephoning (e_2) follows the entering (e_1).

We could say that on a pushing account this ρ is always the identity relation. I prefer this over a resolution of ρ to various temporal relations, what happens on a pulling account, because I think it's conceptually clearer. The point is that if the resolution options of ρ are not restricted the relation is too permissive. A restriction to $\prec$ and $\subseteq$, however, or any temporal relation, is just a stipulation. Moreover, we would expect that the default resolution for ρ is identity. Let me explain this. The complex anaphoric condition of (172) is reminiscent of Asher and Lascarides' (1998) account of the phenomenon of *bridging*. They define bridging as "an inference that two objects or events that are introduced in a text are related in a particular way that isn't explicitly stated, and yet the relation is an essential part of the content of the text in the sense that without this information, the lack of connection between the sentences would make the text incoherent" (p. 83). Let me illustrate this with (176):

(176) I took my car for a test drive. The engine made a weird noise.

The definite description *the engine* introduces the instruction to pick up a previously introduced engine. The context doesn't supply one explicitly. However, the hearer makes the inference that the engine spoken of in the second sentence is the engine of the car mentioned in the first sentence. On Asher and Lascarides's account of this phenomenon, a definite description introduces a discourse marker that has to be linked to a previously introduced discourse

marker via an underspecified relation, which must be further specified through connecting to the discourse context. In (176), the relation is the part-of relation. On this account the normal case of anaphora is the special case of bridging in which the relation resolves to identity. Resolution to identity is the preferred option, as Asher and Lascarides note. This brings me back to pulling accounts of narrative progression. There the default resolution for ρ is not identity, but succession for events and inclusion for states. This is conceptually strange. For these reasons, I prefer a pushing account, in which account the temporal relation is not only by default, but always identity.

6.3.3 Explaining the patterns

Let's now see how the proposed account gives the right results for our Greek examples. (177) (for the glossed version, see (160)), with two aorists, behaves the same as (169), with two passé simples:

- (177) καὶ δύο τε ἀντὶ ἑνὸς νηοῦς τῇ Ἀθηναίῃ οἰκοδόμησε ὁ Ἀλυάττης ἐν τῇ Ἀσσησῶ, αὐτὸς τε ἐκ τῆς νούσου ἀνέστη.
 “Alyattes built-AOR not one but two temples of Athena at Assesos, and recovered-AOR from his illness.” Hdt. 1.22.4

The context for the interpretation of the second clause of (177) contains among other things world knowledge of the ancient and the information provided by the whole work of Herodotus up to that point. For simplicity, however, I take it to be the first clause of (177), which is represented as (178):⁷

(178)	$n \ e_1 \ t_1 \ t_2$
	$a_build_temples(e_1)$
	$\tau(e_1) \subseteq t_1$
	$\tau(e_1) \supset \prec t_2$
	$t_1 \prec n$

Note that (178) is constructed following the rules for the sentence internal composition of meaning with which we were concerned in chapter 4. As before, aoristic aspect specifies that there is an eventuality of the kind specified by the predicate temporally included in the topic time t_1 and past tense indicates that this topic time is in the past.⁸ The only addition is the introduction of an extra time t_2 , immediately following $\tau(e_1)$, a contribution of aoristic aspect.

The preliminary representation of the second clause is (179):

⁷Henceforth I combine the two conditions $\tau(e_1) = t_1$ and $t_1 \subseteq t_2$ into one condition $\tau(e_1) \subseteq t_2$.

⁸Of course, the topic time of this sentence is an anaphor too. For simplicity, I have presented the outcome of the resolution process and accommodated the topic time.

(179)

$e_2 \ t_4$
$a_recover(e_2)$ $\tau(e_2) \subseteq t_3$ $\tau(e_2) \supset \prec t_4$ t_3 $t_3 \prec n$

The topic time t_3 is no longer treated as a free variable (as it was in chapter 4), but as a true anaphor that has to bind to a previously introduced past time. We merge (178) and (179), and following the default rules t_3 binds to t_2 :

(180)

$n \ e_1 \ t_1 \ t_2 \ e_2 \ t_4$
$a_build_temples(e_1)$ $\tau(e_1) \subseteq t_1$ $\tau(e_1) \supset \prec t_2$ $t_1 \prec n$ $a_recover(e_2)$ $\tau(e_2) \subseteq t_3$ $\tau(e_1) \supset \prec t_4$ t_3 $t_3 \prec n$

$t_3 := t_2$
 $\Rightarrow$

$n \ e_1 \ t_1 \ t_2 \ e_2 \ t_4$
$a_build_temples(e_1)$ $\tau(e_1) \subseteq t_1$ $\tau(e_1) \supset \prec t_2$ $t_1 \prec n$ $a_recover(e_2)$ $\tau(e_2) \subseteq t_2$ $\tau(e_1) \supset \prec t_4$ $t_2 \prec n$

The temporal relations are represented graphically in Figure 6.1. The recovery e_2 indeed follows the building of temples e_1 .

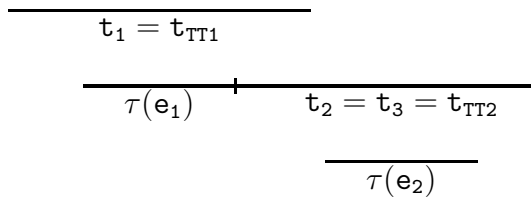


Figure 6.1: Graphical representation of (180), succession

Let's now move on to an example with imperfective aspect. We have seen that a sequence of clauses with imperfective aspect often leads to an interpretation of overlap, like in (181) (for the glossed version, see (162)):

- (181) Περίανδρος δὲ ἦν Κυψέλου παῖς· ... ἐτυράννευε δὲ ὁ Περίανδρος
Κορίνθου
“Periander was-IPFV the son of Cypselus. He reigned-IPFV over
Corinth.” Hdt. 1.23.1

This overlap interpretation is derived in the following way: the first clause, represented as (182), is the context for the interpretation of the second sentence.

(182)

n e ₁ t ₁
p_son(e ₁)
$\tau(e_1) \supset t_1$
$t_1 \prec n$

Since the first clause has imperfective aspect its representation does not contain a discourse marker for a time following the eventuality described, in contrast to (178).

(183) is the preliminary representation of the second clause of (181):

(183)

e ₂
p_reign(e ₂)
$\tau(e_2) \supset t_2$
$t_2 \prec n$

t_2 looks for a past time to bind to. After we have merged the two DRSs, we follow the default rule for imperfective aspect (2b on p. 140) and bind t_2 to t_1 :

(184) (182) $\oplus$ (183) =

n e ₁ t ₁ e ₂
p_son(e ₁)
$\tau(e_1) \supset t_1$
$t_1 \prec n$
p_reign(e ₂)
$\tau(e_2) \supset t_2$
$t_2 \prec n$

$t_2 := t_1 \Rightarrow$

n e ₁ t ₁ e ₂
p_son(e ₁)
$t_1 \prec n$
$\tau(e_1) \supset t_1$
p_reign(e ₂)
$\tau(e_2) \supset t_1$

Due to its imperfective aspect, the first sentence passes on its topic time to the second sentence. Both eventualities described include this time (due to imperfective aspect again), which yields the interpretation that the eventualities overlap. The resulting overlap interpretation is graphically represented in

Figure 6.2.

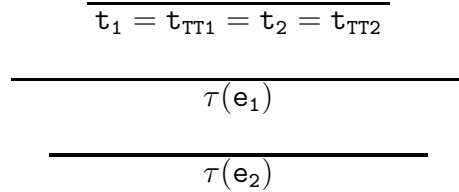


Figure 6.2: Graphical representation of (184), overlap

These default rules for the specification of the topic time also explain the so-called *immediative* use of imperfective aspect, the interpretation that the eventuality described with imperfective aspect follows right after a previously mentioned eventuality with aoristic aspect, as in (185) (cf. (164)):

- (185) $\kappa\alpha\lambda\ \acute{\alpha}\mu\alpha\ \acute{\epsilon}\ \varphi\ \theta\acute{\epsilon}\ \gamma\ \xi\ \alpha\ \nu\ \tau\ \omicron\ \dots\ \pi\acute{\alpha}\nu\tau\epsilon\varsigma\ \kappa\alpha\lambda\ \pi\acute{\alpha}\nu\tau\epsilon\varsigma\ \delta\acute{\epsilon}\ \acute{\epsilon}\ \theta\ \epsilon\ \omicron\ \nu.$
 “At the same time they all set up-AOR a war-cry ... and next all
 were running-IMP.” X. An. 1.8.18

Since the first clause has aoristic aspect, it introduces not only an eventuality of uttering a sound ($\mathbf{e}_1$ in Figure 6.3) included in the topic time $\mathfrak{t}_{\text{TT1}}$, but also a time $\mathfrak{t}_{\text{TT2}}$ which immediately follows this eventuality and acts as topic time for the next clause. Since the second clause has imperfective aspect, the time of the running eventuality $\tau(\mathbf{e}_2)$ described by this clause properly includes the topic time $\mathfrak{t}_{\text{TT2}}$. In many instances of the combination aorist-imperfective the imperfective eventuality will actually include the aorist eventuality as well, as for example in (163), but this is not necessary. The rules, however, exclude the possibility that there is a temporal gap between the two eventualities. As a consequence, if world knowledge tells us that the eventualities described do not overlap, as in (185), we have to interpret the imperfective eventuality as taking place right after the aorist one. This yields the ‘immediative’ effect.

Landeweerd (1998:177–187) has made the same observation for the imparfait in French. With the combination passé simple-imparfait, the described eventualities often overlap, as in (186) (= (41)):

- (186) *Pierre e n t r a.* *Marie t é l é p h o n a i t.*
 Pierre enter.PST.PFV.3SG Marie phone.PST.IPFV.3SG
 “Pierre entered. Marie was phoning.”

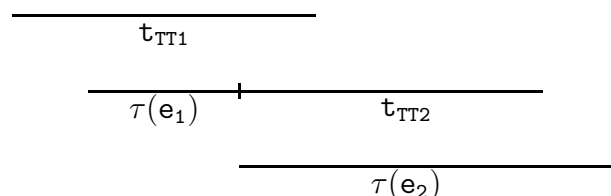


Figure 6.3: Graphical representation of (185), the ‘immediative’ effect

But they need not overlap (from Kamp and Rohrer 1983:259):⁹

- (187) *Jean t o u r n a l' i n t e r r u p t e u r. L a l u m i è r e é c l a t a n t e*
 Jean turn.PST.PFV.3SG the switch the light bright
l' é b l o u i s s a i t.
 him blind.PST.IPFV.3SG
 “Jean switched on the light. The bright light blinded him.”

The blinding happens right after the switching on of the light. It is however impossible that there is a gap between the two eventualities with the combination *passé simple-imparfait*. This is the reason why (188) (from Molendijk et al. 2004:291) is odd, since world knowledge tells us that there is a gap between going out in the rain and being soaking wet:

- (188) *Jean sortit sous la pluie. Il était*
 Jean leave.PST.PFV.3SG under the rain he was.PST.IPFV.3SG
tout mouillé.
 all wet
 “Jean went out in the rain. He was soaking wet.”

In the next section we will see that the account presented here of the temporal structure of discourse, and the account presented in chapter 4 of the variation in interpretation of the two aspects, are not two distinct, independent stories, but rather two sides of the same coin.

⁹Similar examples in English, like (i) based on Hinrichs (1986:68), were the reason for Hinrichs to propose his pushing account:

- (i) Max switched off the light. The room was pitch dark around him.

6.3.4 Temporal structure and variation in interpretation

In chapter 4 I have developed an account of how the various interpretations of aoristic and imperfective aspect come about. In this section I will show that this account fits naturally in the analysis of the temporal structure of discourse presented in the present chapter. Actually, I have already (implicitly) been using the ideas about how the topic time of a sentence is determined in chapter 4 in accounting for the variation in interpretation, as I will show in this section.

As a first example, let's reconsider the argument from section 4.5 why ἐδάκρυσε *edakruse* 'cry.AOR' in (19), here repeated as (189), has an ingressive rather than complexive interpretation (recall that there must be some kind of reinterpretation, since the aorist requires bounded predicates, whereas *Xerxes cry* is unbounded):

- (189) ἐνθαῦτα ὁ Ξέρξης ἐωυτὸν
enthauta ho Xerxēs heōuton
 then the.NOM Xerxes.NOM himself.ACC
 ἐμακάρισε, μετὰ δὲ τοῦτο
emakarise, meta de touto
 declare.happy.PST.AOR.3SG after and that.ACC
 ἐδάκρυσε. μαθὼν δέ μιν
edakruse. Mathōn de min
 weep.PST.AOR.3SG perceive.AOR.PTCP.NOM PRT he.ACC
 Ἀρτάβανος ... δακρύσαντα εἶρετο
Artabanos ... dakrusanta eireto
 Artabanus.NOM weep.AOR.PTCP.ACC ask.PST.IPFV.3SG
 τάδε· ... ὥς πολλὸν ἀλλήλων
tade: ... hōs pollon allēlōn
 this.ACC how far one.other.GEN
 κεχωρισμένα ἐργάσαο νῦν τε καὶ
kechōrismena ergasao nun te kai
 separate.PRF.PASS.PTCP.ACC do.PST.AOR.2SG now PRT PRT
 ὀλίγω πρότερον· μακαρίσας γὰρ
oligōi proteron. Makarisas gar
 a.little.DAT before. declare.happy.AOR.PTCP.NOM because
 σεωυτὸν δακρύεις.
seōuton dakrueis.
 yourself.ACC weep.PRS.IPFV.2SG

"Then Xerxes declared himself happy, and after that he started to weep. Perceiving that he had begun to weep Artabanus questioned

him saying: ‘What a distance is there between what you are doing now and a little while ago! After declaring yourself happy you weep.’
”
Hdt. 7.45-46.1

In section 4.5 I mentioned as the reason for getting an ingressive interpretation in (189) that it is clear from the continuation that Xerxes is still crying at the moment of Artabanus’ utterance. What is implicit in the argument is the assumption that aoristic aspect pushes the topic time forward, an assumption that we have made explicit in this chapter. Let’s see how this assumption yields the ingressive interpretation.

The second clause of (189) introduces an eventuality in the discourse, e_1 in Figure 6.4, that is related to crying. It may be a maximal crying eventuality or an ingressive one. Which of the two is unknown at this point in the discourse. Since the sentence has aoristic aspect, this crying related eventuality is temporally included in the topic time t_{TT1} . Moreover, the aoristic aspect introduces into the discourse a time immediately following the crying related eventuality. This time t_{TT2} acts as topic time for the next sentence. Since the participle $\mu\alpha\theta\acute{\omega}\nu$ *mathōn* ‘perceive.AOR’ has aoristic aspect too, following the same recipe it introduces into the discourse an eventuality e_2 included in t_{TT2} and a time following this eventuality, t_{TT3} , which acts as topic time for the main clause. The saying eventuality e_3 is temporally included in t_{TT3} .¹⁰ Artabanus uses a present tense (imperfective aspect) to describe a crying eventuality e_4 , which indicates that this eventuality temporally includes the time of his utterance.

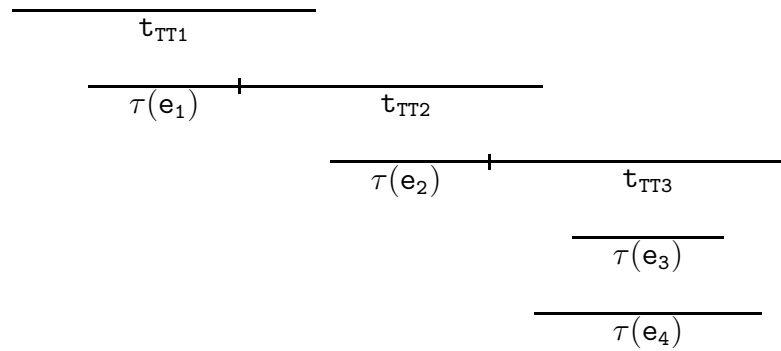


Figure 6.4: Applying the rules to (189)

Let’s now return to $\acute{\epsilon}\delta\acute{\alpha}\chi\rho\upsilon\sigma\epsilon$ *edakruse* ‘cry.AOR’ in the first sentence. If

¹⁰ $\acute{\epsilon}\lambda\acute{\rho}\epsilon\tau\omicron$ *eireto* ‘say’ is an imperfective form. It is a common phenomenon in Ancient Greek that verbs of saying occur in the imperfective form where we would expect an aorist, viz. for complete eventualities. I return to this in section 7.3. For the present example it makes no difference since the aorist forms $\acute{\epsilon}\delta\acute{\alpha}\chi\rho\upsilon\sigma\epsilon$ *edakrusa* ‘cry’ and $\mu\alpha\theta\acute{\omega}\nu$ *mathōn* ‘perceive’ push the time forward already.

it would receive a complexive interpretation, the maximal, i.e. complete crying eventuality would lie before Artabanus' utterance, and hence this crying eventuality and the crying eventuality Artabanus describes cannot be the same ones (or parts of the same one). It is in principle possible, but not very plausible, that we have to do with two distinct crying eventualities. One prefers instead to relate the two crying related eventualities. This is possible on the ingressive interpretation: e_1 then is the beginning of e_4 , as is illustrated in Figure 6.5.

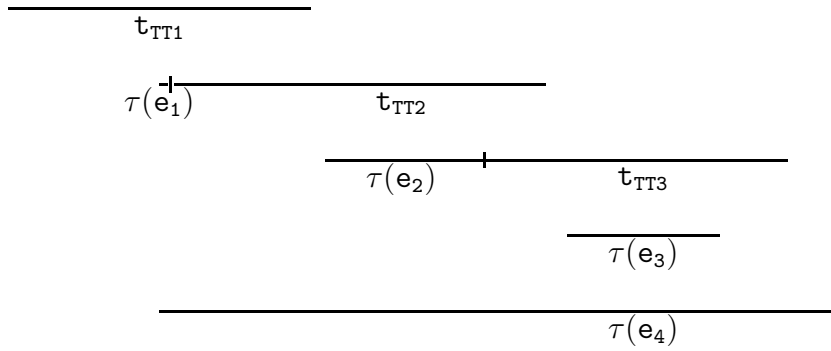


Figure 6.5: The ingressive interpretation of (189)

Let's consider a second example, this time with imperfective aspect. The rule that imperfective aspect by default passes on the topic time, which we have formulated in section 6.3.1, has already been assumed in section 4.7 in the account of how the habitual interpretation of the imperfective form $\acute{\epsilon}\varphi\acute{o}\rho\epsilon\omicron\nu$ *ephoreon* 'carry.IMP' comes about in (131), repeated here as (190):

- (190) Ἦν δὲ τοῦτον τὸν χρόνον ἔθνος
Ēn de touton ton chronon ethnos
 be.PST.IPFV.3SG PRT that.ACC the.ACC time.ACC nation.NOM
 οὐδὲν ἐν τῇ Ἀσίῃ οὔτε ἀνδριότερον οὔτε
ouden en tēi Asiēi oute andrēioteron oute
 no.NOM in the.DAT Asia.DAT nor more.courageous.NOM nor
 ἀλκιμώτερον τοῦ Λυδίου. Ἡ δὲ μάχη
alkimōteron tou Ludiou. Hē de machē
 braver.NOM the.GEN Lydian.GEN the.NOM PRT battle.NOM
 σφέων ἦν ἀπ' ἵππων, δόρατά τε
spheōn ēn ap' hippōn dorata te
 they.GEN be.PST.IPFV.3SG from horses.GEN spears.ACC PRT
 ἐφ' ὅρ' ε' ο' ν μεγάλα καὶ αὐτοὶ ἦσαν
ephoreon megala kai autoi ēsan
 carry.PST.IPFV.3PL long.ACC and they.NOM be.PST.IPFV.3PL

ἵππεύεσθαι ἀγαθοί
hippeuesthai *agathoi*
 manage.horse.IPFV.INF good.NOM

“Now at this time there was no nation in Asia more courageous or braver than the Lydian. They fought on horseback, carried long spears, and they were skillful at managing horses.” Hdt. 1.79.3

Since imperfective aspect passes on the topic time, τοῦτον τὸν χρόνον *touton ton chronon* ‘in that time’, which specifies quite a long time, still is the topic time when we interpret the clause δόρατά τε ἐφόρεον μεγάλα *dorata te ephoreon megala* ‘they carry.IPFV long spears’. Since a simple carrying eventuality is too short to include such a long time we get a habitual reinterpretation. A habitual carrying eventuality can include the topic time. Since the duration associated with other predicates in the passage is longer, we don’t find reinterpretation with them, although the topic time is the same.

In this section I have shown that the reinterpretation phenomena of chapter 4 and the phenomena of narrative progression discussed in the present chapter both depend on the same principles, viz. the default binding rules for the anaphoric topic time.

6.3.5 Flexibility required

In the previous subsections we have seen how the semantics of aspect proposed in chapter 4 together with the default binding rules for the anaphoric topic time yields the temporal patterns commonly found with certain aspect combinations. As one may however expect of an anaphor, the topic time sometimes binds to a previously introduced time different from the one determined by the default rules, or even accommodates.¹¹ The choice to deviate from the default may be triggered by world knowledge, information structure, the presence of discourse particles (abundant in Ancient Greek), et cetera, and intricate interactions between these factors.¹² A relatively simple non-default case is (165), here repeated as (191):

- (191) διαφέρουσι δέ σφι ἐπὶ ἴσης τὸν πόλεμον τῷ ἔκτῳ ἔτεϊ συμβολῆς γενομένης συνήνεικε ὥστε, τῆς μάχης συνεστεώσης, τὴν ἡμέρην ἐξαπίνης νύκτα γενέσθαι. Τὴν δὲ μεταλλαγὴν ταύτην τῆς ἡμέρης Θαλῆς ὁ Μιλήσιος τοῖσι Ἰωσι π ρ ο η γ ὁ ρ ε υ σ ε ἔσεσθαι, οὔρον προθέμενος ἐνιαυτὸν τοῦτον ἐν τῷ δὴ καὶ ἐγένετο ἡ μεταβολή.
 “They were still warring with equal success, when it happened, at an

¹¹See section 3.2.1 for the notion of accommodation.

¹²See Asher and Lascarides’ (2003) Segmented Discourse Representation Theory for a framework that models the influence of these kind of information sources on the temporal structure of English discourse.

encounter which occurred in the sixth year, that during the battle the day was suddenly turned to night. Thales of Miletus had foretold-AOR this loss of daylight to the Ionians, fixing it within the year in which the change did indeed happen.” Hdt. 1.74.2

(191) is an example of the aorist where we go backward rather than forward in narrative time: the natural interpretation is that the prediction of the eclipse happens before the eclipse itself. Here the default binding rule for the aorist is overruled by the lexical knowledge that one foretells something *before* it happens. I believe that for (191) it is natural to assume that a time in the past of the eclipse is accommodated to which the topic time of the foretelling clause binds.

The fact that the Ancient Greek aorist shows quite a large degree of flexibility can be partly explained by the fact that this language does not have a form that exclusively expresses that an eventuality takes place prior to some (contextually given) reference time, that is, a form to express a *past-in-the-past* (the Greek pluperfect indicating a perfect-in-the-past, see e.g. Kühner and Gerth 1898:151). Lacking such a form, Ancient Greek has to find a solution and uses the aorist in this case, as in (191). By contrast, in French, which has its plus-que-parfait to express a past-in-the-past, the passé simple does not allow for a reverse order interpretation (in absence of a temporal adverbial) (see e.g. Molendijk et al. 2004:284–288). (192) (from Molendijk et al. 2004:285), for example, does not have the interpretation that the pushing precedes the falling, in contrast to its English translation (193) (from Lascarides and Asher 1993:438):

(192) *Max tomba. John le poussa.*
 Max fall.PST.PFV. John him push.PST.PFV
 “Max fell. John pushed him.”

(193) Max fell. John pushed him.

The use of the passé simple to express a past-in-the-past is blocked by the existence of a better form to express this.¹³ Ancient Greek, on the other hand, lacking this form, can use the aorist and deviate from its default binding rules.

6.3.6 Autonomous use of the aorist

This leaves me with the autonomous use of the aorist, the use of the aorist for eventualities that are not situated in the time of the story, as illustrated in (166) and (167). The impression is that in these cases the eventualities are presented

¹³This leaves unexplained why in English, having a pluperfect serving as a past-in-the-past form, it is possible to get a reverse order interpretation with the simple past, as (193) shows.

solely from the perspective of the moment of utterance. This impression has led some to the assumption that perfective (= aoristic) aspect, in contrast to imperfective aspect, has a non-anaphoric use (see for example Asher 1995:57 and Molendijk and de Swart 1999 for French). Although there is something intuitive in this assumption, stated in this way it leaves unexplained why the imperfective does not have this use. The restriction of this phenomenon to the aorist can be understood, however, if we realise that the topic time can be accommodated and can be the whole history up to the moment of speaking, or the whole life of the speaker until this moment. If then the aorist is used, which only indicates that an eventuality of the described kind is temporally included somewhere within this long topic time, the impression is that the exact location in time is not relevant as long as it is in the past of the moment of speaking. If on the other hand the imperfective is used, it follows from its semantics that the described eventuality must include the moment of utterance. This is very well possible, but does not give rise to an autonomous interpretation.

As we may expect, this use of the aorist is more common in conversations than in narrative discourses (cf. Ruijgh 1991:201), since here the temporal relations between the eventualities described are less important. When it occurs in narrative discourse, there is a clue present that the narration is temporally interrupted, which allows for a shift in topic time. In (167), for example, such a clue is the fact that Herodotus makes reference to himself, although he is no protagonist in the story he is telling.

Notice that this phenomenon is again explained on the basis of the simple semantics of aspect developed in chapter 4. We do not have to assume an ambiguity for the aorist between an anaphoric and a non-anaphoric use, nor do we have to look for an independent explanation why we do not find the same interpretation with the imperfective.

6.4 Conclusion

In this chapter I have specified the default binding rules for the anaphoric topic time. These rules together with the semantics of aspect proposed in chapter 4 explain the common temporal patterns found in Ancient Greek discourse. One of these patterns was the so-called immediative use of the imperfective. Furthermore, I have shown how the variation in interpretation of aorist and imperfective fits naturally within this account of the temporal structure of discourse. I have argued that the anaphoric nature of the topic time ensures the flexibility needed to allow for deviations from the common patterns under the influence of particles, world knowledge etc. Finally, I have shown that the autonomous use of the aorist is best explained in terms of the accommodation of a long topic time up to the moment of utterance.

Chapter 7

Comparison to theories in Classics

7.1 Introduction

In this chapter I will compare the analysis of Ancient Greek aspect developed in the present work with two influential analyses proposed in the literature, by Ruijgh (1985, 1991) and Sicking (1991, 1996), respectively. My account resembles the former in that Ruijgh and I both claim that grammatical aspect concerns the relation between the time of the eventuality and some reference time. Nevertheless, I will show that my account is preferable over Ruijgh's.

Sicking, on the other hand, takes a very different approach. He treats aspect in terms of focus rather than temporal relations. The motivation for his alternative account are examples that are problematic for any temporal theory of aspect. I will show that although Sicking is right in pointing out these problems, the theory he proposes cannot be upheld.

7.2 Ruijgh's *moment donné*

In both my own and Ruijgh's (1985, 1991) analysis grammatical aspect concerns the relation between the time of the eventuality and some other time. Our accounts differ, however, in the specification of this other time. In my account it is the topic time, in Ruijgh's it's what he calls the *moment donné*. The difference is not just a terminological one. As we have seen in chapter 6, my topic time is an anaphor that binds to a previously introduced time. Ruijgh's *moment donné*, on the other hand, is a different notion which he describes as follows:

Dans le cas du moment donné, il peut s'agir du moment présent, du moment initial d'une autre action mentionnée dans le contexte

ou d'un moment simplement présent dans l'esprit du locuteur. Le moment donné est le *point d'orientation*.

(In the case of the *moment donné*, it can be the present moment, the initial moment of another action mentioned in the context, or a moment that is simply present in the mind of the speaker. The *moment donné* is the orientation point.) Ruijgh (1991:199)

The *moment donné* is not an anaphor, since it often is a time that will be introduced in the following discourse rather than a time that has been introduced already.¹

A second difference between the two accounts becomes clear when we consider the temporal relation they assign to imperfective and aoristic aspect. This temporal relation is roughly the same in case of the imperfective, as both accounts take the eventuality time to include the *moment donné*/topic time, which yields the effect that the eventuality is 'not yet completed'. The two accounts assign different temporal relations to the aorist, however. To capture its value of completion, Ruijgh locates the eventuality time *before* the *moment donné*, whereas I locate it *within* the topic time.² The two proposals are represented graphically in Figure 7.1.

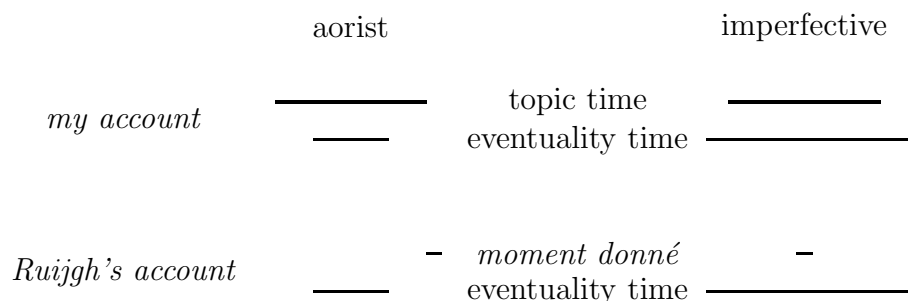


Figure 7.1: My account of grammatical aspect versus Ruijgh's

¹See, for example, Hettrich's (1976) test of Ruijgh's (1971) account, in particular, pp. 33–34.

²This is clear from the following citation:

Le TPr [imperfective aspect] exprime qu'à un moment donné par la situation ou le contexte, l'action exprimée par le thème verbal est encore en cours. Le TAo [aoristic aspect] exprime qu'avant un MD [moment donné], l'action a déjà été achevée (ou finie).

(The TPr [imperfective aspect] indicates that the action expressed by the verbal theme is still going on at a moment given by the situation or context. The TAor [aoristic aspect] expresses that the action has already been achieved (or finished) before an MD [*moment donné*])

Ruijgh (1985:9)

(194) πίνων ἀνέστη
pinōn anestē
 drink.IPFV.PTCP.NOM stand.up.PST.AOR.3SG
 “While he was drinking, he got up.”

(195) πιὼν ἀνέστη
piōn anestē
 drink.AOR.PTCP.NOM stand.up.PST.AOR.3SG
 “After he had drunk, he got up.”

In contrast to my account, Ruijgh's main aim is to capture the basic opposition between imperfective and aoristic aspect in terms of completion and does not try to derive the various interpretations of the two aspects from a uniform semantics. For example, he doesn't assign a role to the length of the reference time in the coming about of the habitual and ingressive interpretations, which is crucial to the analysis I have proposed.

Unfortunately, Ruijgh doesn't discuss the semantics of tense explicitly. In order to understand the problem, let's see what options are open to him:

1. Tense locates the time of the eventuality with respect to the moment of utterance.
2. Tense locates the *moment donné* with respect to the moment of utterance.
3. Tense locates both the time of the eventuality and the *moment donné* with respect to the moment of utterance.

Although he does not discuss the semantics of tense as such, Ruijgh (1985:10–12) does address the location of the *moment donné* with respect to the moment of utterance for the tense-aspect *pairs* present-imperfective, past-imperfective, and past-aorist:

Dans le cas de l'indicatif primaire (valeur : 'non-passée') du TPr [the combination present-imperfective], le MD [moment donné] est en principe le moment présent. ...

Dans le cas de l'indicatif secondaire (valeur : 'passée') du TPr [the combination past-imperfective], le MD est un moment du passé. ...

L'ind. sec. du TAO [the combination past-aorist] exprime, en revanche, l'achèvement de l'action antérieur au MD. Le MD peut être ou bien le MP [moment présent, moment of utterance] ... ou bien un moment du passé.

(In the case of the primary indicative (value: 'non-past') of the TPr [the combination present-imperfective], the MD [*moment donné*] is in principle the moment of utterance. ...

In the case of the secondary indicative (value: 'past') of the TPr [the combination past-imperfective], the MD is a moment in the past. ...

The secondary indicative of the TAO [the combination past-aorist], by contrast, expresses the achievement of the action before the MD. The MD can be the moment of utterance or a moment in the past.)

Let's try to deduce from these remarks, in combination with his semantics of aspect, as given in Figure 7.1, which of the three above mentioned options Ruijgh takes to be the semantics of tense.

As the last citation shows, Ruijgh claims that with the combination past-aorist the *moment donné* can be the moment of utterance. This means that tense does not locate the *moment donné* with respect to the moment of utterance, which excludes the second and third option. We are left with the first option, according to which tense locates the time of the eventuality with respect to the moment of utterance. However, the fact that with the combination present-imperfective the *moment donné* is the moment of utterance, suggests the second or third option. Hence, when combined with his semantics of aspect Ruijgh's remarks concerning the location of the *moment donné* with respect to the utterance time result in a non-uniform account of tense.³

³One could try to save a uniform account of tense in the following way. We stick with the first option and try to explain the claim that with the combination present-imperfective the *moment donné* is the moment of utterance as the result of combining the contributions of

Actually, the problem is worse than this: not only are the actual remarks at odds with a uniform account of tense, it is simply impossible to combine Ruijgh's account of aspect with a uniform account of tense, even if we ignore his remarks about the location of the *moment donné* for the various tense-aspect pairs. In other words, Ruijgh's account of aspect is problematic for any uniform semantics of tense, as I will show now.

There are (at least) two phenomena that Ruijgh would like to explain with his approach to aspect: the autonomous use of the aorist (see the previous chapter) and the lack of a form for the combination present tense and aoristic aspect (see chapter 5). As I will show, however, given Ruijgh's analysis of aspect, these two phenomena impose conflicting constraints on a theory of tense. The former requires the first tense option, the latter the third.

Let's start with the autonomous use of the aorist. This use is the reason why Ruijgh allows the *moment donné* to be the moment of utterance for the combination past-aorist, since he claims that with this use the *moment donné* is the moment of utterance. Imperfective aspect then does not have this use, for with the past-imperfective the *moment donné* cannot be the moment of utterance.⁴ As we have seen, the fact that with the combination past-aorist the *moment donné* can be the moment of utterance excludes the second and third options: tense does not locate the *moment donné* with respect to the moment of utterance. Hence, the autonomous use of the aorist requires the first tense option, in which tense locates the time of the eventuality with respect to the moment of utterance.

But now let's consider the second phenomenon, the absence of a form for the combination of present tense and aoristic aspect. This phenomenon can only be explained on the third tense option. To see this, let's start with the second option, since it is immediately clear that this option doesn't work. If tense would locate the *moment donné* with respect to the moment of utter-

present tense and imperfective aspect. However, the combination of these two contributions does not result in the *moment donné* being the moment of utterance, as I will explain. On the first option, the present tense indicates that the time of the eventuality overlaps with the moment of utterance. (Note that on the first option, it is impossible to say that with the present tense the time of the eventuality *is* (rather than includes or overlaps with) the moment of utterance, since then we could only describe very short eventualities with the present tense, which is not the case.) The combination of the two contributions allows the constellation that both the moment of utterance and the *moment donné* are included in the time of the eventuality, without the moment of utterance being equal to or overlapping with the *moment donné*. Hence, we cannot save a uniform account in this way.

⁴Stated this way it is not so much of an explanation of course, since why can't the *moment donné* be the utterance time for the past-imperfective? One could try to turn it into an explanation in the following way: if the utterance time functions as the *moment donné* and imperfective aspect indicates that the eventuality time includes the *moment donné*, then the eventuality time overlaps with the utterance time, and hence we expect the present tense. For aoristic aspect, on the other hand, since the eventuality time precedes the *moment donné*, the eventuality precedes the utterance time, and hence we expect past tense.

ance, the present tense would indicate that the *moment donné* is (or overlaps with, or includes) the moment of utterance. Since the aorist situates the eventuality before the *moment donné*, and hence with the present tense, before the utterance time, this predicts that there would be many cases in which the present-aorist form can be used (viz. for all kinds of eventualities in the past; the situation is represented graphically in Figure 7.2). Hence we cannot explain the absence of this form in terms of a very restricted use.

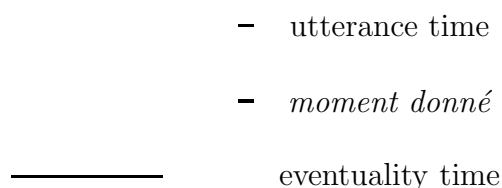


Figure 7.2: The second tense option and the lack of a form for present-aorist

The same holds for the first tense option, although here the situation is somewhat more complicated. The situation is represented graphically in Figure 7.3. If tense would concern the relation between the eventuality time and the utterance time, the present tense would indicate that the eventuality time overlaps with the utterance time. Since the aorist indicates that the eventuality time is in the past of a *moment donné*, there are again many situations in which the present-aorist form could be used, and again, the absence of this form cannot be attributed to a very restricted use of this form.

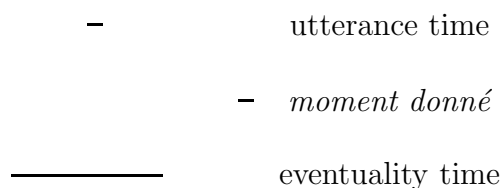


Figure 7.3: The first tense option and the lack of a form for present-aorist

One could try to save this option by letting the utterance time include the time of the eventuality rather than overlap with it. Then, indeed, there is a tension between the semantic values of present tense and aoristic aspect, viz. the same tension that I have sketched in chapter 5 (the form present-aorist could only be used for eventualities of very short duration), and the absence of the form is explained. This proposal is represented in Figure 7.4.

However, this revised version doesn't work either, since it immediately raises the question why the eventuality time should be included in the utterance time. Is it a contribution of the present tense or of the aoristic aspect? If it

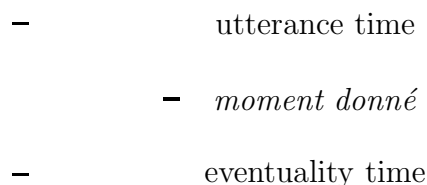


Figure 7.4: The first tense option and the lack of a form for present-aorist, revised version

comes from the present tense, then this account wrongly predicts that there doesn't exist a form for present tense and imperfective aspect either. If it comes from the aoristic aspect feature, on the other hand, the account deviates from Ruijgh's original account, since then aspect does not only concern the relation between the eventuality time and the *moment donné*, but also that between the eventuality time and some other time. The intuition of completion is no longer captured in terms of the relation between eventuality time and *moment donné*, but requires a second temporal relation to capture it. But if we have this second temporal relation (a temporal relation that reminds us of the one I propose for aoristic aspect), what do we need the *moment donné* for?

I have shown that the absence of the form present-aorist cannot be explained on Ruijgh's analysis for aspect if we assume the first or second option for the semantics of tense.⁵ It is explained on the third option: if the present tense indicates that both the eventuality time and the *moment donné* overlap with the moment of utterance, and aoristic aspect indicates that the eventuality is situated completely before the *moment donné*, there is a clash. As

⁵Of course, one could try to find a different kind of explanation for the absence of this form, not in terms of a clash between semantic features. However, Ruijgh himself wants to explain the absence in terms of such a semantic clash:

Le thème d'aoriste [aoristic aspect] ne dispose pas d'un indicatif primaire [present tense]. En effet, une forme constituée d'un thème d'aoriste immédiatement suivi d'une désinence primaire exprimerait deux valeurs incompatibles: l'achèvement de l'action avant le moment présent et la présence de l'action au moment présent.

(The aorist theme [aoristic aspect] does not dispose of a primary indicative [present tense]. In fact, a form made up of an aorist aspect immediately followed by a primary inflection would express two incompatible values: the achievement of the action before the moment of utterance and the presence of the action at the moment of utterance.)

Ruijgh (1991:201)

Note that this extract indeed suggests the third tense option: the present tense indicates that both the *moment donné* and the eventuality time are, or overlap with, the moment of utterance.

I have argued, however, on the third option we lose Ruijgh's account of the autonomous use of the aorist.

In sum, I have shown that Ruijgh's analysis of aspect requires a non-uniform account of tense to explain the data. To explain one phenomenon, tense has to concern the relation between eventuality time and utterance time, whereas to explain the other, tense has to locate both the eventuality time and the *moment donné* with respect to the utterance time. Since my own account does not suffer from this shortcoming, I conclude that it is superior to Ruijgh's.

7.3 Sicking: aspect as focus

Sicking (1991, 1996) proposes an analysis of aspect that is very different from the ones discussed so far. In contrast to, for example, Ruijgh's account and my own, Sicking argues that the contribution of aspect cannot be captured in terms of temporal relations. His motivation for deviating from a temporal analysis are examples like (196) (from Sicking 1991:27):

- (196) Μαρδόνιος δὲ ... μετὰ ταῦτα ἔπεμψε
Mardonios de ... meta tauta epempse
 Mardonius.NOM PRT after that.ACC send.PST.AOR.3SG
 ἄγγελον εἰς Ἀθήνας Ἀλέξανδρον τὸν
angelon es Athēnas Alexandron ton
 messenger.ACC to Athens.ACC Alexander.ACC the.ACC
 Ἀμύντεω ἄνδρα Μακεδόνα, ἅμα μὲν
Amunteō andra Makedona, hama men
 Amyntas.GEN man.ACC Macedonian.ACC at.the.same.time PRT
 ὅτι οἱ προσκηδέες οἱ Πέρσαι
hoti hoi proskēdees hoi Persai
 because he.DAT akin.NOM the.NOM Persians.NOM
 ἦσαν ..., ἅμα δὲ ὁ
ēsan ..., hama de ho
 be.PST.IPFV.3PL at.the.same.time PRT the.NOM
 Μαρδόνιος πυθόμενος ὅτι πρόξεινός τε
Mardonios puthomenos hoti proxeinos te
 Mardonius.NOM learn.AOR.PTCP.NOM that protector.NOM PRT
 εἶη ἐκεῖ καὶ εὐεργέτης ὁ
eiē ekei kai euergetēs ho
 be.IPFV.OPT.3SG there and benefactor.NOM the.NOM
 Ἀλέξανδρος ἔπεμπε.
Alexandros epempe
 Alexander.NOM send.PST.IPFV.3SG

“After that Mardonius sent as a messenger to Athens Alexander, a Macedonian, son of Amyntas, partly because the Persians were akin to him (...), and partly Mardonius sent him because he learned that Alexander was a protector and benefactor of the Athenians.” Hdt. 8.136

In (196) the same sending eventuality is mentioned twice, the first time with aoristic aspect, the second time with imperfective aspect. At first sight at least, this use of the imperfective is puzzling for any temporal theory of aspect, since it is intuitively used for a complete eventuality. That the imperfective sometimes seems to be used to refer to complete eventualities has often been observed in the literature (e.g. Schwyzer and Debrunner 1950:277, Kühner and Gerth 1898:143). Many grammars note that this phenomenon is particularly common with *verba dicendi* in the broad sense (*ibidem*). Examples of verbs that display this behaviour are *κελεύω* *keleuō* ‘to order’, *πέμπω* *pempō* ‘to send’, and *δέομαι* *deomai* ‘to ask’. Blass (1889:410) speaks of *Verba, Handlungen bezeichnend, die ihr Ziel und ihre Vollendung in dem Thun eines Andern haben* (‘verbs that refer to actions that find their goal and completion in the action of someone else’).

Several attempts to save a temporal account for these kind of examples have been proposed in the literature. One popular approach is to claim that the meaning of the above mentioned verbs does not correspond to the meaning of the English translations that I gave but that the so-called *Fortwirkung* is part of the meanings of these verbs too (see e.g. Svensson 1930:passim, Hettrich 1976:61–62). On this view the Greek verb *πέμπω* *pempō* in (196) refers to an eventuality that consists not only of the sending of a messenger but also its effect, that is, the messenger go and tell his message. Even if the sending itself is completed, the imperfective can be used as long as its effect is not yet completed.

Note that in order to deal with examples like (196), we have to assume that the verbs in question are ambiguous, since the aorist in the first clause is not taken to indicate that the *Fortwirkung* is completed, that is, that the messenger completed his task. It’s only the sending itself that is completed.

Sicking (1991, 1996) is not convinced by this solution and takes examples like (196) to be a reason to develop a new, non-temporal approach to aspect in Ancient Greek. He claims that the choice of aspect relates to *focus* rather than temporal relations. More specifically, he argues that with the aorist, in contrast to the imperfective, the verb has *focus function*, a notion that he describes as follows:

... I will, without further ado, use the terms ‘focus function’ for the part of the unit involved that, from a viewpoint of information, is the most prominent in the sense of being its ‘nucleus’, or the

part ‘to which the speaker especially draws the hearer’s attention.’
Sicking (1996:75)

Unfortunately, Sicking’s notion of focus function is not worked out in much detail, though the following example may clarify what he has in mind. According to Sicking, if *he gave a sword* is said in answer to the question *what did he do?*, *gave* is part of the focused information; if it is said in answer to the question *what did he give?*, *gave* is part of the topical information (Sicking 1996:6-7; for similar examples, see Sicking 1991:29). The focal information of a sentence may thus be identified by checking in which discourse context it is or can be felicitously used. More specifically, a syntactic constituent is a ‘focus’ if it correlates with the questioned part of a preceding question. The non-focal remainder is called the background which contains the topical information (to revert to Sicking’s terminology). This explication of focal versus non-focal information has a long history and goes back at least to Paul (1880). Nowadays it is common to see question-answer congruence as the primary test to distinguish focal from non-focal information. This explication is moreover fully compatible with Sicking’s claim cited above that from the viewpoint of information focal information is given by most prominent part of a sentence. Sicking’s central claim can now be stated as follows: if a verb in Greek occurs as part of the focused information, it’s in the aorist; if it is part of the non-focal information, imperfective aspect is used.

Let’s apply Sicking’s analysis to (196). The first time the sending eventuality is mentioned the verb form is part of the focused information. Sicking claims that this is why the aorist is used. With the second mention, the existence of this eventuality is backgrounded information, hence the imperfective.

Sicking claims that his focus account also explains why aspect is traditionally explained in terms of temporal relations. After noting that we often interpret an overlap relation with imperfective aspect, he continues

This is just what one expects since:

1. PS [imperfective aspect] is crucially associated with the presentation of introductory, backgrounded or otherwise subsidiary material, and,
2. backgrounded clauses more often than not refer to durative situations, which, *by definition*, will be going on at the moment the event referred to by the main verb occurs.

Sicking (1996:36; emphasis in original)

Again, it is difficult to get at what exactly Sicking is after. For if focus is used in the same sense as before, it is unclear why verbs without focus function

‘more often than not’ refer to durative situations.⁶ Nor is it clear why durative situations ‘will be going on at the moment the event referred to by the main verb occurs’ (let alone why this should be ‘by definition’).

Apart from this problem, Sicking’s theory faces at least three additional problems. First, as Wakker (1998) rightly points out, it does not explain why there is no form for aoristic aspect in the present tense. A focus account would have to claim that information about the present time cannot be focused, but it is unclear why that should be the case.

Second, it is easy to find counterexamples to the claim that aoristic aspect is used for focused information and imperfective aspect for topical information. I collected the following examples from Herodotus book 1:

- (197) Παρελθὼν δὲ οὗτος ἐς τὰ Κροίσου οἰκία κατὰ νόμους τοὺς ἐπιχωρίους καθαρσίῳ ἐδέετο κυρῆσαι, Κροῖσος δέ μιν ἐκάθηρε. Ἔστι δὲ παραπλησίη ἡ κάθαρσις τοῖσι Λυδοῖσι καὶ τοῖσι Ἑλλήσι. Ἐπεῖτε δὲ τὰ νομιζόμενα ἐποίησε ὁ Κροῖσος, ἐπυνθάνετο ὁκόθεν τε καὶ τίς εἴη, λέγων τάδε· “Ὀνθρωπε, τίς τε ἐὼν καὶ κόθεν τῆς Φρυγίης ἦκων ἐπίστιός μοι ἐγένεο; Τίνα τε ἀνδρῶν ἢ γυναικῶν ἐφόνευσας;” Ὁ δὲ ἀμείβετο· “ὦ βασιλεῦ, Γορδίεω μὲν τοῦ Μίδεω εἰμὶ παῖς, ὀνομάζομαι δὲ Ἀδρηστος, φόνευσας δὲ ἀδελφεὸν ἐμεωυτοῦ ἀέκων πάρεϊμι ἐξεληλαμένος τε ὑπὸ τοῦ πατρὸς καὶ ἐστερημένος πάντων.”
 “This man came to Croesus’ house, and entreated that he might be purified after the custom of the country; so Croesus purified him (the Lydians use the same manner of purification as do the Greeks), and when he had done all according to usage, he inquired of the Phrygian whence he came and who he was: ‘Friend,’ he said, ‘who are you, and from what place in Phrygia do you come to be my suppliant?’ and what man or woman have you killed-AOR?’ ‘O King,’ the man answered, ‘I am the son of Gordias the son of Midas, and my name is Adrastus; by no will of mine, I killed-AOR my brother, and hither I am come, banished by my father and bereft of all.” Hdt. 1.35.2-5⁷

A comparison with Sicking’s own *giving the sword* example tells us that his account predicts the use of imperfective aspect in (197) when the killing eventuality is mentioned for the second time. This is because when we have come to Adrastus’ answer the fact that he killed someone is backgrounded information. The focused information is that the person whom he killed is his brother.

⁶Sicking (1971:38) defines durative situations as situations that do not have natural boundaries, similar to my unbounded predicates; Sicking (1991:41) defines them as situations that are capable of continuing for some time. Neither definition provides durative situations with the characteristics that Sicking ascribes to them in the quoted passage.

⁷The translations of this and the following two Herodotus’ passages are based on Godley’s (Herodotus 1963) translation.

Nevertheless, aoristic aspect is used.

Likewise for the following example:

- (198) Ὡς δὲ καὶ ταῦτα ἤκουσαν οἱ Λακεδαιμόνιοι, ἀπεῖχον τῆς ἐξευρέσιος οὐδὲν ἔλασσον, πάντα διζήμενοι, ἐς οὗ δὴ Λίχης τῶν ἀγαθοεργῶν καλεομένων Σπαρτιητέων ἀνεῦρε. Οἱ δὲ ἀγαθοεργοὶ εἰσι τῶν ἀστῶν, ἐξιόντες ἐκ τῶν ἱππέων αἰεὶ οἱ πρεσβύτατοι, πέντε ἔτεος ἑκάστου· τοὺς δεῖ τοῦτον τὸν ἐνιαυτόν, τὸν ἂν ἐξίωσι ἐκ τῶν ἱππέων, Σπαρτιητέων τῷ κοινῷ διαπεμπομένους μὴ ἐλινύειν ἄλλους ἄλλη. Τούτων ὧν τῶν ἀνδρῶν Λίχης ἀνεῖρε ἐν Τεγέῃ καὶ συντυχίῃ χρησάμενος καὶ σοφίῃ.

“When the Lacedaemonians heard this too, they were no nearer finding what they sought, though they made search everywhere, till at last Liches, one of the Spartans who are called Benefactors, found-AOR it. These Benefactors are the Spartan citizens who pass out of the ranks of the knights, the five oldest in each year; for the year in which they pass out from the knights they are sent on diverse errands by the Spartan state, and must use all despatch. Liches, then, one of these men, by good luck and cleverness found-AOR the tomb at Tegea.” Hdt. 1.67.5-68.1

By the time we have come to the last sentence of (198), the fact that Liches found the tomb is backgrounded information. Still aoristic aspect is used.

A final example is (199):

- (199) Τὴν μὲν δὴ τυραννίδα οὕτω ἔσχον οἱ Μερμνάδαι τοὺς Ἡρακλείδας ἀπελόμενοι, Γύγης δὲ τυραννεύσας ἀπέπεμψε ἀναθήματα ἐς Δελφοὺς ... Οὗτος δὲ ὁ Γύγης πρῶτος βαρβάρων τῶν ἡμεῖς ἴδμεν ἐς Δελφοὺς ἀνέθηκε ἀναθήματα μετὰ Μίδην τὸν Γορδίεω, Φρυγίης βασιλέα.

“Thus did the Mermnadae rob the Heraclidae of the sovereignty and take it for themselves, and having gained it, Gyges sent-AOR offerings to Delphi ... This Gyges was the first foreigner (of our knowledge) who placed-AOR offerings at Delphi after the king of Phrygia, Midas the son of Gordias.” Hdt. 1.14.2

The sending of offerings is already mentioned in the first sentence, and hence is backgrounded information in the last sentence. The focused information of the last sentence is that Gyges was the first who did it. Again, contrary to Sicking’s predictions, aoristic aspect is used.

A final problem with Sicking’s focus theory concerns the notion of focus itself. The giving of the sword example suggests that we have to understand this notion in terms of the difference between foregrounded and backgrounded information. However, a few pages later, in the discussion of an example where

imperfective aspect is used to describe a new, foregrounded eventuality, focus seems to concern how important the information is (Sicking 1991:32). Another complication is that ‘focus function’ plays a role at two levels. According to Sicking (1996:77) focus function has to do both with (i) the information function of the verb form within the clause, and (ii) the information function of a clause within the sentence or larger context. For aoristic aspect to be used, the verb has to have focus function within the clause and the clause has to have focus function within the sentence or larger context. With imperfective aspect, on the other hand, either the verb does not have focus function within the clause, or the clause does not have focus function within the sentence or larger context.^{8,9} The fact that the term *focus* is used in these different senses makes that this theory is as far from a unified theory of aspect choice as is a theory that would use different words for these different senses.

For the above-mentioned reasons I reject Sicking’s theory as a general account of aspect.¹⁰ This is not to say, however, that Sicking isn’t right in pointing out that examples like (196) are problematic for a temporal account of aspect. Admittedly, I don’t have an explanation for the use of the imperfective in these cases. It is unclear to me whether we have to look for an explanation in terms of the *Fortwirkung* associated with the verb, or in terms

⁸The dual nature of Sicking’s notion of focus becomes clear from the following quote:

Aorist indicative verb forms and participles 1) are to be assigned focus function (or: are the ‘nucleus’) in the clause they are part of, and 2) are the predicate of a self-contained statement (...). By using Imperfect indicatives or Present participles, on the other hand, a speaker (or writer) signals to his audience (or readership) that the verb form at hand is not meant to perform an independent information function. *Either* the PS [present stem] verb form indicates that it is not to be taken as the ‘nucleus’ of its clause, the speaker wanting to focus on some other constituent within the same clause, *or* the statement in which the PS verb form is the predicate, is to be connected with another statement (or other statements) in the immediate or wider context – bearing no focus itself, but being just one time in a series or otherwise owing its relevance to some other statement.

Sicking (1996:105)

⁹Sicking claims that with the aorist both explications of focus function have to be fulfilled. This means that his account cannot be saved from the above-mentioned counterexamples by claiming that the aorist is used in these examples because (although the verb does not have focus function with its clause) the clause has focus function within the sentence or larger context. Deviating from Sicking and giving up the idea that both criteria have to be fulfilled wouldn’t help either, as it is not clear what this would mean for imperfective aspect. Could imperfective aspect be used only if neither the verb is the focus of the clause, nor the clause the focus of the context, or would one of the two be enough reason for imperfective aspect to be used? If the latter, the theory would become too flexible.

¹⁰Sicking (1991) ascribes focus a more modest role than Sicking (1996). In the former focus seems to be presented as one of the factors that determines aspect choice, whereas in the latter it is the sole factor (Sicking 1996:74).

of information structure, or maybe something else.

In this light, it is interesting to consider to Grønn's (2003) dissertation about a similar phenomenon in Russian. He develops a temporal approach to aspect in general, but wants to explain the often observed fact that Russian imperfective aspect is sometimes used for complete eventualities (see, for example, Forsyth 1970, to whom Sicking also refers). He labels this the *factual* use of imperfective aspect. In order to explain the data, Grønn has to make quite some distinctions within this use. First he divides the factual use into the presuppositional and existential use. According to Grønn, with the former, the existence of the eventuality to which the verb refers is presupposed. This resembles Sicking's account in terms of focus. Grønn recognises however that this does not hold for all instances of the factual imperfective. With the existential use, the existence of the eventuality is asserted rather than presupposed. The class of existential uses isn't homogeneous either, and Grønn divides it into an experiential, bidirectional, and cyclic use. I don't know whether the phenomena in Russian and Ancient Greek are exactly the same, but the Russian data may shed new light on this puzzle in Ancient Greek.

To conclude, I take it to be the major drawback of Sicking's focus account that the key notion of focus is ill-defined. On the above-given interpretation of this notion, which seems the one intended by Sicking, his account is untenable as a general account of aspect. This is due to (i) its inability to deal with the temporal interpretations, (ii) its inability to explain the lack of a form for aoristic aspect and present tense, and (iii) the existence of counterexamples. Nevertheless, I acknowledge the existence of examples that are problematic for a temporal account of aspect.

In this chapter I have discussed two influential approaches to Ancient Greek aspect found in the literature, that of Ruijgh in terms of temporal relations with respect to a *moment donné* and that of Sicking in terms of focus. I have argued that the account of aspect developed in the present work is preferable over both.

Chapter 8

Conclusions and discussion

8.1 Conclusions

The main challenge in this thesis was to account for the variation in interpretation of imperfective and aoristic aspect in Ancient Greek without postulating ambiguity. I have tackled this problem by employing methods from formal semantics. Let me recapitulate the analysis developed in this thesis. It is also summarised in Figure 8.1.

The starting point of my analysis is that aspect concerns the temporal relation between the run time of the eventuality described by the predicate and the so-called topic time. This topic time can intuitively be seen as the time about which we speak. Formally, it is treated as an anaphor that binds to a previously introduced time. Imperfective and aoristic aspect relate the eventuality's run time to the topic time in different ways. Imperfective aspect indicates that the eventuality is going on at the time about which we speak, that is, the eventuality's run time includes the topic time. Aoristic aspect, by contrast, indicates that the eventuality takes place within the time about which we speak: its run time is included in the topic time. The proposed semantics directly yields what Ancient Greek grammars consider the basic opposition between imperfective and aoristic aspect: *going on* versus *completed*. I have labeled these the *processual* interpretation of imperfective aspect and the *completive* interpretation of aoristic aspect, respectively.

In order to derive the other interpretations associated with imperfective and aoristic aspect in Ancient Greek I used some additional principles and mechanisms. A central role was assigned to coercion, a mechanism which forces the argument of an operator to be reinterpreted in order to resolve a semantic mismatch between the selectional restrictions of the operator and the properties of its argument. The proposed restriction of the aorist operator to bounded predicates (in order to rule out a potential overlap between the use of aorist and imperfective) triggers reinterpretation when it is confronted

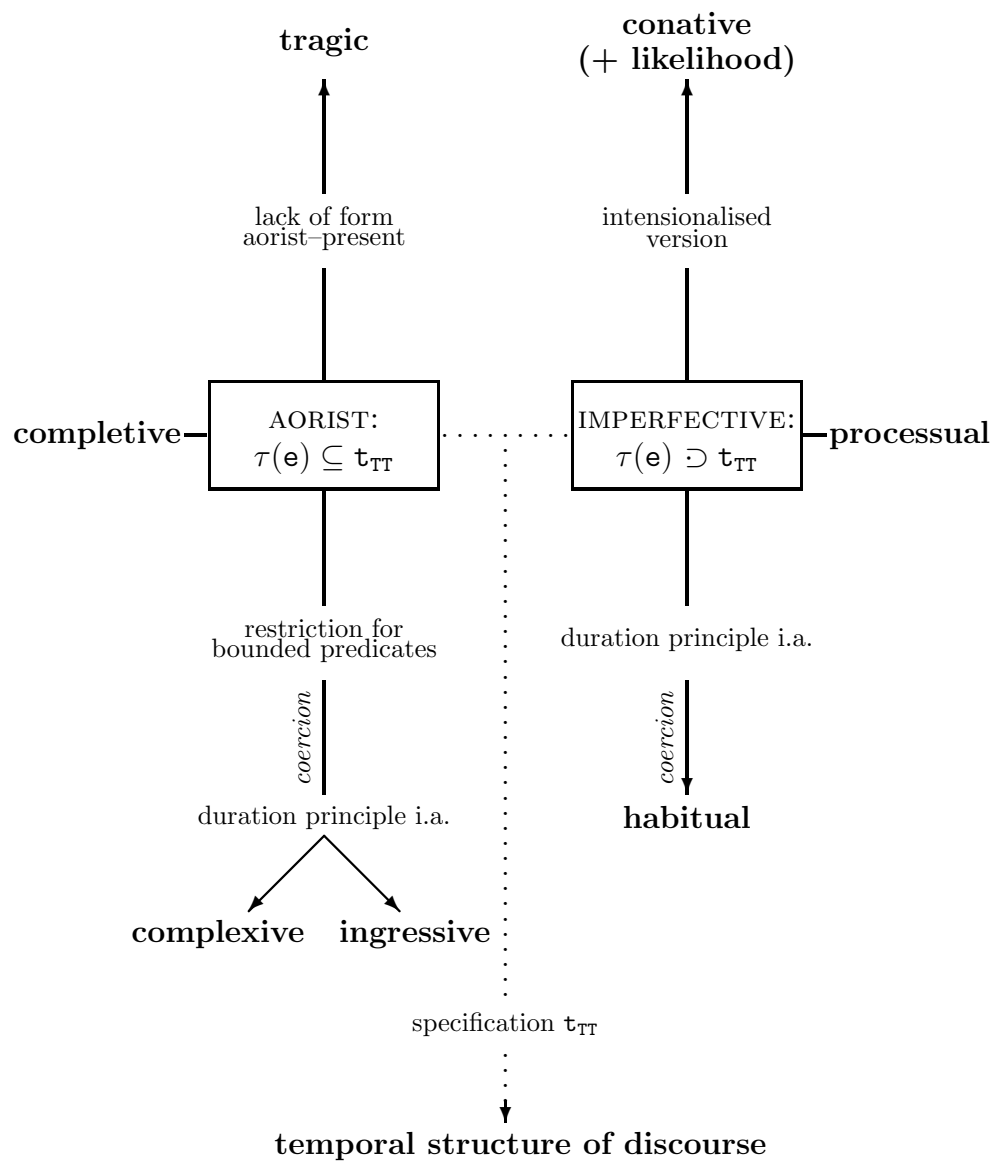


Figure 8.1: Overview of the interpretations of aorist and imperfective 2

with an unbounded predicate. In such cases an intervening coercion operator solves the mismatch between the operator and its argument. For this purpose I defined two operators: the maximality operator, which yields the *complexive* interpretation (the interpretation of completion with unbounded predicates), and the ingressive operator, which yields the *ingressive* interpretation. The Duration Principle, which states that information on duration from various linguistic sources must be compatible, plays a crucial role in the choice between these two operators. Each operator has a different effect on the duration associated with the predicate and the reinterpretation finally chosen is one that obeys the Duration Principle. Thus, if the topic time is short (compared to the time associated with the predicate), an ingressive reinterpretation is chosen, since the ingressive operator shortens the time associated with the predicate. If, on the other hand, the topic time is long, both reinterpretations are available, but a complexive interpretation may be favoured on the basis of a general preference for stronger interpretations.

In contrast to the aorist, the imperfective operator does not impose an aspectual class restriction on its argument. This means that it combines equally well with bounded and unbounded predicates. Nevertheless, the Duration Principle is active here as well. This is due to the fact that, apart from guiding the choice among the various reinterpretations (as it does with the aorist), the Duration Principle can also trigger reinterpretations by its own. I argued that in this way the habitual interpretation of imperfective aspect comes about: if the topic time is longer than the duration associated with the predicate, this mismatch is solved by the intervention of a habitual coercion operator, which lengthens the duration associated with the predicate.

For the conative and likelihood interpretations, we had to adapt our semantics of imperfective aspect in order to avoid the so-called imperfective paradox. I indicated a way to do this which involves an intensionalisation of the semantics of the imperfective.

My analysis naturally extends to the tragic use of the aorist. I have shown that this is the use of the aorist that we find with performatives. Moreover, I have shown that this special use is the result of the absence of an ideal form for such expressions. On the basis of the semantics developed for tense and aspect I demonstrated that the optimal form for performatives would be the combination of present tense and aoristic aspect, since eventuality time and utterance time coincide here. This form, however, does not exist in Ancient Greek. In absence of an optimal form, two suboptimal forms are equally good: that for present tense and imperfective aspect and that for past tense and aoristic aspect. Both forms are attested with performatives in Ancient Greek. With the former, primacy is given to the tense feature and the aspect feature is taken for granted. With the latter, it's the other way around. The latter is what has traditionally been labelled the tragic aorist. Once we recognise

the tragic aorist as the use found in performatives and adopt the semantics of tense and aspect that I propose, this use of the aorist is readily understood.

Moving beyond the level of the sentence I showed that the analysis also accounts for the way in which aspect choice influences the temporal structure of discourse. To explain the observed common temporal patterns, the proposed semantics of aspect was complemented with a specification of how the topic time of a clause is determined in a discourse. This was achieved by treating the topic time as an anaphor and specifying its default binding rules. This also provided an explanation for the *immediative* use of imperfective aspect. Furthermore, the anaphoric nature of the topic time ensured the degree of flexibility required to allow for deviations from the common patterns under the influence of particles, world knowledge, etc. Moreover, I have shown how the variation in interpretation of the aorist and the imperfective and the temporal structure of discourse are two sides of the same coin, since the two features of aspect interpretation crucially depend on each other.

I formalised my analysis in a form of Discourse Representation Theory with lambdas, a fusion of two important frameworks for natural language semantics: DRT and Montague Semantics. The choice for DRT was determined by the need to deal with intersentential anaphora (in the form of an anaphoric topic time), for which DRT is the natural option. I supplemented this framework with mechanisms from the lambda calculus in order to explicate how the meanings of the various constituents of a sentence determine the meaning of the sentence as a whole. The combination of these two frameworks was ideal for showing how the broad range of phenomena concerning aspect interpretation in Ancient Greek can be explained on the basis of a simple semantics for aorist and imperfective.

In this study of aspect in Ancient Greek, we came across a variety of issues that are at the heart of philosophy of language and formal semantics/pragmatics: competition between forms, the intricate interactions between linguistic and extralinguistic knowledge, compositionality, reinterpretation, cooperativity between speaker and hearer, the inextricable connections between sentence and discourse interpretation, and performativity, just to mention a few. In this way, I hope that the contributions of this thesis are not restricted to the specific question it addresses, but that it also shows how fruitful it is to combine insights from Ancient Greek linguistics and formal semantics.

8.2 Future research

In the course of this study I have come across a number of issues that deserve closer attention than they could be given here. In this section I collect some of them and formulate them as pointers to future research.

The first one concerns the puzzling use of the imperfective, described in sec-

tion 7.3, for eventualities that are intuitively complete. As I mentioned there, a closer comparison with the Russian data may be of help in understanding this use.

Another remaining puzzle is that of the generic aorist, the use of the (past) aorist for general truths, mentioned in section 2.4.4. The problem is not so much its past tense feature, which I think can be explained from the lack of the form present–aorist, as I did with the tragic aorist. The real challenge is to explain its aspect feature. Again, I believe that a comparison with similar phenomena in Slavic languages is promising. See, for example, Klimek (2008a, 2008b) on the use of the (present) perfective in generic contexts in Polish.

A third issue concerns the future. Without paying much attention to it, I have treated it as a tense. I claim that it locates the topic time after the utterance time, in the same way as the past tense locates it before the utterance time and the present tense locates it at the utterance time. This seems correct for the indicative. In some respects, however, the future rather behaves like an aspect, for example in the participle forms. Ancient Greek has four participles: the imperfective, the aorist, the perfect, and the future participle. The former three do not have a tense morpheme, but do have an aspect morpheme. Thus, in these environments the future morphology stands in opposition to aspect morphemes, which suggests that it is itself an aspect rather than a tense. I have ignored this dual nature of the future and treated it as a tense.

This brings us to aspect in the non-indicative verb forms in general. Although I present the proposed analysis as a general analysis of aspect and although the analysis is in principle compatible with the fact that the aspect opposition is found throughout the verbal paradigm, this study has largely focused on aspect in the indicative. It remains to be seen whether the analysis also holds for the imperative, for example, a mood that is notably puzzling with respect to aspect choice (see, for example, Bakker 1966, Sicking 1991).

Finally, there are some points of a more technical nature. I mention here only the formulation of the habitual and ingressive operators. The ones I have used capture the temporal facets that were relevant for my purposes. If one tries to formulate more sophisticated operators, however, one gets involved in intricate (philosophical) debates concerning causality and change, among other things. I leave this too for future research.

Appendix A

The language of Compositional DRT

A.1 Introduction

In this appendix I explicate the model, syntax, and semantics of the language that underlies the analyses in this thesis. The language combines the lambdas of Montague Semantics with the DRSs of DRT. Several such systems have been proposed in the literature, for example the λ -DRT of Pinkal and Bos (Latecki and Pinkal 1990, Bos et al. 1994, Blackburn and Bos 2006), Asher’s (1993) bottom-up DRT and Muskens’ (1996) Compositional DRT (CDRT). I follow Muskens’ system which provides a semantics for its language, is mathematically clean, easy to use in practice, and accessible.

The formalism used in CDRT is that of classical type logic. Muskens (1996) shows that, if we adopt certain first-order axioms, DRSs are already present in this logic in the sense that they can be viewed as abbreviations of certain first-order terms. Thus, we can have lambdas and DRSs in one and the same logic. Moreover, the merge operator of DRT is definable in type logic as well, which means type logic provides everything needed to mimic DRT.

To show that DRSs are part of type logic Muskens starts from the idea that the meaning of a DRS can be viewed as a binary relation between input and output assignments (or, in DRT terminology, embeddings).¹ Assignments are functions from the set of variables (or, in DRT terminology, discourse markers) to the domain. A DRS K is a pair of a set of variables $x_1, \dots, x_n$ (the universe of K) and a set of conditions $\gamma_1, \dots, \gamma_2$. The meaning of a DRS K is the set of pairs of assignments $\langle f, f' \rangle$ such that f' differs from f at most in the variables in the universe of K (we write this as $f[x_1, \dots, x_n]f'$) and f' makes

¹Muskens (1996) follows the Groenendijk and Stokhof semantics of DRT. Van Leusen en Muskens (2003) show that the same can be done starting from the Zeevat (1989) semantics of DRT which remains closer to the original formulation of DRT. Here I follow the former.

the conditions of K true:

$$(200) \quad \left\| \begin{array}{c} \boxed{x_1 \dots x_n} \\ \gamma_1 \\ \dots \\ \gamma_m \end{array} \right\|^{\mathfrak{M}} = \{ \langle f, f' \rangle \mid f[x_1, \dots, x_n]f' \& f' \in \llbracket \gamma_1 \rrbracket^{\mathfrak{M}} \cup \dots \cup \llbracket \gamma_m \rrbracket^{\mathfrak{M}} \}$$

The fact that the meaning of a DRS is a *relation* between assignments is responsible for the dynamic nature of DRT. CDRT mimics this in type logic by adopting assignments in the object language. In order to do so, the set of primitive types (with **e** the type of regular Mary and John kind of entities, **t** the type for truth values) is enriched with the types **r** for registers and **s** for states. Registers come in two kinds: variable registers, whose content can always be changed, and constant registers, which have a fixed inhabitant. States and variable registers are to behave as assignments and variables in predicate logic or DRT. This is guaranteed by adopting the axiom that in each state, each variable register can be updated selectively, i.e. its value can be set to any variable, while the values of other registers can remain unchanged (AX1 below). Another axiom (AX4) guarantees that constant registers have a fixed inhabitant.

Once we have registers and states in the language of type logic, functioning as variables and assignments, DRSs can be viewed as abbreviations of expressions in this language:

$$(201) \quad \begin{array}{cc} \textit{abbreviation} & \textit{full form} \\ \boxed{\begin{array}{c} u_1 \dots u_n \\ \gamma_1 \\ \dots \\ \gamma_m \end{array}} & \lambda i \lambda j [i[u_1, \dots, u_n]j \wedge \gamma_1(j) \wedge \dots \wedge \gamma_m(j)] \end{array}$$

where **i** and **j** are variables over states. Note the close similarity with (200). The important difference is that (201) does not give the interpretation of a DRS. DRSs don't get a direct interpretation. Instead, (201) specifies the full type-logical form of the DRS-abbreviation and it is only these type-logical expressions that will be assigned an interpretation. The full abbreviation rules for DRSs are given in section A.7.

Importantly, the merging lemma, as given in (202), still holds under the new interpretation of DRSs:

$$(202) \quad \left\| \begin{array}{|c|} \hline u_1 \dots u_n \\ \hline \gamma_1 \\ \dots \\ \gamma_m \\ \hline \end{array} \oplus \begin{array}{|c|} \hline u'_1 \dots u'_k \\ \hline \delta_1 \\ \dots \\ \delta_q \\ \hline \end{array} \right\|^{m,f} = \left\| \begin{array}{|c|} \hline u_1 \dots u_n u'_1 \dots u'_k \\ \hline \gamma_1 \\ \dots \\ \gamma_m \\ \delta_1 \\ \dots \\ \delta_q \\ \hline \end{array} \right\|^{m,f}$$

if $u'_1, \dots, u'_k$ do not occur in any of $\gamma_1, \dots, \gamma_m$.

In what follows I will give a formal description of the language used in this thesis, starting with a specification of its types (A.2). For my purposes, I add two more types to Muskens' (1996) inventory: **b** for eventualities and **a** for moments of time. Then in section A.3 I specify the models of the language, in particular the structure of the domains of eventualities and times. This is followed by the syntax and semantics of the language in sections A.4 and A.5, respectively. We will see that although in the main text I have been speaking about $e, e', e_1 \dots$ as variables over eventualities, they are actually names of variable registers for eventualities. In the same way are $t, t', t_1 \dots$ names of variable registers for times rather than variables over times. Our familiar P's and Q's which I have treated as variables over predicates over eventualities and times, respectively, will be shown to also have a more complicated type. An overview of my conventions is given in Table A.1 on page 183. Section A.6 gives the axioms that ensure that states and variable registers behave as assignments and variables, and those that guarantee that constant registers have a fixed inhabitant. Section A.7 specifies how DRSs can be viewed as abbreviations of type-logical expressions. Section A.8 gives the truth preserving syntactic operations of lambda conversion and renaming of bound variables. In section A.9 I work out one example.

In this appendix I deviate from the main text of this thesis by taking τ to be a two-place predicate rather than a function. I do this to avoid unnecessary complications with function constants. Because I require functionality for this predicate (AX5), τ nevertheless still behaves like a function.

A few preliminary remarks concerning the typography: as before, I use a typewriter font for expressions in the formal object language, Greek letters as meta-variables over object-language expressions,² calligraphic and italic symbols to denote set-theoretic entities and boldface symbols to denote types.

²Sometimes, however, I sloppily use the typewriter font for expressions in the meta-language. Compare, for example, u and δ in (202).

A.2 Types

The set of types is defined as follows:

- (203) a. **e** is a type (the type for referring to entities like John and Mary)
 b. **b** is a type (the type for referring to eventualities)
 c. **a** is a type (the type for referring to times)
 d. **r** is a type (the type for referring to registers; **r_e** for registers for type **e** objects, **r_b** for registers for type **b** objects, **r_a** for registers for type **a** objects)
 e. **s** is a type (the type for referring to states)
 f. **t** is a type (the type for referring to truth values)
 g. if α and β are types then so is $\langle \alpha, \beta \rangle$

A.3 Models

$$\mathfrak{M} = \langle D, \langle E, \sqcup \rangle, \langle T_0, \preceq \rangle, R, S, I \rangle$$

- with D a set of normal individuals, E a set of eventualities, T_0 a set of moments of time (the set of real numbers), R a set of registers, and S a set of states, and τ a relation, and where
- $\langle E, \sqcup \rangle$ is a join semi-lattice without bottom element, i.e. $\sqcup$ is an operation on E (i.e. $\sqcup : E \times E \rightarrow E$) such that for all $e, e', e'' \in E$:

(i)	$e \sqcup e' = e' \sqcup e$	commutativity
(ii)	$e \sqcup e = e$	idempotency
(iii)	$e \sqcup (e' \sqcup e'') = (e \sqcup e') \sqcup e''$	associativity
(iv)	There is no e such that for all $e', e \sqcup e' = e'$	no bottom element
- $\langle T_0, \preceq \rangle$ is a dense linear ordering, i.e. $\preceq$ is a binary relation on T_0 such that for all $i, i', i'' \in T_0$:

(i)	$i \preceq i$	reflexivity
(ii)	if $i \preceq i'$ and $i' \preceq i''$ then $i \preceq i''$	transitivity
(iii)	if $i \preceq i'$ and $i' \preceq i$ then $i = i'$	antisymmetry
(iv)	$i \preceq i'$ or $i' \preceq i$	totality
(v)	if $i \prec i'$ then there is a i''' such that $i \prec i'''$ and $i''' \prec i'$	density

where $i \prec i'$ iff $i \preceq i'$ and $i \neq i'$

- A model determines an entire domain function, mapping each type α onto a domain of individuals D_α suitable for that type:

- (i) $D_e = D$
- (ii) $D_b = E$
- (iii) $D_a = T_0$
- (iv) $D_{r_e} = R_e$
- (v) $D_{r_b} = R_b$
- (vi) $D_{r_a} = R_a$
- (vii) $D_s = S$
- (viii) $D_t = \{0, 1\}$
- (ix) $D_{\langle \alpha, \beta \rangle} = D_\beta^{D_\alpha}$

$$\mathfrak{D} = \bigcup_\alpha D_\alpha$$

I, the interpretation function, interprets the constants Con of a language:

I: $Con \rightarrow \mathfrak{D}$ such that for all $\alpha \in Con_\tau$: $I(\alpha) \in D_\tau$

- $R = R_e \cup R_b \cup R_a$
- The model also satisfies AX1-AX8 defined in section A.6.

We define:

- T_1 , the set of times, is the powerset of the set of moments of time T_0 ($T_1 = \mathfrak{P}(T_0)$)
- T_2 , the set of intervals, is a subset of the set of times ($T_2 \subset T_1$). An interval t is a non-empty set of time points such that for all moments of time $i, i', i'' \in T_0$:

- (i) if $i, i'' \in t$ and $i \preceq i'$ and $i' \preceq i''$ then $i' \in t$ convexity

- $t, t' \in T_2$ and $i, i' \in T_0$. Then we define

- (i) $t \prec t'$ iff for all $i \in t, i' \in t', i \prec i'$
- (ii) $t \supset \prec t'$ iff $t \prec t'$ and there is no t'' such that $t \prec t''$ and $t'' \prec t'$
- (iii) $t \subseteq t'$ iff for all t'' if $t'' \prec t'$ then $t'' \prec t$ and if $t' \prec t''$ then $t \prec t''$
- (iv) $t \subset t'$ iff $t \subseteq t'$ and $t \neq t'$
- (v) $t \bigcirc t'$ iff there is a t'' such that $t'' \subseteq t$ and $t'' \subseteq t'$
- (vi) $t \subsetneq t'$ iff $t \subset t'$ and there is a t'' such that $t \prec t''$ and $t'' \subseteq t'$

A.4 Syntax

The set of well-formed expressions, Exp :

- (i) Basic expressions (of a certain type):
 - a. Con_α is the (possibly empty) set of constants of type α
 - b. Var_α is the (infinite) set of variables of type α
 - c. $Exp_\alpha \supseteq Con_\alpha \cup Var_\alpha$
 - (ii) Complex expressions:
 - a. If $\mu, \nu \in Exp_t$ and $\xi \in Var$, then $\neg\mu, [\mu \wedge \nu], [\mu \vee \nu], [\mu \rightarrow \nu], \exists\xi\mu, \forall\xi\mu \in Exp_t$
 - b. If $\mu, \nu \in Exp_\alpha$, then $[\mu = \nu] \in Exp_t$
 - c. If $\mu \in Exp_\alpha, \nu \in Exp_{\langle\alpha, \beta\rangle}$, then $[\nu(\mu)] \in Exp_\beta$
 - d. If $\mu \in Exp_\alpha, \xi \in Var_\beta$, then $\lambda\xi\mu \in Exp_{\langle\beta, \alpha\rangle}$
- (204) $Con = \bigcup_\alpha Con_\alpha, Var = \bigcup_\alpha Var_\alpha, Exp = \bigcup_\alpha Exp_\alpha$

I omit superfluous brackets.

The constants and variables that I use are given in Table A.1. $\mathbf{w}$ in this table is a fixed non-logical constant of type $\langle \mathbf{r}, \langle \mathbf{s}, \mathbf{e} \rangle \rangle$. $\mathbf{w}(\mathbf{v})(\mathbf{i})$ stands for ‘the value of register $\mathbf{v}$ in a state $\mathbf{i}$ ’.

A.5 Semantics

Semantic values of arbitrary expressions are given relative to an assignment function f that maps variables on objects from the domain: $f : Var \rightarrow \mathfrak{D}$ with for each $\xi \in Var_\alpha, f(\xi) \in D_\alpha$.

Interpretation is defined as follows:

- (205) a. Basic expressions:
- (i) If $\mu \in Con$, then $\llbracket \mu \rrbracket^{\mathfrak{M}, f} = I(\mu)$
 - (ii) If $\xi \in Var$, then $\llbracket \xi \rrbracket^{\mathfrak{M}, f} = f(\xi)$
- b. Complex expressions:
- (i) $\llbracket \neg\mu \rrbracket^{\mathfrak{M}, f} = 1$ iff $\llbracket \mu \rrbracket^{\mathfrak{M}, f} = 0$
 - (ii) $\llbracket \mu \wedge \nu \rrbracket^{\mathfrak{M}, f} = 1$ iff $\llbracket \mu \rrbracket^{\mathfrak{M}, f} = \llbracket \nu \rrbracket^{\mathfrak{M}, f} = 1$
 - (iii) $\llbracket \mu \vee \nu \rrbracket^{\mathfrak{M}, f} = 1$ iff $\llbracket \mu \rrbracket^{\mathfrak{M}, f} = 1$ or $\llbracket \nu \rrbracket^{\mathfrak{M}, f} = 1$
 - (iv) $\llbracket \mu \rightarrow \nu \rrbracket^{\mathfrak{M}, f} = 0$ iff $\llbracket \mu \rrbracket^{\mathfrak{M}, f} = 1$ and $\llbracket \nu \rrbracket^{\mathfrak{M}, f} = 0$
 - (v) $\llbracket \exists\xi\mu_\alpha \rrbracket^{\mathfrak{M}, f} = 1$ iff there is a $d \in D_\alpha$ s.t. $\llbracket \mu \rrbracket^{\mathfrak{M}, f[\xi/d]} = 1$
 - (vi) $\llbracket \forall\xi\mu_\alpha \rrbracket^{\mathfrak{M}, f} = 1$ iff for all $d \in D_\alpha$ $\llbracket \mu \rrbracket^{\mathfrak{M}, f[\xi/d]} = 1$
 - (vii) $\llbracket \alpha = \beta \rrbracket^{\mathfrak{M}, f} = 1$ iff $\llbracket \alpha \rrbracket^f = \llbracket \beta \rrbracket^{\mathfrak{M}, f}$
 - (viii) $\llbracket \beta(\alpha) \rrbracket^{\mathfrak{M}, f} = \llbracket \beta \rrbracket^{\mathfrak{M}, f}(\llbracket \alpha \rrbracket^{\mathfrak{M}, f})$
 - (ix) $\llbracket \lambda\xi_\alpha\mu_\beta \rrbracket^{\mathfrak{M}, f}$ is the function $h : D_\alpha \rightarrow D_\beta$ s.t. for all $d \in D_\alpha$, $h(d) = \llbracket \mu \rrbracket^{\mathfrak{M}, f[\xi/d]}$

<i>type</i>	<i>name of objects</i>	<i>variables</i>	<i>constants</i>
e	entity	$\mathbf{x}_1, \mathbf{x}_2, \dots$	—
b	eventualities	$\mathbf{b}_1, \mathbf{b}_2, \dots$	—
a	times	$\mathbf{a}_1, \mathbf{a}_2$	—
$\langle \mathbf{a}, \mathbf{t} \rangle$	sets of times	$A_1, A_2, \dots$	A_{TT}, A_n
r	register	$\mathbf{v}_1, \mathbf{v}_2, \dots$	$\mathbf{u}_1, \mathbf{u}_2, \dots$
r_b	register over type b objects	—	unspecific discourse referents: $\mathbf{e}_1, \mathbf{e}_2, \dots$
r_{⟨a,t⟩}	register over type $\langle \mathbf{a}, \mathbf{t} \rangle$ objects	—	unspecific discourse referents: $\mathbf{t}_1, \mathbf{t}_2, \dots$ specific discourse referents: $\mathbf{t}_{TT}, \mathbf{n}, \dots$
s	state	$\mathbf{i}, \mathbf{j}, \dots$	—
$\langle \mathbf{b}, \mathbf{t} \rangle$	static one-place predicate over eventualities	—	$\mathbf{x_cry}, \mathbf{p_king} \dots$
$\langle \langle \mathbf{a}, \mathbf{t} \rangle, \langle \langle \mathbf{a}, \mathbf{t} \rangle, \mathbf{t} \rangle \rangle$	static two-place predicate over times	—	$\subset, \prec \dots$
$\langle \mathbf{b}, \langle \mathbf{b}, \mathbf{t} \rangle \rangle$	static two-place predicate over eventualities	—	$\sqsubset, \dots$
$\langle \mathbf{b}, \langle \mathbf{a}, \mathbf{t} \rangle \rangle$	static two-place predicate over one eventuality and one time	—	$\tau, \dots$
$\langle \mathbf{r}_b, \langle \mathbf{s}, \langle \mathbf{s}, \mathbf{t} \rangle \rangle \rangle$	dynamic one-place predicate over eventualities	$\mathbf{P}, \mathbf{P}', \dots$	—
$\langle \mathbf{r}_{\langle \mathbf{a}, \mathbf{t} \rangle}, \langle \mathbf{s}, \langle \mathbf{s}, \mathbf{t} \rangle \rangle \rangle$	dynamic one-place predicate over times	$\mathbf{Q}, \mathbf{Q}', \dots$	—
$\langle \mathbf{r}, \langle \mathbf{s}, \mathbf{e} \rangle \rangle$		—	$\mathbf{w}$

Table A.1: Variables and constants of various types

$f[\xi/d]$ is the assignment function that assigns d to ξ and assigns the same values as f to all the other variables.

A.6 Axioms

In order to formulate the axioms that reduce the class of models specified in A.3 to the desired class, it is convenient to have the following abbreviation:

$$\begin{array}{ll} \text{abbreviation} & \text{full form} \\ \text{ABB0} & i[\delta_1 \dots \delta_n]j \quad \forall v[[\delta_1 \neq v \wedge \dots \wedge \delta_n \neq v] \rightarrow w(v)(i) = w(v)(j)] \end{array}$$

for all terms i and j of type $\mathbf{s}$ and all $\delta_1 \dots \delta_n$ of type $\mathbf{r}$ (both constants and variables). In other words, ' $i[\delta_1 \dots \delta_n]j$ ' stands for ' i and j differ at most in $\delta_1, \dots, \delta_n$ '.

By adopting the following axioms, we impose the necessary structure on our models. VAR is a predicate of type $\langle \mathbf{r}, \mathbf{t} \rangle$ that singles out variable registers:

- AX1 a. $\forall i \forall v \forall x [\text{VAR}(v) \rightarrow \exists j [i[v]j \wedge w(v)(j) = x]]$
 b. $\forall i \forall v \forall b [\text{VAR}(v) \rightarrow \exists j [i[v]j \wedge w(v)(j) = b]]$
 c. $\forall i \forall v \forall a [\text{VAR}(v) \rightarrow \exists j [i[v]j \wedge w(v)(j) = a]]$
 d. $\forall i \forall v \forall A [\text{VAR}(v) \rightarrow \exists j [i[v]j \wedge w(v)(j) = A]]$
- AX2 $\text{VAR}(u)$, if u is an unspecific discourse referent.
- AX3 $u_n \neq u_m$ for each different unspecific discourse referents u_n and u_m
- AX4 a. $\forall i [w(t_{\text{TT}})(i) = A_{\text{TT}}]$
 b. $\forall i [w(n)(i) = A_n]$

The AX1 axiom says that, in each state, the value of each variable register can be set to any variable while the values of other registers can remain unchanged. This axiom makes states and registers essentially behave as assignments and variables in predicate logic. AX4 ensures that constant registers have a fixed inhabitant.

Type logic enriched with these axioms has the unselective binding property which is defined as follows:

Unselective Binding Lemma. Let $u_1, \dots, u_n$ be constants of type $\mathbf{r}$, let $y_1, \dots, y_n$ be distinct variables, such that y_k is of type α if u_k is of type $\mathbf{r}_\alpha$, let φ be a formula that does not contain j and write $[w(u_1)(j)/x_1, \dots, w(u_n)(j)/x_n]\varphi$ for the simultaneous substitution of $w(u_1)(j)$ for x_1 and $\dots$ and $w(u_n)(j)$ for x_n in φ , then:

$$\models_{AX} \forall i [\exists j [i[u_1, \dots, u_n]j \wedge [w(u_1)(j)/x_1, \dots, w(u_n)(j)/x_n]\varphi] \leftrightarrow \exists y_1 \dots \exists y_n \varphi$$

In words, the Unselective Binding Lemma states that a series of existential quantifications over 'normal' individuals can be replaced by a single existential quantification over a variable of type $\mathbf{s}$. This is not surprising given that a state can be viewed as a list of values for registers.

Apart from the axioms stated above which allow us to mimic DRT in type logic, we need some axioms to ensure that the temporal predicates have the right properties:

AX5	$\forall \mathbf{b} \forall A_1 \forall A_2 [[\tau(\mathbf{b}, A_1) \wedge \tau(\mathbf{b}, A_2)] \rightarrow A_1 = A_2]$	functionality of τ
AX6	$\forall \mathbf{b} \exists A [\tau(\mathbf{b}, A)]$	totality of τ
AX7	a. $\forall A_1 \forall A_2 [A_1 \cup A_2 = A_2 \cup A_1]$ b. $\forall A_1 [A_1 \cup A_1 = A_1]$ c. $\forall A_1 \forall A_2 \forall A_3 [[A_1 \cup [A_2 \cup A_3] = [[A_1 \cup A_2] \cup A_3]$	commutativity of $\cup$ idempotency of $\cup$ associativity of $\cup$
AX8	$\forall \mathbf{b}_1 \forall \mathbf{b}_2 \forall A_1 \forall A_2 \forall A_3 [\tau(\mathbf{b}_1, A_1) \wedge \tau(\mathbf{b}_2, A_2) \wedge \tau(\mathbf{b}_1 \sqcup \mathbf{b}_2, A_3)] \rightarrow A_1 \cup A_2 = A_3]$	homomorphism

A.7 DRSs as abbreviations

DRSs do not get a direct interpretation. Instead they are viewed as abbreviations of type-logical expressions:

	<i>abbreviation</i>	<i>full form</i>				
ABB1	$\Pi\{\delta_1, \dots, \delta_n\}$ $\delta_1 = \delta_2$	$\lambda i \Pi(\mathbf{w}(\delta_1)(i)) \dots (\mathbf{w}(\delta_n)(i))$ $\lambda i \mathbf{w}(\delta_1)(i) = \mathbf{w}(\delta_n)(i)$				
ABB2	$\neg K$ $K \vee K'$ $K \rightarrow K'$	$\lambda i \neg \exists j K(i)(j)$ $\lambda i \exists j [K(i)(j) \vee K'(i)(j)]$ $\lambda i \forall j [K(i)(j) \rightarrow \exists k K'(j)(k)]$				
ABB3	<table border="1"> <tr> <td>$u_1 \dots u_n$</td> </tr> <tr> <td>γ_1</td> </tr> <tr> <td>$\dots$</td> </tr> <tr> <td>γ_m</td> </tr> </table>	$u_1 \dots u_n$	γ_1	$\dots$	γ_m	$\lambda i \lambda j [i \lfloor u_1, \dots, u_n \rfloor j \wedge \gamma_1(j) \wedge \dots \wedge \gamma_m(j)]$
$u_1 \dots u_n$						
γ_1						
$\dots$						
γ_m						
ABB4	$K \oplus K'$	$\lambda i \lambda j \exists k [K(i)(k) \wedge K'(k)(j)]$				

I have, however, used the following conventions:

Rewrite rule 1 (RWR1): $\Pi\{\delta_1, \delta_2\}$ as $\delta_1 \Pi \delta_2$.

Rewrite rule 2 (RWR2): $\Pi\{\delta_1\}$ as $\Pi \delta_1$.³

³By abuse of notation I have written $\Pi(\delta_1)$ rather than $\Pi\{\delta_1\}$ or $\Pi \delta_1$ for the sake of readability throughout this thesis (`p_king(e)` reads better than `p_king e`), apart from this appendix.

A.8 Reductions

The semantics of the language (A.5) ensures a number of equivalences. Let FV be the function that gives the free variables of a well-formed expression and let $\mu_\beta[\xi_\alpha \mapsto \nu_\alpha]$ stand for the expression that results from replacing in μ all free occurrences of the variable ξ by the expression ν . Then:

- (i) $\llbracket \lambda \xi_\alpha \mu_\beta(\nu_\alpha) \rrbracket^{\mathfrak{M},f} = \llbracket \mu_\beta[\xi_\alpha \mapsto \nu_\alpha] \rrbracket^{\mathfrak{M},f}$, if $FV(\lambda \xi \mu(\nu)) = FV(\mu[\xi \mapsto \nu])$
- (ii) $\llbracket \lambda \xi_\alpha \mu_\beta \rrbracket^{\mathfrak{M},f} = \llbracket \lambda \nu_\alpha \mu_\beta[\xi_\alpha \mapsto \nu_\alpha] \rrbracket^{\mathfrak{M},f}$, if $FV(\lambda \xi \mu) = FV(\lambda \nu \mu[\xi \mapsto \nu])$ (idem for $\exists$ or $\forall$ instead of λ)

The syntactic operations corresponding to (i) and (ii) are called lambda-conversion (λ) and renaming bound variables (RBV), respectively.

A.9 Example

Let's now work out one of the examples (cf. (105)):

$$(206) \quad \lambda Q \left[\frac{}{\mathfrak{t}_{TT} \prec n} \oplus Q(\mathfrak{t}_{TT}) \right] (\lambda P \lambda t \left[\frac{e}{\tau(e) \supset t} \oplus P(e) \right] (\lambda e \left[\frac{}{p_king\ e} \right]))$$

As mentioned, I treat τ as a predicate now, which gives:

$$(207) \quad \lambda Q \left[\frac{}{\mathfrak{t}_{TT} \prec n} \oplus Q(\mathfrak{t}_{TT}) \right] (\lambda P \lambda t \left[\frac{\begin{array}{c} e \ t' \\ e \ \tau \ t' \\ t' \supset t \end{array}}{\oplus P(e)} \right] (\lambda e \left[\frac{}{p_king\ e} \right]))$$

Let's first treat the parts (208) to (210) separately and then combine them:

$$(208) \quad \lambda Q \left[\frac{}{\mathfrak{t}_{TT} \prec n} \oplus Q(\mathfrak{t}_{TT}) \right]$$

$$(209) \quad \lambda P \lambda t \left[\frac{\begin{array}{c} e \ t' \\ e \ \tau \ t' \\ t' \supset t \end{array}}{\oplus P(e)} \right]$$

$$(210) \quad \lambda e \left[\frac{}{p_king\ e} \right]$$

First (208):

$$\begin{aligned}
(211) \quad & \text{a. } \lambda Q \left[\frac{}{\mathbf{t}_{TT} \prec \mathbf{n}} \oplus Q(\mathbf{t}_{TT}) \right] \xRightarrow{\text{RWR1}} \\
& \text{b. } \lambda Q \left[\frac{}{\prec \{\mathbf{t}_{TT}, \mathbf{n}\}} \oplus Q(\mathbf{t}_{TT}) \right] \xRightarrow{\text{ABB4}} \\
& \text{c. } \lambda Q \lambda i \lambda j \exists k \left[\frac{}{\prec \{\mathbf{t}_{TT}, \mathbf{n}\}} (i)(k) \wedge Q(\mathbf{t}_{TT})(k)(j) \right] \xRightarrow{\text{ABB3}} \\
& \text{d. } \lambda Q \lambda i \lambda j \exists k [\lambda i \lambda j [i \sqcup j \wedge \prec \{\mathbf{t}_{TT}, \mathbf{n}\}(j)](i)(k) \wedge Q(\mathbf{t}_{TT})(k)(j)] \xRightarrow{\text{ABB1}} \\
& \text{e. } \lambda Q \lambda i \lambda j \exists k [\lambda i \lambda j [i \sqcup j \wedge \lambda i \prec (w(\mathbf{t}_{TT})(i))(w(\mathbf{n})(i))(j)](i)(k) \wedge Q(\mathbf{t}_{TT})(k)(j)] \xRightarrow{\lambda} \\
& \text{f. } \lambda Q \lambda i \lambda j \exists k [\lambda i \lambda j [i \sqcup j \wedge \prec (w(\mathbf{t}_{TT})(j))(w(\mathbf{n})(j))](i)(k) \wedge Q(\mathbf{t}_{TT})(k)(j)] \xRightarrow{\lambda} \\
& \text{g. } \lambda Q \lambda i \lambda j \exists k [\lambda j [i \sqcup j \wedge \prec (w(\mathbf{t}_{TT})(j))(w(\mathbf{n})(j))](k) \wedge Q(\mathbf{t}_{TT})(k)(j)] \xRightarrow{\lambda} \\
& \text{h. } \lambda Q \lambda i \lambda j \exists k [[i \sqcup k \wedge \prec (w(\mathbf{t}_{TT})(k))(w(\mathbf{n})(k)) \wedge Q(\mathbf{t}_{TT})(k)(j)]
\end{aligned}$$

Let's now do (209):

$$\begin{aligned}
(212) \quad & \text{a. } \lambda P \lambda t \left[\frac{\mathbf{e} \ \mathbf{t}'}{\begin{array}{c} \mathbf{e} \ \tau \ \mathbf{t}' \\ \mathbf{t}' \supset \mathbf{t} \end{array}} \oplus P(\mathbf{e}) \right] \xRightarrow{\text{RWR1}} \\
& \text{b. } \lambda P \lambda t \left[\frac{\mathbf{e} \ \mathbf{t}'}{\begin{array}{c} \tau \{\mathbf{e}, \mathbf{t}'\} \\ \supset \{\mathbf{t}', \mathbf{t}\} \end{array}} \oplus P(\mathbf{e}) \right] \xRightarrow{\text{ABB4}} \\
& \text{c. } \lambda P \lambda t [\lambda i \lambda j \exists k \left[\frac{\mathbf{e} \ \mathbf{t}'}{\begin{array}{c} \tau \{\mathbf{e}, \mathbf{t}'\} \\ \supset \{\mathbf{t}', \mathbf{t}\} \end{array}} (i)(k) \wedge P(\mathbf{e})(k)(j) \right]] \xRightarrow{\text{ABB3}} \\
& \text{d. } \lambda P \lambda t [\lambda i \lambda j \exists k [\lambda i \lambda j [i \sqcup \mathbf{e} \ \mathbf{t}' \sqcup j \wedge \tau \{\mathbf{e}, \mathbf{t}'\}(j) \wedge \supset \{\mathbf{t}', \mathbf{t}\}(j)](i)(k) \wedge P(\mathbf{e})(k)(j)]] \xRightarrow{\text{ABB1}} \\
& \text{e. } \lambda P \lambda t [\lambda i \lambda j \exists k [\lambda i \lambda j [i \sqcup \mathbf{e} \ \mathbf{t}' \sqcup j \wedge \lambda i \tau (w(\mathbf{e})(i))(w(\mathbf{t}'))(i))(j) \wedge \supset (w(\mathbf{t}'))(i))(w(\mathbf{t}))(i))(j)](i)(k) \wedge P(\mathbf{e})(k)(j)]] \xRightarrow{\lambda}
\end{aligned}$$

$$\begin{array}{ll}
\text{f. } \lambda P \lambda t [\lambda i \lambda j \exists k [\lambda i \lambda j [i \mid e \ t'] j \wedge \tau(w(e)(j))(w(t')(j)) \\
\quad \wedge \supset (w(t')(j))(w(t)(j))](i)(k) \wedge P(e)(k)(j)]] & \xRightarrow{\lambda} \\
\text{g. } \lambda P \lambda t [\lambda i \lambda j \exists k [\lambda j [i \mid e \ t'] j \wedge \tau(w(e)(j))(w(t')(j)) \\
\quad \wedge \supset (w(t')(j))(w(t)(j))](k) \wedge P(e)(k)(j)]] & \xRightarrow{\lambda} \\
\text{h. } \lambda P \lambda t [\lambda i \lambda j \exists k [[i \mid e \ t'] k \wedge \tau(w(e)(k))(w(t')(k)) \\
\quad \wedge \supset (w(t')(k))(w(t)(k))] \wedge P(e)(k)(j)] &
\end{array}$$

And finally (210):

$$\begin{array}{ll}
(213) \quad \text{a. } \lambda e \begin{array}{|c|} \hline \\ \hline \text{p_king } e \\ \hline \end{array} & \xRightarrow{\text{RWR2}} \\
\text{b. } \lambda e \begin{array}{|c|} \hline \\ \hline \text{p_king}\{e\} \\ \hline \end{array} & \xRightarrow{\text{ABB3}} \\
\text{c. } \lambda e \lambda i \lambda j [i \mid j \wedge \text{p_king}(e)(j)] & \xRightarrow{\text{ABB1}} \\
\text{d. } \lambda e \lambda i \lambda j [i \mid j \wedge \lambda i \text{p_king}(w(e)(i))(j)] & \xRightarrow{\lambda} \\
\text{e. } \lambda e \lambda i \lambda j [i \mid j \wedge \text{p_king}(w(e)(j))] &
\end{array}$$

Then we combine (212h) and (213e):

$$\begin{array}{ll}
(214) \quad \text{a. } \lambda P \lambda t [\lambda i \lambda j \exists k [[i \mid e] k \wedge \tau(w(e)(k))(w(t')(k)) \\
\quad \wedge \supset (w(t')(k))(w(t)(k))] \wedge P(e)(k)(j)] \\
\quad (\lambda e \lambda i \lambda j [i \mid j \wedge \text{p_king}(w(e)(j))]) & \xRightarrow{\lambda} \\
\text{b. } \lambda t [\lambda i \lambda j \exists k [[i \mid e] k \wedge \tau(w(e)(k))(w(t')(k)) \wedge \supset (w(t')(k))(w(t)(k))] \\
\quad \wedge \lambda e \lambda i \lambda j [i \mid j \wedge \text{p_king}(w(e)(j))](e)(k)(j)] & \xRightarrow{\lambda} \\
\text{c. } \lambda t [\lambda i \lambda j \exists k [[i \mid e] k \wedge \tau(w(e)(k))(w(t')(k)) \wedge \supset (w(t')(k))(w(t)(k))] \\
\quad \wedge \lambda i \lambda j [i \mid j \wedge \text{p_king}(w(e)(j))](k)(j)] & \xRightarrow{\lambda} \\
\text{d. } \lambda t [\lambda i \lambda j \exists k [[i \mid e] k \wedge \tau(w(e)(k))(w(t')(k)) \wedge \supset (w(t')(k))(w(t)(k))] \\
\quad \wedge \lambda j [k \mid j \wedge \text{p_king}(w(e)(j))](j)] & \xRightarrow{\lambda} \\
\text{e. } \lambda t [\lambda i \lambda j \exists k [[i \mid e] k \wedge \tau(w(e)(k))(w(t')(k)) \wedge \supset (w(t')(k))(w(t)(k))] \\
\quad \wedge [k \mid j \wedge \text{p_king}(w(e)(j))]] &
\end{array}$$

And finally, we combine (214e) and (211h):

$$(215) \quad \text{a. } \lambda Q \lambda i \lambda j \exists k [[i \mid k \wedge \prec (w(t_{TT})(k))(w(n)(k))] \wedge Q(t_{TT})(k)(j)] \\
\quad (\lambda t [\lambda i \lambda j \exists k [[i \mid e \ t'] k \wedge \tau(w(e)(k))(w(t')(k))$$

$$\begin{aligned}
& \wedge \supset (w(t')(k))(w(t)(k)) \wedge [k \sqcup j \wedge p_king(w(e)(j))]] \quad \xRightarrow{\lambda} \\
b. & \lambda i \lambda j \exists k [[i \sqcup k \wedge \prec (w(t_{TT})(k))(w(n)(k)) \wedge \lambda t [\lambda i \lambda j \exists k [[i \sqcup e \ t'] k \\
& \wedge \tau(w(e)(k))(w(t')(k)) \wedge \supset (w(t')(k))(w(t)(k)) \wedge [k \sqcup j \\
& \wedge p_king(w(e)(j))]]](t_{TT})(k)(j)) \quad \xRightarrow{\lambda} \\
c. & \lambda i \lambda j \exists k [[i \sqcup k \wedge \prec (w(t_{TT})(k))(w(n)(k)) \wedge [\lambda i \lambda j \exists k [[i \sqcup e \ t'] k \\
& \wedge \tau(w(e)(k))(w(t')(k)) \wedge \supset (w(t')(k))(w(t_{TT})(k)) \wedge [k \sqcup j \\
& \wedge p_king(w(e)(j))]]](k)(j)) \quad \xRightarrow{RBV} \\
d. & \lambda i \lambda j \exists k [[i \sqcup k \wedge \prec (w(t_{TT})(k))(w(n)(k)) \wedge [\lambda i \lambda j \exists k' [[i \sqcup e \ t'] k' \\
& \wedge \tau(w(e)(k'))(w(t')(k')) \wedge \supset (w(t')(k'))(w(t_{TT})(k')) \wedge [k' \sqcup j \\
& \wedge p_king(w(e)(j))]]](k)(j)) \quad \xRightarrow{\lambda} \\
e. & \lambda i \lambda j \exists k [[i \sqcup k \wedge \prec (w(t_{TT})(k))(w(n)(k)) \wedge [\lambda j \exists k' [[k \sqcup e \ t'] k' \\
& \wedge \tau(w(e)(k'))(w(t')(k')) \wedge \supset (w(t')(k'))(w(t_{TT})(k')) \wedge [k' \sqcup j \\
& \wedge p_king(w(e)(j))]]](j)) \quad \xRightarrow{\lambda} \\
f. & \lambda i \lambda j \exists k [[i \sqcup k \wedge \prec (w(t_{TT})(k))(w(n)(k)) \wedge \exists k' [[k \sqcup e \ t'] k' \\
& \wedge \tau(w(e)(k))(w(t')(k')) \wedge \supset (w(t')(k'))(w(t_{TT})(k')) \wedge [k' \sqcup j \\
& \wedge p_king(w(e)(j))]] \quad \xRightarrow{AX3} \\
g. & \lambda i \lambda j \exists k [[i \sqcup k \wedge \prec (A_{TT})(A_n)] \wedge \exists k' [[k \sqcup e \ t'] k' \\
& \wedge \tau(w(e)(k'))(w(t')(k')) \wedge \supset (w(t')(k'))(A_{TT}) \wedge [k' \sqcup j \\
& \wedge p_king(w(e)(j))]]
\end{aligned}$$

Viewed as a computer program, (215g) brings a machine from state i to state j via k and k' .

The resulting truth conditions are:

$$(216) \quad \exists j \exists k [[i \sqcup k \wedge \prec (A_{TT})(A_n)] \wedge \exists k' [[k \sqcup e \ t'] k' \wedge \supset (w(\tau(e))(k'))(A_{TT})] \\
\wedge [k' \sqcup j \wedge p_king(w(e)(j))]]$$

Following the Unselective Binding Lemma this can be reduced to (217):

$$(217) \quad \prec (A_{TT})(A_n) \wedge \exists b \exists A_1 [\tau(b)(A_1) \wedge \supset (A_1)(A_{TT}) \wedge p_king(b)]$$

Or, written in a more familiar notation:

$$(218) \quad A_{TT} \prec A_n \wedge \exists b \exists A_1 [\tau(b, A_1) \wedge A_1 \supset A_{TT} \wedge p_king(b)]$$

which means that there is an eventuality b of Periandros being king whose runtime A_1 includes the topic time A_{TT} which is in the past of the moment of speech A_n . This is exactly what I said that (105) meant.

By using the merging lemma (202) we can take short cuts in the reductions. This will be done in the next appendix.

Appendix B

Examples spelled out

In this appendix I give the intermediate steps in the reductions for some of the examples in chapter 4. It's all lambda-conversion and merging.

$$\begin{aligned}
 (219) \quad & \text{PAST}(\text{IMP}(\lambda e \boxed{\text{king}(e)})) \quad \text{ad (105)} \\
 &= \lambda Q[\boxed{t_{TT} \prec n} \oplus Q(t_{TT})](\lambda P \lambda t[\boxed{\begin{smallmatrix} e \\ \tau(e) \supset t \end{smallmatrix}} \oplus P(e)](\lambda e \boxed{\text{king}(e)})) \\
 &\equiv \lambda Q[\boxed{t_{TT} \prec n} \oplus Q(t_{TT})](\lambda t[\boxed{\begin{smallmatrix} e \\ \tau(e) \supset t \end{smallmatrix}} \oplus \lambda e \boxed{\text{king}(e)}(e)]) \\
 &\equiv \lambda Q[\boxed{t_{TT} \prec n} \oplus Q(t_{TT})](\lambda t[\boxed{\begin{smallmatrix} e \\ \tau(e) \supset t \end{smallmatrix}} \oplus \boxed{\text{king}(e)}]) \\
 &\equiv \lambda Q[\boxed{t_{TT} \prec n} \oplus Q(t_{TT})](\lambda t[\boxed{\begin{smallmatrix} e \\ p_king(e) \\ \tau(e) \supset t \end{smallmatrix}}]) \\
 &\equiv \boxed{t_{TT} \prec n} \oplus \lambda t[\boxed{\begin{smallmatrix} e \\ p_king(e) \\ \tau(e) \supset t \end{smallmatrix}}](t_{TT}) \\
 &\equiv \boxed{t_{TT} \prec n} \oplus \boxed{\begin{smallmatrix} e \\ p_king(e) \\ \tau(e) \supset t_{TT} \end{smallmatrix}} \\
 &\equiv \boxed{\begin{smallmatrix} e \\ p_king(e) \\ \tau(e) \supset t_{TT} \\ t_{TT} \prec n \end{smallmatrix}} \\
 (220) \quad & \text{PAST}(\text{AOR}(\text{MAX}(\lambda e \boxed{\text{i_senator}(e)}))) \quad \text{ad (112)}
 \end{aligned}$$

$$\begin{aligned}
&= \lambda Q \left[\frac{}{t_{TT} \prec n} \oplus Q(t_{TT}) \right] (\lambda P \lambda t \left[\frac{e}{\tau(e) \subseteq t} \oplus P(e) \right] \\
&\quad \left(\lambda P \lambda e \left[\frac{\frac{e'}{e \sqsubseteq e'}}{\rightarrow} \rightarrow \neg \left[\frac{}{} \oplus P(e') \right] \right] \oplus P(e) \right) (\lambda e \left[\frac{}{i_senator(e)} \right])) \\
&\equiv \lambda Q \left[\frac{}{t_{TT} \prec n} \oplus Q(t_{TT}) \right] (\lambda P \lambda t \left[\frac{e}{\tau(e) \subseteq t} \oplus P(e) \right] \\
&\quad \left(\lambda e \left[\frac{\frac{e'}{e \sqsubseteq e'}}{\rightarrow} \rightarrow \neg \left[\frac{}{} \oplus \lambda e \left[\frac{}{i_senator(e)} \right] (e') \right] \right] \oplus \lambda e \left[\frac{}{i_senator(e)} \right] (e) \right])) \\
&\equiv \lambda Q \left[\frac{}{t_{TT} \prec n} \oplus Q(t_{TT}) \right] (\lambda P \lambda t \left[\frac{e}{\tau(e) \subseteq t} \oplus P(e) \right] \\
&\quad \left(\lambda e \left[\frac{\frac{e'}{e \sqsubseteq e'}}{\rightarrow} \rightarrow \neg \left[\frac{}{} \oplus \left[\frac{}{i_senator(e')} \right] \right] \right] \oplus \left[\frac{}{i_senator(e)} \right] \right])) \\
&\equiv \lambda Q \left[\frac{}{t_{TT} \prec n} \oplus Q(t_{TT}) \right] (\lambda P \lambda t \left[\frac{e}{\tau(e) \subseteq t} \oplus P(e) \right] \\
&\quad \left(\lambda e \left[\frac{\frac{e'}{e \sqsubseteq e'}}{\rightarrow} \rightarrow \neg \left[\frac{}{} \oplus \left[\frac{}{i_senator(e')} \right] \right] \right] \oplus \left[\frac{}{i_senator(e)} \right] \right])) \\
&\equiv \lambda Q \left[\frac{}{t_{TT} \prec n} \oplus Q(t_{TT}) \right] (\lambda P \lambda t \left[\frac{e}{\tau(e) \subseteq t} \oplus P(e) \right] \\
&\quad \left(\lambda e \left[\frac{}{i_senator(e)} \right] \left(\lambda e' \left[\frac{e'}{e \sqsubseteq e'} \rightarrow \neg \left[\frac{}{} \oplus \left[\frac{}{i_senator(e')} \right] \right] \right] \right) \right))
\end{aligned}$$

$$\begin{aligned}
 &\equiv \lambda Q[\frac{}{t_{TT} \prec n} \oplus Q(t_{TT})](\lambda t[\frac{e}{\tau(e) \subseteq t} \oplus \lambda e \boxed{\begin{array}{c} \boxed{e'} \\ e \sqsubseteq e' \end{array} \rightarrow \boxed{\neg \boxed{i_senator(e')}} \boxed{i_senator(e)} \boxed{(e)}}]) \\
 &\equiv \lambda Q[\frac{}{t_{TT} \prec n} \oplus Q(t_{TT})](\lambda t[\frac{e}{\tau(e) \subseteq t} \oplus \boxed{\begin{array}{c} \boxed{e'} \\ e \sqsubseteq e' \end{array} \rightarrow \boxed{\neg \boxed{i_senator(e')}} \boxed{i_senator(e)} \boxed{)]) \\
 &\equiv \lambda Q[\frac{}{t_{TT} \prec n} \oplus Q(t_{TT})](\lambda t[\boxed{\begin{array}{c} \boxed{e'} \\ e \sqsubseteq e' \end{array} \rightarrow \boxed{\neg \boxed{i_senator(e')}} \boxed{i_senator(e)} \boxed{\tau(e) \subseteq t} \boxed{e} \boxed{)]) \\
 &\equiv \boxed{\frac{}{t_{TT} \prec n}} \oplus \lambda t \boxed{\begin{array}{c} \boxed{e'} \\ e \sqsubseteq e' \end{array} \rightarrow \boxed{\neg \boxed{i_senator(e')}} \boxed{i_senator(e)} \boxed{\tau(e) \subseteq t} \boxed{e} \boxed{(t_{TT})} \\
 &\equiv \boxed{\frac{}{t_{TT} \prec n}} \oplus \boxed{\begin{array}{c} \boxed{e'} \\ e \sqsubseteq e' \end{array} \rightarrow \boxed{\neg \boxed{i_senator(e')}} \boxed{i_senator(e)} \boxed{\tau(e) \subseteq t_{TT}} \boxed{e} \\
 &\equiv \boxed{\begin{array}{c} \boxed{e'} \\ e \sqsubseteq e' \end{array} \rightarrow \boxed{\neg \boxed{i_senator(e')}} \boxed{i_senator(e)} \boxed{\tau(e) \subseteq t_{TT}} \boxed{t_{TT} \prec n} \boxed{e} \\
 &\equiv \text{PAST}(\text{AOR}(\text{INGR}(\lambda e \boxed{\frac{}{x_cry(e)}}))) \quad \text{ad (115)}
 \end{aligned}$$

$$\begin{aligned}
&= \lambda Q \left[\frac{}{t_{TT} \prec n} \oplus Q(t_{TT}) \right] (\lambda P \lambda t \left[\frac{e}{\tau(e) \subseteq t} \oplus P(e) \right] \\
&\quad \left(\lambda P \lambda e \left[\frac{\begin{array}{c} t \ e' \\ \tau(e) = IB(t) \\ \tau(e') = t \\ \frac{t' \ e''}{t \subset t' \oplus P(e'')} \\ t' = \tau(e'') \end{array}}{\neg} \oplus P(e') \right] (\lambda e \left[\frac{}{x_cry(e)} \right]) \right) \right) \\
&\equiv \lambda Q \left[\frac{}{t_{TT} \prec n} \oplus Q(t_{TT}) \right] (\lambda P \lambda t \left[\frac{e}{\tau(e) \subseteq t} \oplus P(e) \right] \\
&\quad \left(\lambda e \left[\frac{\begin{array}{c} t \ e' \\ \tau(e) = IB(t) \\ \tau(e') = t \\ \frac{t' \ e''}{t \subset t' \oplus \lambda e \left[\frac{}{x_cry(e)} \right] (e'')} \\ t' = \tau(e'') \end{array}}{\neg} \oplus \lambda e \left[\frac{}{x_cry(e)} \right] (e') \right) \right) \right) \\
&\equiv \lambda Q \left[\frac{}{t_{TT} \prec n} \oplus Q(t_{TT}) \right] (\lambda P \lambda t \left[\frac{e}{\tau(e) \subseteq t} \oplus P(e) \right] \\
&\quad \left(\lambda e \left[\frac{\begin{array}{c} t \ e' \\ \tau(e) = IB(t) \\ \tau(e') = t \\ \frac{t' \ e''}{t \subset t' \oplus \left[\frac{}{x_cry(e'')} \right]} \\ t' = \tau(e'') \end{array}}{\neg} \oplus \left[\frac{}{x_cry(e')} \right] \right) \right) \right) \\
&\equiv \lambda Q \left[\frac{}{t_{TT} \prec n} \oplus Q(t_{TT}) \right] (\lambda P \lambda t \left[\frac{e}{\tau(e) \subseteq t} \oplus P(e) \right] \\
&\quad \left(\lambda e \left[\frac{\begin{array}{c} t \ e' \\ \tau(e) = IB(t) \\ \tau(e') = t \\ \frac{t' \ e''}{t \subset t' \oplus \left[\frac{}{x_cry(e')} \right]} \\ t' = \tau(e'') \\ x_cry(e'') \end{array}}{\neg} \oplus \left[\frac{}{x_cry(e')} \right] \right) \right) \right) \\
&\equiv \lambda Q \left[\frac{}{t_{TT} \prec n} \oplus Q(t_{TT}) \right] (\lambda P \lambda t \left[\frac{e}{\tau(e) \subseteq t} \oplus P(e) \right] (\lambda e \left[\frac{\begin{array}{c} t \ e' \\ x_cry(e') \\ \tau(e) = IB(t) \\ \tau(e') = t \\ \frac{t' \ e''}{t \subset t' \oplus \left[\frac{}{x_cry(e'')} \right]} \\ t' = \tau(e'') \\ x_cry(e'') \end{array}}{\neg} \right) \right)
\end{aligned}$$

$$\equiv \lambda Q[\frac{}{t_{TT} \prec n} \oplus Q(t_{TT})](\lambda t[\frac{e}{\tau(e) \subseteq t} \oplus \lambda e \left[\begin{array}{c} t \ e' \\ \hline x_cry(e') \\ \tau(e) = IB(t) \\ \tau(e') = t \\ \hline t' \ e'' \\ \hline \neg \\ \begin{array}{c} t \subset t' \\ t' = \tau(e'') \\ x_cry(e'') \end{array} \end{array} \right] (e)])$$

$$\equiv \lambda Q[\frac{}{t_{TT} \prec n} \oplus Q(t_{TT})](\lambda t[\frac{e}{\tau(e) \subseteq t} \oplus \left[\begin{array}{c} t \ e' \\ \hline x_cry(e') \\ \tau(e) = IB(t) \\ \tau(e') = t \\ \hline t' \ e'' \\ \hline \neg \\ \begin{array}{c} t \subset t' \\ t' = \tau(e'') \\ x_cry(e'') \end{array} \end{array} \right])]$$

Variable t has to be renamed. t becomes t' , t' becomes t'' :

$$\equiv \lambda Q[\frac{}{t_{TT} \prec n} \oplus Q(t_{TT})](\lambda t[\frac{e}{\tau(e) \subseteq t} \oplus \left[\begin{array}{c} t' \ e' \\ \hline x_cry(e') \\ \tau(e) = IB(t') \\ \tau(e') = t' \\ \hline t'' \ e'' \\ \hline \neg \\ \begin{array}{c} t' \subset t'' \\ t'' = \tau(e'') \\ x_cry(e'') \end{array} \end{array} \right])]$$

$$\equiv \lambda Q[\frac{}{t_{TT} \prec n} \oplus Q(t_{TT})](\lambda t \left[\begin{array}{c} e \ t' \ e' \\ \hline x_cry(e') \\ \tau(e) = IB(t') \\ \tau(e') = t' \\ \hline t'' \ e'' \\ \hline \neg \\ \begin{array}{c} t' \subset t'' \\ t'' = \tau(e'') \\ x_cry(e'') \end{array} \end{array} \right])$$

$$\equiv \frac{}{t_{TT} \prec n} \oplus \lambda t \left[\begin{array}{c} e \ t' \ e' \\ \hline x_cry(e') \\ \tau(e) = IB(t') \\ \tau(e') = t' \\ \hline t'' \ e'' \\ \hline \neg \\ \begin{array}{c} t' \subset t'' \\ t'' = \tau(e'') \\ x_cry(e'') \end{array} \end{array} \right] (t_{TT})$$

$$\begin{aligned}
& \equiv \boxed{\tau_{\text{TT}} \prec n} \oplus \boxed{\begin{array}{l} e \ t' \ e' \\ \text{x_cry}(e') \\ \tau(e) = \text{IB}(t') \\ \tau(e') = t' \\ \boxed{t'' \ e''} \\ \neg \begin{array}{l} t' \subset t'' \\ t'' = \tau(e'') \\ \text{x_cry}(e'') \end{array} \\ \tau(e) \subseteq \tau_{\text{TT}} \end{array}} \\
& \equiv \boxed{\begin{array}{l} e \ t' \ e' \\ \text{x_cry}(e') \\ \tau(e) = \text{IB}(t') \\ \tau(e') = t' \\ \boxed{t'' \ e''} \\ \neg \begin{array}{l} t' \subset t'' \\ t'' = \tau(e'') \\ \text{x_cry}(e'') \end{array} \\ \tau(e) \subseteq \tau_{\text{TT}} \\ \tau_{\text{TT}} \prec n \end{array}}
\end{aligned}$$

$$(222) \quad \text{PAST}(\text{IMP}(\text{HAB}(\lambda e \boxed{\text{l_bump}(e)})))) \quad \text{ad (128)}$$

$$\begin{aligned}
& = \lambda Q \boxed{\tau_{\text{TT}} \prec n} \oplus Q(\tau_{\text{TT}}) (\lambda P \lambda t \boxed{\begin{array}{l} e \\ \tau(e) \supset t \end{array}} \oplus P(e)) \\
& \quad (\lambda P \lambda e \boxed{\begin{array}{l} t \ t' \ t'' \\ \tau(e) = t \\ \boxed{t'''} \\ t''' \subset t \\ C(t''') \end{array}} \rightarrow \boxed{\begin{array}{l} e' \\ \tau(e') = t''' \end{array}} \oplus P(e')) \oplus P(e)) \\
& \quad \neg \boxed{\begin{array}{l} \tau(e) = t \\ t' \subset t \\ t'' \subset t \\ C(t') \\ C(t'') \\ t' \neq t'' \end{array}} \oplus P(e)) \quad (\lambda e \boxed{\text{l_bump}(e)})) \\
& \equiv \lambda Q \boxed{\tau_{\text{TT}} \prec n} \oplus Q(\tau_{\text{TT}}) (\lambda P \lambda t \boxed{\begin{array}{l} e \\ \tau(e) \supset t \end{array}} \oplus P(e))
\end{aligned}$$

$$\begin{array}{c}
 \boxed{\begin{array}{c} t \ t' \ t'' \\ \tau(e) = t \\ \begin{array}{c} \boxed{t'''} \\ t''' \subset t \\ C(t''') \end{array} \rightarrow \boxed{\begin{array}{c} e' \\ \tau(e') = t''' \end{array}} \oplus \lambda e \boxed{\begin{array}{c} \text{l_bump}(e) \end{array}}(e')] \\
 (\lambda e \quad \neg \boxed{\quad} \oplus \lambda e \boxed{\begin{array}{c} \text{l_bump}(e) \end{array}}(e)) \\
 \begin{array}{c} t' \subset t \\ t'' \subset t \\ C(t') \\ C(t'') \\ t' \neq t'' \end{array} \end{array} \Bigg) \\
 \equiv \lambda Q \boxed{\begin{array}{c} \text{t}_{TT} \prec n \end{array}} \oplus Q(t_{TT}) [(\lambda P \lambda t \boxed{\begin{array}{c} e \\ \tau(e) \supset t \end{array}} \oplus P(e))] \\
 \boxed{\begin{array}{c} t \ t' \ t'' \\ \tau(e) = t \\ \begin{array}{c} \boxed{t'''} \\ t''' \subset t \\ C(t''') \end{array} \rightarrow \boxed{\begin{array}{c} e' \\ \tau(e') = t''' \end{array}} \oplus \boxed{\begin{array}{c} \text{l_bump}(e') \end{array}} \\
 (\lambda e \quad \neg \boxed{\quad} \oplus \boxed{\begin{array}{c} \text{l_bump}(e) \end{array}}) \\
 \begin{array}{c} t' \subset t \\ t'' \subset t \\ C(t') \\ C(t'') \\ t' \neq t'' \end{array} \end{array} \Bigg) \\
 \equiv \lambda Q \boxed{\begin{array}{c} \text{t}_{TT} \prec n \end{array}} \oplus Q(t_{TT}) [(\lambda P \lambda t \boxed{\begin{array}{c} e \\ \tau(e) \supset t \end{array}} \oplus P(e))] \\
 \boxed{\begin{array}{c} t \ t' \ t'' \\ \tau(e) = t \\ \begin{array}{c} \boxed{t'''} \\ t''' \subset t \\ C(t''') \end{array} \rightarrow \boxed{\begin{array}{c} e' \\ \tau(e') = t''' \\ \text{l_bump}(e') \end{array}} \\
 (\lambda e \quad \neg \boxed{\begin{array}{c} \text{l_bump}(e) \end{array}}) \\
 \begin{array}{c} t' \subset t \\ t'' \subset t \\ C(t') \\ C(t'') \\ t' \neq t'' \end{array} \end{array} \Bigg)
 \end{array}$$

$$\begin{aligned}
&\equiv \lambda Q[\boxed{\begin{array}{c} \tau_{TT} < n \end{array}} \oplus Q(\tau_{TT})](\lambda t[\boxed{\begin{array}{c} e \\ \tau(e) \supset t \end{array}} \oplus \lambda e \\
&\quad \neg \boxed{\begin{array}{c} \tau(e) = t \\ \tau(e') = t''' \\ \text{l_bump}(e') \end{array}} \rightarrow \boxed{\begin{array}{c} t''' \\ t''' \subset t \\ C(t''') \end{array}} \rightarrow \boxed{\begin{array}{c} t' \\ t' \subset t \\ t'' \subset t \\ C(t') \\ C(t'') \\ t' \neq t'' \end{array}} \text{ (e)})]) \\
&\equiv \lambda Q[\boxed{\begin{array}{c} \tau_{TT} < n \end{array}} \oplus Q(\tau_{TT})](\lambda t[\boxed{\begin{array}{c} e \\ \tau(e) \supset t \end{array}} \oplus \\
&\quad \neg \boxed{\begin{array}{c} \tau(e) = t \\ \tau(e') = t''' \\ \text{l_bump}(e') \end{array}} \rightarrow \boxed{\begin{array}{c} t''' \\ t''' \subset t \\ C(t''') \end{array}} \rightarrow \boxed{\begin{array}{c} t' \\ t' \subset t \\ t'' \subset t \\ C(t') \\ C(t'') \\ t' \neq t'' \end{array}} \text{]})
\end{aligned}$$

Variable t has to be renamed. t becomes t' , t' becomes t'' , t'' becomes t''' , t''' becomes t'''' :

$$\begin{aligned}
&\equiv \lambda Q[\boxed{\begin{array}{c} \tau_{TT} < n \end{array}} \oplus Q(\tau_{TT})](\lambda t[\boxed{\begin{array}{c} e \\ \tau(e) \supset t \end{array}} \oplus \\
&\quad \neg \boxed{\begin{array}{c} \tau(e) = t' \\ \tau(e') = t'''' \\ \text{l_bump}(e') \end{array}} \rightarrow \boxed{\begin{array}{c} t'''' \\ t'''' \subset t' \\ C(t''') \end{array}} \rightarrow \boxed{\begin{array}{c} t'' \\ t'' \subset t' \\ t''' \subset t' \\ C(t'') \\ C(t''') \\ t'' \neq t''' \end{array}} \text{]})
\end{aligned}$$

$\equiv \lambda Q[\frac{}{t_{TT} \prec n} \oplus Q(t_{TT})] (\lambda t$

$e \ t' \ t'' \ t'''$						
$\tau(e) = t'$						
<table border="1"> <tr> <td>t''''</td> </tr> <tr> <td> $t'''' \subset t'$ $C(t''')$ </td> </tr> </table>	t''''	$t'''' \subset t'$ $C(t''')$	$\rightarrow$	<table border="1"> <tr> <td>e'</td> </tr> <tr> <td> $\tau(e') = t''''$ $l_bump(e')$ </td> </tr> </table>	e'	$\tau(e') = t''''$ $l_bump(e')$
t''''						
$t'''' \subset t'$ $C(t''')$						
e'						
$\tau(e') = t''''$ $l_bump(e')$						

$\neg$

$l_bump(e)$

$t'' \subset t'$
 $t''' \subset t'$
 $C(t'')$
 $C(t''')$
 $t'' \neq t'''$
 $\tau(e) \supset t$

[illegible]

The diagram illustrates the decomposition of a transition t into a sequence of transitions t' and t'' . It is divided into two main sections by a vertical line.

Left Section:

- A box containing $t_{TT} \prec n$.
- A plus sign $\oplus$ is placed to the right of this box.

Right Section:

- A header box contains $e \ t' \ t'' \ t'''$.
- Below the header, the text $\tau(e) = t'$ is shown.
- Two boxes are shown side-by-side, connected by a right-pointing arrow $\rightarrow$:
 - Left Box:** Contains t''' in the top row and $t''' \subset t'$ and $C(t''')$ in the bottom row.
 - Right Box:** Contains e' in the top row and $\tau(e') = t'''$ and $l_bump(e')$ in the bottom row.
- Below these boxes, a box contains $l_bump(e)$.
- Below the $l_bump(e)$ box, the text $\neg$ is shown.
- Below the $\neg$, the following sequence of text is shown:
 - $t'' \subset t'$
 - $t''' \subset t'$
 - $C(t'')$
 - $C(t''')$
 - $t'' \neq t'''$
 - $\tau(e) \supset t_{TT}$

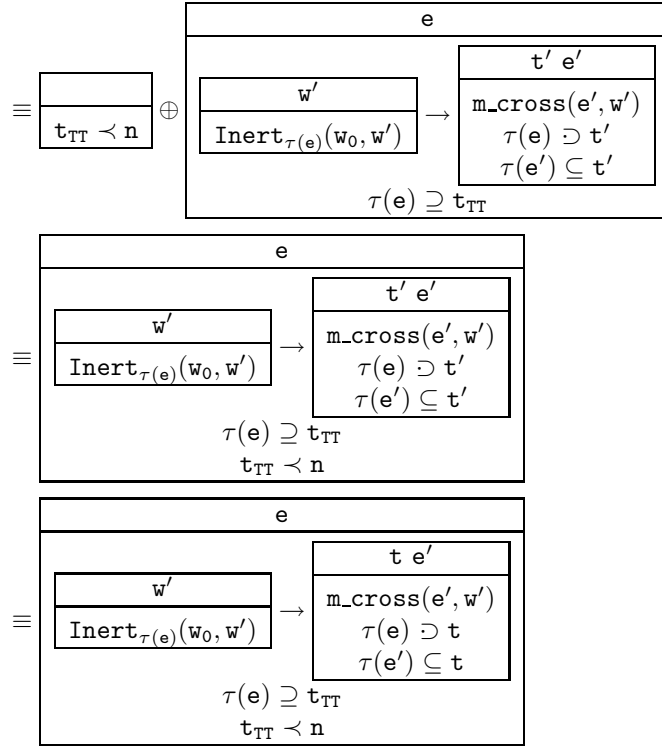
$$\begin{array}{c}
\boxed{\begin{array}{c} e \ t' \ t'' \ t''' \\ \hline \tau(e) = t' \\ \hline \boxed{\begin{array}{c} t''' \\ \hline t''' \subset t' \\ C(t''') \end{array}} \rightarrow \boxed{\begin{array}{c} e' \\ \hline \tau(e') = t''' \\ l_bump(e') \end{array}} \\ \hline \neg \boxed{\begin{array}{c} l_bump(e) \\ \hline t'' \subset t' \\ t''' \subset t' \\ C(t'') \\ C(t''') \\ t'' \neq t''' \\ \tau(e) \supset t_{TT} \\ t_{TT} \prec n \end{array}} \end{array}} \\
\equiv
\end{array}$$

$$(223) \quad \text{PAST}(\text{IMP}'(\lambda w \lambda e \boxed{\begin{array}{c} \\ \hline d_buy(e, w) \end{array}})) \quad \text{ad (138)}$$

$$\begin{aligned}
&= \lambda Q[Q(t_{TT}) \oplus \boxed{\begin{array}{c} \\ \hline t_{TT} \prec n \end{array}}] (\lambda P \lambda t \boxed{\begin{array}{c} w' \\ \hline \text{Inert}_t(w_0, w') \end{array}} \rightarrow \boxed{\begin{array}{c} e \\ \hline \tau(e) \supset t \end{array}} \oplus P(w')(e)) \\
&\quad (\lambda w \lambda e \boxed{\begin{array}{c} \\ \hline d_buy(e, w) \end{array}})) \\
&\equiv \lambda Q[Q(t_{TT}) \oplus \boxed{\begin{array}{c} \\ \hline t_{TT} \prec n \end{array}}] \\
&\quad (\lambda t \boxed{\begin{array}{c} w' \\ \hline \text{Inert}_t(w_0, w') \end{array}} \rightarrow \boxed{\begin{array}{c} e \\ \hline \tau(e) \supset t \end{array}} \oplus \lambda w \lambda e \boxed{\begin{array}{c} \\ \hline d_buy(e, w) \end{array}}(w')(e)) \\
&\equiv \lambda Q[Q(t_{TT}) \oplus \boxed{\begin{array}{c} \\ \hline t_{TT} \prec n \end{array}}] \\
&\quad (\lambda t \boxed{\begin{array}{c} w' \\ \hline \text{Inert}_t(w_0, w') \end{array}} \rightarrow \boxed{\begin{array}{c} e \\ \hline \tau(e) \supset t \end{array}} \oplus \lambda e \boxed{\begin{array}{c} \\ \hline d_buy(e, w') \end{array}}(e)) \\
&\equiv \lambda Q[Q(t_{TT}) \oplus \boxed{\begin{array}{c} \\ \hline t_{TT} \prec n \end{array}}] (\lambda t \boxed{\begin{array}{c} w' \\ \hline \text{Inert}_t(w_0, w') \end{array}} \rightarrow \boxed{\begin{array}{c} e \\ \hline \tau(e) \supset t \end{array}} \oplus \boxed{\begin{array}{c} \\ \hline d_buy(e, w') \end{array}}) \\
&\equiv \lambda Q[Q(t_{TT}) \oplus \boxed{\begin{array}{c} \\ \hline t_{TT} \prec n \end{array}}] (\lambda t \boxed{\begin{array}{c} w' \\ \hline \text{Inert}_t(w_0, w') \end{array}} \rightarrow \boxed{\begin{array}{c} e \\ \hline d_buy(e, w') \\ \tau(e) \supset t \end{array}})
\end{aligned}$$

$$\begin{aligned}
& \equiv \lambda t \left[\begin{array}{c} \boxed{w'} \\ \text{Inert}_t(w_0, w') \end{array} \rightarrow \begin{array}{c} \boxed{e} \\ \text{d_buy}(e, w') \\ \tau(e) \supseteq t \end{array} \right] (\mathbf{t}_{\text{TT}}) \oplus \boxed{\mathbf{t}_{\text{TT}} \prec \mathbf{n}} \\
& \equiv \left[\begin{array}{c} \boxed{w'} \\ \text{Inert}_{\mathbf{t}_{\text{TT}}}(w_0, w') \end{array} \rightarrow \begin{array}{c} \boxed{e} \\ \text{d_buy}(e, w') \\ \tau(e) \supseteq \mathbf{t}_{\text{TT}} \end{array} \right] \oplus \boxed{\mathbf{t}_{\text{TT}} \prec \mathbf{n}} \\
& \equiv \left[\begin{array}{c} \boxed{w'} \\ \text{Inert}_{\mathbf{t}_{\text{TT}}}(w_0, w') \end{array} \rightarrow \begin{array}{c} \boxed{e} \\ \text{d_buy}(e, w') \\ \tau(e) \supseteq \mathbf{t}_{\text{TT}} \end{array} \right] \\
& \quad \mathbf{t}_{\text{TT}} \prec \mathbf{n} \\
(224) \quad & \text{PAST}(\text{INCLUDED}(\text{PROG}'(\lambda w \lambda e \boxed{\text{m_cross}(e, w)}))) \quad \text{ad (141)} \\
& = \lambda Q \left[\boxed{\mathbf{t}_{\text{TT}} \prec \mathbf{n}} \oplus Q(\mathbf{t}_{\text{TT}}) \right] (\lambda P \lambda t \left[\begin{array}{c} \boxed{e} \\ \tau(e) \supseteq t \end{array} \oplus P(e) \right] \\
& \quad (\lambda P \lambda e \left[\begin{array}{c} \boxed{w'} \\ \text{Inert}_{\tau(e)}(w_0, w') \end{array} \rightarrow \left[\begin{array}{c} \boxed{t \ e'} \\ \tau(e) \supseteq t \\ \tau(e') \subseteq t \end{array} \oplus P(w')(e') \right] \right. \\
& \quad \left. (\lambda w \lambda e \boxed{\text{m_cross}(e, w)})) \right) \\
& = \lambda Q \left[\boxed{\mathbf{t}_{\text{TT}} \prec \mathbf{n}} \oplus Q(\mathbf{t}_{\text{TT}}) \right] (\lambda P \lambda t \left[\begin{array}{c} \boxed{e} \\ \tau(e) \supseteq t \end{array} \oplus P(e) \right] \\
& \quad (\lambda P \lambda e \left[\begin{array}{c} \boxed{w'} \\ \text{Inert}_{\tau(e)}(w_0, w') \end{array} \rightarrow \left[\begin{array}{c} \boxed{t \ e'} \\ \tau(e) \supseteq t \\ \tau(e') \subseteq t \end{array} \oplus \lambda w \lambda e \boxed{\text{m_cross}(e, w)}(w')(e') \right] \right) \\
& = \lambda Q \left[\boxed{\mathbf{t}_{\text{TT}} \prec \mathbf{n}} \oplus Q(\mathbf{t}_{\text{TT}}) \right] (\lambda P \lambda t \left[\begin{array}{c} \boxed{e} \\ \tau(e) \supseteq t \end{array} \oplus P(e) \right] \\
& \quad (\lambda P \lambda e \left[\begin{array}{c} \boxed{w'} \\ \text{Inert}_{\tau(e)}(w_0, w') \end{array} \rightarrow \left[\begin{array}{c} \boxed{t \ e'} \\ \tau(e) \supseteq t \\ \tau(e') \subseteq t \end{array} \oplus \lambda e \boxed{\text{m_cross}(e, w')}(e') \right] \right) \\
& = \lambda Q \left[\boxed{\mathbf{t}_{\text{TT}} \prec \mathbf{n}} \oplus Q(\mathbf{t}_{\text{TT}}) \right] (\lambda P \lambda t \left[\begin{array}{c} \boxed{e} \\ \tau(e) \supseteq t \end{array} \oplus P(e) \right]
\end{aligned}$$

$$\begin{aligned}
& (\lambda P \lambda e \left[\begin{array}{c} \boxed{w'} \\ \text{Inert}_{\tau(e)}(w_0, w') \end{array} \rightarrow \left[\begin{array}{c} \boxed{t \ e'} \\ \tau(e) \supset t \\ \tau(e') \subseteq t \end{array} \oplus \boxed{m_cross(e', w')} \right] \right]) \\
& \equiv \lambda Q \left[\begin{array}{c} \boxed{t_{TT} \prec n} \\ \oplus Q(t_{TT}) \end{array} \right] (\lambda P \lambda t \left[\begin{array}{c} \boxed{e} \\ \tau(e) \supseteq t \end{array} \oplus P(e) \right]) \\
& \quad (\lambda e \left[\begin{array}{c} \boxed{w'} \\ \text{Inert}_{\tau(e)}(w_0, w') \end{array} \rightarrow \begin{array}{c} \boxed{t \ e'} \\ m_cross(e', w') \\ \tau(e) \supset t \\ \tau(e') \subseteq t \end{array} \right]) \\
& \equiv \lambda Q \left[\begin{array}{c} \boxed{t_{TT} \prec n} \\ \oplus Q(t_{TT}) \end{array} \right] \\
& \quad (\lambda t \left[\begin{array}{c} \boxed{e} \\ \tau(e) \supseteq t \end{array} \oplus \lambda e \left[\begin{array}{c} \boxed{w'} \\ \text{Inert}_{\tau(e)}(w_0, w') \end{array} \rightarrow \begin{array}{c} \boxed{t \ e'} \\ m_cross(e', w') \\ \tau(e) \supset t \\ \tau(e') \subseteq t \end{array} \right] (e) \right]) \\
& \equiv \lambda Q \left[\begin{array}{c} \boxed{t_{TT} \prec n} \\ \oplus Q(t_{TT}) \end{array} \right] \\
& \quad (\lambda t \left[\begin{array}{c} \boxed{e} \\ \tau(e) \supseteq t \end{array} \oplus \left[\begin{array}{c} \boxed{w'} \\ \text{Inert}_{\tau(e)}(w_0, w') \end{array} \rightarrow \begin{array}{c} \boxed{t \ e'} \\ m_cross(e', w') \\ \tau(e) \supset t \\ \tau(e') \subseteq t \end{array} \right] \right]) \\
& \equiv \lambda Q \left[\begin{array}{c} \boxed{t_{TT} \prec n} \\ \oplus Q(t_{TT}) \end{array} \right] (\lambda t \left[\begin{array}{c} \boxed{w'} \\ \text{Inert}_{\tau(e)}(w_0, w') \end{array} \rightarrow \begin{array}{c} \boxed{t \ e'} \\ m_cross(e', w') \\ \tau(e) \supset t \\ \tau(e') \subseteq t \end{array} \right] \tau(e) \supseteq t) \\
& \equiv \left[\begin{array}{c} \boxed{t_{TT} \prec n} \\ \oplus \lambda t \left[\begin{array}{c} \boxed{w'} \\ \text{Inert}_{\tau(e)}(w_0, w') \end{array} \rightarrow \begin{array}{c} \boxed{t' \ e'} \\ m_cross(e', w') \\ \tau(e) \supset t' \\ \tau(e') \subseteq t' \end{array} \right] (t_{TT}) \end{array} \right]
\end{aligned}$$



Appendix C

List of abbreviations and symbols

C.1 Authors and works

I used the following abbreviations for classical authors and their works (following Liddell, Scott, and Jones 1940):

E. <i>Ion</i>	Euripides <i>Ion</i>
E. <i>I. T.</i>	Euripides <i>Iphigeneia in Tauris</i>
E. <i>Or.</i>	Euripides <i>Orestes</i>
E. <i>Med.</i>	Euripides <i>Medea</i>
Hdt.	Herodotus
<i>Il.</i>	Homer <i>Iliad</i>
Lys.	Lysias
Pl. <i>Ap.</i>	Plato <i>Apology</i>
Plu. <i>Mar.</i>	Plutarch <i>Marius</i>
Plu. <i>Thes.</i>	Plutarch <i>Theseus</i>
Th.	Thucydides
Theoc. <i>Id.</i>	Theocritus <i>Idylls</i>
X. <i>An.</i>	Xenophon <i>Anabasis</i>
X. <i>Cyr.</i>	Xenophon <i>Cyropaedia</i>

For the Greek texts, I used the Thesaurus Linguae Graecae (TLG) CD-ROM version D. Translations are mine, unless indicated otherwise.

C.2 Glosses

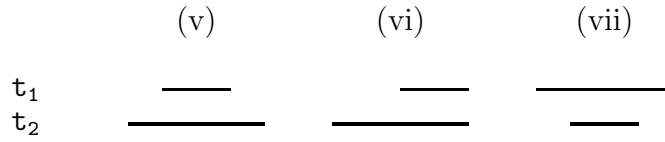
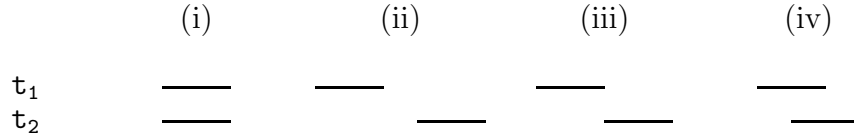
I used the following abbreviations in the glosses (based on the Leipzig Glossing Rules, see <http://www.eva.mpg.de/lingua/resources/glossing-rules.php>):

1	first person
3	second person
3	third person
ACC	accusative
ADJ	adjective
AOR	aorist
CONJ	conjunctive
DAT	dative
FUT	future
GEN	genitive
IPFV	imperfective
INF	infinitive
NOM	nominative
NPST	non-past
OPT	optative
PASS	passive
PC	passé composé
PFV	perfective
PL	plural
PREP	preposition
PRF	perfect
PRS	present
PRT	particle
PST	past
PTCP	participle
REFL	reflexive
REL	relative
SG	singular
VCP	vocative particle
VOC	vocative

For reasons of space, I refrained from glossing gender. Furthermore, I glossed mood only for non-indicative moods, and voice only for passive voice.

C.3 Temporal relations

		true in:
$t_1 = t_2$	t_1 is t_2	(i)
$t_1 \prec t_2$	t_1 precedes t_2	(ii), (iii)
$t_1 \supset\prec t_2$	t_1 abuts t_2 on the left	(iii)
$t_1 \bigcirc t_2$	t_1 overlaps with t_2	(i), (iv), (v), (vi), (vii)
$t_1 \subset t_2$	t_1 is properly included in t_2	(v), (vi)
$t_1 \subseteq t_2$	t_1 is included in t_2	(i), (v), (vi)
$t_1 \subsetneq t_2$	t_1 is a non-final part of t_2	(v)



References

- Armstrong, D. (1981). The Ancient Greek Aorist as the aspect of countable action. In P. J. Tedeschi and A. Zaenen (Eds.), *Tense and Aspect*, pp. 1–11. New York: Academic Press.
- Asher, N. (1992). A default truth-conditional semantics for the progressive. *Linguistics and Philosophy* 15, 463–508.
- Asher, N. (1993). *Reference to Abstract Objects*. Dordrecht: Kluwer.
- Asher, N. (1995). An evolution of applications of nonmonotonic reasoning in linguistics and philosophy. In P. Amsili, M. Borillo, and L. Vieu (Eds.), *Time, Space, and Movement. Meaning and Knowledge of the Sensible World. Workshop Papers of the 5th International Workshop*, pp. 51–65. Toulouse: University of Toulouse.
- Asher, N. and A. Lascarides (1998). Bridging. *Journal of Semantics* 15, 83–113.
- Austin, J. L. (1962). *How To Do Things With Words*. Oxford: Clarendon Press.
- Austin, J. L. (1976). Performative utterances. In J. O. Urmson and G. J. Warnock (Eds.), *Austin, Philosophical Papers*, pp. 233–252. London: Oxford University Press.
- Bach, E. (1986). The algebra of events. *Linguistics and Philosophy* 9, 5–16.
- Bakker, W. F. (1966). *The Greek Imperative. An Investigation into the Aspectual Differences between the Present and Aorist Imperfectives in Greek Prayer from Homer up to the Present Day*. Amsterdam: Hakkert.
- Bary, C. (2006). A semantic analysis of aspect in Ancient Greek. MA thesis, Radboud University Nijmegen.
- Bary, C. (2007). Aspect and the temporal structure of Ancient Greek discourse. Paper presented at the 6th International Colloquium on Ancient Greek Linguistics.
- Bary, C. (to appear). The perfective/imperfective distinction: coercion or aspectual operators? In L. Hogeweg, H. de Hoop, and A. Malchukov

- (Eds.), *Cross-linguistic semantics of Tense, Aspect and Modality*. Amsterdam and Philadelphia: John Benjamins.
- Bary, C. and M. Egg (2007). Aspect and coercion in Ancient Greek. In M. Aloni, P. Dekker, and F. Roelofsen (Eds.), *Proceedings of the Sixteenth Amsterdam Colloquium*, pp. 49–54. Amsterdam: ILLC/Department of Philosophy, University of Amsterdam.
- Bary, C. and E. Maier (2009). The dynamics of tense under attitudes: Anaphoricity and *de se* interpretation in the backward shift past. In H. Hattori (Ed.), *New Frontiers in Artificial Intelligence*, pp. 144–160. Berlin: Springer.
- Beekes, R. S. (1995). *Comparative Indo-European Linguistics. An Introduction*. Amsterdam & Philadelphia: John Benjamins.
- Blackburn, P. and J. Bos (2006). Working with Discourse Representation Theory. An advanced course in computational semantics. www.blackburnbos.org.
- Blass, F. (1889). Demosthenische Studien III (Aorist und Imperfekt). *Rheinisches Museum für Philologie* 44, 406–430 [non vidi].
- Bos, J., E. Mastenbroek, S. McGlashan, S. Millies, and M. Pinkal (1994). A compositional DRS-based formalism for NLP applications. In H. Bunt, R. Muskens, and G. Rentier (Eds.), *Proceedings of the International Workshop on Computational Semantics*, pp. 21–31. Tilburg: ITK.
- Comrie, B. (1976). *Aspect*. Cambridge: Cambridge University Press.
- Comrie, B. (1985). *Tense*. Cambridge: Cambridge University Press.
- Dalrymple, M., M. Kanazawa, Y. Kim, S. Mchombo, and S. Peters (1998). Reciprocal expressions and the concept of reciprocity. *Linguistics and Philosophy* 21, 159–210.
- Dowty, D. R. (1979). *Word Meaning and Montague Grammar. The Semantics of Verbs and Times in Generative Semantics and in Montague's PTQ*. Dordrecht: Reidel.
- Dowty, D. R. (1986). The effects of aspectual class on the temporal structure of discourse: semantics or pragmatics? *Linguistics and Philosophy* 9, 37–62.
- Dowty, D. R., R. E. Wall, and S. Peters (1981). *Introduction to Montague Semantics*. Dordrecht: Reidel.
- Egg, M. (1994). *Aktionsart und Kompositionalität: zur kompositionellen Ableitung der Aktionsart komplexer Kategorien*. Berlin: Akademie Verlag.

- Egg, M. (1995). The intergressive as a new category of verbal aktionsart. *Journal of Semantics* 12, 311–356.
- Egg, M. (2005). *Flexible Semantics for Reinterpretation Phenomena*. Stanford: CLSI Publications.
- Egg, M., A. Koller, and J. Niehren (2001). The constraint language for lambda-structures. *Journal of Logic, Language, and Information* 10, 457–485.
- Euripides (1938). *The Complete Greek Drama*. Edited by W. J. Oates and E. O'Neill Jr. *Iphigeneia in Tauris*, translated by W. R. M. Lamb; *Orestes*, translated by E. P. Coleridge. New York: Random House.
- Faller, M. (2002). *Semantics and Pragmatics of Evidentials in Cuzco Quechua*. Ph. D. thesis, Stanford University.
- Forsyth, J. (1970). *A Grammar of Aspect. Usage and Meaning in the Russian Verb*. Cambridge: Cambridge University Press.
- Frege, G. (1879). *Begriffsschrift, eine der arithmetischen nachgebildete Formelsprache des reinen Denkens*. Halle a. S.: Louis Nebert.
- Frege, G. (1892). Über Sinn und Bedeutung. *Zeitschrift für Philosophie und philosophische Kritik* 100, 25–50.
- Frege, G. (1918-1919). Der Gedanke, eine logische Untersuchung. *Beiträge zur Philosophie des Deutschen Idealismus* 1, 58–77.
- Gamut, L. T. F. (1991). *Logic, Language, and Meaning 2: Intensional Logic and Logical Grammar*. Chicago: University of Chicago Press.
- van Geenhoven, V. (1998). *Semantic Incorporation and Indefinite Descriptions. Semantic and Syntactic Aspects of Noun Incorporation in West Greenlandic*. Stanford: CSLI.
- Gerö, E.-C. and A. von Stechow (2003). Tense in time: the Greek perfect. In R. Eckardt, K. von Heusinger, and C. Schwarze (Eds.), *Words in Time: Diachronic Semantics from Different Points of View*, pp. 251–269. Berlin: Mouton de Gruyter.
- Geurts, B. and D. Beaver (2007). Discourse representation theory. In *Stanford Encyclopedia of Philosophy*. <http://plato.stanford.edu>.
- Goodwin, W. W. (1966). *Syntax of the Moods and Tenses of the Greek Verb*. London: MacMillan.
- Greenberg, M. (2006). Short Slovene reference grammar. Reference grammar network. Duke University/University of North Carolina, Chapel Hill: SEELRC. <http://www.seelrc.org/projects/grammars.ptml>.

- Grice, P. (1975). Logic and conversation. In P. Cole and J. Morgan (Eds.), *Syntax and semantics 3: Speech acts*, pp. 41–58. New York: Academic Press.
- Grønn, A. (2003). *The Semantics and Pragmatics of the Russian Factual Imperfective*. Ph. D. thesis, University of Oslo.
- Groenendijk, J. and M. Stokhof (1991). Dynamic predicate logic. *Linguistics and Philosophy* 14(1), 39–100.
- Hawkins, J. (1991). On (in)definite articles: implicatures and (un)grammaticality predictions. *Journal of Linguistics* 27, 405–442.
- Heim, I. (1982). *On the Semantics of Definite and Indefinite Noun Phrases*. Ph. D. thesis, University of Massachusetts, Amherst.
- Herodotus (1957–1963). *Histories*. Translated by A. D. Godley. Loeb. London: Heinemann.
- Hettrich, H. (1976). *Kontext und Aspekt in der altgriechischen Prosa Herodots*. Göttingen: Vandenhoeck & Ruprecht.
- Hewson, J. and V. Bubenik (1997). *Tense and Aspect in Indo-European Languages*. Amsterdam and Philadelphia: John Benjamins.
- Hinrichs, E. (1981). Temporale Anaphora im Englischen. Zulassungsarbeit Universität Tübingen.
- Hinrichs, E. (1986). Temporal anaphora and discourses of English. *Linguistics and Philosophy* 9, 63–82.
- Joosten, J. (2002). Do the finite verbal forms in Biblical Hebrew express aspect? *Journal of the Ancient Near Eastern Society* 29, 49–70.
- Kamp, H. (1980). Some remarks on the logic of change. In C. Rohrer (Ed.), *Time, Tense and Quantifiers*, pp. 103–114. Tübingen: Niemeyer.
- Kamp, H. (1981). A theory of truth and semantic representation. In J. Groenendijk, T. Janssen, and M. Stokhof (Eds.), *Formal Methods in the Study of Language*, pp. 277–322. Amsterdam: Mathematisch Centrum.
- Kamp, H. (1992). Temporal reference in French. Unpublished progress-report.
- Kamp, H. (2006). Temporal reference inside and outside propositional attitudes. In K. von Heusinger and K. Turner (Eds.), *Where Semantics Meets Pragmatics*, pp. 439–472. Amsterdam: Elsevier.
- Kamp, H. and U. Reyle (1993). *From Discourse to Logic*. Dordrecht: Kluwer.
- Kamp, H. and C. Rohrer (1983). Tense in texts. In R. Bäuerle, C. Schwarze, and A. von Stechow (Eds.), *Meaning, Use, and Interpretation of Language*, pp. 250–269. Berlin: de Gruyter.

- Kamp, H., J. van Genabith, and U. Reyle (2005). Discourse Representation Theory. In D. M. Gabbay and F. Günthner (Eds.), *Handbook of Philosophical Logic*. Dordrecht: Springer.
- Klein, W. (1994). *Time in Language*. London and New York: Routledge.
- Klimek-Jankowska, D. (2008a). *Aspect in Quantified and Bare Habitual Contexts: Semantics, Discourse and Micro-variation in a Cross-linguistic Perspective*. Ph. D. thesis, Wrocław University.
- Klimek-Jankowska, D. (2008b). On an analogie between English nominal and Polish aspectual manifestations of genericity. In A. Grønn (Ed.), *Proceedings of Sinn und Bedeutung 12*, pp. 318–336. Oslo: ILOS.
- Koschmieder, E. (1929). *Zeitbezug und Sprache. Ein Beitrag zur Aspekt- und Tempusfrage*. Leipzig: Teubner.
- Koschmieder, E. (1930). Durchkreuzungen von Aspekt- und Tempussystem im Präsens. *Zeitschrift für Slavische Philologie* 7, 341–358.
- Koschmieder, E. (1945). *Zur Bestimmung der Funktionen grammatischer Kategorien*. München: Verlag der Bayerischen Akademie der Wissenschaften.
- Krifka, M. (1989a). Nominal reference and quantification in event semantics. In R. Bartsch, J. van Benthem, and P. van Emde Boas (Eds.), *Semantics and Contextual Expression*, pp. 75–115. Dordrecht: Foris Publications.
- Krifka, M. (1989b). *Nominalreferenz und Zeitkonstitution*. München: Fink.
- Krifka, M. (1998). The origins of telicity. In S. Rothstein (Ed.), *Events and Grammar*, pp. 197–235. Dordrecht: Kluwer.
- Kühner, R. and B. Gerth (1898). *Ausführliche Grammatik der Griechischen Sprache*, Volume 2.1. Hannover: Hahnsche Buchhandlung.
- van Lambalgen, M. and F. Hamm (2004). *The Proper Treatment of Events*. London: Routledge.
- Landeweerd, R. (1998). *Discourse Semantics of Perspective and Temporal Structure*. Ph. D. thesis, Rijksuniversiteit Groningen.
- Landman, F. (1992). The progressive. *Natural Language Semantics* 1, 1–32.
- Lascarides, A. (1991). The progressive and the imperfective paradox. *Synthese* 87(6), 401–447.
- Lascarides, A. and N. Asher (1993). Temporal interpretation, discourse relations and commonsense entailment. *Linguistics and Philosophy* 16, 437–493.
- Latecki, L. and M. Pinkal (1990). Syntactic and semantic conditions for quantifier scope. Technical report, Universität des Saarlandes, Saarbrücken.

- Lemmon, E. J. (1962). On sentences verifiable by their use. *Analysis* 22, 86–89.
- Lewis, D. (1979). Attitudes *de dicto* and *de se*. *The Philosophical Review* 88, 513–543.
- Liddell, H. G., R. Scott, and H. S. Jones (1940). *A Greek-English Lexicon*. Oxford: Clarendon.
- Link, G. (1983). The logical analysis of plurals and mass terms: a lattice-theoretical approach. In R. Bäuerle, C. Schwarze, and A. von Stechow (Eds.), *Meaning, Use and Interpretation of Language*, pp. 302–323. Berlin and New York: Walter de Gruyter.
- Lloyd, M. (1999). The tragic aorist. *The Classical Quarterly* 49(1), 24–45.
- Lysias (2000). *Lysias*. Translated by W. R. M. Lamb. Loeb. New York: Harvard University Press.
- Moens, M. (1987). *Tense, Aspect and Temporal Reference*. Ph. D. thesis, University of Edinburgh.
- Moens, M. and M. Steedman (1986). Temporal information and natural language processing. Research paper/rp-2, Center for Cognitive Science, University of Edinburgh.
- Moens, M. and M. Steedman (1988). Temporal ontology and temporal reference. *Computational Linguistics* 14(2), 15–28.
- Molendijk, A. (1990). *Le Passé Simple et l'Imparfait: une Approche Reichenbachienne*. Ph. D. thesis, Rijksuniversiteit Groningen.
- Molendijk, A. and H. de Swart (1999). L'ordre discursif inverse en français. *Travaux de Linguistique* 39, 77–96.
- Molendijk, A., H. de Swart, C. Vetter, A. Borillo, M. Bras, A. L. Draoulec, L. Vieu, H. Verkuy, and C. Vet (2004). Meaning and use of the past tenses in discourse. In F. Corblin and H. de Swart (Eds.), *Handbook of French Semantics*, pp. 271–308. Stanford: CSLI.
- Montague, R. (1970). Universal Grammar (UG). *Theoria* 36, 373–398.
- Montague, R. (1973). The proper treatment of quantification in ordinary English. In J. Hintikka, J. Moravcsik, and P. Suppes (Eds.), *Approaches to Natural Language*, pp. 247–270. Dordrecht: Reidel.
- Moorhouse, A. C. (1982). *The Syntax of Sophocles*. Leiden: Brill.
- Mourelatos, A. P. D. (1981). Events, processes, and states. In P. Tedeschi and A. Zaenen (Eds.), *Tense and Aspect*, pp. 191–212. New York: Academic Press.

- Muskens, R. (1996). Combining Montague Semantics and Discourse Representations. *Linguistics and Philosophy* 19, 143–186.
- Neale, S. (1990). *Descriptions*. Cambridge (Mass.): MIT.
- Nunberg, G. (1979). The non-uniqueness of semantic solutions: polysemy. *Linguistics and Philosophy* 3, 143–184.
- Partee, B. H. (1973). Some structural analogies between tenses and pronouns in English. *The Journal of Philosophy* 70(18), 601–609.
- Partee, B. H. (1984). Nominal and temporal anaphora. *Linguistics and Philosophy* 7, 243–286.
- Paslawska, A. and A. von Stechow (2003). Perfect readings in Russian. In A. Alexiadou, M. Rathert, and A. von Stechow (Eds.), *Perfect explorations*, pp. 307–362. Berlin: Mouton de Gruyter.
- Paul, H. (1880). *Principien der Sprachgeschichte*. Halle am S.: Niemeyer.
- Pustejovsky, J. (1991). The Generative Lexicon. *Computational Linguistics* 17, 409–441.
- Pustejovsky, J. (1993). Type coercion and lexical selection. In J. Pustejovsky (Ed.), *Semantics and the Lexicon*, pp. 73–94. Dordrecht: Kluwer.
- Pustejovsky, J. (1995). *The Generative Lexicon*. Cambridge (Mass.): MIT Press.
- Reyle, U. (1993). Dealing with ambiguities by underspecification: Construction, representation and deduction. *Journal of Semantics* 10, 123–179.
- Reyle, U., A. Rossdeutscher, and H. Kamp (2007). Ups and down in the theory of temporal reference. *Linguistics and Philosophy* 30, 565–635.
- Rijksbaron, A. (2002). *The Syntax and Semantics of the Verb in Classical Greek*. Amsterdam: J. C. Gieben.
- Rijksbaron, A., S. R. Slings, P. Stork, and G. C. Wakker (2000). *Beknopte syntaxis van het klassiek Grieks*. Lunteren: Hermaion.
- Rogland, M. (2001). Performative utterances in Classical Syriac. *Journal of Semitic Studies* 46, 243–250.
- Ruijgh, C. J. (1971). *Autour de “te épique”*. *Études sur la syntaxe grecque*. Amsterdam: Adolf M. Hakkert.
- Ruijgh, C. J. (1985). L’emploi ‘inceptif’ du thème du présent du verbe grec. *Mnemosyne* 38, 1–61.
- Ruijgh, C. J. (1991). Les valeurs temporelles des formes verbales en grec ancien. In J. Gvozdanović and T. A. J. M. Janssen (Eds.), *The Function of Tense in Texts*, pp. 197–217. Amsterdam: North-Holland.

- van der Sandt, R. (1992). Presupposition projection as anaphora resolution. *Journal of Semantics* 9, 333–377.
- Schwyzler, E. and A. Debrunner (1950). *Griechische Grammatik*, Volume 2. München: Beck.
- Sicking, C. M. J. (1971). *Hoofdstukken uit de Griekse 'syntaxis'*. Amsterdam: Atheneum – Polak and Van Genneep.
- Sicking, C. M. J. (1991). The distribution of aorist and present tense stem forms in Greek, especially in the imperative. *Glotta* 69, 14–43 and 154–170.
- Sicking, C. M. J. (1996). Aspect choice; time reference or discourse function? In C. M. J. Sicking and P. Stork, *Two Studies in the Semantics of the Verb in Classical Greek*, pp. 1–118. Leiden: E.J. Brill.
- Smith, C. S. (1997). *The Parameter of Aspect*. Dordrecht: Kluwer.
- Smyth, H. W. (1984). *Greek Grammar*. Cambridge (Mass.): Harvard University Press.
- von Stechow, A. (1995). On the proper treatment of tense. In M. Simons and T. Galloway (Eds.), *Proceedings from Semantics and Linguistic Theory V*, pp. 362–386. Ithaca and New York: Cornell University.
- Svensson, A. (1930). *Zum Gebrauch der erzählenden Tempora im Griechischen*. Lund: Håkan Ohlsson.
- de Swart, H. (1998). Aspect shift and coercion. *Natural Language and Linguistic Theory* 16, 347–385.
- Taylor, B. (1977). Tense and continuity. *Linguistics and Philosophy* 1, 199–220.
- Tichy, E. (2006). *Der Konjunktiv und seine Nachbarkategorien: Studien zum indogermanischen Verbum, ausgehend von der älteren vedischen Prosa*. Bremen: Hempen.
- Tonhauser, J. (2006). *The Temporal Semantics of Noun Phrases: Evidence from Guaraní*. Ph. D. thesis, Stanford University.
- van Leusen, N. and R. Muskens (2003). Construction by description in discourse representation. In J. Peregrin (Ed.), *Meaning: The Dynamic Turn*, pp. 33–65. Amsterdam: Elsevier.
- Vet, C. (1994). Petite grammaire de l'aktionsart et de l'aspect. *Cahiers de Grammaire* 19, 1–17.
- Wakker, G. C. (1998). Review on: C. M. J. Sicking and P. Stork (1996). Two Studies in the Semantics of the Verb in Classical Greek. *Mnemosyne* 51(IV), 357–372.

- Zeevat, H. (1989). A compositional approach to Discourse Representation Theory. *Linguistics and Philosophy* 12, 95–131.

Samenvatting

Summary in Dutch

In dit proefschrift geef ik een semantische analyse van aspect in het Oudgrieks. Ik concentreer me daarbij op de oppositie tussen aoristisch en imperfectief aspect. Uit de Griekse grammaticale traditie is het bekend dat deze twee werkwoordsvormen beide met verschillende interpretaties gepaard kunnen gaan. Zo wordt de aoristus vaak gebruikt om aan te geven dat een eventualiteit (gebeurtenis of toestand) voltooid is, maar soms ook om aan te geven dat deze begonnen is. Daarnaast is er nog het zogenaamde tragische gebruik van de aoristus waarbij een verledentijdsvorm een tegenwoordige-tijdsinterpretatie krijgt. Evenzo kan het imperfectief aspect meerdere interpretaties krijgen. Vaak geeft het aan dat een eventualiteit nog niet voltooid is. Maar het kan bijvoorbeeld ook gebruikt worden om aan te geven dat er sprake is van een gewoonte, de zogenaamde habituele interpretatie. De centrale vraag in dit proefschrift is hoe de verschillende interpretaties van beide aspecten tot stand komen. Het uitgangspunt van mijn analyse is om vanuit één basisbetekenis de verschillende interpretaties af te leiden en hiermee tot een zo uniform mogelijke verklaring te komen.

Na in hoofdstuk 2 een overzicht van de interpretaties van beide aspecten te hebben gegeven en in hoofdstuk 3 een aantal formele theorieën over aspect te hebben besproken, ontwikkel ik in hoofdstuk 4 mijn eigen analyse. Ik beweer dat aspect de relatie aangeeft tussen de tijd van een eventualiteit en de zogenaamde topic-tijd. Onder deze laatste notie verstaan we de tijd waarover op dat moment in de discourse wordt gesproken. Volgens mijn analyse geeft de aoristus dan aan dat de tijd van de eventualiteit besloten ligt in de topic-tijd. Imperfectief aspect geeft daarentegen juist het omgekeerde aan: de tijd van de eventualiteit omvat de topic-tijd. Op deze manier wordt een precieze invulling gegeven aan de intuïtie die je in veel grammatica's vindt, namelijk dat het semantische onderscheid tussen aoristisch en imperfectief aspect in termen van *voltooid* versus *onvoltooid* begrepen moet worden. Ik heb deze interpretaties respectievelijk de *completieve* interpretatie van de aoristus en de *processuele* interpretatie van het imperfectief aspect genoemd.

Vanuit deze grondbetekeningen van beide aspecten kunnen we vervolgens

ook de andere interpretaties van aoristisch en imperfectief aspect begrijpen. Daarvoor maak ik gebruik van een zogenaamd *coercion*-mechanisme. Dit mechanisme zorgt voor herinterpretatie van een argument op het moment dat er een botsing dreigt tussen de selectierestricties van een operator (in ons geval aoristisch en imperfectief aspect) en de semantische eigenschappen van het argument (in ons geval het predicaat). Een dergelijke herinterpretatie wordt formeel expliciet gemaakt met behulp van een coercion-operator.

Voor de aoristus beweer ik dat deze een restrictie heeft voor begrensde predicaten en dat deze restrictie bestaat om een potentiële overlap met imperfectief aspect te voorkomen. Het gevolg is dat als de aoristus toch met een onbegrensd predicaat wordt geconfronteerd, er herinterpretatie optreedt. Ik heb hiervoor twee coercion-operatoren gedefinieerd: de maximaliteitsoperator, die de zogenaamde complexieve interpretatie geeft (de interpretatie van voltooidheid bij onbegrensde predicaten), en de ingressiviteitsoperator, die de ingressieve interpretatie geeft (verwijzend naar het beginpunt van een eventualiteit). De keuze tussen deze twee operatoren wordt mede bepaald door het durativiteitsprincipe. Dit principe stelt dat informatie over de duur van een eventualiteit consistent moet zijn, ook als die van verschillende bronnen komt. De beide operatoren verschillen in hun effect op de duur die met het predicaat wordt geassocieerd en de keuze valt op die operator die in overeenstemming is met het durativiteitsprincipe. Als de topic-tijd kort is, wordt dus de ingressieve interpretatie gekozen. Als de topic-tijd daarentegen lang is, zijn beide herinterpretaties beschikbaar. Vaak zal dan echter een voorkeur worden gegeven aan een complexieve interpretatie op basis van een algemene voorkeur voor de sterkere interpretatie.

In tegenstelling tot de aoristus legt de imperfectieve operator zijn argument geen restrictie op wat betreft aspectuele klasse. Dit betekent dat imperfectief aspect even goed met begrensde als met onbegrensde predicaten gecombineerd kan worden. Toch is ook hier het durativiteitsprincipe actief. De reden hiervoor is dat dit principe niet alleen de keuze bepaalt tussen herinterpretatie-operatoren wanneer de herinterpretatie door een aspectuele botsing wordt veroorzaakt, maar zelf ook herinterpretaties teweeg kan brengen. Ik stel dat op deze manier de habituele interpretatie ontstaat: als de topic-tijd langer is dan de tijd die met het predicaat wordt geassocieerd, dan wordt dit gerepareerd door de tussenkomst van een habituele operator, die de tijd die met het predicaat wordt geassocieerd verlengt.

In hoofdstuk 5 laat ik zien dat mijn analyse van aspect ook een verklaring biedt voor het tragische gebruik van de aoristus. De tragische aoristus blijkt het gebruik van de aoristus in performatieven te betreffen. Ik laat zien dat dit gebruik van de aoristus het resultaat is van het ontbreken van een optimale vorm voor zulke uitingen. Op basis van de semantiek die ik heb ontwikkeld zou de optimale vorm voor performatieven de combinatie van tegenwoordige

tijd en aoristisch aspect zijn. Bij deze vorm vallen namelijk de tijd van de eventualiteit en de tijd van uiting samen. Deze vorm bestaat echter niet in het Grieks. Bij gebrek hieraan zijn twee suboptimale vormen even goed: de vorm voor tegenwoordige tijd en imperfectief aspect en de vorm voor verleden tijd en aoristisch aspect. Beide worden dan ook in het Grieks gebruikt voor performatieven. Bij de eerste wordt prioriteit gegeven aan de tijdsmarkering terwijl de aspectsmarkering voor lief wordt genomen. Bij de tweede is het andersom. Deze laatste vorm is wat traditioneel de tragische aoristus wordt genoemd. Op het moment dat we de tragische aoristus herkennen als het gebruik van de aoristus in performatieven en we de semantiek van tijd en aspect volgen die ik voorstel, is er niets raadselachtigs meer aan dit gebruik van de aoristus.

Aspect heeft ook consequenties voor de interpretatie van discourse. In hoofdstuk 6 laat ik zien hoe de voorgestelde analyse kan worden uitgebreid naar de invloed van aspect op de temporele structuur van discourse. Om veelvoorkomende temporele patronen te verklaren wordt de voorgestelde analyse van aspect aangevuld met een specificatie van hoe de topic-tijd van een zin in een discourse wordt bepaald. De topic-tijd wordt behandeld als een anafoor die worden gebonden aan een eerder geïntroduceerde tijd. Ik specificeer de *default* regels voor het binden van deze anafoor. Hieruit volgt ook direct een natuurlijke verklaring voor het zogenaamde immediatieve gebruik van imperfectief aspect. De in dit proefschrift ontwikkelde analyse van aspect behandelt twee fenomenen die vaak met aspectinterpretatie worden verbonden, te weten de grote verscheidenheid aan interpretaties en het effect van aspect op de temporele structuur van een discourse, als twee zijden van één en dezelfde medaille.

De analyse is geformaliseerd in een versie van Discourse Representatie Theorie (DRT) met lambda's, een combinatie van twee belangrijke frameworks voor de semantiek van natuurlijke taal: DRT en Montague Semantiek. De keuze voor DRT wordt ingegeven door de noodzaak om te werken met intersententiële anaforen (namelijk de anaforische topic-tijd). De mechanismen van de lambda-calculus zorgen ervoor dat ik kan preciseren hoe de betekenissen van de afzonderlijke constituenten van een zin samen de betekenis van de hele zin bepalen. De combinatie van deze twee benaderingen maakt het mogelijk om de vele facetten van aspectinterpretatie te verklaren met een uniforme semantiek voor aoristisch en imperfectief aspect.

Curriculum vitae

Corien Bary was born in Wijchen in 1981. She studied Greek and Latin Languages and Cultures at the University of Nijmegen, starting in 1999 and graduating *cum laude* in 2004 with an MA thesis on a handbook for logic by the sixteenth century humanist Johannes Caesarius. From 2000 onwards she combined her studies in Classics with a study in Philosophy at the same university, where she graduated *cum laude* in 2006 with an MA thesis on aspect in Ancient Greek.

In 2004 she joined the Philosophy Department of the Radboud University as a junior researcher (PhD candidate). Up to 2008 she worked on her PhD thesis, supervised by Prof. dr. Van der Sandt, and taught courses on philosophy of language, logic, and argumentation theory. A VSB grant gave her the opportunity to spend the spring of 2005 at the Institute of Communicating and Collaborative Systems of the University of Edinburgh. A Fulbright grant in 2006 facilitated a four months' stay at the Department of Philosophy of the University of Texas at Austin. She published and presented research on tense, aspect, argument structure, anaphoricity, and indexicality.

Currently, she has a research and teaching position at the Faculty of Philosophy of the Radboud University.